Rehabilitation for older people after emergency hospital admission; A systematic review

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Background

- Older patients at risk of physical deconditioning, functional decline and disability during emergency hospital admissions

- Exercise during admission is safe and improves physical function to allow discharge from hospital

Purpose

Which exercise-based rehabilitative interventions are more effective than usual care in improving function for older adults who have an unplanned emergency admission?

Inclusion Criteria	
Age	80% Participants aged over 60 years
Population	Admitted to a hospital ward as an emergency/unplanned way for urgent care
Intervention	Exercise Based Rehabilitation intervention to improve function
Timing of intervention	Patients are admitted to hospital as an emergency/or in an unplanned way Hospital admission lasts greater than 4 hours Intervention takes place during or after the hospital admission
Study Design	Randomised control trials (RCT)
Outcome measured	Primary Outcome: Measures of functional ability (Activities of Daily Living): Barthel's ADL Index (BI), Functional Independence Measure (FIM), Katz ADL, Lawton's Instrumental ADL (IADL), Nottingham extended ADL (EADL), Physical functioning aspect of the Health Related Quality of Life Short Form 36 (HRQOL SF-36) Secondary outcomes: Length of hospital stay, readmission rate, mortality

Exclusion Criteria	
Age	<60 years
Population	Patients living in residential or nursing homes Patients recruited from the Community without an emergency hospital admission
Intervention	Interventions designed solely to reduce the incidence of falls Complementary or Alternative Therapies Exercise is not the main component of the intervention
Timing of intervention	During an elective planned admission e.g. for a planned surgical procedure Hospital admission lasts less than 4 hours
Diagnosis	Disease processes which require specialized rehabilitation: Pulmonary rehab for COPD Cardiac rehabilitation after Myocardial Infarction, Acute Coronary Syndrome or Heart Failure Rehabilitation after Stroke, Orthopaedic Injury such as hip fractures, Spinal Injuries or Traumatic Brain Injury (TBI), Intensive care treatment, Psychological disorders, Cancer
Study Design	Cohort, Case Control, Pilot, Feasibility, Cost Analysis and Review articles
Outcome measured	No specific measures of function

Methods

- Online database search (CINAHL, Cochrane Library, Embase, Ovid Medline, OT seeker, PEDRO and Web of Science)

- **Randomised control trials** that compared exercise-based rehabilitative interventions with usual hospital care.

- Primary outcome: **functional status**, assessed through activities of daily living scores (ADLs)

- Secondary outcomes: **length of stay** (LOS) and **readmissions, mortality**
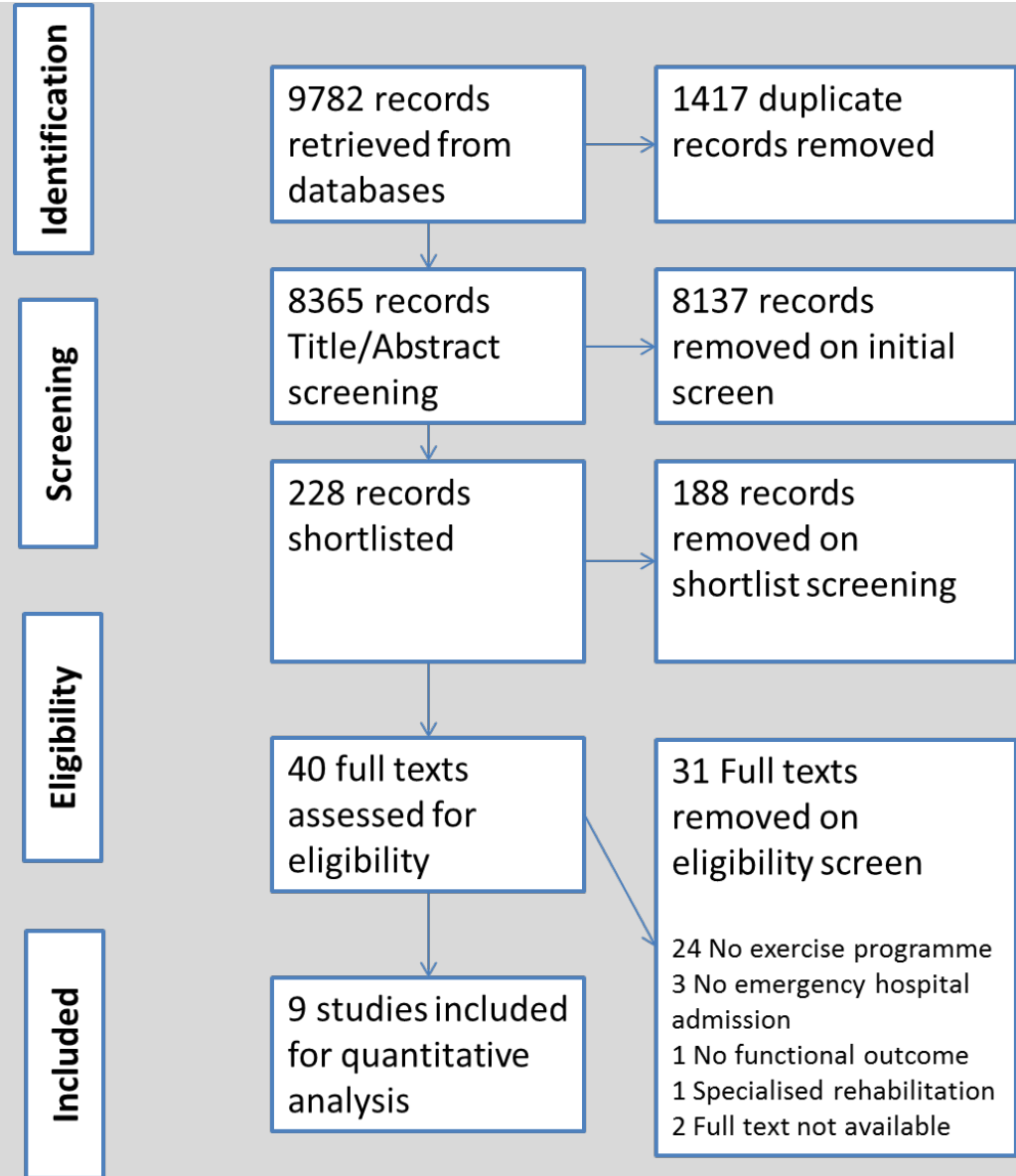
Methods

