CHAPTER – 2

Frailty- Implications for clinical practice and public health

Background:

Frailty syndrome is abstracted as a helpless or vulnerable conditionallied with increased risk of morbidity and mortality when the individual is imperilled to various stressors.This syndrome is contemplated as a handy tool for clinical risk classificationamong the elderly population. The developed countries such as the U.S, and U.K has a rapidly growing population of those aged more than 85 years, which is considered as a global burden. Whilst theelderly population endures to rise, the influence of frailty will be sensed throughout families of the affected individuals. Moreover, this burdensome situation will saturate the countries' economy, and affect the healthcare,and social systems.

Important consensus points on physical frailty: (1)

1. Physical frailty is a significant medical syndrome that is defined as "a medical syndrome with multiple causes and contributors that is characterized by diminished strength, endurance, and reduced physiologic function that increases an individual's vulnerability for developing increased dependency and/or death" (1).

2. It can be prevented or treated by early diagnosis and prompt management with precise treatment strategies such as routine exercise, nutrition rich diet (specifically proteins and vitamin D), and reduction of polypharmacy.

3. Easy,swift screening tests have been devised and authenticated, such as Frailty index (Chapter 1), Frailty scale, and simple 'FRAIL' questionnaire (Table 1). This permits the clinicians to diagnose the frail individuals at

the earliest.

4. In order to preciselymanage the affectedpersons with this syndrome, every individual above the age of 70 years and individuals with significant weight loss (≥5% of total body weight) due to any debilitating disease must beassessed for any signs of frailty.

Table 1: The Simple "FRAIL" Questionnaire Screening Tool (1)

3 or greater = Frailty; 1 or 2 = Prefrail
Fatigue: Are you fatigued?
Resistance: Cannot walk up 1 flight of stairs?
Aerobic: Cannot walk 1 block?
Illnesses: Do you have more than 5 illnesses?
Loss of weight: Have you lost more than 5% of your weight in the past 6 months?

Clinical implication:

Ahmed N in 2007 highlighted the clinical significance of the frailty during practice: (2)

1. A patient who is in pre-frail state has an increased risk for falls, hospitalization, institutionalization, and mortality, when compared to non-frail individual of the same age (Figure 1). However, the risk is not as high as an individual previously diagnosed with frailty syndrome.

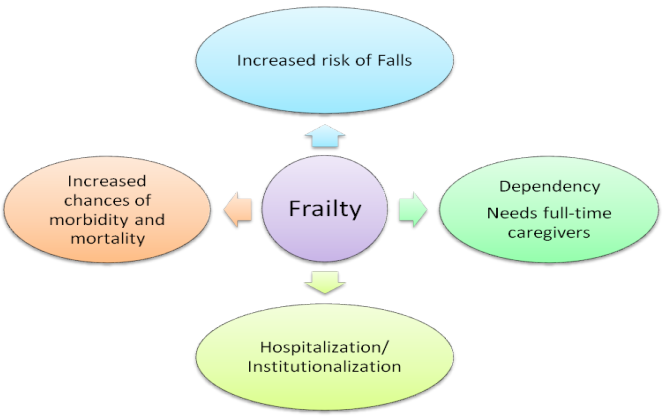
2.The pre-frail stage can still be reversed when diagnosed at an early stage.

3. Various studies have established that regular exercising, stretching, and resistance training can improve the condition remarkably. Reduction in the level of frailty markers are seeneven after 30 to60 minutes of routine

exercise that is performed at leastthrice a week.

4. A physician can prevent the comorbidities or reduce the severity of the syndrome by identifying the signs of frailty and recommending certain lifestyle changes before the condition reaches the next stages.

Figure 1: Risks due to frailty



Clinical application of frailty (Figure 2):

Research evidencessignify that frailty can be considered as an essential tool to assess the risk of developing post-surgical complications in elderly patients.The Frailty index (FI) and Frailty Phenotype (FP)aids in predictingthe possible postoperative complications in susceptible individuals (3, 4).

