

Clinical Prediction Tool for Functional Decline in Elderly Women Using Modifiable Risk Factors

Overview: Sarkisian et al developed risk scores to predict functional decline in the elderly women living in the community based only on modifiable risk factors. The evaluation can be performed in a primary care setting using minimal equipment. Women identified as at risk can then have a directed intervention to reduce their risk. The authors are from the University of California (UCLA and UCSF) and are associated with the Study of Osteoporotic Fractures Research Group.

Functional decline was defined as a loss of ability over a 4 year period to perform one or more activities in the following groups:

- (1) vigorous activities based on 5 activities
- (2) basic activities of daily living based on 8 daily activities

Nonmodifiable risk factors for functional decline (see Appendices Ia and Ib):

- (1) age
- (2) education
- (3) medical comorbidity
- (4) cognitive function
- (5) smoking history
- (6) history of previous spine fractures

Modifiable Risk Factors (8) for functional decline identified by multivariate analysis:

- (1) slow gait (lowest quintile as determined by the number of seconds to walk a 6 meter course using fastest pace)
- (2) short-acting benzodiazepine use
- (3) long-acting benzodiazepine use
- (4) depression (6 or greater on shortened 15-item Geriatric Depression Scale)
- (5) low exercise level (lowest quintile using a modified Paffenberger survey)
- (6) weak grip strength using a grip dynamometer in both hands (lowest quintile based on an average of 2 or more readings)
- (7) body mass index (BMI) > 29 kg per square meter (obese)
- (8) binocular visual acuity worse than 20/40 (in the Methods section on page 171 poor visual acuity is defined as 20/40 or worse but worse than 20/40 is used in the risk score)

| Risk Factor for Decline in Vigorous Activities | Odds Ratio | 95% CI | Co-efficient |
|---|-------------------|---------------|---------------------|
| slow gait | 1.76 | 1.44 - 2.16 | 0.57 |
| short-acting benzodiazepine use | 1.62 | 1.21 - 2.18 | 0.48 |
| depression | 1.51 | 1.09 - 2.08 | 0.41 |
| low exercise level | 1.36 | 1.12 - 1.67 | 0.31 |
| BMI >= 29 | 1.30 | 1.07 - 1.58 | 0.26 |
| weak grip strength | 1.21 | 0.99 - 1.49 | 0.19 |

after Table 3 page 174; y intercept coefficient = -3.53

| Risk Factor for Decline in Basic Activities | Odds Ratio | 95% CI | Co-efficient |
|--|-------------------|---------------|---------------------|
| slow gait | 2.29 | 1.66 - 3.17 | 0.83 |
| long-acting benzodiazepine use | 1.80 | 1.10 - 2.95 | 0.59 |
| short-acting benzodiazepine use | 1.66 | 1.02 - 2.68 | 0.50 |
| depression | 1.87 | 1.17 - 2.98 | 0.62 |
| visual acuity worse than 20/40 | 1.66 | 1.09 - 2.55 | 0.51 |
| low exercise level | 1.47 | 1.06 - 2.05 | 0.39 |
| BMI >= 29 | 1.37 | 0.98 - 1.93 | 0.32 |

after Table 4 page 174; y intercept coefficient = - 1.66

A risk score for decline in vigorous activities can be derived from the beta-coefficients by multiplying them each by 4 and rounding the product to the nearest integer.

| Risk Factor for Decline in Vigorous Activities | Finding | Points |
|---|----------------|---------------|
| gait over 6 meter course | > 1 m/sec | 0 |
| | <= 1 m/sec | 2 |
| slow-acting benzodiazepine use | no | 0 |
| | yes | 2 |
| depression in 15 item Geriatric | < 6 | 0 |

| | | |
|------------------------|---------------------------------------|---|
| Depression Scale | | |
| | >= 6 | 2 |
| exercise level | >= 448 kcal per week | 0 |
| | < 448 kcal per week (lowest quintile) | 1 |
| body mass index | < 29 kg per square meter | 0 |
| | >= 29 kg per square meter | 1 |
| grip strength averaged | >= 15 kg | 0 |
| | < 15 kg | 1 |

A risk score for decline in basic activities can be derived from the beta-coefficients by multiplying them each by 2 and rounding the product to the nearest integer.

| Risk Factor for Decline in Basic Activities | Finding | Points |
|--|---------------------------------------|---------------|
| gait over 6 meter course | > 1 m/sec | 0 |
| | <= 1 m/sec | 2 |
| long-acting benzodiazepine use | no | 0 |
| | yes | 1 |
| slow-acting benzodiazepine use | no | 0 |
| | yes | 1 |
| depression in 15 item Geriatric Depression Scale | < 6 | 0 |
| | >= 6 | 1 |
| visual acuity | 20/40 or better | 0 |
| | worse than 20/40 | 1 |
| exercise level | >= 448 kcal per week | 0 |
| | < 448 kcal per week (lowest quintile) | 1 |
| body mass index | < 29 kg per square meter | 0 |
| | >= 29 kg per square meter | 1 |

risk score for decline in vigorous activities

= SUM(points for all 6 risk factors)

risk score for decline in basic activities

= SUM(points for all 7 risk factors)

Interpretation:

- minimum risk score: 0
- maximum risk score for a decline in vigorous activities: 9
- maximum risk score for a decline in basic activities: 8

| Group | Risk Score | Risk of Decline |
|---------------------|-------------------|------------------------|
| vigorous activities | 0 - 1 | low |
| | 2 - 3 | moderate |
| | > = 4 | high |
| basic activities | 0 - 1 | low |
| | > = 2 | high |

References:

Sarkisian CA Liu H et al. Modifiable risk factors predict functional decline among older women: A prospectively validated clinical prediction tool. J Am Geriatr Soc. 2000; 48: 170-178.