- Random effects meta-analyses using the standardised mean difference (SMD)

- GRADE criteria

- Pre-planned sub group meta-analyses for 2 groups: In-Hospital (IH) or in both In-Hospital (IH PD) and Post Discharge

Results

- 9 studies included

- 1602 patients

- Mean age 79 years

- Countries: Australia (3), Norway (2), USA (2), Denmark (1) and France (1)

- Meta-analysis of 7 studies

Identification

| 9782 records retrieved from databases | → | 1417 duplicate records removed |

Screening

| 8365 records Title/Abstract screening | → | 8137 records removed on initial screen |

| 228 records shortlisted | → | 188 records removed on shortlist screening |

Eligibility

| 40 full texts assessed for eligibility | → | 31 Full texts removed on eligibility screen |

24 No exercise programme
3 No emergency hospital admission
1 No functional outcome
1 Specialised rehabilitation
2 Full text not available

Included

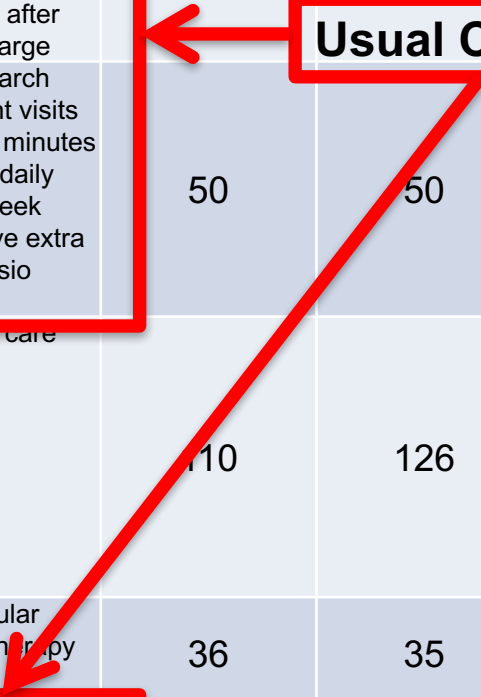| 9 studies included for quantitative analysis |

Results

- Delivery: Trained Physiotherapist

- Frequency: Usually 2-5x per week, one 2x day

- Adherence: only 4 studies reporting

- Type: Strengthening exercises in combination with resistance, mobility, balance, high intensity

- Timing:

  - 5 in hospital trials lasting 4-28 day

  - 3 in hospital and post discharge trials 4-12 weeks

  - 1 post discharge trial

Study	Intervention	Usual Care	Intervention (n)	Control (n)	Mean Age (years)	Function Measures	Assessment time points
In Hospital Exercise Interventions							
Blanc-Bisson 2008	Early intensive physiotherapy focused on dynamic leg extension exercise	Walking and physiotherapy 3x/week, continues at home for 1 month after discharge	38	38	85.4	Katz ADL	Baseline, Clinical stability and 1 month after
Brown 2016	Mobility programme (MP) Sit to Stand, Transfer and Walking	Research assistant visits for 15-20 minutes twice daily 7x/week 34% have extra physio	50	50	73.9	ADLs	Baseline, hospital DC and at 1m post DC
DeMorton 2007	Individually prescribed exercise Bed, Sit, Stand, Stairs with resistance exercises	Usual care	110	126	UC 78 Int 80	Barthel Index, TUG	Baseline DC
Tibaek 2014b	Progressive resistance strength training	Regular physiotherapy	36	35	UC 79 Int 80	Barthel Index, TUG	Baseline DC
Raymond 2017	High-intensity functional exercise (HIFE) Exercise group 3x/week physio 2x/week Resistance, Strength and Balance	Individual physiotherapy balance, strength or aerobic exercise 5x/week	236	232	Control 84.05 Int 84.51	Elderly Mobility Scale, TUG	Baseline DC

