Comparison of a fall risk assessment tool with nurses’ judgment alone

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Medical Faculty
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A remarkable number of fall risk assessment tools have been developed in recent years and a lot of research has been done.
Nursing experts have regularly recommended that nurses should not rely on their clinical judgement alone but to add on a standardised tool to increase their professional awareness.

Es werden einzelne Funktionen der Mobilität analysiert und mit Hilfe eines Punktescores bewertet. Der Test ist in einer Untersuchung des Gleichgewichts (Stand und Balance), sowie das Geheschwäche untersucht. Maximal sind als Summe beider Teile 28 Punkte erreichbar. Der Proband darf ein Hilfsmittel (z.B. Stock) benutzen. Der Test stellt eine Möglichkeit dar, das Sturzrisiko einzuschätzen.
The rise of fall risk assessment tools in Germany

(Dassen et al. 2008)
Aim of fall risk assessment

• To identify people at risk of falling
• To discriminate between people at risk of falling and people without risk of falling

aimed

– to refer people at risk of falling to preventive measures/programmes in order to reduce the number of accidental fallers and falls and finally of fall-related injuries

– to avoid unnecessary preventive interventions in people without risk of falling
Which requirements should a fall risk assessment fulfill?

- Appropriate and feasible for application to the population
- Simple and safe
- Accurate and trustworthy
- Available and reasonable

- Results must be relevant for decision making about fall preventive measures

- Application of a fall risk assessment tool must result in better clinical outcomes than usual care (without fall risk assessment)
  - Gold standard for evaluation: randomised-controlled trial
Evidence based diagnostics

Four phases in architecture of diagnostic research

• Phase I—Determining the normal range of values for a diagnostic test though observational studies in healthy people
• Phase II—Determining the diagnostic accuracy
• Phase III—Determining the clinical consequences of introducing a diagnostic test through randomised trials
• Phase IV—Determining the effects of introducing a new diagnostic test into clinical practice by surveillance in large cohort studies

Gluud & Gluud BMJ 2005
Cross sectional or cohort studies can provide high quality evidence of test accuracy.

However, test accuracy is a surrogate for patient-important outcomes, so such studies often provide low quality evidence for recommendations about diagnostic tests, even when the studies do not have serious limitations.

Judgments are thus needed to assess the directness of test results in relation to consequences of diagnostic recommendations that are important to patients.
Comparison of a fall risk assessment tool with nurses’ judgement alone: a cluster-randomised controlled trial

Gabriele Meyer1,2, Sascha Köpke1, Burkhard Haastert3, Ingrid Mühlhauser1

Cochrane reviews (Gillespie et al. 2012 & Cameron et al. 2012): Significant lack of evidence on the efficacy of fall risk assessment tools
Evidence from accuracy studies: An example

**Screening older adults at risk of falling with the Tinetti balance scale**

Michel Raîche, Réjean Hébert, François Prince, Hélène Corriveau

In a 75 balance once 7 10 this post char people pre Alt an individual's risk of falling, a standardised and valid screening instrument to identify people at risk of falling is still unavailable. There is no evidence to include specificity.

Using this screening test for preventing falls, the cut-off score of ≤36 is preferred since the test has a higher

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225 community dwelling people
>75 years old
1 year follow-up

Study question: Validity of the Tinetti balance scale to predict individuals who will fall at least once during the following year
### Results – contingency table

Might respond to prevention depending on effectiveness

<table>
<thead>
<tr>
<th>Cut-off 36 points</th>
<th>Fallers</th>
<th>Non-fallers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive ≤ 36 p.</td>
<td>37</td>
<td>83</td>
<td>120</td>
</tr>
<tr>
<td>Negative &gt; 36 p.</td>
<td>16</td>
<td>89</td>
<td>105</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>172</td>
<td>225</td>
</tr>
</tbody>
</table>

Approx. 7 out of 10 fallers identified  
Sensitivity of 70%

Approx. 5 out of 10 non-fallers identified  
Specificity of 52%

Target group for preventive measures

53% screened positive

Will be „overtreated“
### Scenario 1

- **No risk assessment, no fall prevention:**
  - 24% of persons will fall at least once during one year.

