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Review Article

Frailty Screening Tools: Frail Detection to Primary Assessment

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A B S T R A C T

Frailty is a vulnerable situation among older adults which can lead to unfavorable health outcomes such as falls, mortality, functional decline and institutionalization. The increasing number of elderly people and low rate of mortality has necessitated the need for high-quality medical services for this aging population, and this has led to a high cost of geriatric health care. There exist a huge number of screening tools to detect frailty and it is important for researchers and general practitioners (GPs) to select the appropriate and precise tool that would effectively lead to quality results. Frail individuals can be managed effectively when there is an early screening and intervention. Healthcare providers need tools that are simple and validated in order for screening and interventions to become effective. Self-reported frailty screening tools are very simple to use, not expensive and test results can be interpreted by non-health professionals. This work reviewed some of the commonly used frailty screening tools, and proposed a practical approach that would assist GPs in assessing frailty in older adults.

Keywords: Frailty, Aged, Screening Tools, Primary Health Care, Geriatrics

Introduction

Frailty is a physical occurrence used by healthcare professionals to describe older individuals who find themselves in vulnerable situations that can lead to unfavorable health outcomes. Age and loss of functional abilities are associated with frailty. The growing number of older people in the world today has led to a large number of old and frail people. These frail individuals are vulnerable to unfavorable health outcomes such as falls, mortality, functional decline and institutionalization (1). In 2000, elderly people aged 60 years and above were over 600 million and this number is expected to escalate to about 2 billion by 2050 (2). The increasing number of elderly people and low rate of mortality has necessitated the need for high-quality medical services for this aging population, and this has led to a high cost of geriatric health care (3). Turner et al. reveals that, about 10% of older adults aged 65 years and above experience some form of frailty, while there is an increase of 25%-50% among individuals aged 85 years and above (4).

There is enough evidence to show that older adults who are frail have benefited from proactive healthcare delivery and the early delivery of effective and sufficient care for frail people needs recognition of their health issues (5). Frail individuals can be managed effectively when there is an early screening and intervention (6). In order for this screening and intervention to become effective, healthcare providers need tools that are simple, validated and effective (7). This has led to the advancement in technology of relevant, easy and timely screening tools of care, although most have not been validated in primary care setting (5-8). The purpose of this work is to review some of the commonly used frailty screening tools, and propose a practical approach that would assist general practitioners (GPs) in assessing frailty in older adults.

What is frailty?

Frailty has been defined in many ways and there

has been a significant number of studies in this area (9). A frail individual is often associated with 5 common characteristics: loss of weight, low levels of activity, slow gait speed, fatigue and poor grip strength (9). Dr. Linda Fried and colleagues are known to have first defined this syndrome in 2001 (9). Fried's phenotype of frailty and the accumulation of deficits are the two main concepts of frailty (10). The purpose of the frailty phenotype is to identify frail individuals focusing on the occurrence of three factors or more of five: weight reduction, slow gait speed, poor grip strength, fatigue and low levels of activity (11). The concept of accumulation of deficits suggest that an individual is vulnerable to adverse health outcomes and frail when there are more deficits (10). The Frailty Index (FI) is the common tool used in operating the accumulation of deficits (11).

Frailty may be reversed through interventions that focus on the root causes, although many of the causes are not related with age and may not be reversible (9). When frailty is left unattended to, it may worsen over time and the individual may be vulnerable to falls that can lead to disability and death (9).

Assessing frailty

It is important for GPs to use simple and reliable screening tools to detect frail in older adults as it would inform them about the necessary geriatric assessment frail individuals may need. There exist a huge number of screening tools to detect frailty and it is important for researchers and GPs to select the appropriate and precise tool that would effectively lead to quality results. Frailty screening tools can be classified as either self-reported or performed and this research describes some of these important tools.

Frailty screening tools

Self-reported frailty tools

- Fatigue, resistance, ambulation, illness, and loss of weight index scale (FRAIL)
- Groningen Frailty Indicator (GFI)
- The Dutch Tilburg Frailty Indicator (TFI)
- The Sherbrooke Postal Questionnaire (SPQ)
- PRISMA-7 Questionnaire

Performed frailty tools

- Frailty Index of Cumulative Deficit
- Gérontopôle Frailty Screening Tool (GFST)
- Cardiovascular Health Study Criteria (CHS)
- Gait Speed, Chair Stands and Grip Strength
- The Short Physical Performance Battery (SPPB)
- Comprehensive Geriatric Assessment (CGA)
- Multidimensional Prognostic Index (MPI)
- The Timed Up-to Go Test (TUG)
- Edmonton Frailty Scale (EFS)
- Frailty Index derived from Comprehensive Geriatric Assessment (FI-CGA)
- Vulnerable Elders Survey -13 (VES-13)

Self-reported frailty screening tools

FRAIL is a measurement tool in predicting frailty suggested by the International Association of Nutrition and Aging. The FRAIL is made up of five criteria: fatigue, resistance, ambulation, illness, and loss of weight. A patient is considered frail when there is the presence of three or more of these criteria. Researchers and GPs have found the FRAIL to be time and cost effective (12, 13).

