

## An occupational therapy consultation provided to older adults presenting to accident and emergency improves ADL functioning and reduces falls and hospital stays

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**CLINICAL SCENARIO:** Elderly people presenting to hospital emergency departments (ED) or accident and emergency (A and E) with symptoms after a fall are often not admitted to hospital. However, their ability to independently perform activities of daily living (ADL) can be significantly affected. While occupational therapy (OT) services are often available, a referral is not always made to assess home environment, supports and ability to perform ADLs. Does OT consultation improve functional outcomes for these people?

**FOCUSSED CLINICAL QUESTION:** Among elderly people presenting to emergency and acute medical assessment units, does an OT referral/consultation result in greater ADL independence and safety post discharge when compared to those who do not receive OT?

### **SUMMARY of Search, 'Best' Evidence' appraised, and Key Findings:**

Four RCTs were located and appraised (Close et al, 1999; Davison et al, 2005; Hendriksen et al, 2001; and Shaw et al, 2003). These represent Level 2b evidence. Results indicate that:

- Interdisciplinary/multifactorial assessment and intervention (including OT) for cognitively intact in-patients,  $\geq 65$  years, whose primary diagnosis in A and E was a fall, reduced the falls rate in the year following their fall. This was also true for those with a history of falls who present as above. Number and length of subsequent hospital admissions may also be reduced and independence in ADL may be improved.
- Multifactorial intervention (including OT) had no effect on falls reduction within the following year for people  $\geq 65$  years, with cognitive impairment and dementia whose primary diagnosis in A and E was a fall.
- OT assessment and treatment for people,  $\geq 75$  years whose primary diagnosis in A and E was limb, back or rib trauma, increased the number who were independent in self care seven days post discharge.
- A service involving an OT actively identifying people from an A and E list, resulted in more people who were independent in self-care, than usual care involving access to an established A and E OT by referral only.

The collective evidence answers our clinical question about elderly people presenting to, and discharged from, A and E but not acute medical assessment units. Furthermore, while these studies recruited from emergency departments, some also included those people who went on to be admitted to hospital. Finally, three of the studies investigated OT as part of a multi-disciplinary program. Therefore the impact of the OT component on outcomes of interest is unclear, compared to other program components.

**CLINICAL BOTTOM LINE:** Older adults (65 to 75 years +) presenting to A and E with a primary diagnosis of a fall, limb, back or rib trauma, and with no cognitive impairment or dementia, who receive an OT consultation have greater independence in ADL, reduced falls and less days in hospital up to a year following discharge.

**Limitation of this CAT:** This CAT has been peer-reviewed by one independent person.

### SEARCH STRATEGY:

Using the levels of evidence defined by the Oxford Centre for Evidence-based Medicine (Phillips et al., 2001), the search strategy aimed to locate the best available evidence:

**Table 1. LEVELS OF EVIDENCE FOR STUDIES EVALUATING INTERVENTION EFFECTIVENESS**

LEVEL	STUDY DESIGNS	NUMBER LOCATED
1a	Systematic reviews (SR) of RCT's (RCT= control group✓ random allocation✓)	0
1b	Individual RCT's of good quality	0
2a	SR of cohort studies (Cohort Study = control group✓ random allocation* – identification of a cohort receiving the intervention/ factor and one not, then comparison of outcomes).	0
2b	Individual cohort studies and low quality RCT's	4 (1-4)
3a	SR of case control studies (Case Control Study = control group✓ random allocation* – identification of a group of people with the outcome/ disease and a group without, then retrospectively identifying the involvement of the intervention being investigated).	
3b	Individual case control study	
4	Case Series and poor quality case control and cohort studies (Case series = control group* random allocation* - a single group of subjects is exposed to the intervention and their outcomes measured).	
5	Expert opinion	

### Terms used to guide Search Strategy:

- **Patient/client group:** Emergency, emergency department, emergency care, acute care, acute hospital, medical assessment units, short stay units, observation units, acute medical admissions unit, admissions unit, assessment unit
- **Intervention:** Occupational therapy, occupational therapy assessment, occupational therapy intervention, multidisciplinary care team, multidisciplinary assessment, discharge, early discharge
- **Comparison:** Nil
- **Outcomes:** Patient discharge, admission, treatment outcome, occupational therapy, patient admission, function, self care, ADL, activities of daily living.