<table>
<thead>
<tr>
<th></th>
<th>Fallers</th>
<th>Non-fallers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive</strong> &lt; 36 P.</td>
<td>37</td>
<td>83</td>
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</tr>
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<td>225</td>
</tr>
</tbody>
</table>
Scenario 2

Risk assessment and multiple-component home-based exercise (Gillespie et al. 2012: RR 0.78, 95% CI 0.64 to 0.94; six trials; 714 participants) for positively assessed persons (n=120):

– Reduction of prevalence of fallers from 24% to 20%.
– 7% of the total population would not get exercise although faller.
– 69% of the positively assessed population (37% of the total population) would get exercise although non-faller.

<table>
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<th>Non-fallers</th>
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</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>172</td>
<td>225</td>
</tr>
</tbody>
</table>
Scenario 3

• No risk assessment, fall-preventive exercise for all (n=225):
  – Reduction of fall prevalence from 24% to 19%.
  – 76% would get exercise although without risk of falling.

<table>
<thead>
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<th></th>
<th>Fallers</th>
<th>Non-fallers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive &lt; 36 P.</td>
<td>37</td>
<td>83</td>
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<tr>
<td>Total</td>
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<td>225</td>
</tr>
</tbody>
</table>
These characteristics support the use of this test to screen older people at risk of falling in order to include them in a preventive intervention.
OBJECTIVES: To investigate the discriminative ability and diagnostic accuracy of the Timed Up and Go Test (TUG) as a clinical screening instrument for identifying older people at risk of falling.

DESIGN: Systematic literature review and meta-analysis.

SETTING AND PARTICIPANTS: People aged 60 and older living independently or in institutional settings.

CONCLUSION: The findings suggest that the TUG is not useful for discriminating fallers from non-fallers in healthy, high-functioning older people but is of more value in less healthy, lower-functioning older people. Overall, the predictive ability and diagnostic accuracy of the TUG are at best moderate.
“No tool had higher predictive accuracy than the question, “has the resident fallen in past 12 months?”
Materials and methods: A prospective observational cohort study was carried out for 18 months. One thousand one hundred and forty-eight participants were included and assessed for fall risk. (...) The St-Thomas Risk Assessment tool (STRATIFY- modified for nursing homes), staff judgment of fall risk, and previous falls remembered by the staff were evaluated.

Conclusions: The diagnostic accuracy of the three methods did not differ markedly. However, staff judgment had the highest sensitivity and the lowest specificity after 30, 90 and 180 days. A combination of either two of the methods showed the highest sensitivity but the lowest specificity.
Objective: To compare the effectiveness of the STRATIFY falls tool with nurses’ clinical judgments in predicting patient falls.

Study Design and Setting: A prospective cohort study was conducted among the inpatients of an acute tertiary hospital. Participants were patients over 65 years of age admitted to any hospital unit. (…)

Conclusion: Considering the poor specificity and high rates of false-positive results for both the STRATIFY tool and nurses’ clinical judgments, we conclude that neither of these approaches are useful for screening of falls in acute hospital settings.
Discussion: Heterogeneity between studies indicates that the Morse Falls Scale and STRATIFY may still be useful in particular settings, but that widespread adoption of either is unlikely to generate benefits significantly greater than that of nursing staff clinical judgment.
<table>
<thead>
<tr>
<th></th>
<th>Yes = 1</th>
<th>No = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the patient present to hospital with a fall or has he or she fallen on the ward since admission?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think the patient is ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agitated?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visually impaired to the extent that everyday function is affected?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In need of especially frequent toileting?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer and mobility sore of 3 or 4?*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Transfer score: 0 = unable, 1 = major help needed (one or two people, physical aids), 2 = minor help (verbal or physical), 3 = independent; Mobility score: 0 = immobile, 1 = independent with aid of wheelchair, 2 = walks with help of one person, 3 = independent.
## Accuracy of the STRATIFY

