

UNIT NO. 1

PHYSICAL FUNCTION

Dr Wong Sweet Fun

ABSTRACT

In recent years, a growing body of research shows that physical performance measures such as the Short Physical Performance Battery (SPPB), are valuable in providing useful information in the assessment of older adults. These measures have the advantages of being reproducible and more sensitive to change. They have also been proven to be practical and safe for trained persons to administer in the home and community settings.

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BACKGROUND

Assessing physical function and disability is a critical component in the evaluation of older adults in the clinical setting. Self- and proxy-reported measures in activities of daily living (ADL) and instrumental activities of daily living (IADL) are traditional tools used. They use interval scoring of degree-of-difficulty, and focus on identifying the presence of disability (defined as a limitation or inability to perform social activities and roles). Performance measures (i.e. observing performance of an activity in a person's normal milieu) are uneconomical and too time consuming, and rarely done outside of the rehabilitation setting. Discordance between self-reported measures and actual performance limit the true assessment of physical function. Many possible reasons could account for the discordance, including the person misunderstanding the question or referring to his usual state of function, instead of his current temporary incapacity or the interviewer misinterpreting the response.

In recent years, a growing body of research shows that physical performance measures such as the Short Physical Performance Battery (SPPB), are valuable in providing useful information in the assessment of older adults. These performance measures:

- Can assess the full range of performance, even in high functioning persons.
- The outcomes for useful healthcare utilisation, falls prevention, institutionalisation and death.
- Improvement in response to interventions, such as exercise and cataract surgery (where cataracts directly impact on physical function).

These measures have the advantages of being reproducible and more sensitive to change. They have also been proven to be practical and safe for trained persons to administer in the home and community settings.

Functional limitations (defined as a restriction or lack of ability to perform an action) lie proximal on the pathway to disability (Figure 1). Performance measures objectively assess these limitations. Low scores on these tests may indicate a pre-clinical precursor state prior to the onset of disability. For older adults with chronic disease, with little or no disability, physical performance measures can signal early functional decline even before it is reported by the patient or noticed by the doctor. It is at these early stages of decline that interventions are valuable to prevent established disability.

Measuring disability and functional limitations, using performance measures as well as self-reported measures, all add to our understanding of an older adult's function.

