Comparison of retrospective interviews and prospective diaries to facilitate fall reports among people with stroke

SIR—Monitoring falls is an important aspect of stroke rehabilitation. Retrospective methods include face-to-face or telephone interviews, postal questionnaires and medical note reviews [1–4]. Prospective methods include post cards, medical records, diaries and calendars as well as surveillance systems [1, 5–7]. Although prospective methods are considered preferable [1, 8, 9], it remains difficult to ascertain the accuracy of reporting methods as both may lead to over- or under-reporting [8, 10–17] and many factors influence recall [1, 8, 18–20].

Recall of falls in the previous year has reasonable sensitivity (80–89%) and specificity (91–95%) [5, 11, 16, 18] but recent studies have advocated short recall periods and intensive prospective (weekly or monthly) follow-up over longer periods [1, 5]. Little is known about the accuracy of fall reports among people with stroke. The present study examined the agreement between two fall-reporting methods (retrospective interviews and prospective fall diaries) over a 12-month period.

Methods

This study formed part of a larger project predicting fall risk among stroke patients [21]. Ethical approval was obtained from the Southampton and South West Hampshire Local Research Ethics Committee. Consecutively hospitalised patients were recruited if they were independently mobile prior to stroke, able to give consent: those who failed a cognitive function test [22] which might have affected fall recall, were excluded. Two researchers carried out assessments: the first carried out tests of balance, function, mood and attention and was kept blind to participants’ fall status; the second collected data concerning falls, the focus of this paper.

Retrospective falls data were collected during an interview with participants and significant others at 12 months following discharge from hospital to the community, using an interview schedule [23]. Over the same time period, prospective falls data were self-completed in a diary: participants (and significant others) were asked to record falls as and when they occurred and were reminded to do so by regular telephone calls and letters. We defined a fall as an event that resulted in a person coming to rest unintentionally on the ground or other lower level, not as a result of a major intrinsic event or overwhelming hazard [24]: participants were asked to adhere to this definition when reporting falls for either method. Participants were classified as fallers if they experienced one or more falls and as repeat fallers if they experienced two or more.

Agreement between the retrospective and prospective methods of collecting numbers of falls was examined using kappa statistics and Bland and Altman limits [25], which give a range of values in which the difference is expected to lie 95% of the time. Response and falling rates are presented with 95% confidence intervals calculated in CIA [26]

Results

Of the 122 participants recruited to the main study, retrospective falls information during the 12-month period following hospital discharge was available for 112 (93%, confidence interval 85–95%). Of these, 62 (55%, confidence interval 46–64%) reported one or more falls, and 45 (40%, confidence interval 32–49%) reported repeat falling. Using the prospective diary method, data for 76 (62%, confidence interval 53–70%) cases were available. Missing prospective information was due to the diary being lost (n = 26), death (n = 4) and no reason was recorded for the remaining 16.

References

[1, 5, 11, 16, 18]
There were no participants with prospective but not retrospective information on falls and hence 76 cases were included in the comparison of the retrospective and prospective methods. On average they were aged 70 years; had spent 11 (median 9) weeks in hospital; and two-thirds were male. Their characteristics with respect to age, gender, stroke type, length of hospital stay and retrospectively collected falls were similar to the entire group (see Supplementary data available in Age and Ageing online).

On first observation, the retrospective method resulted in a higher mean number of falls than the prospective method (5.9 vs. 1.7) though the median number of falls (1) was the same from both methods. There was a slightly higher percentage reporting one or more falls (61 vs. 57%) than two or more falls (41 vs. 41%) from the retrospective compared with the prospective method. The high mean (5.9) number of falls from the retrospective method was due to two participants who reported 100 and 200 falls retrospectively but no falls prospectively. These participants were falling on a frequent basis in the same circumstances but did not record these events in their diaries. In Figure 1, the Bland and Altman plot of the retrospective minus prospective difference in number of falls against their average is shown after excluding the two outliers, and there is then little difference between the two methods (retrospective minus prospective mean difference = 0.23, SD = 2.46). The Bland and Altman limits of agreement were −4.7–5.2, indicating that after excluding outliers, the remainder tend to give numbers of falls that are within 5 of each other.

