Pilot study into impaired judgement, self-toileting behaviour in fallers and non-fallers

Daniel K. Y. Chan · Eric Diu · K. Florence Loh ·
M. Hossain · Dev Verick · Huong Van Nguyen

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Abstract Falls are a significant cause of morbidity and mortality in older people. There is an increased frequency of falls in older adults with cognitive impairment and dementia which may be due to impaired judgement of self capability to mobilise safely. This case control study assessed 53 Aged Care subjects aged 75+ years that were hospitalised post fall, from January 2008–December 2009, and compared these subjects' responses to those of 26 non-fallers to a standard question: 'While you are in the hospital, what would you do if you need to go to the toilet later?' This hypothetical scenario question was designed to assess judgement based on self-toileting behaviour and mobility. The study group and control group were similar in age (83.9 ± 4.7 vs. 82.0 ± 4.6 years respectively, $p = 0.081$) but the study group had statistically lower MMSE results when compared to controls (median 23 vs. 26.5 respectively, $p = 0.031$). Impaired judgement, defined as an unsafe/inappropriate response to the scenario question, was significantly more prevalent in the study group (fallers) compared to the control group (non-fallers) (41.5 vs. 15.4 %, $p = 0.020$). Impaired judgement was also more common with lower MMSE scores with 80.9 % of unsafe/inappropriate responses given by participants with MMSE of ≤ 20 . The authors suggest there may be an association between impaired judgement, evidenced by responses to a standardised question, and falls history in older subjects, particularly in those with cognitive

impairment or dementia. Ultimately, this may lead to identification of people at increased risk of falls and possibly effective falls prevention strategies in this population.

Keywords Older adults · Inpatients · Dementia · Falls

Introduction

Falls are a common health problem amongst older people and are associated with significant morbidity, mortality and health care costs (Tinetti et al. 1988). There is strong evidence that people with dementia or cognitive impairment are at risk of falls and associated adverse outcomes (Chen et al. 2010; Guo et al. 1998; Van Doorn et al. 2003). This applies to hospital settings, residential aged care facility and community. In hospital, patients with dementia or cognitive impairment are found to have higher falls risk (Chen et al. 2010). Older people with cognitive impairment are also over-represented amongst patients who sustain falls resulting in hip fractures (Guo et al. 1998). In residential aged care setting, the fall rate is also higher amongst residents with dementia versus without (Van Doorn et al. 2003). In one prospective study of older adults with a history of falls living in the community, the adjusted odds ratio for falls in people with dementia was reported as 5.0 when compared to those without dementia (Blake et al. 1988). There is evidence that preventing falls in older people who do not have cognitive impairment or dementia is possible through the use of multi-factorial falls risk assessments and exercise programs (Chang et al. 2004). Whether these multi-faceted interventions are effective in people with dementia is less certain.

The increased falls risk seen in older people with dementia is incompletely understood. It is known that older

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D. K. Y. Chan · H. Van Nguyen
University of New South Wales, Sydney, NSW, Australia

D. K. Y. Chan (✉) · E. Diu · K. F. Loh · M. Hossain ·
D. Verick · H. Van Nguyen
Bankstown-Lidcombe Hospital, Bankstown, NSW, Australia
e-mail: daniel.chan@sswahs.nsw.gov.au

people with dementia or cognitive impairment may have greater impairments in gait and balance (Franssen et al. 1999). We are especially interested to follow on our previous investigation which found that patients with low mini-mental status examination (MMSE) scores were at high risk of falls or recurrent falls in the hospital setting (Chen et al. 2010). This is of particular importance as falls in the hospital may lead to legal mitigation and adverse outcomes. Detecting falls risk in cognitively impaired patients may not be easy as these patients may not be ‘able to comply’ with tedious screening tools.

The first aim of our pilot case–control study is, therefore, to examine whether judgement of toileting safety using a hypothetical scenario question designed to test the study participants’ perception of their fall risk pertaining to a common self care activity: ‘while you are in hospital, what would you do if you need to go to the toilet later’ differentiates between fallers and non-fallers. The content of the scenario question was based on the results of an audit indicating a high proportion of falls had occurred while patients at risk of falls attempted to ambulate to toilet by themselves.

The second aim of our study is to examine if the association between impaired judgement and fall history is different for people with low and high MMSE scores. This second aim was to help us develop a simple screening strategy to identify patients with dementia or cognitive impairment at risk of falls in the hospital setting. If successful, it would be expected that the association of impaired judgement and falls history is stronger in the cognitively impaired group (low MMSE) when compared to non-impaired group (high MMSE).