ASSESSMENT**Vulnerable Elders Survey (VES-13)**

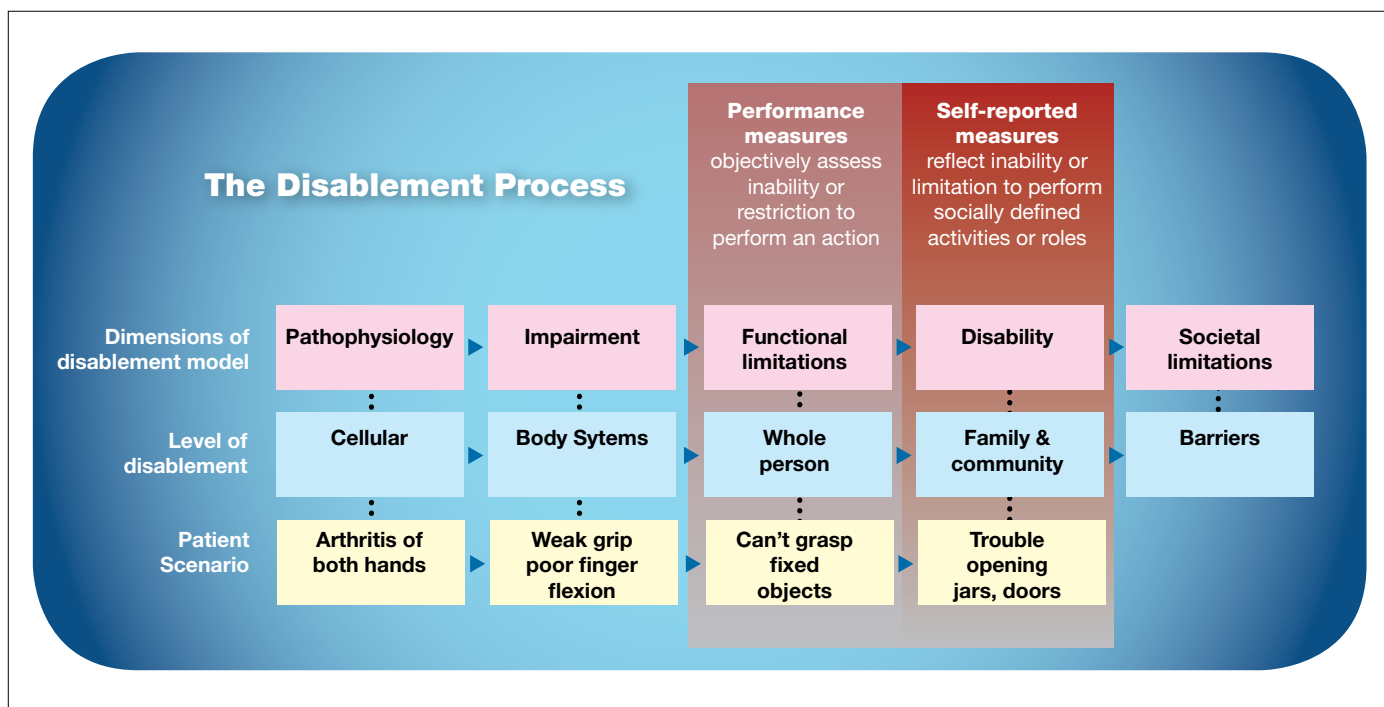
The Vulnerable Elders Survey (VES-13) is a simple function-based tool for screening community-dwelling populations to identify older adults at risk of health deterioration. The components of the 13-item questionnaire include age, self-rated health, limitations in physical function and disability. The VES-13 relies on self-reporting. It takes an older adult less than 5 minutes to complete it. See Annex PF1 & Figure 2.

In a US-based study, a score of 3 or more on the VES-13 identified 32% of individuals as vulnerable. This vulnerable group had 4.2 times the risk of death or functional decline over 2 years, compared to those who scored less than 3.

Figure 2: Scoring of the VES-13

Scoring the VES-13	
Item	Score Range
Age	0-3
Self-rated health	0-1
Physical function	0-2
Functional disability	0-4
Maximum possible score	10

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Figure 1: The Disablement Process

Source: Nagi, 1976; Verbrugge & Jette, 1994

Short Physical Performance Battery (SPPB)

The SPPB measures balance, gait speed and lower limb strength and endurance. See Annex PF2. Functional decline is more rapid in the lower than in the upper extremities, and this difference might explain the value of lower limb function as a predictor of vulnerability. Among non-disabled older adults living in the community, the SPPB was highly predictive of subsequent disability, allowing identification of persons with a pre-clinical stage of disability who could benefit from early intervention.

In a study involving 3,381 subjects, non-disabled older adults with low performance score measuring ≤ 6 were more likely to have higher BMI and more often reported diagnoses of stroke, hip fracture, diabetes and hospital admission in the previous 3 years. Low performance scores were also associated with high levels of inflammation markers, and more frequent and longer hospital admissions.

INTERPRETING RESULTS

Abnormal Results

Higher scores on the VES-13 reflect greater risk of health deterioration. Lower scores on SPPB reflect higher odds of mobility-related disability. See Figure 3.

