

Supplement 5. The various assessment tools include in the recommendations

1) Screening tools of frailty

(1) Frailty Phenotype Questionnaire (FPQ)⁶²⁾

Item	Name of question	Questions	Answer options	Score
Fatigue	Exhaustion	During the past week, I felt that everything I did was an effort	1. Rare (less than 1 day per week) 2. Sometimes (1–2 days per week) 3. Often (3–4 days per week) 4. Most (over 5 days per week)	1=option 3 or 4 0=option 1 or 2
Resistance	10 steps of stair-climb	By yourself and not using aids, do you have any difficulty walking up 10 stairs without resting?	1. Yes 2. No	1=option 1 0=option 2
Ambulation	Walking 1 lap of a playground track	Do you have any difficulty walking one lap of a playground track (400 m)?	1. Unable to do it at all 2. Very difficult 3. A bit difficult 4. Not difficult at all	1=option 1, 2, or 3 0=option 4
Inactivity	Moderate to vigorous physical activities of IPAQ	During the past week, how often did you participate in any moderate physical activities that make you slightly more breathless than usual, such as rapid walking, carrying a light item, cleaning, infant care (carrying, bathing)? (excluding walking) During the past week, how often did you engage in vigorous physical activities, such as vigorous sports, carrying 20 kg or more weights, carrying items up a set of stairs, digging, construction laboring	1. Never 2. More than once per week	1=option 1 for both questions 0=others
Loss of weight	Weight loss for 1 year	Was there an unintended weight loss of 4.5 kg in the past year?	1. Yes 2. No	1=option 1 0=option 2

Sum of the 5 items' score: 0=robust, 1–2=pre-frail, 3–5=frail.

IPAQ, International Physical Activity Questionnaire.

(2) FRAIL scale⁶⁸⁾

Item	Question
Fatigue	"How much of the time during the past 4 weeks did you feel tired?" 1=all of the time, 2=most of the time, 3=some of the time, 4=a little of the time, 5=none of the time. Responses of "1" or "2" are scored as 1 and all others as 0. Baseline prevalence=20.1%.
Resistance	"By yourself and not using aids, do you have any difficulty walking up 10 steps without resting?" 1=yes, 0=no. Baseline prevalence=25.5%.
Ambulation	By yourself and not using aids, do you have any difficulty walking several hundred yards?" 1=yes, 0=no. Baseline prevalence=27.7%.
Illness	For 11 illnesses, participants are asked, "Did a doctor ever tell you that you have [illness]?" 1=yes, 0=no. The total illnesses (0–11) are recoded as 0–4 = 0 and 5–11=1. The illnesses include hypertension, diabetes, cancer (other than a minor skin cancer), chronic lung disease, heart attack, congestive heart failure, angina, asthma, arthritis, stroke, and kidney disease. Baseline prevalence=2.1%.
Loss of weight	"How much do you weigh with your clothes on but without shoes? [current weight]" "One year ago in (MO, YR), how much did you weigh without your shoes and with your clothes on? [weight 1 year ago]" Percent weight change is computed as: [(weight 1 year ago–current weight)/weight 1 year ago]×100. Percent change >5 (representing a 5% loss of weight) is scored as 1 and <5 as 0. Baseline prevalence=21.0%.

Korean version of FRAIL scale can be found in the following literature: Jung HW, et al. Korean J Intern Med 2016;31:594-600.⁹⁾

2) Diagnostic and assessment tools of frailty

(1) Frailty phenotype criteria (Korean version)^{6,69)}

A. Characteristics of frailty	B. Cardiovascular health study measure
Shrinking: weight loss (unintentional)	Baseline >4.5 kg loss unintentionally in prior year
Exhaustion*	Self-reported: at least 3–4 days per week for (1), (2) (1) The feeling hard about everything, (2) the feeling that I can't get through anything
Slowness [†]	Males: height ≤165 cm, walking speed ≥0.93 m/s; height >165 cm, walking speed ≥0.98 m/s Females: height ≤152 cm, walking speed ≥0.85 m/s; height >152 cm, walking speed ≥0.93 m/s
Low activity [‡]	Males <494.65 kcal/wk, females <283.50 kcal/wk; used IPAQ
Weakness [§]	Males: BMI (kg/m ²) ≤22, grip strength (kg) ≤25.0; BMI, 22.1–24, grip strength ≤27.0; BMI, 24.1–26; grip strength ≤27.8; BMI >26, grip strength ≤28.5 Females: BMI (kg/m ²) ≤23, grip strength (kg) ≤16.8; BMI, 23.1–25; grip strength ≤17.7; BMI, 25.1–27; grip strength ≤17.8; BMI >27; grip strength ≤17.7
C. Presence of frailty	Positive for frailty phenotype, ≥3 criteria present; intermediate or pre-frail, 1 or 2 criteria present

IPAQ, International Physical Activity Questionnaire; BMI, body mass index; KFACS, Korean Frailty and Aging Cohort study.

