not enhanced sufficiently to improve access to the material in the memory trace, on which accurate FOK judgements are based.Gammas for the SPT were significantly above chance for the old participants. Whilst the finding that gamma in older adults under the Read condition was not above chance replicates previous studies showing Episodic FOK was sensitive to age [13,16]. These results show for the first time that FOK accuracy can be improved in older adults, i.e. by improving memory, one can also improve metamemory. However, further research needs to address the influence of the FOK paradigm and the recognition paradigm used as these factors might influence the findings.

To conclude, this research could have implications for memory rehabilitation. Indeed, despite our findings not showing improved FOK accuracy in PD, there is evidence that by enhancing memory performance at encoding, we can improve metamemory in ageing. Evidence from clinical populations indicates that individuals who are more aware of their memory performance are more likely to benefit from memory rehabilitation [17]. In light of this, further research should examine whether enhancing metamemory in normal ageing can be extended to clinical groups. Finally, from a rehabilitation point of view, other memory-improvement techniques, as well as practice effects, should be assessed to improve memory awareness in clinical populations [18].

### Key points
- This study aims to investigate memory awareness (i.e. metamemory) using the FOK paradigm on a SPT in PD.
- The accessibility model [7] suggests that FOK accuracy is linked to the strength of the memory trace.
- Enactment improves memory in Parkinson's patients [9].
- Individuals who are more aware of their memory performance are more likely to benefit from rehabilitation [17].
- FOK accuracy was improved in older adults but not in PD patients on the SPT.

### Conflicts of interest
None.

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**Finding the right outcome measures for care home research**

SIR—The authors of this report conducted a cluster-randomised trial investigating the efficacy of a rehabilitation intervention on the functional independence and mobility of UK care home residents versus a control sample who received standard care [1].

When selecting outcome measures for the trial, it was relatively easy to identify self or proxy report activities of daily living (ADLs) and mobility measures that had well-
established psychometric properties with regard to this population and setting. However, the investigators and funders also identified a need for physical performance data as it was felt this would improve the quality of the study, providing more objective outcomes of physical parameters. Measures were chosen that had been used in previous care home studies or other community-dwelling elderly populations but not in UK care homes [2–6].

Consequently, this report will focus on the utility of the outcome measures selected and the implications of this for research in UK care homes. Future directions will also be proposed to ensure appropriate outcome measures are used with this population group in future trials.

**Method**

Primary outcome measures administered were the Barthel ADL Index [7] and Rivermead Mobility Index (RMI) [8]. The Barthel Index (BI) is scored on a scale of 0 to 20 with a higher score indicating greater independence. The RMI is hierarchically scored from 0 to 15 with a higher score indicating greater mobility.

Secondary outcomes were the ‘Timed Up and Go’ (TUG) test [9] and hand grip dynamometry, included to provide physical performance outcomes of mobility and strength, respectively. The Falls Efficacy Scale (FES) [10] was used to assess fear of falling during ADLs. The FES is scored from 10 to 40 with higher scores indicating greater fear of falling. Finally, calcaneal ultrasound densitometry was conducted to assess changes in bone density.

Outcome measures were conducted by two blind independent assessors at pre-intervention, immediately post 3-month intervention and at a further 3-month follow-up time-point to assess immediate and maintained effects of the intervention. All assessments were conducted in the care home environment.

Full details of the methodology can be found in the main cluster-randomised trial paper [1]. The trial was funded by the Health Foundation and the Stroke Association. Oxfordshire and South Birmingham NHS Research Ethics Committees granted ethical approval.

**Results**

Response rates and results are presented with respect to study group in Table 1, for primary and secondary measures that were included in the assessment battery used in the cluster-randomised trial [1]. A total of 128 residents were recruited to the intervention (with median cluster size 11) and 121 to the control (with median cluster size 8). Missing data on BI and RMI were due to losses to follow-up, with overall percentage losses ranging from 3% at pre-intervention to 25% at 3-month post-intervention follow-up. In comparison, across these same assessments, percentage missing values ranged from 53 to 72% on FES, 36 to 53% on Hand Grip Test and 45 to 61% on the TUG test.

**Discussion**

The high completion rates and absence of floor and ceiling effects support the utility of the primary outcomes for use with this population. This was expected since their choice had been based on previous research demonstrating good measurement properties in similar populations [11–15]. However, it is evident from the results table that response rates were low for the secondary outcome measures, across all assessment time-points (in some cases as low as 12%). Such low response rates suggest that these measures are inappropriate for use in the specific population used in the cluster-randomised trial. There were several reasons for this including the time taken to complete the task (e.g. one participant took 418 s to complete the TUG), level of difficulty to understand the task and in some residents, an inability to complete the task due to physical or cognitive impairments. The primary outcome measures have demonstrated reliability when completed by proxy [16,17] in situations where factors precluded residents’ self-completion. However, secondary outcomes were left missing as there was no possible way of obtaining these data.