Figure 3: Cut off scores and action to be taken

VES-13	Individuals with scores ≥ 3 are referred to their primary care doctor
SPPB	Individuals with scores ≤ 6 are referred to their primary care doctor

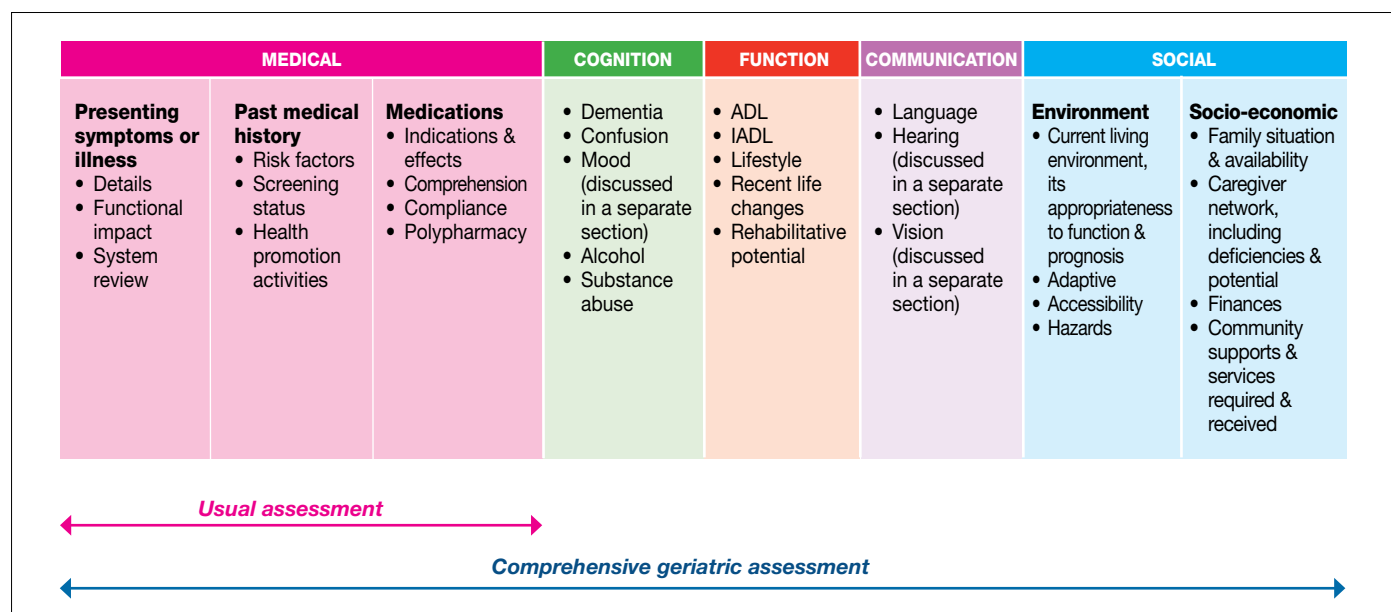
A community-dwelling older gentleman has been referred to you, after attending the Community Functional Screening Programme with a VES-13 score of 4 and SPPB score of 6. How do you respond to this?

The VES-13 score of more than 3 identifies him as vulnerable to the risks of functional decline over the next 2 years. The SPPB score of 6 is a low performance score, reflecting higher odds of mobility-related disability.

PRIMARY CARE ROLES AND RESPONSIBILITIES

Clinical Evaluation

The VES-13 and SPPB can identify older adults with impending decline in physical function, or those at risk of decline. Disuse, a lower level of fitness and an increased susceptibility to injury in those with impaired function can possibly explain the correlation. Acute illness and injury can precipitate poor function, usually in an abrupt manner which is potentially reversible if treated early. On the other hand, chronic diseases, especially those that limit physical activity, bring on gradual decline. Unhealthy lifestyles (e.g. being sedentary, malnutrition – either insufficiency or excess) conspire to worsen function. Such patients can benefit from disability prevention interventions such as aerobic exercise,

Figure 4: Components of usual vs a comprehensive geriatric assessment of an older adult

Source: 'Community Functional Screening Follow Up Resource for Primary Care Doctors', March 2011

strength training, medical (chronic disease) optimisation, weight management etc.