*Assessed using two items extracted from questions in the Center for Epidemiologic Studies Depression scale. [†]According to data of the KFACS, the figures in bottom 20% are presented as a cut-point by stratification based on gender and height. [‡]Energy consumption was calculated using IPAQ and based on data from the survey of living condition and welfare needs of Korean older people, the figure is equivalent to the bottom 20% of the total energy consumption. [§]Based on KFACS data, the figure is equivalent to the bottom 20% of the grip strength, stratified into four sections according to BMI by gender.

(2) Korean frailty index⁸⁾

Items	Score
1. How many times have you been hospitalized in the last year?	Never=0, more than once=1
2. What do you think your health is like now?	Good=0, not good or bad=1
3. Do you continue to take more than four medicines regularly? (including herbal medicine)	No=0, yes=1
4. Have you lost weight enough to make your clothes loose in the last year?	No=0, yes=1
5. Have you been depressed or sad in the past month?	No=0, yes=1
6. Have you had urinary or fecal incontinence in the last month?	No=0, yes = 1
7. Timed up and go test	≤10 seconds=0, >10 seconds=1
8. Have you ever had problems with hearing or vision problems in your daily life?	No=0, yes=1

In a study conducted in Korea using the above evaluation tool, the cutting points of frailty was 4.5 point, and the pre-frailty was 2.5 point.⁹⁾

(3) Korean Comprehensive Assessment Tools, a short form⁶³⁾

Category	Items
Self-recording questionnaire	Chronic diseases, medication, subjective health status and frailty, alcohol, smoking, and physical activity Quality of sleep, dysuria, oral health, vaccination, fall, and housing; six questions (ADL 4+IADL 2), GDS five questions, social support
Assessment of physical function	Memory and recall: 3 word recall, hearing test, lower extremity function, and balance

ADL, activity of daily living; IADL, instrumental activity of daily living; GDS, geriatric depression screening scale.

3) Physical activity

(1) Short Physical Performance Battery (SPPB)

Test	Scoring
Balance test	
Side-by-side	>10 seconds: 1 point
Semi tandem gait	>10 seconds: 1 point
Tandem gait	3 to 10 seconds: 1 point >10 seconds: 2 point
If any of the above three tests have a zero score, the balance test is terminated.	
Gait speed: 4-meter walk	<4.82 seconds: 4 point 4.82 to 6.20 seconds: 3 point 6.21 to 8.70 seconds: 2 point >8.70 seconds: 1 point Failed to perform test: 0 point
Chair stand test: repeated 5 times	<11.19 seconds: 4 point 11.20 to 13.69 seconds: 3 point 13.70 to 16.69 seconds: 2 point >16.7 seconds: 1 point >60 seconds: 0 point