### Databases/ Sites searched:

- The Cochrane Library ([www.cochrane.org](http://www.cochrane.org))
- PEDro database ([www.pedro.fhs.usyd.edu.au](http://www.pedro.fhs.usyd.edu.au)), OTseeker ([www.otseeker.com](http://www.otseeker.com)) and OT-CATS ([www.otcats.com](http://www.otcats.com))
- Medline – Pre Medline
- CINAHL
- Ovid Medline ® In-Process and Other Non-Indexed Citations

- Clinical Practise Guidelines – QLD Health Approved
- Clinical Evidence
- Evidence Based Medicine Reviews – ACP Journal Club
- Reference lists from articles

**Inclusion Criteria: Studies:**

- Investigating the effectiveness of OT Assessment and Intervention for people in ED and/or acute medical assessment units.
- Full-text published/available in English

**Exclusion criteria: Studies:**

- Including hospital in-patients
- Investigating discharge planning processes, assessment tools or intervention in emergency departments, which did not specifically mention the involvement of occupational therapy.

**RESULTS OF SEARCH**

Four RCTs were located (see Table 1). All four RCTs were of similar quality, and were appraised for this CAT.

**Table 2:** Description and appraisal of RCT by Close et al (1999).**Aim of the Study:**

To assess the benefit of a structured bidisciplinary assessment (medical and occupational therapy) of people admitted to A and E who have fallen, or for preventing further falls.

**Study design:** RCT (n= 397). Concealed allocation. Subjects randomised by random-numbers table after baseline information was collected by physician. Not subject, therapist or assessor blinded.

**Participants and Setting:**

- **Inclusion criteria:** In-patients >65 years who lived in the community and presented to accident and emergency department with a primary diagnosis of a fall. Fall defined as inadvertently coming to rest on the ground or other lower level with or without loss of consciousness and other than as a consequence of sudden onset of paralysis, epileptic seizure, excess alcohol intake, or overwhelming external force.
- **Exclusion criteria:** People with cognitive impairment (Abbreviated Mental Test: AMT <7) and with no regular carer, those who did not live locally and were unable to speak English.
- **Method of recruitment:** Potential subjects identified by computerised ED registration list (King's College Hospital London, UK) and recruited within seven days of discharge.
- Follow up was achieved by subjects keeping a falls diary and reporting retrospectively on postal questionnaires sent every 4 months for a year.
- People admitted to hospital were not recruited until discharged from hospital.

**Intervention:**

- **Experimental Group (n= 184):**

Received detailed medical and occupational therapy assessment. Referrals for further social/hospital services were made if required.

**(a) Medical Assessment by physician:** Comprehensive general examination, plus more detailed assessment of visual acuity, balance, cognition, affect and prescribing practice. On completion of assessment, primary cause for the fall was identified, risk factors modified (if possible), and referrals to relevant services made for further investigation, assessment or follow-up (including multidisciplinary input from Day Hospital).

**(b) Occupational Therapy Involvement:** Single home visit including functional assessment using Barthel Index (0-100) (Mahoney et al, 1965), Environmental Hazards Checklist (designed by Health and Safety Executive UK), and Falls Handicap Inventory (used indirectly for psychological consequences of the fall). These assessment findings were utilised in provision of advice and education regarding safety at home, minor home modifications and equipment, or referrals to other social and hospital services. Level of experience of the therapists – not reported.

- **Control Group (n=213):**

“Usual care only”. Not described but reported to involve no such detailed medical and occupational therapy assessment.

**Outcomes Measured:**

- **Primary:** Rate of falls during the 12 month follow-up period, measured by postal questionnaires sent to each participant every four months for one year after the fall. (Each participant was given a “falls diary” with 12 monthly sheets to assist with recall):  
1) Cumulative number of falls and serious injuries (fracture or joint dislocation) 2) Risk of falling and 3) Risk of recurrent falls.

- **Secondary:** Mean change in Barthel scores (0-100) (Mahoney et al, 1965) compared with baseline measurement taken by physician (Author JC), ability to go out alone (yes/no), admission to hospital (yes/no), death (yes/no), major injury (yes/no), moves to institutional care and health care use.

NB. Falls, ADL function, ability to go out alone and hospital admissions will be reported in this appraisal.

**Results:** (Table below adapted from original publication)

Total number of randomised subjects = 397. 304 completed the study. A sample size of 352 was reportedly required for 90% power to detect a 30% reduction in the rate of falls at  $p < 0.05$ .

Results	Control group (n=213)	Intervention group (n=184)	P value	After adjustment for baseline differences
No. of subjects who completed the study.	163 (77%)	141 (77%)	p=0.81	
Cumulative number of falls after 12 months	510	183	p=0.002	
No. of subjects reporting falls @12 months	111 (52%)	59 (32%)		Logistic Regression Analysis for risk of falling: OR* = 0.39 (95% CI 0.23 to 0.60)
Median no. of falls per person	1	0		
No. of subjects reporting $\geq$ three falls @12 months	55 (26%)	21 (11%)		Logistic Regression Analysis for risk of recurrent falls: OR* = 0.33 (95% CI 0.16 to 0.68)
No. of subjects reporting serious injury from falls (fracture or joint dislocation)	16 (8%)	8 (4%)	p=0.26	
Able to go out alone @ 12 months (yes/no)	106 (65%)	108 (77%)	p=0.04	p=0.27
Mean Barthel Score @12 months (SD)	17.3 (3.7)	18.6 (2.5)		Repeated –measures ANCOVA: Difference between groups (p=0.017); Change in scores (p<0.0001)
Hospital admission	97	69	P=0.78	Odds of $\geq$ 1 admission: OR*=0.61 (95% CI 0.35 to 1.05)

**Not statistically significant differences:** While the proportion able to go out alone at 12 month follow-up was higher in the intervention group, this was not statistically significant after adjustment for baseline differences. Difference in proportion of serious injuries was not significant.