The first step in evaluating his low scores in function is to perform a comprehensive geriatric assessment. Components of an appropriate assessment include the domains in Figure 4.

A comprehensive assessment may be impossible in a busy practice, under constraints of time and limited tolerance of the older adult, and may require multiple visits. It needs to be sufficiently flexible in scope and adaptable in content to serve a wide range of patients. The point of a comprehensive assessment is to know and understand the patient well.

Management

The result of the assessment is a problem list which should go beyond the traditional formal medical diagnoses. Medical diagnoses can be categorised into active and inactive problems, long-term and short-term problems, etc. to help prioritise attention. The problem list should also include function, risk factors for dependency, and relevant social history that can be improved with intervention, or that may affect decision-making in the care process. Moreover, it can guide therapeutic, rehabilitative, preventive and health-promoting plans, timely screening activity and practical plans for continuing and future care.

The management will largely be directed by the findings of the evaluation. Some areas for intervention, not necessarily by a doctor alone, are shown in Figure 5.

In geriatric care, the function of the patient, and the impact that a disease and its treatment has on his function, are central to all management decisions. Treatment that can make a huge

impact on function should take first priority. Function can also help decide if the intensity of a treatment module, and its overall effectiveness, shift the risk-benefit ratio in his favour.

Function, therefore, should be objectively measured, and its trend tracked, so that any change or the rate of change can be appreciated, and intervention offered early.

Clinical Pathway

The clinical pathway to take from screening to intervention is shown in Figure 6.

REFERRAL

The primary care doctor first needs to decide if the older adult has an acute illness: this could occur even in a patient without specific organ-based symptoms, or one with non-specific, altered, atypical or functional presentation, since symptom specificity breaks the rules in ill older adults. These patients may benefit from referral for treatment in more acute care settings.

The other decision that a primary care doctor needs to make is the frequency of regular re-assessments in a clinically stable older adult. The recommendation for this is less clear, but a trusted relationship with the patient will yield occasions where open discussions can facilitate this decision.

