Self-reported screening tools for detecting community-dwelling older persons with frailty

Matteo Cesari, MD, PhD

EUGMS Congress
Nice (France) – September 22, 2017
Disclosure of speaker’s interests

• Presentations at scientific meetings for Nestlé
• Member of a Scientific Advisory Board for Boehringer Ingelheim
• National coordinator and WP leader of a research project (SPRRINTT) funded by the Innovative Medicines Initiative in which several members of the European Federation of Pharmaceutical Industries and Associations (EFPIA) are collaborating
SUMMARY

• Introduction
  The screening process and self-reported tools

• What frailty is and why it is measured

• Instruments for screening frailty in community-dwelling older persons
  Examples of self-reported tools

• Role of self-reported screening tools

• Future perspectives in the field

• Conclusions
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SCREENING FOR DISEASE

1. The condition sought should be an *important health problem*
2. There should be an *accepted treatment* for patients with recognized disease
3. **Facilities** for diagnosis and treatment should be available
4. There should be a recognizable *latent or early symptomatic stage*
5. There should be a *suitable test or examination*
6. The test should be *acceptable* to the population
7. The *natural history* of the condition should be adequately understood
8. There should be an *agreed policy* on whom to treat as patients
9. The *cost* of case-finding should be economically balanced in relation to possible expenditure on medical care as a whole
10. Case-finding should be a *continuing process* and not a “once and for all” project
Limitations of self-reported tools

1. **Honesty, image management**
2. **Introspective ability** (ability to self-conduct an introspective assessment and provide accurate answer)
3. **Understanding**
4. **Rating scales** (different interpretation of rating scales)
5. **Response bias** (tendency to respond a certain way)
6. **Ordinal measures** (translation of data into categories)
7. **Control of sample, correct conjunction of the survey** (representativeness?)
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Severe disease of the central nervous system may follow infection with several E.C.H.O. viruses, causing ataxia, vertigo, and nystagmus. Undifferentiated febrile illness without rash is commonly seen with types 4, 6, 9, 14, and 16, and sometimes 2, 11, and 18. E.C.H.O. viruses, usually type 1 and occasionally 8, 11, 14, and 20, have also been isolated from cases of infantile gastroenteritis, but the causal relationship is by no means so clear as in the cases of aseptic meningitis. World-wide in distribution, E.C.H.O. virus infections, whether sporadic or epidemic, are common in the spring and summer than at other seasons. These viruses can be recovered from the nasopharynx, faeces, and blood, and it is probable that these are the main source of transmission.

In this week's issue of the B.M.J. Squadron Leader L. J. Germain and his colleagues describe at page 742 an outbreak of E.C.H.O. type 5 infection in a maternity unit in Singapore. Sixty-four cases were observed between July and October 1965, of which 56 were among infants. All had a pyrexia of 99-103°F (37-39.4°C), the onset usually being between the fourth and eighth day of life. The patients recovered, and the outbreak lasted only 6 weeks. A similar outbreak was reported by E. W. Hart and his colleagues from a London maternity unit in 1962. The symptoms then were fever, diarrhoea, lymphadenopathy, and an enlarged spleen, but no rashes were observed.

A virological investigation was particularly valuable in such circumstances, for the prophylaxis of E.C.H.O. virus infections generally is good, and during an outbreak in a maternity hospital this is comforting news to have. On the other hand, E.C.H.O. viruses can cause serious disease, particularly in the very young, but they do not appear to cause such severe disease in this age group as do Coxsackie B viruses.

Old and Frail

One of the miracles of our times is the increase in the average length of life. In England and Wales, for instance, the expectation of life at birth has risen by 30 years since 1900, from about 50 to about 90. Eileen M. Brooke1 puts another way when she says that in 1965 in England and Wales one in every eight persons was aged 65 or more, and if the trend is continued by 1982 the ratio will be 1:6. Not only will the ratio of retired to working people be adversely affected, but the number of old people in absolute terms will have reached the formidable total of 7½ million in 1982. There will be proportionately fewer persons capable of looking after their aged kin, and for a variety of socioeconomic reasons there will probably be fewer still able to do so even if they wish.

