Research letters

- Drug prescriptions in the elderly should consider the adverse cognitive effect of drugs with anticholinergic actions.

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Conflicts of interest

None. No commercial company sponsored or played any role in the design, methods, subject recruitment, data collections, analysis and preparation of paper.

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References


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Practicality, validity and sensitivity to change of fear of falling self-report in hospitalised elderly—a comparison of four instruments

Sir—The assessment of fear of falling (FOF) has considerably improved over the last decade [1, 2]. Global single-item measures (‘Are you afraid of falling?’) have been replaced by newer tools that are capable of detecting falls-related self-efficacy, such as the Falls Efficacy Scale (FES) [3] and FES-International (FES-I) [4, 5] or of detecting balance confidence such as the Activities-specific Balance Confidence Scale (ABC-Scale) [6]. The range of activities in these instruments allows for a more detailed view and a better measurement of change [1]. However, some of the items of these
tools cannot be easily transferred to an inpatient setting (e.g. ‘going out to social events’ or ‘sweeping the floor’) although hospitals integrated these instruments in their geriatric assessment and researchers included them in clinical studies of hospitalised [7–9] and institutionalised [10, 11] patients. Additionally, as pointed out in a recent review, practicality and feasibility are rarely reported despite the fact that they are critical for the translation of assessments into everyday practice [1]. Therefore, in the present study, psychometric properties are compared alongside with practicality issues for four measures of FOF: a global rating with a dichotomous answer format, a global rating with a polytomous 11-point answer format, the Short FES-I [12] and the full FES-I [4, 5]. The short version of the FES-I has been published only recently and has the potential for improving the feasibility of FOF assessments in a clinical setting.

Methods

Participants and design

We conducted a prospective observational trial with geriatric inpatients at a rehabilitation clinic in Germany. The exclusion criteria were inability to walk, severe communication problems, inability to comply with simple instructions and serious adverse events during the stay. Patients were assessed on admission, at discharge and 4 months later at home. One hundred fifty-six patients were included in the practicality analyses. For the evaluation of psychometric properties including sensitivity to change, patients were excluded from the analysis if they did not understand the FES-I or if more than four items were missing (n = 32), leaving n = 124. n = 99 patients were analysed for predictive validity and sensitivity to change (n = 25, lost to follow-up at a 4-month follow-up at home). Reasons for loss to follow-up were withdrawal of consent (n = 16), institutionalisation (n = 6) or death (n = 5). The study was approved by the ethics committee of Ulm University (No. 181/06).

Measures

FOF was assessed using a single-item measure (‘Are you presently afraid of falling? Yes or No’) with a dichotomous global rating scale (D-GRS) and a polytomous 11-point rating scale (P-GRS) (‘Please rate your fear/concern of falling from 0 = no fear/concern at all to 10 = extreme fear/concern’). The FES-I was applied according to the manual available on the ProFaNE website [13]. The Short FES-I was not assessed separately, but was derived from the original version of the instrument.

The Brief Alzheimer Scale (BAS) [14] and Trail Making Test B [15] were used to measure cognitive and executive function.

Physical performance was measured using the short physical performance battery (SPPB) [16] and the function component of the abbreviated Late Life Function and Disability Instrument (SF-LLFDI) [17]. For the analysis of predictive validity, the disability component of the SF-LLFDI was also included.

Results

Baseline characteristics

For baseline characteristics of all three samples, please see Appendix 1 in the supplementary data at Age and Ageing online. In summary, at baseline (n = 156), the mean age was 81.7 years (SD 6.4) and n = 112 (71.8%) were female. Primary diagnoses were hip fractures (24.4%), musculoskeletal diseases including arthritis (25.0%), respiratory and cardiac disease (18.0%) and stroke (14.7%). The median BAS was 23 points (range 3–36). Physical function was considerably reduced (median SPPB = 4 points, range 1–12; median SF-LLFDI function component = 38 points, range 15–71). The median FES-I was 30 points (range 16–60) and the median Short FES-I 14 points (7–26). The median P-GRS was 5 points (0–10), while 62.8% rated themselves as being afraid of falling according to the D-GRS. There was no clinically relevant difference between samples.

Practicality

It took 3–10 min to complete the original FES-I and ~3–5 min to complete the short version (Table 1). Both single-item questions took ~1 min. Missing values were relatively prevalent in the original FES-I and less frequent in the Short FES-I (Table 1). There were only few missing values in both global ratings.

Ceiling and floor effects

FES-I and Short FES-I showed less floor effects (lowest possible values) than the P-GRS at admission and at discharge (Table 1). Floor effects were especially obvious at discharge where most patients had improved and, therefore, reported less FOF. Ceiling effects could only be seen with the P-GRS, while both FES-I versions demonstrated no or negligible ceiling effects.