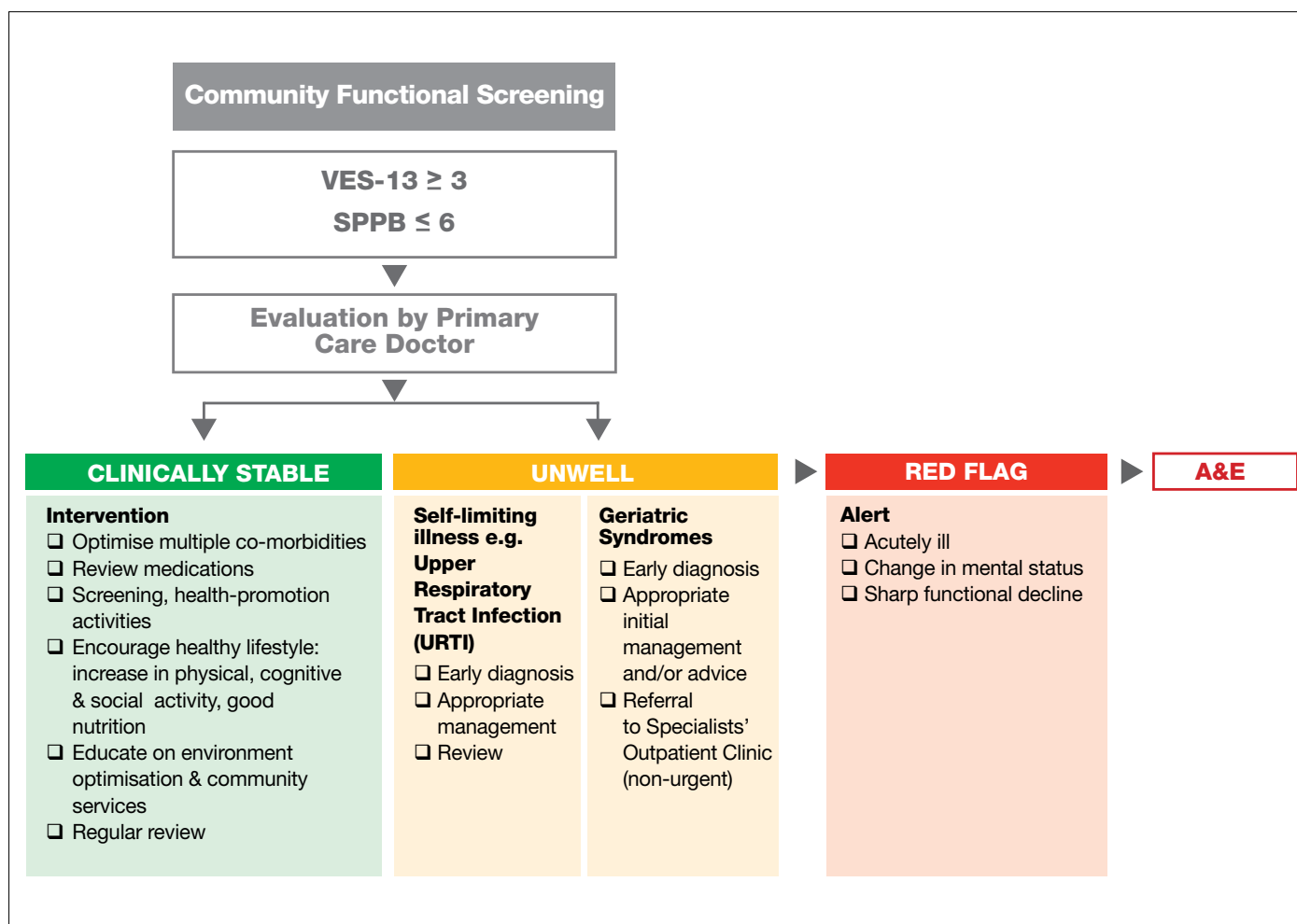
RECOMMENDED PHYSICAL ACTIVITY PROGRAMMES

Figure 7 shows the recommended physician activity programmes based on SPPB scores. For further details about the physical activity programmes, please see Annex PF3.

Figure 5: Intervention areas and persons involved

Intervention areas		Persons involved
1	Early detection and appropriate management of acute illness or recent deterioration	Doctor
2	Management and coordination of co-morbidities with their attendant polypharmacy	Doctor, nurse, pharmacist
3	Mobilisation & increasing physical activity	Therapist, community services
4	Encouraging cognitive activities and social engagement	Community services
5	Optimisation of the environment	Therapist, community services
6	Maximising community & socio-economic support	Social worker, community services

Source: Community Functional Screening Follow Up Resource for Primary Care Doctors', March 2011

Figure 6: Clinical pathway from screening to intervention

Source: Community Functional Screening Follow Up Resource for Primary Care Doctors', March 2011

Figure 7: Recommended physical activity programmes

SPPB SCORES	0 - 3	4 - 6	7 - 9	10 - 12
CLASSIFICATION	Very low physical function	Low physical function	Moderate physical function	High physical function
RECOMMENDATIONS	<p>A. Geriatric assessment</p> <p>B. Recommend to visit a Geriatrician for further evaluation & appropriate intervention of identified problems</p>	<p>A. Geriatric assessment</p> <p>B. Recommend self-help Strength Training Programme to patients along with advice about suitability of the activities based on doctor's assessment</p> <p>C. Recommend HPB's "Stronger Together" programme (a structured 12-week exercise programme conducted by HPB designed specifically for this group of patients)</p>	<p>Strongly recommend participants to take part in various forms of physical activity such as:</p> <p>A. HPB's FaBulouS community-based physical activity programme</p> <p>B. Brisk walking</p> <p>C. Health Qigong</p> <p>* <i>to provide information for individuals to join existing classes and/or groups in the community</i></p>	<p>If participants are not already involved in any active lifestyle or exercise programme, recommend participants to take part in various forms of physical activity such as:</p> <p>A. HPB's FaBulouS physical activity programme</p> <p>B. Brisk walking</p> <p>C. Health Qigong</p> <p>* <i>to provide information for individuals to join existing classes and/or groups in the community</i></p>
RESOURCES	Geriatric Clinics at restructured & private sector hospitals	www.hpb.gov.sg	www.hpb.gov.sg/physicalactivity	www.hpb.gov.sg/physicalactivity