**Statistically significant differences:** After adjustment for baseline differences, logistic regression analysis identified statistically significant differences between groups after 12 months in favour of the treatment group for the following outcomes:

- Risk of falling in 12 months post interdisciplinary assessment.
- Risk of recurrent falls in 12 months post interdisciplinary assessment.
- Odds of at least one hospital admission.
- Repeated measures ANCOVA showed a statistically significant difference in Barthel scores between the groups and a statistically significant change in scores over time.

**Original Authors' Conclusions:**

The adoption of a structured interdisciplinary approach to people 65 years and older who presented to an accident and emergency department after a fall significantly decreased risk of further falls and functional impairment.

**Critical Appraisal:**

**Validity:**

PEDro Score = 6/10: RCT of moderate quality (Moseley et al 2000), Level 2b study with some caution when interpreting results due to PEDro score.

Potential biases: lack of subject, therapist and assessor blinding, and only 77% follow up of subjects initially allocated to groups (ie 33% not available for follow-up measures, which is a potential bias typically favouring treatment group).

Point measures indicating central tendency (ie medians/proportions), and measures of variability (confidence intervals, interquartile ranges) and between-group statistical comparisons provided for primary outcome, therefore statistical reporting considered sufficient for interpretation.

**Results:**

- Interpretation of Odds Ratios: Likelihood/odds of falling within the 12 month follow-up period was nearly 4 times less for the intervention group (Odds ratio 0.39: 95% CI 0.23 – 0.66), and recurrent falls was over three times less likely (Odds ratio 0.33: 95% CI 0.16 – 0.68).
- These broad confidence intervals indicate that the true values, and the effect of treatment on individuals within the population, may fall anywhere within this range and therefore may possibly be quite small or large. In other words, a person might gain a small benefit (0.16) or a large benefit (0.68).
- However as the intervals do not cross the point of no effect (1.0), we can be confident that the true value indicates decreased odds of falling. Furthermore, even an OR of 0.23 could be argued to be a clinically significant result.
- After logistic regression analysis to adjust for baseline differences, results were not significantly different between groups for proportion of subjects able to go out alone at 12 month follow-up.
- Between-group differences in Barthel scores after 12 months were reported as statistically significant at  $p=0.017$  (presumably based on  $p$ -value of less than 0.05), but the size of the difference was not reported.
- Statistical power of the study is questionable. Calculations indicated that 352 subjects were required, however only 304 were available at follow-up.

- The initial power calculation indicated that a 30% reduction in rate of falls per person was desired/considered clinically worthwhile given the cost/nature of the intervention, from an average of two reduced to 1.4 falls per year. However the study did not report results in terms of falls per person per year, probably because falls are relatively rare events for most people. As a guide, had these results (after 12 months) been reported, it appears the control group would average 2.39 (510/213) falls and the intervention group 0.99 (183/184) falls per person per year. From this it appears that the intervention group fall rate per person was 41% of the control group rate (0.99/2.39), reflecting a reduction of 59%, well above the 30% reduction rate desired.
- “Usual care” was not specifically described but reported to include referral for multidisciplinary input from the Day Hospital if indicated.

\* Odds Ratio: The ratio of the odds of an event (such as falling) occurring in the treatment group compared to the odds of the event occurring in the control group. OR>1 means the treatment is estimated to increase the odds of falling. OR<1 means the treatment is estimated to decrease the odds of falling. OR=1 is the point of no effect (Queensland Health 2003).

**Table 3:** Description and appraisal of RCT by Shaw et al (2003).

***Aim of the Study:***

To determine the effectiveness of multifactorial treatment after a fall in older people with cognitive impairment and dementia ( $\geq 65$  years) attending A and E (Accident and Emergency Department).

***Study design:***

RCT (n=274). Participant selection and randomisation process were not reported.

***Participants and setting:***

*Included:* People  $\geq 65$  years with cognitive impairment and dementia (Mini Mental State Exam score  $< 24$ ) were recruited after presenting with a fall to one of two UK A and E departments, Newcastle upon Tyne.