The GFI was developed by Steverink et al. (14) as a screening tool to predict frailty. It consists of 8 criteria including mobility, vision, hearing, nutrition, comorbidity, cognition, psychological and physical fitness (11). A score of ≥ 4 indicates moderate to severe frail (14, 15).

However, the TFI described by Gobbens et al. (16) is made up of two subscales which includes socio-demographic data and data about life events and chronic diseases. The second is focused on analyzing predictive values. The TFI is made up of 15 self-reported items about psychological, physical and social factors. A score of 5 or higher indicate frailty (16).

Also, the SPQ is a frail measurement tool developed by Hébert et al. (17). The SPQ consist of six items to predict frailty. These items are based on physical, social and cognitive domains of functioning. Answers to questions are either a "yes" or a "no". With a score ranging from 0 to 6, individuals who score two or higher are assumed to be frail (17). The SPQ is considered to be less efficient in comparison with the TFI and the Groningen Frailty Indicator (18).

On the other hand, PRISMA-7 questionnaire is a simple tool for the identification of risk factors for functional decline. It is based on seven items with the purpose of identifying aged individuals in a community. Frailty is identified using this tool with a score of 3 or more items (19). The PRISMA-7 questionnaire has been highly recommended by the Royal College of General Practitioners and British Geriatrics Society for Identifying frailty as compared to other tools.

Performed frailty tools

Frailty Index of Cumulative Deficit: Rockwood and Mitnitski defined the Frailty Index (FI) as being dependent on the deficit accumulation model of frailty (20). They suggest that health deficit including psychology, physiology; comorbidities were used to construct a frailty index (20). Each deficit has a score of 0 to 1 with 0 indicating the least frailty and 1 indicating severe frailty. Although the FI has been widely used in outcome prediction, it is complicated to use and also time consuming.

Another tool worth mentioning is the GFST. This is an instrument that is structured in three parts in order to identify frailty early in community-dwelling older adults (22-24). The first step requires the use of the basic activities of daily living scale: (living, involuntary weight loss, fatigue, mobility memory complaint, and slow walking speed) (22-25). The second step involves the use of a questionnaire to inform the GPs about the signs and/or symptoms that indicate frailty in community-dwelling older adults (26, 27). The third and final step involves the invitation of a GPs to give their views on

frailty status of the individual. This is done to determine whether the individual is frail or not after examination of the criteria. The limitation of this tool is that frailty or no frailty is determined based on the clinical judgement of the general practitioner.

Also, the Fried frailty phenotype also known as the Cardiovascular Health Study (CHS) index is based on five components namely, weight loss, exhaustion, low grip strength, slow gait speed and low physical activity as a reference measure for frailty (26). The CHS has a strong predictor of clinical outcomes including injury, falling, mortality and hospital stays, and has been utilized extensively by many studies of older adults living in the community (7, 26, 28, 29). Older persons with the presence of three or more of these components are considered frail, those associated with one or two are pre-frail, and without any of the components indicate the absence of frailty (26). A Hand Dynamometer and Minnesota Leisure Time Activity are the special equipment and complex questionnaire used respectively by this tool (30).

Gait speed, chair stands and grip strength are classified to be a physical performance measure and can be used as a single predictor for frailty. Gait speed is often used to assess the functional limitation in older adults. It has shown the capacity to predict adverse conditions such as hospitalization, fragility, falls, dependence and mortality. It is also associated with Fried's frail phenotype. A gait speed greater than 1m/s is considered normal, while values greater than 0.8-0.9 m/s indicate pre-frail and under 0.8 m/s were classified as frail (31). The grip strength is conducted using a hand dynamometer to measure grip and strength and the chair stands usually demands supervision of individuals involved. Researchers and GPs consider this measure to be quick and easy to perform although it is not able to detect the complex nature of frailty (11, 32).

The SPPB is a validated and standardized test which combines balance, speed gait and chair stands. It is validated for testing frailty and has a high reliability in predicting disability. A score of 10-12 is considered non-frail, 4-9 frail, and between 0 and 3 as disabled (32, 33).