Source: Community Functional Screening Follow Up Resource for Primary Care Doctors', March 2011

ANNEX PFI – VULNERABLE ELDER'S SURVEY-13 (VES-13)

VES-13

1. Age _____

SCORE : 1 POINT FOR AGE 73-84
3 POINTS FOR AGE \geq 85

2. In general compared to other people your age, would you say that your health is:

- ☐ Poor* (1 POINT)
☐ Fair* (1 POINT)
☐ Good
☐ Very good, or
☐ Excellent

SCORE : 1 POINT FOR FAIR or POOR

3. How much difficulty, on average, do you have with the following physical activities.

	No Difficulty	A little Difficulty	Some Difficulty	A Lot of Difficulty	Unable to do
a. stooping, crouching or kneeling?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> *	<input type="checkbox"/> *
b. lifting or carrying objects as heavy as 10 pounds?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> *	<input type="checkbox"/> *
c. reaching or extending arms above shoulder level?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> *	<input type="checkbox"/> *
d. writing or handling and draping small objects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> *	<input type="checkbox"/> *
e. walking a quarter of a mile?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> *	<input type="checkbox"/> *
f. heavy housework such as scrubbing floors or washing windows?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> *	<input type="checkbox"/> *

SCORE : 1 POINT FOR EACH * RESPONSE IN
Q3a THROUGH Q3f. MAXIMUM OF 2 POINTS

4. Because of your health or a physical condition, do you have any difficulty

a. shopping for personal items (like toilet items or medicines)?

- ☐ YES → Do you get help with shopping? ☐ YES* ☐ NO
☐ NO
☐ DON'T DO → Is that because of your health? ☐ YES* ☐ NO

b. managing money (like keeping track of expenses or paying bills)?

- ☐ YES → Do you get help with managing money? ☐ YES* ☐ NO
☐ NO
☐ DON'T DO → Is that because of your health? ☐ YES* ☐ NO

c. walking across the room? USE OF CANE OR WALKER IS OK.

- ☐ YES → Do you get help with walking? ☐ YES* ☐ NO
☐ NO
☐ DON'T DO → Is that because of your health? ☐ YES* ☐ NO

d. doing light housework (like washing dishes, straightening up, or light cleaning)?

- ☐ YES → Do you get help with light housework? ☐ YES* ☐ NO
☐ NO
☐ DON'T DO → Is that because of your health? ☐ YES* ☐ NO

e. bathing or showering?

- ☐ YES → Do you get help with bathing or showering? ☐ YES* ☐ NO
☐ NO
☐ DON'T DO → Is that because of your health? ☐ YES* ☐ NO

SCORE : 1 POINTS FOR ONE OR MORE *
RESPONSES IN Q4a THROUGH Q4e

ANNEX PF2 – SHORT PHYSICAL PERFORMANCE BATTERY

1. Repeated Chair Stands

Instructions: Do you think it is safe for you to try and stand up from a chair five times without using your arms? Please stand up straight as quickly as you can five times, without stopping in between. After standing up each time, sit down and then stand up again. Keep your arms folded across your chest. Please watch while I demonstrate. I'll be timing you with a stopwatch. Are you ready? Begin

Grading: Begin stop watch when subject begins to stand up. Count aloud each time subject arises. Stop the stopwatch when subject has straightened up completely for the fifth time. Also stop if the subject uses arms, or after 1 minute, if subject has not completed rises, and if concerned about the subject's safety.. Record the number of seconds and the presence of imbalance.. Then complete ordinal scoring.