Convergent validity

Assessments were compared to a performance-based measure of physical function (SPPB), a self-report measure of physical function (SF-LLFDI, function component) and to

Statistics

For the convergent and predictive validity estimates, Spearman correlation coefficients were calculated. Convergent validity refers to the degree to which a test score is similar to (converges on) other validated scores measuring a related construct. Predictive validity refers to a parameter’s ability to predict a related (or the same) construct in the future. For associations between ordinal and dichotomous measures, the biserial rank correlation [18] was calculated using a SAS macro [19]. Statistical considerations concerning data analyses in the appendices are attached to the respective appendix in the supplementary data at Age and Ageing online.

All statistical analyses were done using SAS 9.1 (SAS Institutes, Cary, CA, USA).
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Table 1. Practicality of compared instruments for inpatient assessment of fear of falling including ceiling and floor effects (n = 159)

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Practicality</th>
<th>Ceiling and floor effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Administration time</td>
<td>Did not understand (%)</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>FES-I</td>
<td>6 min (3–10)</td>
<td>14.3</td>
</tr>
<tr>
<td>Short FES-I</td>
<td>∼3–5 minb</td>
<td>11.8</td>
</tr>
<tr>
<td>P-GRS</td>
<td>1 min (1–2)</td>
<td>4.3</td>
</tr>
<tr>
<td>D-GRS</td>
<td>&lt;1 min (1–2)</td>
<td>1.2</td>
</tr>
</tbody>
</table>

a Did not understand at all or more than four items missing.
b Derived from original version, duration represents an estimation.
c Not available retrospectively.
d Not computable for a dichotomous item.

Table 1 demonstrates the practicality of compared instruments for inpatient assessment of fear of falling, including ceiling and floor effects. The FES-I and the Short FES-I were superior to the P-GRS concerning ceiling and floor effects. However, the administration time of the original FES-I and the fairly high number of missing values due to problems of patient refusing to or not being able to answer are of important concern in inpatients. The Short FES-I had comparably high convergent validity measures in hospitalised patients with respect to physical function and FOF. The single-item approaches (either dichotomous or polytomous) had less favourable, although still acceptable, scores. In our sample of hospitalised patients, we found high correlations of the Short FES-I with the full version, further supporting prior results in community-dwelling elderly [12].

When looking at predictive validity, there was little difference between the four assessment tools. The remarkably high point-biserial correlation of the dichotomous question with the full FES-I could be relevant for future clinical use: an algorithm which starts with a single screening item could certainly save time.

The trend towards a better performance of both efficacy scales with regard to sensitivity to change and discriminative validity (as shown in Appendix 2 available in the supplementary data at Age and Ageing online) supports their use when the assessment of change is indicated. In geriatric rehabilitation this is often the case because assessment of change in individual patients can be used for reimbursement, quality of care monitoring and continuous quality improvement.

The strength of the study is that, to our knowledge, it is the first one to directly compare different assessment options for FOF in a hospital setting. Additionally, we are supplying data on sensitivity to change, validity and importantly on essential practicality issues. Although practicality and sensitivity to change are infrequently reported as noted by Jørstad and colleagues in their review article [1], these measurements are of importance when trying to implement new assessment tools in busy clinical practice.

There are also some limitations to consider. The population studied was a convenience sample of inpatients at a geriatric rehabilitation unit, able to walk at baseline. Therefore, our conclusions should not be generalised. Regarding the two single-item questions, our comparison is limited, first, because of methodological problems when comparing measurements on different scales, and second, because of missing data for some instruments at certain measurement points.

Conclusion

To conclude, the Short FES-I is the best choice to measure FOF in inpatients if an assessment of change is required. Compared with the longer version, it is more practical with respect to administration time and missing values, while demonstrating comparable validity estimates. If the
Table 2. Criterion-related validity: convergent (measured at discharge) and predictive (correlation from admission to follow-up 4 months later back home in the community)

<table>
<thead>
<tr>
<th>Assessment</th>
<th>SPPBa</th>
<th>FESIb</th>
<th>SF-LLFDIc function</th>
<th>SPPBc</th>
<th>FESIc</th>
<th>SF-LLFDIfull score</th>
</tr>
</thead>
<tbody>
<tr>
<td>FES-Ia</td>
<td>−0.48</td>
<td>1.00</td>
<td>−0.77</td>
<td>0.45</td>
<td>0.62</td>
<td>−0.52</td>
</tr>
<tr>
<td>Short FES-Ia</td>
<td>−0.44</td>
<td>0.96</td>
<td>−0.73</td>
<td>0.46</td>
<td>0.62</td>
<td>−0.53</td>
</tr>
<tr>
<td>P-GRSb</td>
<td>−0.38</td>
<td>0.70</td>
<td>−0.63</td>
<td>0.51</td>
<td>0.45</td>
<td>−0.51</td>
</tr>
<tr>
<td>D-GRSb</td>
<td>−0.47</td>
<td>0.70</td>
<td>−0.61</td>
<td>0.43</td>
<td>0.71</td>
<td>−0.56</td>
</tr>
</tbody>
</table>

* Spearman correlation coefficient.
* Rank-biserial correlation coefficient.
* Correlations significant with P<0.001 in all cases.