Cognitive impairments and physical limitations precluded many residents from completing the performance-based measures. Cognitive impairments greatly restricted participants’ ability or made it impossible for them to follow the instructions to complete the TUG, hand grip strength test and calcaneal ultrasound densitometry, which requires maintaining the foot in a set position for a prolonged period of time. In addition, physical limitations meant that some participants were unable to attempt the TUG and Hand Grip Test measures, whilst severe oedema in a large proportion of residents prevented their ankle fitting into the scanner thereby precluding measurement. Participants who were cognitively impaired, as assessed by the Mini-Mental State Examination [18] prior to pre-intervention assessments, had all patient-report measures completed by a proxy. The FES does not lend itself to proxy completion as it assesses self-perceptions of fear of falling, hence the high percentage of missing data. In addition, many of the residents who did respond scored the lowest value on the scale or close to it, suggesting a floor effect. A major contribution to this occurrence was that many residents reported no fear of falling whilst conducting functional activities, such as bathing, because they get help from carers, often as a result of care home policy. This situation contrasts with findings in non-institutionalised populations with similar characteristics, such as the community-dwelling elderly population from which the scale was derived [19], and could be attributed to institutionalised risk assessment.

From the observations discussed above, it is evident that it can be difficult to select appropriate outcome measures for use in certain populations, especially those such as care home settings, in which there are few studies published on the validity of instruments to measure specific attributes in a UK setting. The secondary measures used in the cluster-randomised trial [1] were selected because they were the only
outcome measures available with some evidence of suitability for assessment of physical performance. The observed lack of acceptability to trial participants and of specific outcome measures validated for use in this trial population would strongly suggest that there is a need for the development of new measurement outcomes or, at least, for more research to be conducted on the validity of existing measures for use in a UK care home setting.

Future research could include the validation of outcome measures that are not dependent on participants’ ability to complete measures in the care home population. For example, the use of fitted accelerometers might enable objective measure of mobility to be conducted as this method is independent of a resident’s ability to complete a specified task and is not influenced by cognitive status, other than potential problems with fitting monitors or participants interfering with monitors during measurement.

Summary
In line with guidelines on good practice, researchers should select outcome measures that are appropriate for use in the intended population. Choice of instruments is more difficult when little or no previous research has been conducted on their validity in a comparable population. Caution is advised over selecting such instruments solely on the basis that they are the only available measures. This choice could lead to non-meaningful results and a lack of participant response. There appears to be a need for some existing tools to be validated in specific population groups, and where these tools are demonstrated to be inappropriate, new outcome instruments developed.

Key points
- Outcome measures should be selected that have been validated in the population studied.
- Lack of appropriate outcomes available for care home populations.
- There is a need for validation of existing and development of alternative measures in this population.

Conflicts of interest
The authors declare that they have no conflict of interest.
Detecting potential respiratory pathogens in the mouths of older people in hospital

SIR—Hospital acquired pneumonia (HAP) is the third most common health care associated infection, and complicates 1.27% of UK hospital admissions [1]. The incidence is higher in groups such as the elderly, post-operative patients and those on specialist units such as liver, burns or haematology [1]. The incidence of HAP appears to increase with age [2], and the mortality in older people is thought to be between 12.2–55% depending on the group studied [3, 4].

The bacteria which cause hospital acquired pneumonia (HAP) such as *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Staphylococcus aureus* are thought to reside in the oropharynx before being aspirated into the lungs causing pneumonia [5, 6]. These bacteria are more commonly found in the mouths of sick or institutionalised persons than healthy people [7–11] but are not considered part of the normal oral flora.

Randomised controlled trials employing rigorous oral hygiene interventions have significantly reduced the incidence of HAP in both nursing home residents [12] and ventilated persons undergoing cardiothoracic surgery [13], but these studies have not identified exactly why oral hygiene may be beneficial. It has been hypothesised that heavy dental plaque load, prior antibiotics or illness may allow these ‘foreign’ bacteria to become part of the oral bacterial community. Currently the relationship between plaque, oral bacteria and HAP is unclear.

The next step is to investigate whether prior oral bacterial colonisation with hospital pneumonia pathogens is associated with subsequent HAP. However, the most sensitive oral sampling site for gram-negative bacilli and *S. aureus* need to be verified before this research can be undertaken. In particular clarification is needed regarding the utility of dental or denture plaque as a site for identifying these bacteria.

The aims of this study were to identify the optimal sampling method for identifying gram negative bacilli and *S. aureus* in the mouth which could cause HAP, and to explore the extent to which visible dental plaque and the number of days on antibiotics contributed to the emergence of these bacteria.

**Subjects and methods**

Permission to undertake this study was granted by a local research ethics committee, County Durham and Tees Valley