(2) Senior fitness test⁷⁰⁾

Test	Contents
30-second chair stand	Purpose: to assess lower body strength, needed for numerous tasks such as climbing stairs, walking and getting out of a chair, tub or car. Also reduces the chance of falling Description: number of full stands that can be completed in 30 seconds with arms folded across chest. Risk zone: less than 8 unassisted stands for men and women.
Arm curl	Purpose: to assess upper body strength, needed for performing household and other activities involving lifting and carrying things such as groceries, suitcases and grandchildren. Description: number of bicep curls that can be completed in 30 seconds holding a hand weight of 5 lbs (2.27 kg) for women; 8 lbs (3.63 kg) for men. Risk zone: less than 11 curls using correct form for men and women.
6-minute walk	Purpose: to assess aerobic endurance, which is important for walking distances, stair climbing, shopping, sightseeing while on vacation, etc. Description: number of yards/meters that can be walked in 6 minutes around a 50-yard (45.7 m) course. (5 yards=4.57 m) Risk zone: less than 350 yards for men and women
2-minute step test	Purpose: alternate aerobic endurance test, for use when space limitations or weather prohibits taking the 6-minute walk test. Description: number of full steps completed in 2 minutes, raising each knee to a point midway between the patella (kneecap) and iliac crest (top hip bone). Score is number of times right knee reaches the required height. Risk zone: less than 65 steps for men and women.
Chair sit-and-reach	Purpose: to assess lower body flexibility, which is important for good posture, for normal gait patterns and for various mobility tasks, such as getting in and out of a bathtub or car. Description: from a sitting position at front of chair, with leg extended and hands reaching toward toes, the number of inches (cm) (+ or -) between extended fingers and tip of toe. Risk zone: men, minus (-) 4 inches or more; women, minus (-) 2 inches or more
Back scratch	Purpose: to assess upper body (shoulder) flexibility, which is important in tasks such as combing one's hair, putting on overhead garments and reaching for a seat belt Description: with one hand reaching over the shoulder and one up the middle of the back, the number of inches (cm) between extended middle fingers (+ or -). Risk zone: men, minus (-) 4 inches or more; women, minus (-) 2 inches or more
8-foot up-and-go	Purpose: to assess agility/dynamic balance, which is important in tasks that require quick maneuvering, such as getting off a bus in time or getting up to attend to something in the kitchen, to go to the bathroom or to answer the phone. Description: number of seconds required to get up from a seated position, walk 8 feet (2.44 m), turn, and return to seated position. Risk zone: more than 9 seconds

4) Nutrition

(1) Mini Nutritional Assessment (MNA)⁶⁴⁾

Screening	Score
A. Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?	0=severe decrease in food intake, 1=moderate decrease in food intake, 2=no decrease in food intake
B. Weight loss during the last 3 months	0=weight loss greater than 3 kg (6.6 lbs), 1=does not know, 2=weight loss between 1 and 3 kg (2.2 and 6.6 lbs), 3=no weight loss
C. Mobility	0=bed or chair bound, 1=able to get out of bed/chair but does not go out, 2=goes out
D. Has suffered psychological stress or acute disease in the past 3 months?	0=yes 2=no
E. Neuropsychological problems	0=severe dementia or depression, 1=mild dementia, 2=no psychological problems
F1. BMI (weight in kg)/(height in m) ²	0=BMI less than 19, 1=BMI 19 to less than 21, 2=BMI 21 to less than 23, 3=BMI 23 or greater
If, BMI is not available, replace question F1 with question F2. Do not answer F2 if question F1 is already completed.	
F2. CC in cm	0=CC less than 31, 3=CC 31 or greater

Screening score (maximum 14 points). 12 to 14 points: normal nutritional status, 8 to 11 points: at risk of malnutrition, 0–7 points: malnourished.

BMI, body mass index; CC, calf circumference.

(2) Geriatric Oral Health Assessment Index (GOHAI)^{65,71)}

Questions (how open during last 6 months)	
Question 1.	Were there any restrictions on the amount or type of food eaten due to teeth or dental problems?
Question 2.	Did you have a problem chewing on some kind of food such as hard apples and meat?
Question 3.	Do you have a swallowing disorder?
Question 4.	Have your teeth or dentures ever interrupted you when you were trying to talk?
Question 5.	Is there any inconvenience in eating food?
Question 6.	Were there any restrictions on meeting other people because of your teeth or dentures?
Question 7.	Do you feel unhappy with your teeth, gums, or dentures?
Question 8.	Have you ever been on medication for pain or discomfort around your mouth?
Question 9.	Have you ever been worried about your teeth or dentures?
Question 10.	Do you feel serious or self-aware about your teeth or dentures?
Question 11.	Did you feel uncomfortable eating in front of other people because of your teeth or dentures?
Question 12.	Do you feel sensitive when something hot or cold touches your teeth or gums?

Score: never: 5 point, seldom: 4 point, sometimes: 3 point, often: 2 point, very often: 1 point, always: 0 point.

5) Cognitive function

(1) Korean Mini-Mental State Examination (K-MMSE)⁶⁶⁾

Category	Sub-category	Score	Question
Orientation	Time	1	What year is it today?
		1	What month is it today?
		1	What day is it today?
	Place	1	What day of the week is it today?
		1	Which city or province do you live in?
		1	Which district (Korean administrative region as 'gu' or 'gun') do you live in?
		1	Which dong (Korean administrative region) do you live in?
		1	Where is this?
		1	What is this place for?
Memory	Registration	3	Repeat three words immediately
	Recall	3	In 5 minutes: Tell me the three words you said 5 minutes ago.
Attention and calculation	Numeracy	5	Subtract 7 from 100, the repeat from result. Continue 5 times
Language	Name	2	Name to objects (e.g., pen, watch)
	Three stage command	3	Give a three stage command. Score 1 for each stage. (e.g., Raise your index finger of right hand and place it on your nose and then your left ear.)
	Repeat	1	Repeat " No ifs, ands, or buts"
Copying	Pentagons	1	Ask the patient to copy a pair of intersecting pentagons
Understanding and judging	Understanding	1	Why do you wash your clothes?
	Judging	1	What should I do if you give someone else's ID on the street?