*Excluded:* People were excluded if unable to walk, had a medical diagnosis that was the likely cause of fall (eg. CVA), were unfit for investigation within 4 months, unable to communicate for reasons other than dementia and had no major informant (someone in contact with the person at least twice a week).

***Intervention:***

- ***Experimental Group (n=130):*** A multifactorial clinical assessment (medical, physiotherapy, OT and cardiovascular) and intervention for all identified falls risk factors. At three months the interventions and assessments were repeated in the experimental group if abnormal, and compliance with treatment was reviewed.
- ***Control (n=144):*** A multifactorial clinical assessment (as above), followed by conventional care only (health professionals who were already involved, or became involved in their care in the following year).

***Outcomes Measured:***

- ***Primary:*** Number of participants who fell at least once in the year after intervention. Data was collected prospectively using a weekly diary to record falls.
- ***Secondary:*** Number of falls (corrected for diary returns), time to first fall, injury rates, fall-related attendance at A and E, fall-related hospital admissions and mortality. (Injuries and hospital admissions collected from computerised records).

**Results:**

Power calculation estimated 90 subjects would be needed in each group (n=180 total) to detect a 30% reduction (from an estimated annual incidence of 66% to about 46%) in the proportion of people who had at least one fall. 308 subjects were recruited and 274 reported on (88% follow-up).

Results	Control group (n=144)	Intervention group (n=130)	Relative Risk Ratio (and CI)	NS = Not statistically significant
No. of subjects who fell in 1 yr	96 (74%)	115 (80%)	0.92 (0.81-1.05)	NS
Median no. of falls	3	3	-0.02 (-0.32-0.09)	NS
Median no. of weeks to first fall	11	11	p=0.459	NS
Major injury	37 (28%)	31 (21%)	1.32 (0.87-2.00)	NS
Fall-related A and E attendance	52 (40%)	46 (32%)	1.25 (0.91-1.72)	NS
Fall-related hospital admission	19 (15%)	19 (13%)	1.11 (0.61-2.00)	NS
Mortality	27 (21%)	29 (20%)	1.03 (0.65-1.64)	NS

**Original Authors' Conclusions:**

Multifactorial intervention after a fall had no effect on falls reduction for people with cognitive impairment and dementia. More research regarding this population group is needed as people with cognitive impairment remain a high falls risk group. Limited available resources should target falls prevention in cognitively normal older people living in the community.

**Critical Appraisal:****Validity:**

PEDro Score = 7/10: RCT of moderate to good quality (Moseley et al 2000), Level 2b study.

Potential biases include: lack of subject and therapist blinding, and concealed allocation (systematic bias which can predict effect size).

- Follow-up rate (n=274/ 308 = 88%) is acceptable, with only 12% loss to follow up at 12 months. Numbers lost from each group were not reported.
- Groups were comparable at baseline for main prognostic indicators. Total number of falls risk factors was 1011 (485 in intervention group, 526 in control); median of 4 per person for both groups
- Data was analysed by "intention to treat"
- The selected primary and secondary outcomes appear appropriate, however the primary reporting method may be questionable. It appears feasible that accuracy of weekly diary entry might be compromised by cognitive impairment.
- Participant selection or randomisation process was not reported except to describe that the two A and E departments were screened for 52 weeks for eligible subjects.

**Results:**

Approx 6% fewer people in the intervention group fell, compared to the control group. As sample size was calculated to detect a 30% difference, this between group difference was not stat significant or clinically important. While the relative risk ratio of 0.92 indicates a very small reduction in risk of falling for people in the intervention group, the confidence interval is narrow and crosses the value of no effect (1.0), indicating no statistical significance (ie the results and differences could have occurred due to chance). This is true for nearly all secondary outcome measures also. Results support the authors' conclusions.

\* Relative Risk (or Relative Risk Ratio): Expresses the risk of an event (such as falling) in the treatment group relative to that in the control group.  $RR > 1$  means the person is estimated to be at an increased risk falling compared to a person who has not had the intervention.  $RR < 1$  means the person is at a decreased risk.  $RR = 1$  is the point of no effect (Queensland Health 2003).

**Table 4:** Description and appraisal of RCT by Hendriksen and Harrison (2001)

**Aim of the Study:**

To evaluate the effect of a full occupational therapy assessment and any recommended intervention before discharge from accident and emergency on the functional status of older adults (75 +) previously living in the community and presenting with fractures and trauma.

**Study design:**

RCT (n= 39). Baseline data were collected prior to randomisation. Randomisation was stratified according to FMT score (high vs low score), with the allocation schedule created from a computer generated list of random numbers. Each subjects allocation group was obtained by the OT by opening opaque sealed envelopes prepared in advance by an independent centre.