Two recent papers, one complementing the other, highlight the present inadequacies for the care of the aged and underline the danger in a failure to plan for the future. F. Allen Black2 drew attention to the misuse of geriatric units, and criticized general hospitals for their failure to share the burden of the care of the aged. He implied that too many people who work in these hospitals fail to accept the responsibility they should be bearing, and insisted that elderly patients were often not given proper care in hospitals.

He also made a telling comparison between the understaffed geriatric ward working at 97% bed occupancy and the 70% occupancy of acute hospitals where there is no such shortage. How, he argues, in the circumstances can there be complaints that the “acute” beds are being blocked by elderly patients? Yet in a manner of which he was writing an “excess of 750 acute beds and a deficiency of 720 geriatric beds is being charged to one with an excess of 1,125 acute beds and a deficiency of 245 geriatric beds.”

In the second paper, R. W. Parnell reports on twocare experiences in a geriatric unit which takes three-quarters of the patients over the age of 65 admitted to a hospital. He makes the most important point that, “Even today, when board psychiatric and geriatric advisory committees may act in isolation from each other, forgetting that the common focus of their attention is the prevention of hospital care for old people, the board is treated as one hand or mindless on the other.” He goes on to turn the knife and points out that because of the grim shortage of beds for sick old people they tend to flow into any vacant bed, irrespective of admittance lists, and labelled selectively from their multiple pathologies, with the diagnosis best calculated to gain admission by a particular hospital. It is indeed a curious perversion of the legend of Procrustes: instead of the patient being shaped to the bed, the bed is shaped to the patient. The pressure on mental hospital beds from general hospitals, geriatric units, and elsewhere was not foreseen a few years ago. As Parnell observes, this is in itself sufficient to upset the outlook for the mid-1970s; we might need only half as many beds for mental illness. Many mental hospital psychiatrists would agree with Parnell’s observation.

Binks and Parnell paint on a small canvas framed by the limits of their own experience. Miss Eileen M. Brooke, however, is able to project her statistical data on a national screen. Some of her data are particularly pertinent. For example, a census of patients in psychiatric hospitals at the end of 1965 showed that there were 2,616 persons aged 65 and over. One in every 109 persons in the population as a whole was resident in a mental hospital or unit. Of all mental hospital patients 39% were aged 65 and over, and of these nearly half were 75 or more. Between 1944 and 1963 the numbers aged 65 and over in psychiatric hospitals in England and Wales increased by 6,300, representing an increase from 30 to 59% of the total hospital population. The shift towards care of more elderly patients in these hospitals is most unlikely to be reversed.

What is perhaps the most alarming statistic is that 11% of the men and 6% of the women die within a month of...
“...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...”
Special Article

Frailty: An Emerging Public Health Priority

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A total of 67 frailty instruments available in the literature

Nine instruments are "highly-cited" (≥200 citations)

The most common assessment context was observational studies of older community-dwelling adults
Table 2
The Simple “FRAIL” Questionnaire Screening Tool

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?
Table 2. Screening instrument (PRISMA-7) for selecting clients eligible for the ISD system

<table>
<thead>
<tr>
<th>CLIENT QUESTION</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you older than 85 years?</td>
<td></td>
<td></td>
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<tr>
<td>Are you male?</td>
<td></td>
<td></td>
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<tr>
<td>In general, do you have any health problems that require you to limit your activities?</td>
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<tr>
<td>Do you need someone to help you regularly?</td>
<td></td>
<td></td>
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<tr>
<td>In general, do you have any health problems that require you to stay at home?</td>
<td></td>
<td></td>
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<tr>
<td>If you need help, can you count on someone close to you?</td>
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<tr>
<td>Do you regularly use a cane, a walker, or a wheelchair to move about?</td>
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<tr>
<td>TOTAL CHECKED</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hebert Ret al.  
*Can Fam Physician* 2003;49:992-997
Screening for Frailty in Older Adults Using a Postal Questionnaire: Rationale, Methods, and Instruments Validation of the INTER-FRAIL Study