Excluding outliers, the total number of falls reported was 182 (Table 1): of these 54 falls were reported retrospectively but not prospectively, and 37 prospectively but not retrospectively. In terms of number of participants involved, 16 reported excess retrospective falls, and 18 excess prospective falls (the remaining 40 reported the same number by both methods). In terms of the falls classification, the number of discrepancies was lower with only 8 classified as a faller retrospectively but not prospectively and 5 in the opposite direction, thus the methods agreed for 83% of participants with $\kappa = 0.6481$ indicative of good agreement. There were nine participants with discrepancies in each direction with respect to the classification as a repeat faller, and $\kappa = 0.5097$ is indicative of only moderate agreement.

**Discussion**

In this study, fall information was collected both retrospectively during interviews and prospectively using diaries by 76 people with stroke in the year following hospital discharge. When outliers were excluded, the Bland and Altman limits of agreement indicated that the two methods are unlikely to differ by more than five falls. Even though the total numbers of falls reported were similar, they comprise 91 falls reported by both methods, and a further 91 reported by one method only (54 during interviews and 37

![Figure 1. Bland and Altman plot comparing fall reports from retrospective interviews and prospective diaries (excluding outliers).](image)

**Table 1. Cross-tabulation of falls and participants reporting falling by the retrospective vs. prospective methods**

<table>
<thead>
<tr>
<th>Number of falls excluding two outliers*</th>
<th>Prospective</th>
<th>Reported</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrospective</td>
<td>Not reported</td>
<td>0</td>
<td>37 (18 participants)</td>
</tr>
<tr>
<td></td>
<td>Reported</td>
<td>54 (16 participants)</td>
<td>91 (40 participants)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>54</td>
<td>128</td>
</tr>
<tr>
<td>Numbers reporting falling (agreement 63/76, 83%, $\kappa = 0.6481$, $P = 0.000$)</td>
<td>Non-faller</td>
<td>Faller</td>
<td></td>
</tr>
<tr>
<td>Retrospective</td>
<td>Non-faller</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Faller</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>33</td>
<td>43 (57%)</td>
</tr>
<tr>
<td>Number reporting repeat falling (agreement 583/76, 76%, $\kappa = 0.5097$, $P = 0.000$)</td>
<td>Non-repeat faller</td>
<td>Repeat faller</td>
<td></td>
</tr>
<tr>
<td>Retrospective</td>
<td>Non-repeat faller</td>
<td>36</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Repeat faller</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45</td>
<td>31 (41%)</td>
</tr>
</tbody>
</table>

*Calculated under the assumption that falls reported by a participant by both methods are the same events.
in the diaries). Relative agreement between the two methods in the general population has been reported by some [15, 16], but others reported greater disparities [18].

One major difference between the two methods in our study was the percentage for which data were available: 92% from the interviews, but only 62% from the diaries. Leaving the diary with people for the 12-month follow-up period was a limitation of the study design, in spite of the telephone and postal reminders: collecting the diaries in person or asking people to send them in on a monthly basis might have avoided this problem. Another potential problem with the retrospective method was that two people who reported frequent falls in the same or similar circumstances during the retrospective interview did not bother to fill in their diaries possibly because they considered these falls to be an almost ‘normal’ occurrence. This led to a vast discrepancy in the total number of falls reported but also highlighted that face-to-face prompting can produce a more complete picture of patterns of falling in a small percentage of people.

