Predicting in-hospital falls in the elderly population

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Falls in older people are a major public health concern in terms of morbidity, mortality and the cost to health and social services. In the community, 30% of people over the age of 65 years fall each year. This rate rises to 40% of those over 80 years of age. Recurrent falls are associated with increased mortality, increased rates of hospitalisation, curtailment of daily activities, increased fear of falling, loss of confidence, higher rates of institutionalisation and mortality. The latest guidance from the National Institute for Health and Care Excellence indicates 'There is little detailed information regarding the precise events leading to inpatient falls. The majority of falls in hospital occur unobserved or the witness accounts are inadequate to give insight into the mechanics of falling and resultant injury.'

In response to this we aim to investigate the use of sensing technology in a hospital environment. Examples include wearable devices such as ECG and accelerometers, pressure sensors in chairs and beds and video surveillance in wards. This will enable us to relate behavioural monitoring e.g. getting out of bed frequently, with physiological monitoring e.g. change in heart rate. A large amount of data from a range of sources will be collected and so there are considerable challenges in relating this to falls prediction.

The project will involve implementation of sensing systems with a particular emphasis on the application of machine learning techniques to providing a decision support system for clinicians. One challenge is that a high false alarm rate will result in clinical staff no longer making use of the technology. It is likely that a combination of advanced data analysis methods will be required, including supervised, semi-supervised and unsupervised approaches, data aggregation techniques, and uncertainty handling, although the methodologies adopted will be dependent on the actual data collected. The project will involve close collaboration with the falls prevention team at Nottingham University Hospitals Trust.

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