Frailty can also be employed for evaluating the risk in older patients with cardiovascular disorders, since it forecaststhe morbidity and mortality rates amongst the elderly population, including the patients enduring cardiac surgery (5, 6).Moreover, frailty can be considered as a clinical marker to assess the decline in the overall immune status of the older adults. FP has been suggested to recognize the people who fail to showpassable immune responses to common infection, andimmunization shots

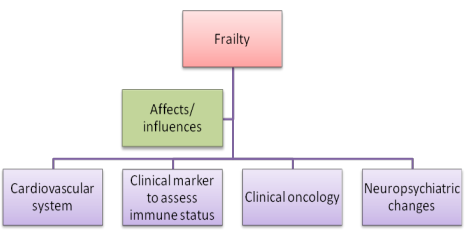
(vaccines against influenza and pneumococcal infections) (7, 8).

Evaluating the risk of frailty can also enable in predicting risk and vulnerability of older patients suffering from cancer (9, 10).Hence, assessment of frailty holds a critical position in geriatric oncology as it aids in foreseeing the mortality rate in older patients who receive chemotherapy for advanced tumors such as colorectal cancer (11). Furthermore, it also enables in predicting the post-operative complications of the patients who undergo treatment for tumours of gynecologic origin (12).

Effect of human immunodeficiency virus (HIV) infection and aging seem to be inter-related. Various studies have showed thatHIV infection and individuals with frailty or frailty-related phenotype have significant influence on mortality and decelerated immune-function (13, 14).

Most importantly, a frail individual are more prevalent to developimpairment of cognitive function and dementia. Though cognitive dysfunction is primarily due to chronic inflammatory state within the brain cortex, adverse effects of aging of the brain cells, i.e., "the frail brain" or "cognitive frailty" can be contributory factors to loss/reduction of cognitive function. But this association is still in the early stages of research and needs more long-term studies to substantiate this statement (15).

Figure 2: Clinical application of frailty



Chiefelements of health status in elderly population:

The three main components that have to be considered before assessing the overall health of the elderly population are:

1. Frailty
2. Disability
3. Comorbidity

(Refer chapter 1 for the details regarding each component).

Though each component is clinically different from each other, the prevalence and clinical signs and symptoms overlap to a certain extent (figure 3).

The major healthcare implication for patientswith these 3 components:

Frailty:

The patients are more vulnerable to frequent falls, hospitalization, and other related stressors. There is need to minimize these vulnerabilities and to treat the underlying conditions such as vitamin deficiency, generalized weakness, obesity, etc. However, it has to be kept in mind that this condition is progressive in nature that might demand primary and secondary preventive measures.

Disability:

The affected individuals require rehabilitative and supportive services. They are prone for partial or complete dependency, social isolation, and varying level of mortality. Therefore measures to reduce the risks for the above mentioned factors needs to be planned and implemented. When the degree of disability progresses, the patients will be either hospitalized or institutionalized and will require long-term care. However, in disabled patients, there is

scope for primary, secondary and tertiary prevention.

Comorbidity:

There is increased complexity in treating patients with diseases occurring concurrently. Handling comorbidity necessitates minimizing the risk for frailty and disability. There is potential for prevention of specific diseases, and minimizing the severity of the diseases.

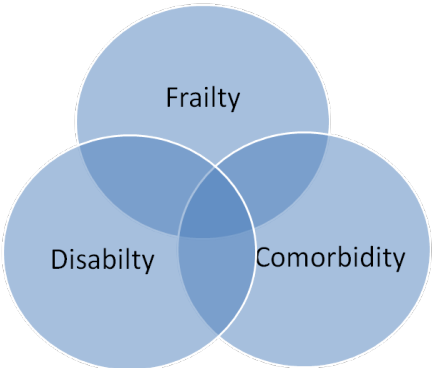
Cost of frailty:

Each of these components has critical prognostic insinuations that are not dependent on the other components. They are also independently related to the intensified need for healthcare assistance and amplified costs, including the risk of hospitalization. The researches on influence of frailty on health-care expenditure clearly suggested that there is a clear and evident pattern of augmented healthcare costs (16, 17). This pattern involves vaster practice in in-patient, and outpatient healthcare segments.