Time: _____sec (if five stands are completed)

Number of Stands Completed: 1 2 3 4 5

Chair Stand Ordinal Score: _____

0 = unable

1 = > 16.7 sec

2 = 16.6-13.7 sec

3 = 13.6-11.2 sec

4 = < 11.1 sec

2. Balance Testing

Begin with a semitandem stand (heel of one foot placed by the big toe of the other foot). Individuals unable to hold this position should try the side-by-side position. Those able to stand in the semitandem position should be tested in the full tandem position. Once you have completed time measures, complete ordinal scoring.

a. Semitandem Stand

Instructions: Now I want you to try to stand with the side of the heel of one foot touching the big toe of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you. Please watch while I demonstrate.

Grading: Stand next to the participant to help him or her into semitandem position. Allow participant to hold onto your arms to get balance. Begin timing when participant has the feet in position and lets go.

Circle one number

2. Held for 10 sec

1. Held for less than 10 sec; number of seconds held _____

0. Not attempted

b. Side-by-Side stand

Instructions: I want you to try to stand with your feet together, side by side, for about 10 sec. Please watch while I demonstrate. You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop.

Grading: Stand next to the participant to help him or her into the side-by-side position. Allow participant to hold onto your arms to get balance. Begin timing when participant has feet together and lets go.

Grading

2. Held of 10 sec

1. Held for less than 10 sec; number of seconds held _____

0. Not attempted

c. Tandem Stand

Instructions: Now I want you to try to stand with the heel of one foot in front of and touching the toes of the other foot for 10 sec. You may put either foot in front, whichever is more comfortable for you. Please watch while I demonstrate.

Grading: Stand next to the participant to help him or her into the side-by-side position. Allow participant to hold onto your arms to get balance. Begin timing when participant has feet together and lets go.

Grading

- 2. Held of 10 sec
- 1. Held for less than 10 sec; number of seconds held _____
- 0. Not attempted

Balance Ordinal Score: _____

- 0 = side by side 0-9 sec or unable
- 1 = side by side 10, <10 sec semitandem
- 2 = semitandem 10 sec, tandem 0-2 sec
- 3 = semitandem 10 sec, tandem 3-9 sec
- 4 = tandem 10 sec

3. 8' Walk (2.44 meters)

Instructions: This is our walking course. If you use a cane or other walking aid when walking outside your home, please use it for this test. I want you to walk at your usual pace to the other end of this course (a distance of 8'). Walk all the way past the other end of the tape before you stop. I will walk with you. Are you ready?

Grading: Press the start button to start the stopwatch as the participant begins walking. Measure the time take to walk 8'. Then complete ordinal scoring.

Time: _____ sec

Gait Ordinal Score: _____

- 0 = could not do
- 1 = >5.7 sec (<0.43 m/sec)
- 2 = 4.1-6.5 sec (0.44-0.60 m/sec)
- 3 = 3.2-4.0 (0.61-0.77 m/sec)
- 4 = <3.1 sec (>0.78 m/sec)

Summary Ordinal Score: _____

Range: 0 (worst performance) to 12 (best performance). Shown to have predictive validity showing a gradient of risk for mortality, nursing home admission, and disability.

Reprinted from Guralnik JM, Simonsick EM, Ferrucci L, Glynn RJ, Berkman LF, Blazer DG, Scherr PA, Wallace RB. A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. J Gerontol Med Sci 1994; 49(2):M85-M94

ANNEX PF3 – PHYSICAL ACTIVITY PROGRAMME

STRONGER TOGETHER

Stronger Together is a 12-week structured exercise programme designed by HPB to improve the muscle strength and balance of older adults with low physical function. The programme will be conducted twice-weekly in a small group setting supervised by a qualified physiotherapist. Evidence has shown that progressive strength training can improve muscle strength and functional performance in older adults. Cross-messaging with falls prevention education will also be incorporated into the programme to promote awareness and adherence to healthy behaviours.