<table>
<thead>
<tr>
<th>Reference</th>
<th>Setting</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oliver et al. 1997</td>
<td>HOS</td>
<td>0.69</td>
<td>0.96</td>
</tr>
<tr>
<td>Oliver et al. 1997</td>
<td>HOS</td>
<td>0.93</td>
<td>0.88</td>
</tr>
<tr>
<td>Oliver et al. 1997</td>
<td>HOS</td>
<td>0.54</td>
<td>0.88</td>
</tr>
<tr>
<td>Oliver et al. 1997</td>
<td>HOS</td>
<td>0.92</td>
<td>0.68</td>
</tr>
<tr>
<td>Coker &amp; Oliver 2003</td>
<td>GR</td>
<td>0.66</td>
<td>0.47</td>
</tr>
<tr>
<td>Coker &amp; Oliver 2003</td>
<td>GR</td>
<td>0.36</td>
<td>0.85</td>
</tr>
<tr>
<td>Papaioannou et al.</td>
<td>HOS</td>
<td>0.62</td>
<td>0.71</td>
</tr>
<tr>
<td>Papaioannou et al.</td>
<td>HOS</td>
<td>0.91</td>
<td>0.49</td>
</tr>
<tr>
<td>Jester et al. 2005</td>
<td>HOS</td>
<td>0.5</td>
<td>0.24</td>
</tr>
<tr>
<td>Vassallo et al. 2005</td>
<td>HOS</td>
<td>0.68</td>
<td>0.66</td>
</tr>
<tr>
<td>Haines et al. 2006</td>
<td>HOS</td>
<td>0.77</td>
<td>0.51</td>
</tr>
<tr>
<td>Smith et al. 2006</td>
<td>HC</td>
<td>0.16</td>
<td>0.86</td>
</tr>
<tr>
<td>Wijnia et al. 2006</td>
<td>RF</td>
<td>0.5</td>
<td>0.76</td>
</tr>
<tr>
<td>Milisen et al. 2007</td>
<td>HO</td>
<td>0.9</td>
<td>0.59</td>
</tr>
<tr>
<td>Kim et al. 2007</td>
<td>HO</td>
<td>0.55</td>
<td>0.75</td>
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<tr>
<td>Kim et al. 2007</td>
<td>HO</td>
<td>0.25</td>
<td>0.91</td>
</tr>
<tr>
<td>Vassalo et al. 2008</td>
<td>GR</td>
<td>0.82</td>
<td>0.34</td>
</tr>
<tr>
<td>Marschollek et al. 2011</td>
<td>HO</td>
<td>0.79</td>
<td>0.26</td>
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<tr>
<td>Walsh et al. 2011</td>
<td>HO</td>
<td>0.71</td>
<td>0.58</td>
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<tr>
<td>Barker et al. 2011</td>
<td>HO</td>
<td>0.35</td>
<td>0.93</td>
</tr>
<tr>
<td>Webster et al. 2011</td>
<td>HO</td>
<td>0.82</td>
<td>0.61</td>
</tr>
<tr>
<td>Bentzen et al. 2011</td>
<td>RF</td>
<td>0.56</td>
<td>0.76</td>
</tr>
<tr>
<td>Neumann et al. 2013</td>
<td>HO</td>
<td>0.56</td>
<td>0.60</td>
</tr>
</tbody>
</table>

**Abbreviations:**
- **HOS** = hospital
- **GR** = geriatric rehabilitation
- **HC** = home care
- **RF** = residential care facilities
CONCLUSION: This analysis, based on multicenter data and a large sample size, suggests that NCJ can be recommended on surgical and general medical wards and in individuals younger than 75, but on geriatric wards and in participants aged 75 and older, NCJ overestimates risk of falling and is thus not recommended because expensive comprehensive fall-prevention measures would be implemented in a large number of individuals who do not need it.
• Diagnostic accuracy studies using fall events as outcome for validation of the fall risk assessment tools suffer from one major methodological flaw: **TREATMENT PARAXOX**

• **HOW?**
Natural course and interventions administered during follow-up period might affect the outcome (falls) and therefore flaw determination of test accuracy.
Only randomised controlled trials can overcome the problem and inform decision makers about the benefit of fall risk assessment tools.
Comparison of a fall risk assessment tool with nurses’ judgement alone: a cluster-randomised controlled trial

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²Faculty of Medicine, Institute of Nursing Science, University of Witten/Herdecke, Stockumer Strasse 12, 58453 Witten, Germany
³medistatistica, Lambertusweg 1b, 58809 Neuenrade, Germany