Summary:

The prognosis and treatment of other diseases such as cardiovascular diseases, tumors, and cognitive disorders are also significantly affected by frailty. Therefore, a clear understanding of the clinical implication of frailty and the associated components such as disability, and comorbidity is essential.

Figure 3: Interrelationship of disability, frailty, and comorbidity



References:

1. Morley JE, Vellas B, Van Kan GA, Anker SD, Bauer JM, Bernabei R, Cesari M, Chumlea WC, Doehner W, Evans J, Fried LP. Frailty consensus: a call to action. Journal of the American Medical Directors Association. 2013 Jun 1;14(6):392-7.

2. Ahmed N, Mandel R, Fain MJ. Frailty: an emerging geriatric syndrome. Am J Med 2007: 120: 748–753

3. Makary MA, Segev DL, Pronovost PJ, et al. Frailty as a predictor of surgical outcomes in older patients. J Am Coll Surg. 2010;210: 901–908.

4. Ronning B, Wyller TB, Seljeflot I, et al. Frailty measures, inflammatory biomarkers and post-operative complications in older surgical patients. Age Ageing. 2010;39:758–761.

5. Afilalo J, Karunananthan S, Eisenberg MJ, Alexander KP, Bergman H. Role of frailty in patients with cardiovascular disease. Am J Cardiol. 2009;103:1616–1621.

6. Iqbal J, Denvir M, Gunn J. Frailty assessment in elderly people. Lancet. 2013;381:1985–1986.

7. Yao X, Hamilton RG, Weng NP, et al. Frailty is associated with impairment of vaccine-induced antibody response and increase in post-vaccination influenza infection in community-dwelling older adults.

Vaccine. 2011;29:5015–5021.

8. Ridda I, MacIntyre CR, Lindley R, et al. Immunological responses to pneumococcal vaccine in frail older people. Vaccine. 2009;27: 1628–1636.

9. Hamaker ME, Jonker JM, de Rooij SE, Vos AG, Smorenburg CH, van Munster BC. Frailty screening methods for predicting outcome of a comprehensive geriatric assessment in elderly patients with cancer: a systematic review. Lancet Oncol. 2012;13:e437–e444.

10. Audisio RA, van LB. When reporting on older patients with cancer, frailty information is needed. Ann Surg Oncol. 2011;18:4–5.

11. Aaldriks AA, van der Geest LG, Giltay EJ, et al. Frailty and malnutrition predictive of mortality risk in older patients with advanced colorectal cancer receiving chemotherapy. J Geriatr Oncol. 2013;4:218–226.

12. Courtney-Brooks M, Tellawi AR, Scalici J, et al. Frailty: an outcome predictor for elderly gynecologic oncology patients. Gynecol Oncol. 2012;126:20–24.

13. Desquilbet L, Jacobson LP, Fried LP, et al. HIV-1 infection is associated with an earlier occurrence of a phenotype related to frailty. J Gerontol A Biol Sci Med Sci. 2007;62:1279–1286.

14. Desquilbet L, Margolick JB, Fried LP, et al. Relationship between a frailty-related phenotype and progressive deterioration of the immune system in HIV-infected men. J Acquir Immune Defic Syndr. 2009;50: 299–306.

15. Boyle PA, Buchman AS, Wilson RS, Leurgans SE, Bennett DA. Physical frailty is associated with incident mild cognitive impairment in community-based older persons. J Am Geriatr Soc. 2010;58: 248–255.

16. Ensrud KE, Kats AM, Schousboe JT, et al. Frailty phenotype and healthcare costs and utilization in older women. J Am Geriatr Soc 2018; 66: 1276–83.

17. Kim DH, Glynn RJ, Avorn J, et al. Validation of a claims-based frailty index against physical performance and adverse health outcomes in the Health and Retirement Study. J Gerontol A Biol Sci Med Sci 2019; 74: 1271–76.