Mauro Di Bari, MD, PhD, *† Francesco Profili, Stat, ‡ Stefania Bandinelli, MD, § Anna Salvioni, MD, ¶ Enrico Mossello, MD, PhD, *† Carla Corridori, SW, ** Matilde Razzanelli, PsyD, ‡
Teresa Di Fiandra, PsyD, †† and Paolo Francesconi, MD, MS ‡


Postal screening can identify frailty and predict poor outcomes in older adults: longitudinal data from INTER-FRAIL study

Enrico Mossello¹, Francesco Profili², Mauro Di Bari¹, Stefania Bandinelli³, Matilde Razzanelli², Anna Salvioni¹, Carla Corridori⁵, Teresa Di Fiandra⁶, Paolo Francesconi²

Age Ageing 2016;45:469-74
<table>
<thead>
<tr>
<th>INTER-FRAIL</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do you live</strong> <em>alone</em>?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is your <em>sight</em> good enough to read newspaper headings?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you easily get <em>exhausted</em> in daily chores?</td>
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<td></td>
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<tr>
<td>Do you have problems with your <em>memory</em>?</td>
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<td></td>
</tr>
<tr>
<td>Did you have any <em>falls</em> in last 6 months?</td>
<td></td>
<td></td>
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<tr>
<td>Have you been <em>admitted to hospital</em> or ER in the last 6 months?</td>
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<tr>
<td>Do you have difficulty <em>walking</em> 400 m on a flat surface?</td>
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<tr>
<td>Do you take 5+ <em>drugs</em> on a regular basis (daily or almost daily)?</td>
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<tr>
<td>Have you lost 3+ kg of <em>weight</em> unintentionally in prior year</td>
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<td></td>
</tr>
<tr>
<td>Can you easily rely on <em>somebody’s help</em> in case of need?</td>
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</table>
Significant age- and sex-adjusted associations of the Fi with:

- the number of hospitalized days (beta=45.7, 95%CI 36.1-55.4, p<0.001)
- the number of visits to a physician (beta=25.93, 95%CI 19.27-32.6, p<0.001)
Self-Assessed Health Status, Walking Speed and Mortality in Older Mexican-Americans

Matteo Cesari\textsuperscript{a} Marco Pahor\textsuperscript{a} Emanuele Marzetti\textsuperscript{a} Valentina Zamboni\textsuperscript{b} Giuseppe Colloca\textsuperscript{b} Matteo Tosato\textsuperscript{b} Kushang V. Patel\textsuperscript{c} Jennifer J. Tovar\textsuperscript{d} Kyriakos Markides\textsuperscript{d}

Fig. 1. Kaplan-Meier survival curves for mortality according to walking speed categories (a) and SAHS (b).
Figure 1. Prevalence of frailty. SHARE = Survey of Health, Ageing and Retirement in Europe; FI-CGA = Frailty Index based on a Comprehensive Geriatric Assessment.

Table 3. Agreement of Survey of Health, Ageing and Retirement in Europe Frailty Scales (Cohen Kappa Statistic)