Added to the above tools described so far, the Comprehensive Geriatric Assessment (CGA) is a frailty detection tool for in older adults (≥ 70 years) with cancer. It has a high recommendation from the International Society for Geriatric Oncology (34). But a notable limitation of the CGA is that it is expensive and time-consuming.

The MPI is a proven prognostic tool based on a CGA. It is used to accurately predict mortality in multimorbid individuals with chronic conditions (35). CGA's evaluation components include number of drugs, (activities of daily living), (instrumental activities of daily living), mental wellbeing, diet, pressure score risk, co-morbidity and social network (11).

The TUG test on the other hand was designed to quantify mobility and has shown to be useful in predicting deteriorating health status and life activities daily. Its main drawback lies in being a better short-term predictor (at one year) and therefore seems to be more useful when associated with interventions consequential damages. It is a validated test to assess the risk of falls. The normal value for this test is considered 10 seconds or less. A score of 20 seconds would mean that the patient has a high risk of falls (32, 36).

The EFS tests nine frailty factors, including cognitive ability, overall health status, functional independence, social assistance, use of medications, diet, mood, stabilty and physical functioning (37, 38). Results from this test ranges from 0 to 17. A score of ≤ 5 indicates no frailty, $6 \leq n \geq 11$ vulnerable and $12 \leq n \geq 17$ indicates severe frailty (37). No formal training is needed to conduct the EFS and it also requires few minutes to administer.

Furthermore, the FI-CGA consists of components such as cognitive ability, mood, enthusiasm, energy, movement, stability, incontinence, social assistance and complications (11). The FI-CGA is used to detect cardiovascular diseases in the general population (39, 40).

The VES-13 is a simple frailty prediction tool that can be conducted by non-health professionals within 4 minutes either in person or over the telephone (41). The VES-13 tool focus on 11 questions including age, self-rated health, and physical fitness. The VES-13 is used in predicting death, cancer, fall risk, functional decline and traumatic injury in older adults (41- 45). This important tool can be used in identifying older adults who are frail, especially in a busy clinical practice where there is no trained geriatrician or the availability of time to perform a CGA. A limitation of this tool is that it involves the services of the provider in contacting and collecting data from the individuals.

Does a suitable and effective frailty assessment tool exist?

A simple frailty prediction approach (Frail detection to primary assessment)

Many studies have attempted to develop a suitable or perfect approach in the identification of frailty in older people. Frailty assessment tools need to be tied with their intended use (11). The frailty tools described above can be classified in to two types: tools for frail detection and those for primary assessment based on their purpose (46). Although most researchers and GPs often use the frailty phenotype, there is the need to take into account other assessment tools. Two recent studies (11, 47) aimed at assisting in predicting and assessing frail older people in primary care were effective, but GPs were involved throughout the process (47), and also used geriatric assessment tools that were either time-consuming or expensive (11). We propose the use of a simple frailty prediction tool that is easy to use, can be conducted within a short period of time by both health and non-health professionals and less expensive. The time factor and cost of the assessment tool is very important to the researcher since the target population are older people who may not have the energy to go through time consuming procedures.

The first stage of this approach is frail detection in primary care, where simple and quick self-reported frailty screening tools that do not need equipment or health professionals to identify frailty in older adults are used (Figure 1). The final stage involves the use of a simple frailty prediction tool (VES -13) to identify the care demand of frail individuals. Although complex instruments like the CGA is often considered as the

standard in geriatric assessment, it is time consuming, expensive to use and demands the use of an experienced geriatrician to conduct the assessment (48) as compared to the VES-13 which is simple to use and does not necessarily need equipment or health professionals to identify frailty in older adults. Results from VES-13 has been considered to be comparable to that of CGA (49). The VES-13 provides a broader assessment of older persons to identify vulnerable older persons (49) (Fig 1).