Usual Care

Study	Assessment time point	Functional Measures used	Functional Outcome	Length of stay	Readmissions	Mortality
In Hospital Exercise Interventions						
Blanc-Bisson 2008	Baseline (T0), at clinical stability (T1), and 1 month later (T2)	Katz ADL Score 0 independent 12 dependent	Δ mean ADL score T0 to T2 INT 2.2 UC 3	Time to clinical stability 12.6 days both groups	Not assessed	Not assessed
Brown 2016	Baseline (T0), hospital discharge (T1) and by telephone at 1 month after discharge (T2)	ADL Score 7 independent 21 dependent	Both groups similar ADLs (p=0.62) No change over time (p=0.77)	INT 4.6 days UC 3.6 days P=0.13	Not assessed	INT 2 deaths UC 1 death
DeMorton 2007	Baseline (within 48 hrs of admission, T0) and at discharge (within 48 hrs of discharge, T1)	Barthel Index 0 dependent 20 independent	Δ mean ADL score T0 to T2 INT 12, UC 10	Median LOS INT 5 days UC 6 days P=0.45	28 days readmission rate INT 20% UC 19%	INT 2% UC 2% RR 1.15 (0.16-8)
		TUG Time in seconds	Reduction in time T0 to T1 INT -10 seconds UC -5 seconds			
					Varied duration LOS	
Tibaek 2014b	Baseline (T0) and after intervention but before discharge (T1)	Barthel Index 0 dependent – 20 independent	Δ Mean ADL Transfers INT 1.8, UC 0.3 Walking INT 2, UC 1.2 Stairs INT 3.8, UC 3.9	Mean LOS INT 28 days UC 24 days P=0.23	Not assessed	Not assessed
		TUG Time in seconds	Reduction in time T0 to T1 INT -7 seconds UC -6 seconds P=0.29			
Raymond 2017	Prior to randomisation (T0) and within 48 hours of discharge (T1)	Elderly Mobility Scale 0 independent 20 dependent	Δ mean ADL score T0 to T1 INT 5, UC 5 P=0.446	Median LOS INT 12.3 days UC 12.2 days	Not assessed	Not assessed
		TUG Time in seconds	No significant difference			

Study	Intervention	Usual Care	Intervention (n)	Control (n)	Mean Age (years)	Function Measures	Assessment time points
In hospital and Post Discharge Exercise Interventions							
Brovold 2012	Combined counselling and exercise programme (balance, resistance training)	45 minutes balance exercise 2x/week.	53	55	80	SF36 TUG	Baseline, DC and 3m post DC
Courtney 2009	individually tailored exercise programme, (muscle stretching, walking, balance and resistance training)	Usual care	64	64	78.8	SF12 TUG	Baseline and 4,12, and 24 weeks post DC
Siebens 2000	Hospital based general exercise programme and exercise at home (strength, flexibility exercises and walking)	Usual care	149	151	UC 78.2 Int 78.5	IADL	Baseline and at 1 month Post DC
Post discharge Exercise Interventions							
Brovold 2013	High intensity group-based aerobic interval training programme	Low intensity home exercise 3x/week	59	56	78	SF36 TUG	Baseline, 3m post DC

Longer contact time with physiotherapist

Study	Assessment time point	Functional Measures used	Functional Outcome	Length of stay	Readmissions	Mortality
In Hospital and Post Discharge Exercise Interventions						
Brovold 2012	Baseline (T0), after discharge from hospital (T1), and after 3 months (T2)	SF36 0 dependent 100 independent	Δ ADL T0 to T2 INT 6.0 UC 6.5 Time effect p=0.0001 Treatment effect p=0.5	Not assessed	INT 5 UC 7	INT 3 deaths UC 3 deaths
		TUG Time in seconds	Reduction in time T0 to T2 INT -1.9 seconds US -1.3 seconds			
Courtney 2009	Baseline (T0) and 4 (T1) ,12 (T2), and 24 weeks after discharge (T4)	SF12 Physical component score 0 dependent 100 independent	Δ mean score T0 to T4 **INT 11.2 UC -8.5** P=<0.001	Not assessed	INT 21 UC 49 UC 7.2x more likely to be readmitted (multi-variant log regression)	INT 3 deaths UC 2 deaths
		TUG Time in seconds	Not reported			
Siebens 2000	Baseline (T0) and at 1 month after discharge (T1)	IADL Average number of independent ADLs T0 to T1 0 dependent 7 independent	Δ mean score T0 to T1 INT -0.2 UC -0.7	Mean LOS INT 12 days UC 10.5 days P=0.23	Not assessed	At T0 INT 2 deaths UC 0 deaths At T1 10 deaths both groups
Post discharge exercise interventions						
Brovold 2013	Baseline (2-4 weeks post discharge) and 3 months after discharge	SF36 0 dependent 100 independent	Change mean score 0.5 INT & UC	N/A	Not assessed	Not assessed (Adverse events INT 23% UC 29%)
		TUG Time in seconds	Reduction in time -0.3 seconds INT & UC			