Objectives for Stronger Together Programme:

1. Improve physical function
2. Reduce the risk of falls
3. Build the older adult's confidence (self-efficacy) in exercise

FaBulouS

FaBulouS is an exercise routine developed by HPB to promote flexibility, balance and muscular-strength. Each routine has four progressive levels and each level comprises of the following components: warm-up, balance, muscle-strengthening and flexibility/cool-down.

BRISK WALKING

Brisk walking is a great low-impact activity suitable for everyone, no matter what age or fitness level.

Regular brisk walking can:

- Improve stamina
- Provide an enjoyable way to share time with family and friends
- Burn calories and help manage weight
- Relieve stress and help beat the blues
- Help in getting better rest and sleep
- Create more confidence
- Provide a great way to bond and make new friends

HEALTH QIGONG

Health Qigong belongs to a class of physical activity referred to by physical activity scientists as mind body exercise (MBE) or meditative movement. Health Qigong incorporates a series of easy to learn repeatable physical movements which requires the interaction of breathing and concentration.

Practising Health Qigong:

- Helps to slow the rate of bone Loss
- Improves blood pressure
- Improves immune function
- Enhances balance
- Decreases anxiety
- Boosts self confidence

** For important health benefits, older adults need at least:*

150 minutes of moderate-intensity aerobic activity every week and muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).

Moderate intensity aerobic activity includes brisk walking, leisurely biking, low impact aerobics, swimming, table tennis, badminton, dancing, house work, doubles tennis or water aerobics.

**If your patient has a chronic disease or other health condition that might limit activity and prevents him from meeting the guidelines, encourage him about setting physical activity goals. Advise him to avoid an inactive lifestyle. If you recognise that your patient is inactive, ask him to increase the amount of physical activity gradually.*

RESOURCES

For further information, prescribe to the patient:

- HealthLine - 1800 223 1313 to speak to a Nurse Advisor (available in 4 languages)
- Health Promotion Board website - <http://www.hpb.gov.sg>

REFERENCES

1. Adapted from Nagi SZ. An epidemiology of disability among adults in the United States. *Milbank Mem Fund Q Health Soc.* 1976; 54: 439-67.
2. Verbrugge LM, Jette AM. The disablement process. *Soc Sci Med.* 1994; 38: 1-14.

REFERENCES FOR FURTHER READING

1. Ferrucci L, Penninx BWJH, Leveille SG, Corti MC, Pahor M, Wallace R, Harris TB, Havlik RJ, Guralnik JM. Characteristics of non-disabled older persons who perform poorly in objective tests of lower extremity function. *J Am Geriatr Soc* 2000; 48: 1102-10.
2. Physical Activity Resource – http://growingstronger.nutrition.tufts.edu/growing_stronger.pdf

LEARNING POINTS

- **For older adults with chronic disease, with little or no disability, physical performance measures can signal early functional decline even before it is reported by the patient or noticed by the doctor.**
 - **The Vulnerable Elders Survey (VES-13) is a simple function-based tool for screening community-dwelling populations to identify older adults at risk for health deterioration.**
 - **Function should be objectively measured, and its trend tracked, so that any change or the rate of change can be appreciated, and intervention offered early.**
 - **The primary care doctor first needs to decide if the older adult has an acute illness. The other decision that a primary care doctor needs to make is the frequency of regular re-assessments in a clinically stable older adult.**
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The above extract is taken from the 'Community Functional Screening Follow Up Resource for Primary Care Doctors', published by the Health Promotion Board in partnership with Dr Wong Sweet Fun, March 2011.