SF-LLFDI = Short Form-Late Life Function and Disability Instrument; SPPB = short physical performance battery; FES-I = Falls Efficacy Scale-International; P-GRS = polytomous 11-point global rating scale; D-GRS = dichotomous 2-point global rating scale.

Key points
- The Short FES-I is more practical in hospitalised patients than the original version while maintaining good criterion-related validity.
- Both full FES-I and Short FES-I demonstrated sensitivity to change between admission and discharge in the hospital and between admission and follow-up.
- The single-item approaches (dichotomous or polytomous) show acceptable criterion-related validity estimates; they can be feasible in inpatient settings if the reduction of missing values is highly desirable.
- In order to reduce the considerable number of missing values when using both FES-I versions, an adaptation to hospital settings would be favourable.

Supplementary data

Supplementary data are available online at Age and Ageing online.

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References
7. Lannin NA, Clemson L, McCluskey A et al. Feasibility and results of a randomised pilot-study of pre-discharge occupational therapy home visits. BMC Health Serv Res 2007; 7:

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Conflicts of interest
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Associations and consequences of hypophosphataemia in older hospitalised women

SIR—Hypophosphataemia has been associated with increased morbidity and mortality in a number of patient groups, including patients on intensive care units [1], patients with respiratory tract infections [2], severe sepsis [3] and older patients [4]. Low phosphate has a number of adverse physiological effects, including myocardial depression, neuromuscular weakness, rhabdomyolysis, haemolysis, impairment of white blood cell function and decreased insulin sensitivity.

Most studies examining the association between low phosphate and mortality have focussed on patients with severe hypophosphataemia, sometimes defined as serum phosphate of <0.32 mmol/l (1 mg/dl) [5]. Very few studies have examined the effect of more modest degrees of hypophosphataemia or the occurrence of hypophosphataemia in older hospitalised patients [4]. Impaired homeostasis and lack of physiological reserve in old age suggest that older patients may not only be at high risk of hypophosphataemia but could be more susceptible to its adverse effects.

The aim of this study was to examine the prevalence of hypophosphataemia in a cohort of hospitalised older women, determine factors associated with low phosphate and examine the effect of hypophosphataemia on outcome in terms of mortality and length of hospital stay.

Methods

We studied consecutive admissions to a single Medicine for the Elderly assessment ward at Ninewells Hospital, Dundee, Scotland, from November 2004 to April 2005 inclusive. Female patients are admitted via the emergency department and medical admissions unit and undergo comprehensive geriatric assessment. From November 2004, ward policy was changed to perform magnesium and phosphate measurements on all new admissions to the ward. Tayside local ethics committee deemed that the study did not require formal ethics approval as it utilised existing data collected in routine clinical practice. Approval from the local statutory Data Protection Officer was obtained to access and use confidential patient data.

We prospectively collected biochemistry results on all admissions to the ward, and then performed retrospective notes review on the cohort a mean of 16 (range 7–28) months later. Data were abstracted from the notes by the authors using a standard proforma. Length of stay and date of death were also abstracted from the casenotes; death date is recorded on casenotes even if death occurs in the community. Charlson comorbidity score was calculated from casenote diagnoses [6]. Cognitive impairment was defined as an abbreviated mental test score of <8/10 [7] or a Folstein mini-mental test score of <25/30 [8].

Potassium and magnesium are important intracellular ions and low serum levels are commonly found in older people [9]. Disorders such as refeeding syndrome may cause serum levels of all three ions to fall. Potassium ion activity was measured indirectly by ion selective electrode on the core unit of the Roche P800 modular system. Magnesium was measured using a xylyl blue colourimetric end point methodology and phosphate was measured by ammonium molybdate to phosphomolybdate as an end point method (all Roche Diagnostics, Lewes, East Sussex, UK). The coefficient of variation for the phosphate assay was 2.3%.

Data were analysed using SPSS version 15 (SPSS, Chicago, USA). Hypokalaemia was defined as a potassium level of <3.5 mmol/l. Hypomagnesaemia was defined as a magnesium level of <0.7 mmol/l. Hypophosphataemia was defined as a phosphate level of <0.8 mmol/l. These cutoffs are those used by our local laboratory as population normal ranges.