Address correspondence to: G. Meyer. Tel: (+49) 2302 926 317; Fax: (+49) 2302 926 318. Email: Gabriele.Meyer@uni-wh.de
58 nursing homes in Hamburg and catchment area

n= 1972 residents eligible and screened for inclusion
n= 1125 residents included

70 education sessions on optimised usual care

Randomisation of clusters

IG (29 nursing homes, 574 residents)
Downton Index

CG (29 nursing homes, 551 residents)
No risk assessment tool

Follow-up: 12 months
Education sessions

- 1-3 sessions per nursing home
- Approx. 90 minutes
- 4-24 participants
- Best evidence
- Work in small groups to solve „cases“
- Information brochures
Intervention group

- Risk assessment tool
  - monthly
  - by nurses

```markdown
<table>
<thead>
<tr>
<th>Codenummer Bewohner _ _ _</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro bejahter *-Antwort 1 Punkt anrechnen</td>
</tr>
<tr>
<td>Ist der Bewohner im letzten Jahr gestürzt?</td>
</tr>
<tr>
<td></td>
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<td>Medikamente?</td>
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<td>Sensorische Ausfälle?</td>
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<tr>
<td>Mentaler Zustand?</td>
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<td>Gang?</td>
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<td>Datum:</td>
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<tr>
<td>Handzeichen:</td>
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<td></td>
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</tbody>
</table>
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## Results – falls

<table>
<thead>
<tr>
<th></th>
<th>IG (n=574)</th>
<th>CG (n=551)</th>
<th>Mean difference (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents ≥ 1 fall (%)</td>
<td>302 (52.6)</td>
<td>292 (53)</td>
<td>-0.4 (-10.0 to 9.3)</td>
</tr>
<tr>
<td>Falls, n</td>
<td>1036</td>
<td>1027</td>
<td></td>
</tr>
<tr>
<td>Falls per resident, MV (SD)</td>
<td>1.8 (1.2)</td>
<td>1.8 (1.0)</td>
<td>-0.05 (-0.64 to 0.54)</td>
</tr>
</tbody>
</table>

* Cluster-adjusted
Results – fall-related medical attention

<table>
<thead>
<tr>
<th>Per resident MV* (SD)</th>
<th>IG (n=574)</th>
<th>CG (n=551)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fracture</td>
<td>0.07 (0.07)</td>
<td>0.07 (0.05)</td>
<td>0.97</td>
</tr>
<tr>
<td>Suture</td>
<td>0.08 (0.07)</td>
<td>0.10 (0.09)</td>
<td>0.39</td>
</tr>
<tr>
<td>Physician consultation</td>
<td>0.16 (0.15)</td>
<td>0.18 (0.13)</td>
<td>0.68</td>
</tr>
<tr>
<td>Hospital admission</td>
<td>0.21 (0.15)</td>
<td>0.25 (0.14)</td>
<td>0.33</td>
</tr>
</tbody>
</table>

* Cluster-adjusted
Results – preventive measures

• No impact on administration of fall preventive measures: walking aids, hip protectors
• No impact on use of bedrails
In conclusion

• The monthly administration of a fall risk assessment tool in nursing homes did not result in a reduction of fallers and fall-related consequences.

• The use of a risk assessment tool should be avoided since it has no clinical benefit but wastes scarce nursing resources.
COMMENTARY

Falls risk-prediction tools for hospital inpatients. Time to put them to bed?

DAVID OLIVER

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Address correspondence to: David OLiver. Email: D.oliver@reading.ac.uk
“As one of the authors of the most widely validated tool for use in hospital (STRATIFY) - still used in many hospitals - I am happy to recant. “

“Often, when I advocate that we should abandon the use of falls prediction tools, staff (...) become vexed. A prominent fellow researcher in this field labeled my advice as ‘unethical’ suggesting that this meant simply allowing patients to fall."

“However, unless we have an understanding of the limitations of such tools and the evidence for their use, this is a fool’s paradise. If we look after all older people in hospital better, it is likely they will fall less.”
Fall risk assessment tools:

"There is always an easy solution to every human problem - neat, plausible, and wrong."

Mencken HL, American journalist and essayist
Evidence indicates, that ...

• Currently available fall risk assessment tools do not work.
• Time spend for filling in the instruments should be re-allocated to patient care.
• Further flawed accuracy studies should be avoided.
• Implementation of fall risk assessment tools should be stopped unless their benefit is proven.
Thank you for the attention!