Though expert consensus has been reached recommending daily recording, continued surveillance of documentation and collection of circumstances of falls at least once per month for research studies [13], this combination of methods is too labour and time intensive for clinical settings. Even collecting fall information using prospective diaries combined with follow-up phone calls as utilised in the present study is not recommended for clinical settings, being costly in terms of manpower and time. If the time and money is available to collect prospective fall information, we recommend that regular face-to-face follow-up interviews are included in addition, to identify those who experience falls (particularly those with frequent falls) but fail to record them in their diary. On the basis of the findings from this study, we can recommend that structured retrospective interviews will yield acceptable results for most cases.

Key points
- More participants yielded information on falls from the retrospective interview than from self-completed diaries.
- Frequent repeat fallers reported falls during the interview but did not record all falls in the diary.
- Excluding outliers, a similar number of falls were reported using either method.
- There was an 83% agreement in the classification of fallers between the two methods.

Supplementary data
Supplementary data mentioned in the text is available to subscribers in *Age and Ageing* online.

Conflicts of interest
None declared.

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DORIT KUNKEL1,*, RUTH M. PICKERING2, ANN M. ASHBURN1
1Faculty of Health Sciences, University of Southampton, Southampton, UK
2Public Health Sciences and Medical Statistics, University of Southampton, Southampton Hampshire, UK
*To whom correspondence should be addressed

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Longitudinal changes in serum lipids in older people The Turku Elderly Study 1991–2006

SIR—Serum lipid levels are related to age. In previous cross-sectional [1–5] and prospective [6–10] studies, total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-c) gradually increase after adolescence until the age of 60–65 in men and 70–75 in women, and thereafter start to decline. High-density lipoprotein cholesterol (HDL-c) and triglycerides change less during adulthood [1], but in cross-sectional reports HDL-c tends to be higher in old age-groups [4, 11]. Existing data on the longitudinal changes of HDL-c in the elderly is rather inconsistent [8, 9, 12, 13].

With advanced age, the role of serum lipids, in determining the risk of cardiovascular and total mortality becomes more complex due to multiple illnesses and frailty [14–16]. Previous cohort studies have reported an inverse relationship between TC and mortality [16–18]. However, HDL-c has shown to be an important and independent predictor of cardiovascular risk and survival in the elderly [19–21].

The aim of this population-based study is to describe age-related changes in lipid values of elderly home-dwelling subjects, who are not using lipid-lowering drugs.

Methods

Study population is derived from a prospective cohort study, the Turku Elderly Study. The cohort consisted of home-dwelling citizens of Turku (Southern Finland), who were 70 years old at baseline. During the follow-up from January 1991 to March 2006, the cohort of 1,032 elderly went through three clinical and laboratory examinations, which provided eligible lipid values for this study. All subjects who used lipid-lowering drugs or had missing values in their lipid panel were excluded. At baseline, first follow-up (2001), and second follow-up (2006), there were, respectively, 956, 492 and 221 lipid measurements available for the analyses. Longitudinal changes in the lipid values of those 221 persons (73% women), who participated in all three examinations are the main outcome in this study. The study protocol was approved by the ethics committee of the Hospital District of Southwest Finland. (A detailed description of the study protocol is provided elsewhere [22].)

Venous blood samples were obtained after a 12-h overnight fast. TC, HDL-c and triglyceride levels were measured from fresh blood specimens in the laboratory of Turku City Hospital. TC and triglycerides were determined by a standard enzymatic method. LDL-c was calculated with the Friedewald formula for those whose triglyceride level was <4 mmol/l [23]. HDL-c was determined by polyethylene glycol precipitation method at baseline, and by direct enzymatic method at the follow-ups, which may result in approximately 5% rise in HDL-c values between baseline and the follow-up examinations. (Berlin M, Turku City Hospital laboratory, personal communication.)

Changes in lipid values between adjacent examinations were calculated as 10-, 5- and 15-year change. Variance analysis was used to assess the statistical significance of changes over time and differences between the sexes. Multiple regression models were used to search for confounding factors that might have influenced the lipid values. All analyses were performed with the NCSS 2007 statistical package.

Results

Average serum levels of all four different lipids are presented in Table 1. Women had significantly higher TC,