**Participants and setting:**

- *Included:* People aged 75 years or older with primary diagnosis made in A and E of limb, back or rib trauma. Recruited from a general district hospital in North-West England (71,000 patient visits per year).
- *Excluded:* People living in a nursing home, admitted to hospital, already referred to OT in A and E or who were unable or unwilling to give written informed consent.
- *Recruitment method:* Senior OT approached eligible people identified from A and E list after diagnosis and medical discharge, within her working hours (those who attended outside her working hours were not able to be recruited). All subjects reassessed at home seven days later.

**Intervention:**

- **Experimental (n=19):** Occupational therapy assessment and treatment (eg. education, equipment provided/arrangements made) after medical discharge but before D/C from A and E, on weekdays during normal working hours.
- **Control (n=20):** Received routine care (No further OT input).

**Outcomes Measured:**

- **Primary:** Change in proportion of subjects with total ADL independence between the initial assessment and second assessment 7 days later (including restricted analysis to

exclude those independent at first assessment). Dependence in ADL was measured using the Functional Measurement Tool (FMT), based on shortened form of the Barthel Index with four items: 1. General mobility 2. Getting in/out of bed, 3. Getting on/off a chair 4. Using the toilet. *FMT Grading*: Independent = 3, Partial Assistance = 2, Dependent = 1. (FMT Total Independence = 12/12, Total Dependence = 4/12).

- **Secondary:** Proportion with total independence on second assessment only (at 7 days post discharge), proportion who initiated contact with GP by day 7, and the change in proportion with possible/probable anxiety between the initial and day-7 assessments (Hospital Anxiety and Depression Scale – HADS, 0-21 score for depression sub-scale and 0-21 score for anxiety sub-scale).

### Results

Total number of subjects followed up at seven days = 38/39. No power calculations reported. Results reported by authors as follows:

Groups	Baseline Assessment	Day-7 Assessment		Change	Difference between groups at day 7
Experimental Group (n=19)	FMT 12/12= 6 (32%)	FMT 12/12= 19 (100%)	21% difference in proportion independent in favour of exp. group (95%CI 0.38% to 41.6%; p<0.05).	68%	54% difference in change in proportion independent in favour of exp. group (95%CI 27.8% to 80.14%; p<0.001).
Control Group (n=19)	FMT 12/12= 13 (65%)	FMT 12/12= 15 (79%)		14%	
Experimental Group (n=19)	HADS ≥8/21= 8/19 (42.1%)	HADS ≥8/21= 6/19 (31.6%)		-10.5%	5.2% difference in change in proportion with poss/probable anxiety in favour of exp. group (95%CI 11.9% to 22.3%; p=0.11)
Control Group (n=19)	HADS ≥8/21= 5/19 (26.3%)	HADS ≥8/21= 4/19 (21.0%)		-5.3%	
Restricted analysis: FMT <12/12 at baseline. Control Group (n=6)	FMT 12/12= 0 (0%)	FMT 12/12= 2 (33.3%)	66.7% difference in proportion independent in favour of Exp. Group	33.3%	66.7% difference in change in proportion independent in favour of Exp. Group (95%CI 29.4% to 104%; p< 0.001)
Restricted analysis: FMT <12/12 at baseline. Experimental Group (n=13)	FMT 12/12= 0 (0%)	FMT 12/12= 13 (100%)		100%	

The 15.8% difference between groups (in favour of intervention group) in percentage who requested a home visit from their GP by day 7 was not reported on further for statistical significance.

### Original Authors' Conclusions:

An OT based directly in A and E to screen older people and address unmet functional needs will significantly reduce the number of older people who continue to be discharged from A and E with unmet functional needs. This is despite medical and nursing staff being able to refer people for a rapid OT assessment. Reported limitations of the study included insufficient sample size to detect effect on anxiety.

## Critical Appraisal:

### Validity:

- PEDro Score = 7/10: RCT of moderate to good quality (Moseley et al 2000), Level 1b study.
- Potential biases: Lack of subject, therapist and assessor blinding.
- Groups dissimilar at baseline in percentage who were functionally independent (however this biased in favour of the control group only, therefore not affecting the direction of results). A greater percentage of the control group (75%) demonstrated no anxiety, when compared to the intervention group (57.9%) at baseline, however this was not likely to have favoured the intervention group in terms of functional independence. Overall, baseline characteristics similar between groups.
- Allocation was concealed.
- Follow-up rate ( $n=38/39 = 97\%$ ) is acceptable, with only 3% lost to follow up at day 7.
- Data was analysed by "intention to treat".
- Percentage differences, confidence intervals and p-values satisfy between group statistical comparison, point measures and measures of variability for outcomes.