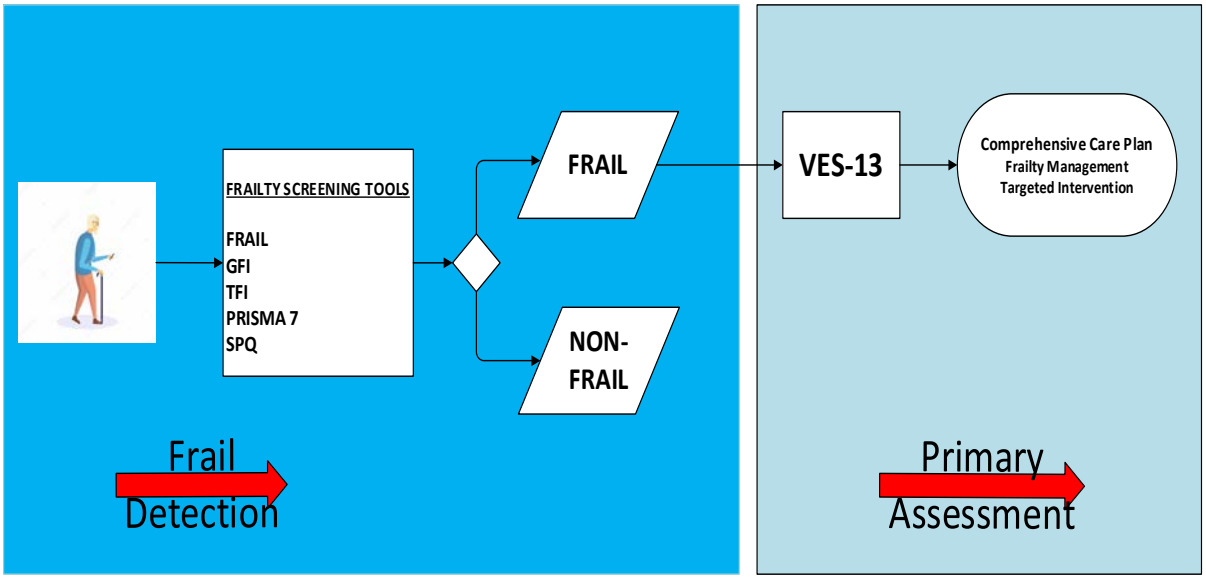

Figure 1. A simple frailty prediction approach

Step 1. Frail detection: Self-reported tools are used by either non health professionals or partakers themselves to identify frailty

Step 2. Primary assessment: Using a performed assessment tool (VES-13) which is not time-consuming and does not necessarily need a trained health professional to operate

This is followed by a comprehensive care plan which includes frailty management and targeted intervention (Figure 1).

Study limitation

The main limitation of this study is that older adults who are being tested for frailty through the self-reported tools may be swayed by their understanding which may raise questions about the reliability of the data gathered. Older adults who have serious mental disorders may provide information which might not be reliable, leading to a miscalculation of frailty occurrence.

Future developments in frailty assessment

There is no harmony in the meaning, classification and measurement of frailty. More efforts need to be done in order to transform the various self-reported screening tools into subspecialized clinical work (11). There is a deficit in transforming frailty screening tools into clinical practice despite the abilities of the various tools to identify frailty in vulnerable older adults (50, 51). Reveals that frailty screening tools that make clinical decisions and target interventions for frail adults are scarce. Future studies should also take into account personal and environmental issues in frailty assessment and make a comparison of frailty screening tools with different patient care settings. In light of the above, future studies should focus on the validity and feasibility of these measurement tools in order to do away with the inconsistencies between self-reported and performed tools. It is important to note that predicting frailty with the use of different measurement tools is not the best (52). Researchers and GPs must take into account the simplicity of the tool, time needed to assess frailty, resources, and results interpretation by non-specialist professionals in the process of identifying frailty.

Conclusions

Frailty is a vulnerable situation among older adults which can lead to unfavorable health outcomes. It is important for GPs and researchers to use simple and reliable screening tools to detect frailty in older adults in order to propose the necessary geriatric assessment and intervention a frail individual may need. A number of screening tools have been developed and proposed but most of them are time-consuming, expensive and demands the use of complex equipment and health care professionals to conduct assessment. Most self-reported frailty screening tools have been validated and are very simple to use, not expensive and test results can be interpreted by non-health professionals. However, a number of these tools have not yet been verified as being reliable. Till date, no research has been able to prove an ideal measurement tool that would guide healthcare professionals. Screening of frailty should focus on identifying risk and the best intervention for frail individuals. From this view point, a simple frailty prediction approach (frail detection to primary assessment) might be the way to go. Using a performed frailty tool that is not time consuming after frailty has

been detected in an individual through a self-reported instrument would guide healthcare professionals to develop the best interventions for older adults who are frail.

Conflict of interests

The authors declare that they have no confict of interests.

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Authors' contribution

Nutakor JA and Gavu AK conceived and designed the study. Gavu AK collected and analyzed the data. Nutakor JA drafted initial manuscript. Nutakor JA and Gavu AK revised initial draft. Nutakor JA and Gavu AK revised final draft and approved the final manuscript.

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