Video based in-home fall risk assessment

Greet Baldewijns
Why is fall risk assessment important?

- to identify persons with an increased fall risk;
- to identify possible risk factors;
- to facilitate the implementation of fall prevention strategies

Accurate fall risk estimation can be an important aid in the prevention of fall incidents.
When do we need to assess a person’s fall risk?

- At admission time;
- A change in a patient’s condition;
- Any addition or change in medication;
- High-risk patients need daily assessments;
- Immediately after a fall;

Fall risk assessment is an ongoing process.
How is fall risk currently assessed?

- checklists;
- timed – Get – Up – and – Go test;
- 10 meter step test;
- berg balance scale;
- five step test;
- functional reach test;
- ....
What are the shortcomings of these methodologies?

- artificial setting;
- test awareness;
- administered infrequently;
- snapshot;
- time-consuming;
- ...

There is a need for an automated fall risk assessment tool that can continuously monitor the fall risk of a person on a continuous basis.
Our approach - Concept

• Automating fall risk assessment:
  ➢ Gait speed used as primary predictor for:
    • hospitalization
    • decline in health
    • falls
  ➢ Measuring the time needed to perform the exact same transfer several times a day.
  ➢ Using real-life data acquired with cameras
Our approach – Measuring transfer times

- Predefined walking zone
- Automatic selection and measurement of the transfers several times a day during several weeks (4 participants)
Our approach – Results of one participant

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Sex</th>
<th>Home</th>
<th>Walking aid</th>
<th>Period</th>
<th>Events</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>75</td>
<td>F</td>
<td>Service flat</td>
<td>Walker, Cane, NA</td>
<td>12 weeks</td>
<td>444</td>
<td>AMACS</td>
</tr>
</tbody>
</table>
Who should review this data?

Nurse

Family members

General Practitioner

Physiotherapist

Other carers
Should they?

- Review data for each patient individually?
- Daily / weekly / monthly?
- When to intervene?

The system should automatically trigger an alert when the transfer times change significantly
Automatically triggering alerts - Concept

- Use Statistical process control (SPC) techniques:
  - Monitor a process and identify variations not inherent to the process
  - Define upper control limit, lower control limit and center line of control charts using median and std of first 2 weeks of data
  - An unusual source of variation results in a point outside the control limits which warrants investigation
Automatically triggering alerts
Using the Wii Balance Board to classify elderly people as fallers and non-fallers

- Use 4 Balance sensors to calculate COG of a person;
- Measure COG during 40 seconds
- Automatically classify a person as ‘healthy’ or as a person with an elevated fall risk
Questions?