### Results:

#### *For primary outcomes measured:*

- Results for proportion independent in ADL support the original authors conclusions. P-values indicate differences between groups were unlikely to be due to chance. The broad Confidence intervals indicate that the true size of the treatment effect may lie anywhere within this range (as small as X and as large as Y), however even a 27.8% increase in numbers independent could be argued to be clinically significant.
- Additionally, the restricted analysis shows that for those people who were not independent at baseline, this treatment effect is even more pronounced.
- NO power calculations were reported to indicate necessary sample size required. However as a significant treatment effect was found and confidence intervals are far from zero, this does not affect the results of this study.
- A limitation of the study is the use of an assessment tool with unreported validity and reliability (FMT), potentially introducing measurement error into the results.
- The results could arguably have been presented in an alternative and more easily interpreted manner such as numbers needed to treat (NNT). Additionally, different calculations to those used by the authors produce different results (eg. in calculating percentage change between assessments in numbers independent in control group,  $15-13/19=11\%$  vs  $79\%-65\%=14\%$ ), however this does not significantly affect overall results. It appears possible that in seeking to maximise reported treatment effect, results may have been reviewed before decisions were made about their calculation and presentation.

#### *For secondary outcomes measured:*

- It is not clear why proportion independent at day 7 was chosen as an outcome to be presented in addition to change in proportion independent.
- It is also not clear why the 15.8% difference between groups percentage who requested a home visit from their GP by day 7 was not reported on further for statistical significance.
- There was no significant effect in the change in proportion of those with probable/possible anxiety. This reviewer was unable to interpret the reported confidence interval for difference in change in proportion with possible/probable anxiety (95% CI of 11.9 to 22.3% is not inclusive of 5.2%).

**Table 5:** Description and appraisal of RCT by Davison et al (2005).**Aim of the Study**

To determine the effectiveness of multifactorial intervention to prevent falls in cognitively intact older persons with recurrent falls presenting to A and E.

**Study design:**

RCT (n= 313). Subjects randomised by computer-generated block randomisation. Not subject or therapist blinded, and it was not reported whether allocation was concealed. Baseline assessment by blinded interviewer-led questionnaire in each subject's home. Final assessment at 12 months.

**Participants and setting:**

- **Inclusion criteria:** The records of A and E departments at Newcastle upon Tyne (UK) were screened daily and candidates contacted by postal questionnaire to determine falls history, then telephoned and invited to participate if eligible. Candidates were eligible if they presented to A and E with a fall or fall-related injury, were over 65 years and had at least one additional fall in the preceding year.
- **Exclusion criteria:** Cognitive impairment (MMSE<24), >1 previous syncopal episode, immobility, home >15 miles from A and E, registered blind, aphasic, clear medical explanation for fall (ie acute myocardial infarction, stroke, epilepsy) or enrolment in another study.

**Intervention:**

**Experimental group (n=141):** Multifactorial falls assessment and prioritised individualised intervention plan for falls risk factors, including:

- Hospital-based medical assessments and interventions (replicating those described in Shaw et al's study, 2003).
- Home-based physiotherapy assessment (including gait and balance, feet, footwear, and assistive devices).
- Home-based OT assessment (User safety and Environmental Risk home hazard checklist).

**Control group (n=141):** received no medical or therapy assessment.

**Outcomes Measured :**

- **Primary:** Number of falls and number of subjects who fell again during the one year follow-up. A fall was defined as "inadvertently coming to rest on the ground or other lower level with or without loss of consciousness or injury". (Collected prospectively by falls diaries, returned every four weeks, plus phone prompting to increase compliance).
- **Secondary:** Injury rates, fall-related hospitalisation, mortality, fear of falling (Activities-specific Balance Confidence Scale or ABC scale). Blinded interviewer-led questionnaires were completed at 3, 6, and 12 month follow-up. Hospital and A and E attendances were recorded prospectively and hospital records checked retrospectively at 12 months for all subjects.

**Results**

Power calculation determined that 352 subjects would need to be recruited/randomised to detect a statistically important difference between groups, and a clinically important reduction in no of fallers (33% reduction over 12 months). Investigators recruited and

randomised 313, fewer than they required based on power calculations. A further 31 (9.9%) were lost to follow-up.

Results	Control group (n=141)	Intervention group (n=141)	Relative risk ratio	95% CI.
Mean rate of falls/year - two outliers excluded. (total no. of falls)	5.1 (617)	3.3 (387)	0.64	0.46-0.90
Subjects who fell	68%(102)	65% (94)	0.95	0.81-1.12
No. of fractured NOFs	2(1%)	1(1%)	0.48	0.04-5.29
No. of other fractures	11 (7%)	6 (4%)	0.53	0.20-1.39
Fall-related A and E attendances	27 (18%)	25 (16%)	0.90	0.55-1.47
Fall-related hospital admissions	17 (11%)	14 (9%)	0.80	0.41-1.56
Mean no. of days in hospital	4.5	0.8	Difference = 3.6	0.1-7.6
Mean ABC score @12 months	53%	61%	Difference = 7.5	0.7-14.2

### **Original Authors' Conclusions:**

Multifactorial falls assessment and intervention including occupational therapy reduced the falls rate after 12 months by 36% in cognitively preserved older persons presenting to A and E with recurrent falls. However the intervention did not reduce the number of subjects continuing to fall, or number of fall-related hospital admissions. Length of hospital stay was significantly shorter in the intervention group and they experienced a reduction in fear of falling. There was insufficient power to detect differences in fracture rates.