3m ADL improvements INT>UC

Usual Care Readmissions

Results
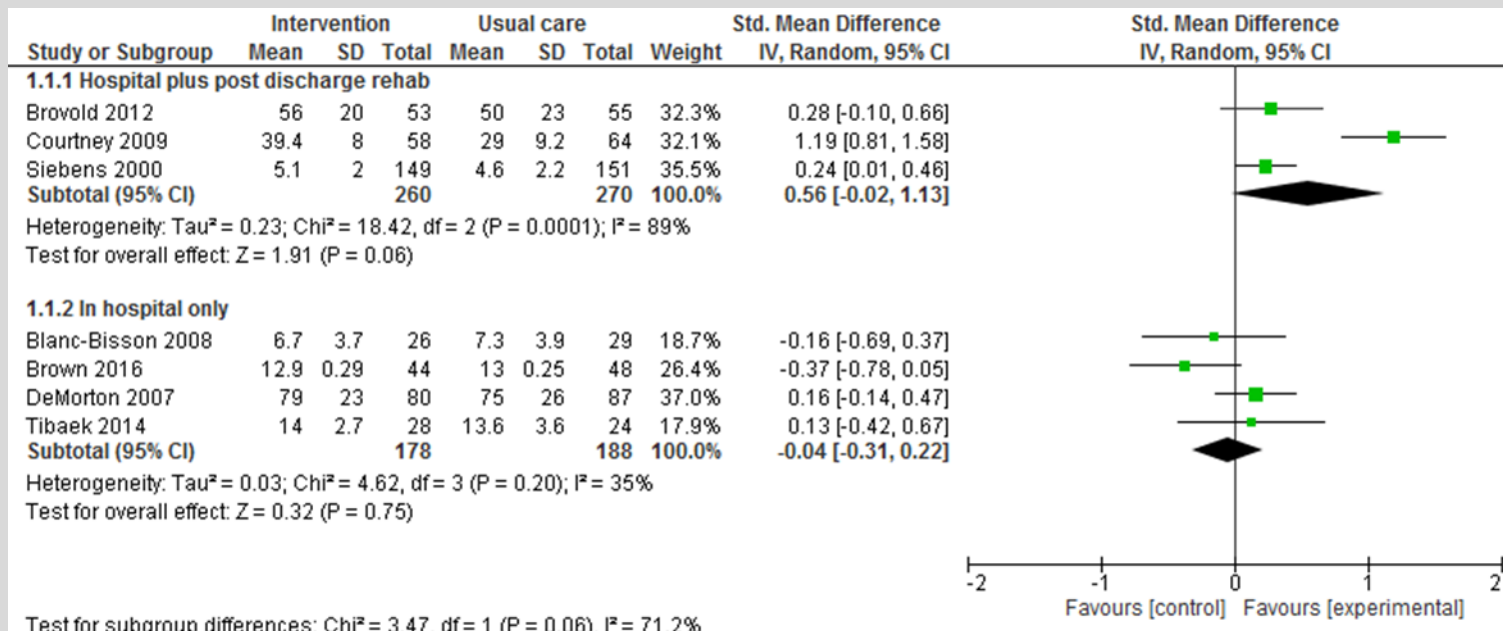
Functional ability: Activities of Daily Living

Conclusions

- Additional exercise based rehabilitation for older patients after emergency hospitalisation needs to start in-hospital and follow on at home to improve function

- Due to contact increased time with physiotherapist?

- Limited descriptions of exercise intervention(frequency, intensity, timing, type), adherence, fidelity or duration

- No conclusions can be made on the effective dose or content of exercise

- 'Active' usual care control groups

Implications

- Further research to understand what components constitute an effective exercise intervention

- To improve service planning and delivery for vulnerable older patients at risk of functional decline in hospital

- Detailed intervention descriptions of content, frequency, intensity, timing and type of exercise

- Use of TIDier and CERT guidelines to standardise and improve reporting

Any questions?

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Publication under review