<table>
<thead>
<tr>
<th></th>
<th>Groningen Frailty Indicator</th>
<th>Tilburg Frailty Indicator</th>
<th>Frailty Index</th>
<th>FI-CGA</th>
<th>Clinical Frailty Scale</th>
<th>Frailty phenotype</th>
<th>Edmonton Frail Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilburg Frailty Indicator</td>
<td>0.50</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Frailty Index</td>
<td>0.46</td>
<td>0.52</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>FI-CGA</td>
<td>0.46</td>
<td>0.52</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Frailty Scale</td>
<td>0.30</td>
<td>0.38</td>
<td>0.61</td>
<td>0.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frailty phenotype</td>
<td>0.25</td>
<td>0.37</td>
<td>0.51</td>
<td>0.51</td>
<td>0.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edmonton Frail Scale</td>
<td>0.18</td>
<td>0.27</td>
<td>0.45</td>
<td>0.46</td>
<td>0.52</td>
<td>0.55</td>
<td>0.55</td>
</tr>
<tr>
<td>FRAIL scale</td>
<td>0.13</td>
<td>0.27</td>
<td>0.28</td>
<td>0.29</td>
<td>0.27</td>
<td>0.46</td>
<td>0.45</td>
</tr>
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FI-CGA = Frailty Index based on a Comprehensive Geriatric Assessment.
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COMMENTARIES

What are frailty instruments for?

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³Geriatric Medicine Research, Dalhousie University, Halifax, NS, Canada
⁴Department of Medicine, Dalhousie University, Halifax, NS, Canada

always
ask
why?
SCREENING

IDENTIFICATION SUBJECTS AT INCREASED RISK OF EVENTS (FRAILTY)

COMPREHENSIVE GERIATRIC ASSESSMENT Planning – Implementation of a specific intervention

FOLLOW-UP RE-EVALUATION
3. Recognising and identifying frailty in individuals

Recommendations

- Older people should be assessed for the possible presence of frailty during all encounters with health and social care professionals. Slow gait speed, the PRISMA questionnaire, the timed-up-and-go test are recommended as reasonable assessments. The Edmonton Frail Scale is recommended in elective surgical settings.

- Provide training in frailty recognition to all health and social care staff who are likely to encounter older people.

- Do not offer routine population screening for frailty.
Recognition of Frailty in an individual

- Either by encounter screening or
- by frailty presentation
  (or by systematic screening - not yet recommended)

Holistic Medical Review including

- Identification and Optimisation of medical illnesses plus onward referral to other specialists
- Individualised goal setting
- Drug review
- Anticipatory care planning (which may include escalation plans, emergency plans, end of life care (EOLC) plans)

Geriatrician, Therapist or other community team member, Specialist nurse, OPMHT

Individualised Care and Support Plan –
With details of personal goals, optimisation plans, escalation and emergency plans; as well as advance care plans where these are indicated.

Fit for Frailty
Consensus best practice guidance for the care of older people living with frailty in community and outpatient settings
Reference Sites Network for Prevention and Care of Frailty and Chronic Conditions in Community-dwelling Persons of EU Countries

3rd European Union Health Programme
Persons aged 65 years and older referring to a public health service

Pre-screening of frailty and multimorbidity

Positive results

Alert to the general practitioner and clinical evaluation of the case

Negative results

False positive result

General practitioner’s intervention

Referral to specialist/diagnostic assessment by geriatrician and multidisciplinary team
1. In case of need, can you count on someone close to you?
2. Which is your highest education degree? [below secondary level]
3. Do you feel lonely most of the time?
4. Have you been evaluated by a healthcare professional during the past 12 months?
5. Have you experienced a memory decline during the past 12 months?
6. Do you take 5 or more medications per day?
7. Have you recently lost weight such that your clothing has become looser?
8. Have you recently experienced any worsening of your mobility due to physical state?
9. Have you experienced one or more fall events during the past 12 months?
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Ask your Doctor!
Depression self-assessment

This is for information only and is not intended to replace a consultation with a GP. The PHQ was developed by Drs Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues with a grant from Pfizer Inc. Reproduced with permission.

Could you be depressed?

There are many symptoms of depression, including low mood, feelings of hopelessness, low self-esteem, lethargy and sleep problems. The more symptoms someone has, the more likely they are to be depressed.

This test will help you to assess whether you could be suffering from depression. Give answers you've been feeling during the last
Depression self-assessment

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Depression severity rating 3

Based on your responses today it's unlikely you're suffering from depression.