Total score: 30 points. Scoring: If the respondent has never attended school, he/she shall add 1 point to the orientation of the time, 1 or 2 point to the attention and calculation, 1 point to the language category. However, do not exceed the perfect score (30 points) due to the added score. Assessment: ≥24 points: normal, 20 to 23 points: suspected dementia, 15 to 19 points: definite dementia, ≤14 points: severe dementia.

6) Social frailty

(1) The Lubben Social Network Scale-Revised (LSNS-R)

Question	Score
Family: Considering the people to whom you are related by birth, marriage, adoption, etc.	
1. How many relatives do you see or hear from at least once a month?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
2. How often do you see or hear from the relative with whom you have the most contact?	0=less than monthly, 1=monthly, 2=few times a month, 3=weekly, 4=few times a week, 5=daily
3. How many relatives do you feel at ease with that you can talk about private matters?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
4. How many relatives do you feel close to such that you could call on them for help?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
5. When one of your relatives has an important decision to make, how often do they talk to you about it?	0=never, 1=seldom, 2=sometimes, 3=often, 4=very often, 5=always
6. How often is one of your relatives available for you to talk to when you have an important decision to make?	0=never, 1=seldom, 2=sometimes, 3=often, 4=very often, 5=always
Friendships: Considering all of your friends including those who live in your neighborhood	
7. How many of your friends do you see or hear from at least once a month?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
8. How often do you see or hear from the friend with whom you have the most contact?	0=less than monthly, 1=monthly, 2=few times a month, 3=weekly, 4=few times a week, 5=daily
9. How many friends do you feel at ease with that you can talk about private matters?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
10. How many friends do you feel close to such that you could call on them for help?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
11. When one of your friends has an important decision to make, how often do they talk to you about it?	0=never, 1=seldom, 2=sometimes, 3=often, 4=very often, 5=always
12. How often is one of your friends available for you to talk to when you have an important decision to make?	0=never, 1=seldom, 2=sometimes, 3=often, 4=very often, 5=always

The total score is calculated by finding the sum of all items. For the LSNS-R, the score ranges between 0 and 60, with a higher score indicating more social engagement (available from: https://www.brandeis.edu/roybal/docs/LSNS_website_PDF.pdf).

(2) Korean version of Lubben Social Network Scale⁶⁷⁾

Question	Score
1. How many relatives do you see or hear from at least once a month?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
2. How often do you see or hear from the relative with whom you have the most contact?	0=less than monthly, 1=monthly, 2=few times a month, 3=weekly, 4=few times a week, 5=daily
3. How many relatives do you feel close to such that you could call on them for help?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
4. How many friends do you feel close to such that you could call on them for help?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
5. How many of the above friends do you see or hear from at least once a month?	0=none, 1=one, 2=two, 3=three or four, 4=five thru eight, 5=nine or more
6. How often do you see or hear from the friend with whom you have the most contact?	0=less than monthly, 1=monthly, 2=few times a month, 3=weekly, 4=few times a week, 5=daily
7. When one of your relatives or your friends has an important decision to make, how often do they talk to you about it?	0=never, 1=seldom, 2=sometimes, 3=often, 4=very often, 5=always
8. How often is one of your relatives or your friends available for you to talk to when you have an important decision to make?	0=never, 1=seldom, 2=sometimes, 3=often, 4=very often, 5=always
9. Do any of your relatives or friends need your help with things like grocery shopping, preparing food, repairing the house, cleaning the room, and caring a baby?	if yes: go to question no.10, if no: go to question no.9-b
9-b. Do you help your relatives or friends through things like grocery shopping, paperwork, house repairs, and babysitting?	0=never, 1=seldom, 2=sometimes, 3=often, 4=very often, 5=always
10. Do you live alone or with someone else?	With spouse; with other family members, relatives or friends other than your spouse; with someone other than friends or relatives; alone