Methods

This prospective pilot study was conducted at the Bankstown-Lidcombe hospital, a 426-bed teaching hospital, located in south western Sydney, NSW, Australia. From January 2008–December 2009, 53 older patients admitted under the Aged Care service following a fall were recruited at random intervals to be in the study group and a group of 26 Aged Care inpatients who did not fall were also randomly chosen to be the control group giving an approximate 2:1 ratio of cases to controls. The exclusion criteria were as follows: participants aged younger than 75 years, bed-bound status, delirium, haemodynamic instability, reduced level of consciousness and non-English speaking patients. After preliminary analysis the unsafe/inappropriate responses to the scenario question amongst study group were found to be 41.5 % (22 of 53 patients). Half the number of subjects in the control group is required (i.e. ratio of 2:1) assuming that the percentage of unsafe/inappropriate response was less than that of study control

by 30 %, the sample size of 52 cases and 26 controls would have 80 % power to detect a significance level of 0.05.

Eligible patients were invited to participate in the research project by the following procedures.

The purpose of the study was explained to either patient (if mentally competent), or ‘person responsible’ or legal guardian (if mentally not competent). Explanation was given regarding why the patient was chosen—‘because of the presentation of a fall’ (or as ‘control’).

Explanation was also given that participation was voluntary and if agreeable, a consent form would be signed. That the study might not bring direct benefit and that confidentiality would be kept were explained. We also explained that we would analyse and publish the result and that any concern was to be directed to the Chief Investigator of the study.

To ensure uniformity in the administration of the interviews, the interviewers who were Aged Care advanced trainees and ward nursing staff received training on how to conduct the interview and interpret the findings.

The study group and control group were given an introduction on self-toileting behaviour and risk of falls in hospital by interviewers and the content was based on the results of an audit indicating a high proportion of falls had occurred, while patients at risk of falls attempted to ambulate to toilet by themselves. The participants were also provided with their usual walking aid(s) and the hospital call bell as part of the introduction. They were then administered the scenario question: ‘While you are in the hospital here, what would you do if you need to go to the toilet later?’ The replies were then analysed according to whether safety issues were considered by the participants.

Two categories of reply were considered. For example, if a participant was deemed unsafe to mobilise without assistance as judged by ward physiotherapists, but elected to answer that he/she would go to the toilet alone, then this would be regarded as an ‘unsafe/inappropriate’ reply. In this instance, a reply that indicates the person would seek help would be considered a ‘safe/appropriate’ answer. On the other hand, if a participant was deemed safe to mobilise alone by the ward physiotherapists, but elected to answer that he/she would seek help/or would go alone to the toilet, then both of these would be ‘safe/appropriate’ answers. For participants that gave ‘uninterpretable’ answers or answers that did not indicate a definite choice, these were also considered ‘unsafe/inappropriate’ replies. Given that the sample size was small, decision was made not to separate unsafe or inappropriate replies into different categories.

Other data collected included age, gender, presenting diagnosis, number of medical co-morbidities and number of regular medications. The number of medical co-morbidities includes only chronic medical conditions. This information together with regular medications was available on the

inpatient medical records. A MMSE was performed as a screening test for dementia and was carried out by staff independent from those administering the ‘self-toileting’ scenario.

The MMSE scores were arbitrarily categorised as follows: ≤ 20 , 21–24 and > 24 indicating different degrees of cognitive impairment, respectively. All data collected were de-identified and kept in a secure format.

Chi square tests were used to compare the differences between proportions of two designated groups (i.e. study vs. control) for categorical variables. Mann–Whitney U test was used for comparing medians of the two groups for continuous non-parametric data. A difference was considered significant when the p value was < 0.05 . SPSS statistics version 15.0 (SPSS Inc., Chicago, Illinois) was used to perform these analyses.

The study was approved by the Sydney South West Ethics Committee, which is the Area Health Service of the study hospital.

Results

The baseline characteristics and results of cognitive testing are summarised in Table 1. The study group and the control group were similar in age (83.9 ± 4.7 vs. 82.0 ± 4.6 years, respectively). The study group had a fall as a presenting problem whereas in the control group the presenting diagnoses were musculoskeletal/rheumatological in 10 (38.5 %) of participants; gastrointestinal in 8 (30.8 %); cardiac in 2 (7.7 %); vascular diseases in 2 (7.7 %); neurological in 2 (7.7 %), respiratory in 1 (3.8 %) and skin condition in 1 (3.8 %). The study group had statistically lower MMSE (median 23, interquartile range 19–27) when compared to controls (median 26.5, interquartile range 23.5–28.25) with $p = 0.031$. The proportion of patients with MMSE scores of > 24 was also lower in the study group compared to the control group. The number of medications did not differ significantly between the two groups, but the control group had more medical co-morbidities than the study group. (Table 1).