While it's unlikely that you have depression, if you have any concerns about your health or mood, please call NHS 111 or arrange to speak to your GP.

More information on depression, and its causes, can be found by following the link at the bottom of this tool.
Your Results

Depression severity rating 3

Based on your responses today it's unlikely you're suffering from depression.

While it's unlikely that you have depression, if you have any concerns about your health or mood, please call NHS 111 or arrange to speak to your GP.

More information on depression, and its causes, can be found by following the link at the bottom of this tool.
Are you walking slower and slower?

Have you been feeling weaker lately?

Frailty is an early sign of the loss of independence.

Do you feel tired, are you going out less than before?

Are you losing weight for no apparent reason?
Solutions are available, so do talk to your doctor
The emerging field of mobile health

Steven R. Steinhubl,* Evan D. Muse, Eric J. Topol

Eye
- Glucose-sensing lens
- Digital fundoscope
- Smartphone visual-acuity tracking
- Automated refractive error
- Noninvasive intraocular pressure

Ear
- Smart hearing aids
- Digital otoscope

Lung
- Home spirometry
- Pulse oximetry
- Inhaler use
- Breath-based diagnostics
- Breathing sounds
- Environmental exposure

Blood
- Continuous glucose
- Transdermal Hb
- Pathogens (genomics-based)
- POC blood tests

Skin
- Temperature
- Gross lesions
- Pressure sensor (wound care)
- Sweat chemistry
- Cutaneous blood flow

Other sensors and monitors
- Pill-box and bottle
- Posture
- Body position
- Activity
- Sleep

Bladder and urine
- Comprehensive urinalysis
- STDs (genomic detection)
- Diaper-based sensors

Brain and emotion
- Wireless mobile EEG
- Seizure
- Autonomic nervous activity
- Head-impact sensor
- Intracranial pressure (noninvasive)
- Stress recognition (voice, respiration)

Heart and vascular
- Continuous BP tracking
- Handheld ECG
- Heart rhythm
- Cardiac output
- Stroke volume
- Thoracic impedance (fluid)

Gastrointestinal
- Endoscopic imaging
- Esophageal pH
- Medication compliance
- Fecal blood or bilirubin
- Gut electrical activity
- Chewing

Watching over one's health
- Pulse
- BP
- Temperature
- Activity
- Hydration
- Sleep stages
- Seizure
- Respiration rate
- O₂ saturation
- Blood CO₂
- Blood glucose
- ECG (single-lead)
- Cardiac output
- Stroke volume
- Stress
- Heart rate variability
- Electrodermal activity

Sci Transl Med 2015;7:283rv3
Large-scale physical activity data reveal worldwide activity inequality

Tim Althoff, Rok Soskic, Jennifer L. Hicks, Abby C. King, Scott L. Delp & Jure Leskovec

(a) Map showing average daily steps across different countries. The map is color-coded with the average daily steps ranging from 3,500 to 6,000 steps, with areas lacking data marked in gray.

(b) Density plots for Japan, UK, USA, and Saudi Arabia. The plots show the distribution of daily steps with the peak indicating the most common number of steps taken.

(c) Probability density plots for steps per steps mode, showing the distribution of steps per steps mode across the same countries.
Pedometer Use Increases Daily Steps and Functional Status in Older Adults

Allison Snyder, MD, Bryanne Colvin, MD, and Julie K. Gammack, MD

Fig. 1. Percent change in average daily steps at weekly study time points compared to baseline and to previous week.

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Frailty is a clinical condition of public health interest.

Prevention and management of frailty are not easy and require special consideration of ethical, methodological and cost-effectiveness aspects.

Self-reported screening tools for frailty might be important for raising awareness the individual about often underestimated conditions of risk.

The nature of these tools, however, makes them inappropriate for allocating services or interventions, which should always rely on clinical judgment.

Novel technologies might in the future facilitate the awareness of the individual about his health status and promote the adoption of healthier lifestyles and behaviors.
Thank you!

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