### **Critical Appraisal:**

#### **Validity:**

PEDro scale Total Score = 7/10: RCT of moderate to good quality (Moseley et al 2000), Level 2b study.

- Potential biases: lack of subject and therapists blinding, and lack of reporting re: allocation concealment.
- Follow-up rate (n=282/ 313 = 91.1%) is acceptable, with only 9.9% lost to follow up at 12 months.
- Data was analysed by "intention to treat"
- The selected primary and secondary outcomes appear appropriate.
- Randomisation process was by computer-generated block randomisation.
- Baseline characteristics were similar between groups. Use of block randomisation ensures equal numbers in groups.
- Relative risk ratios, mean differences and confidence intervals satisfy between group statistical comparison, point measures and measures of variability for outcomes. P-values were not provided and would have been desirable for at least number/rate of falls and mean length of hospital stay, as results for these outcomes appear statistically significant according to the confidence interval (confidence interval does not cross the point of no effect).

**Results:**

- Results support the original authors conclusions:
- Relative Risk Ratios (close to 1.0) and confidence intervals (ranges cross 1.0, the point of no effect) indicate no statistically significant differences between groups for number of subjects who fell, injuries or falls-related A and E presentations / hospital admissions. This study was underpowered to detect a significant difference between groups regarding at least: number of fallers and injuries.
- Mean rate of falls however was significantly different between groups (primary outcome measure), with the intervention group falls rate (3.3 falls/person) at 64% (relative risk ratio 0.64) of the control group falls rate (5.1 falls/person). The 95% confidence interval (0.46 to 0.90) is broad but does not cross the point of no effect (which in this case is one). The true values/treatment effect may therefore be as small as 90% of the control group falls rate or as large as over 50% reduction in falls. While increasing the statistical power of the study would narrow the confidence interval for this result, we can still be confident that there was a significant treatment effect with the subject numbers that were utilised.
- Another way of presenting this result is in terms of absolute risk reduction\* (ARR = 1.8 falls/year) and numbers needed to treat\*\* (NNT = 0.5 falls/year), which would indicate that 0.5 people from this population would need to be treated in order to prevent one fall.
- Mean hospital LOS also demonstrated a statistically significant difference between groups, in favour of the intervention group (3.6 days). While the confidence interval does not cross the point of no effect (which in this case is zero), it is broad range (0.1 to 7.6) questions the clinical importance of this difference. A reduction in hospital LOS of 0.1 days may not be significant, however a reduction by 7.6 days certainly would. Increasing the power of this study would again narrow this range and improve confidence in the treatment effect.
- While a statistically significant between-group difference in "fear of falling" was reported, more information would be required to analyse clinical significance of differences, due to this reviewer's unfamiliarity with the ABC assessment tool.

\* Absolute risk reduction (ARR): The absolute arithmetic difference in bad event rates between experimental and control groups in a trial (Queensland Health 2003).

\*\*Numbers needed to treat (NNT): The number of subjects needed to treat with the intervention in order to achieve one additional good outcome or prevent one bad outcome. It is the inverse of absolute risk reduction.  $NNT = 1/ARR$  (Queensland Health 2003).