Impaired judgement, defined here as an unsafe/inappropriate response to the aforementioned scenario question, was significantly more prevalent in the study group (fallers) compared to the control group (non-fallers) (41.5 % vs. 15.4 %, $p = 0.020$) (Table 2). Furthermore, impaired judgement was increasingly common with lower MMSE scores with 17/21 (80.9 %) of participants with MMSE ≤ 20 giving an inappropriate response. Amongst patients with a low MMSE, (≤ 24) people with inappropriate/unsafe responses were more likely to be fallers than non-fallers ($p = 0.064$) (see Table 3). For those with MMSE > 24 , the scenario question was less likely to differentiate fallers

from non-fallers with 21/23 (91.3 %) of the study group (fallers) and 17/19 (89.5 %) of the control group (non-fallers) giving an appropriate response.

Discussion

These pilot results suggest that impaired judgement is frequently seen amongst older people who present to hospital with falls. Furthermore, impaired judgement was shown to be more frequent in fallers compared to non-fallers with cognitive impairment or dementia. A plausible underlying mechanism for this association is that in addition to gait and balance problems, known to be more prevalent in this group of older adults, impaired judgement results in a further increase in falls risk. That is, impulsivity and the inability to appreciate the significance of environmental feedback and potential hazards compounds with impaired judgement, reducing the ability to make a sound decision whether it is safe for them to walk by themselves.

There is limited supportive evidence available, but one study looking at patients with right hemispheric strokes did show that impairments in response inhibition were an independent predictor of falls (Rapport et al. 1993). It has also been shown albeit in otherwise healthy older adults, that abnormalities in measures of response inhibition, attention, and problem solving were significant predictors of difficulty in performing an obstacle avoidance task (Persad et al. 1995). Other studies also examined the role of executive function and gait stability or falls risk. (Ijmker and Lamoth 2011; Herman et al. 2010; Sheridan and Hausdorff 2007). In a prospective study, participants who reported no previous falls, but were in the worst executive function quartile were three times more likely to fall during the 2 years of followup, and they were more likely to transition from non-fallers to faller sooner (Herman et al. 2010).

In addition to a possible association between impaired judgement and falls, we suggest that impaired judgement may actually be a predictor of falls in this population. Therefore, screening for impaired judgement, through clinical assessment or standardised questions could potentially identify older people who are at increased risk of falls. Ultimately, this may lead to effective falls reduction strategies.

As this was planned as a pilot study, inherent limitations to our study include a small sample size and case control design. Nevertheless, it is reasonable to conclude that this study does suggest an association between an inappropriate response to a judgement scenario and a history of falls when compared to no history of falls, particularly in those with markedly reduced MMSEs. Further research with a larger sample, a prospective cohort study design with a

Table 1 Participants' characteristics

Characteristics	Case (<i>n</i> = 53)	Control (<i>n</i> = 26)	<i>p</i> value
Age (years) (mean ± SD)	83.9 ± 4.7	82.0 ± 4.6	0.081
Males (%)	30.2	30.8	0.958
Number of medications (median and interquartile range)	8 (5–10)	7 (4–9)	0.533
Number of co-morbidities (median and interquartile range)	5 (3–5)	6 (5–11)	0.001
MMSE (median and interquartile range)	23 (19–27)	26.5 (23.50–28.25)	0.031
MMSE category <i>n</i> (%)			
10–20	16 (30.2 %)	5 (19.2 %)	
21–24	14 (26.4 %)	2 (7.7 %)	
25–30	23 (43.4 %)	19 (73.1 %)	

Table 2 Participants' responses to the self-toileting questionnaire

Categories of responses	Case (<i>n</i> = 53)	Control (<i>n</i> = 26)	<i>p</i> value
Unsafe/inappropriate (<i>n</i> , %)	22 (41.5 %)	4 (15.4 %)	<i>p</i> = 0.020
Safe/appropriate (<i>n</i> , %)	31 (58.5 %)	22 (84.6 %)	

Table 3 Responses to self-toileting questionnaire in patients with MMSE ≤24

Categories of responses	Case (<i>n</i> = 30)	Control (<i>n</i> = 7)	<i>p</i> value
Unsafe/inappropriate (<i>n</i> , %)	20 (67 %)	2 (29 %)	<i>p</i> = 0.064
Safe/appropriate (<i>n</i> , %)	10 (33 %)	5 (71 %)	

followup period for actual falls is warranted to confirm this association and perhaps lead to preventative strategies.

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