

# Research to reduce falls in older people: the TRIL centre

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Falls are a major cause of disability, are the leading cause of mortality resulting from injury, and have a huge impact on health-care costs. 33–50% of people older than 65 years fall each year. Thousands of those fall at home, and more than 1000 die after falling down stairs.<sup>1</sup> Falls account for more than 80% of all injury-related admissions to hospital in that age group.<sup>2</sup> The cost to the NHS and Social Services is £981 million, and £600 million of that is for the over 75s.<sup>3</sup>

Older people, especially women, fear fracturing a hip after a fall, which is a major cause of morbidity and mortality, more so even than cancer or heart attack. Falls also lead to a loss of independence through disability and fear of further falls. Even a minor fall can cause older people to lose confidence in their ability to live independently.<sup>4</sup>

For years, interventions to prevent falls have been reviewed, providing many insights. A personalised multifactorial intervention strategy, such as strength and balance training, home hazard assessment, vision assessment, or referral and review of medication, reduces falls by around 30%.<sup>5</sup>

Do we have new ways to prevent falls and injury? Can technology identify an opportunity to intervene at an early stage and allow older people to remain independent longer, wherever they live?

The answer is yes. Imagine being able to assess an older person's risk of falling by how they walk across a room, the change in the height of their steps, or drops in blood pressure that cause dizziness or blackouts. The general practitioner could determine changes in the risk of falling with devices placed in the patient's home. This scenario may sound far-fetched but some of this technology is already being tested in the Technology Research for Independent Living (TRIL) Centre, in Ireland.

The TRIL Centre at St James's Hospital in Dublin, Ireland opened in August 2007, and is jointly funded by Intel and the Industrial Development Agency, Ireland. It takes a holistic approach to research into the three aspects of ageing—falls prevention, cognitive function, and social connection. These factors are crucial to older people maintaining independence,

and are the areas in which researchers believe that technology could make a difference.

This research centre has a multidisciplinary team of about 70 medical and technological researchers. The falls prevention strand aims to uncover the underlying mechanisms of falls to allow early intervention. We have recruited more than 500 older people, including those who have fallen, have signs of cognitive impairment, and are lonely and isolated.

Our tests range from monitoring blood pressure and motor function to visual acuity. Clinicians evaluate how participants walk across a mat embedded with sensors that detect their gait, stride, and sway. Additional data is captured by a video camera that tracks movements while walking. To evaluate postural stability, participants are given a Berg balance test, which measures how well they perform tasks such as standing on one leg, getting up from a chair, and turning around. Blood pressure is monitored closely during a 6-minute walk test; this information is particularly

useful for patients with a history of dizziness or blackouts. Finally, a physiotherapist assesses balance and muscle strength.<sup>6</sup>

At the beginning of 2009, 2 years into its three-year research initiative, we had completed in-depth clinical assessments on 600 people. In the autumn of 2008, we began in-home trials of technology prototypes. Clinical assessments in the TRIL Clinic have enabled us to identify unique behavioural markers for common health problems that inhibit the ability of older people to live independently. For example, preliminary data suggest that a slowing walking pace or weakening grip strength are two indicators associated with higher likelihood of falling.

Pilot schemes using related technology have begun. We have developed an open-source, free software called BioMOBIUS to explore new technologies to prevent falls. We use a small wireless sensor called SHIMMER to help with with gait analysis. Other apparatus such as sensor-infused walkways, measure the

weight, angle, and pressure of a person's steps and so measure changes in gait that could help predict and prevent a fall.

Our research could have a positive effect on falls prevention and on the lives of older people. We have also had very positive feedback from our participants on their experience with our study.<sup>6</sup> Early results are highlighting further areas for investigation. Publications of analyses of data collected are listed on the TRIL website ([www.trilcentre.org](http://www.trilcentre.org)).

We welcome interest from all stakeholders including health-care providers, researchers, and patients' groups. Please contact us if you are interested in using TRIL technology for research, piloting new models of health care, joining the TRIL consortium, or supporting research into independent living technology.

## References

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