## IMPLICATIONS FOR PRACTICE, EDUCATION, FUTURE RESEARCH

- Collective evidence has been synthesised from four RCTs, each of which evaluated an intervention delivered in part by an occupational therapist, to older adults presenting to A and E.
- This evidence supports the provision of occupational therapy consultations in hospital emergency departments to cognitively intact people  $\geq 65$  years whose primary diagnosis is a fall, or back, limb, or rib trauma.
- It does not support the same intervention for cognitively impaired people  $\geq 65$  years.
- While many Australian hospitals have occupational therapists providing consultations within accident and emergency departments, anecdotal evidence suggests that many of these services are provided on referral only. This appears to be particularly so for patients attending A & E outside usual OT working hours, such as on weekends if no weekend OT service is available.
- This evidence indicates that when OTs screen admission lists for referrals, they will identify more people who need their services than waiting for referrals from another discipline. This may have particular implications for centres without weekend OT services.
- When screening A and E patient lists, an OT should prioritise fall's prevention interventions for those people  $\geq 65$  years whose primary diagnosis is a fall, or back, limb, or rib trauma, without cognitive impairment or dementia.
- Additionally, strategies might be considered for assisting other disciplines identify more people who are in need of occupational therapy services in the A and E setting, such as brief education sessions, checklists or modifications to existing forms/processes, especially for patients admitted outside usual OT working hours.
- Consideration could be given to investigating standard use of a simple functional measurement tool within an emergency department setting (eg. Functional measurement Tool / 5 item Barthel), for screening or outcomes measurement.
- There is a need for large studies in this field of research with sound statistical power, which specifically investigate occupational therapy consultations in Australian A and E departments and MAP units. Relevant outcomes such as reduction in falls and ADL dependence should be measured using tools that have demonstrated validity and reliability, and results should be presented in an easily understood manner (such as presentation of NNT).
- Furthermore, it may be of benefit to “unpack” the type/intensity of occupational therapy intervention provided. For example, whether advice based on patient/care report and functional observation is as effective as advice following home visit for certain groups, or whether the use of follow-up phone calls or loan equipment pools improves effectiveness. Stratifying data by age, falls history and other key characteristics may further enrich the picture of OT in A and E.
- Clearly the profile of, and supported assessments/interventions for, the OT role in A and E departments and MAP units might then be reinforced accordingly in university and professional development education programs.

## REFERENCES

### Articles critically appraised:

1. Close, J., Ellis, M., Hooper, R., Glucksman, E., Jackson, S., & Swift, C. (1999). Prevention of falls in the elderly trial (PROFET): A randomised controlled trial, *The Lancet*, , 353(9147), pp 93-97
2. Davison, J., Bond, J., Dawson, P., Steen, N., & Kenny, R. (2005). Patients with recurrent falls attending accident and emergency benefit from multifactorial intervention - a randomised controlled trial, *Age and Ageing*, 34, 162-168.
3. Hendriksen, H., and Harrison, R. A. (2001). Occupational therapy in accident and emergency departments: A randomised controlled trial, *Journal of Advanced Nursing*, 36(6), 727-732.
4. Shaw, F.E., Bond, J., Richardson, D.A., Dawson, P., Steen, I., McKeith, I. G., & Kenny, R.A. (2003). Multifactorial intervention after a fall in older people with cognitive impairment and dementia presenting to the accident and emergency department: Randomised controlled trial, *British Medical Journal*, 326(7380), 73-75.

### Related Articles not included in this appraisal:

#### Level 1a Evidence:

5. Hyde, C., Robert, I., & Sinclair, A. (2000). Systematic review: The effects of supporting discharge from hospital to home in older people, *Age and Ageing*, 29, 271-279.
6. Shepperd, S., Parkes, J., McClaren, J., & Phillips, C. (2004). Discharge planning from hospital to home (Cochrane Review). In: *The Cochrane Library*, Issue 1. Chichester, UK: John Wiley and Sons, Ltd.

#### Level 5 Evidence:

7. Griffin, S.D. (1993). Short bed stays: Their effect on occupational therapy services in teaching hospitals, *Archives of Physical Medicine and Rehabilitation*, 74(10): 1087-90.
8. Sutton, S. (1998). An acute medical admission unit: Is there a place for an occupational therapist?, *British Journal of Occupational Therapy*, 61(1): 2-6.

### Other References /Resources Used:

9. Ellis, M. (2003). Workshop hand-out form: *Introduction to Evidence-Based Practice for Allied Health Professional*, Workshop in Townsville 13/05/2003.
10. Informed Health Online: [www.http://informedhealthonline.org/item.aspx?tabid=15](http://informedhealthonline.org/item.aspx?tabid=15)
11. Kault, D. (2003). *Statistics with common sense*, Greenwood press; Westport, USA.
12. Moseley, A., Sherrington, C., Herbert, R., & Maher, C. (2000). The extent and quality of evidence in neurological physiotherapy: An analysis of the physiotherapy evidence database (PEDro), *Brain Impairment*, 1(2): 130-140.
13. Physiotherapy Evidence Database (PEDro), [www.pedro.fhs.usyd.edu.au](http://www.pedro.fhs.usyd.edu.au)
14. Phillips, Ball, Sackett, et al. (2001). Oxford Centre for Evidence-based Medicine Levels of Evidence.
15. Queensland Health. (2003). *EBP terminology*. [www.medeserv.com.au/meseduframe/unit\\_res/TRT-2002/TRT-2002-1.pdf](http://www.medeserv.com.au/meseduframe/unit_res/TRT-2002/TRT-2002-1.pdf)
16. Swinscow, T. D. V., & Campbell, M. J. (2002). *Statistics at square one*, Ed. 10, BMJ publishing group, London.
17. Mahoney, Fl., & Barthel DW. (1965). Functional evaluation: the Barthel Index. *Maryland State Med J*, 14, 61-65.