Original Article

Integrated Care Pathway for Hip Fractures in a Subacute Rehabilitation Setting

Tsung Wei Chong, [1]*MMed, FCFP*, Gribson Chan, [2]*MSc*, Liang Feng, [3]*PhD*, Susie Goh, [4]*BSN*, Agnes Hew, [2]*BSc*, Tze Pin Ng, [3]*FAMS, PhD*, Boon Yeow Tan, [1]*MMed, FCFP*

Abstract

Introduction: The effectiveness of integrated care pathways for hip fractures in subacute rehabilitation settings is not known. The study objective was to assess if a hip fracture integrated care pathway at a subacute rehabilitation facility would result in better functional outcomes, shorter length of stay and fewer institutionalisations. Materials and Methods: A randomised controlled trial on an integrated care pathway for hip fracture patients in a subacute rehabilitation setting. Modified Barthel Index, ambulatory status, SF-12, length of stay, discharge destination, hospital readmission and mortality were measured. Follow-up assessments were up to 1 year post-hip fracture. Results: There were no significant differences in Montebello Rehabilitation Factor Scores and proportions achieving pre-morbid ambulatory status at discharge, 6 months and 12 months respectively. There was a significant reduction in the median length of stay between the control group at 48.0 days and the intervention group at 35.0 days ($P = 0.009$). The proportion of readmissions to acute hospitals was similar in both groups up to 1 year. There were no significant differences for nursing home stay up to 1 year post-discharge and mortality at 1 year. Conclusion: Our study supports the use of integrated care pathways in subacute rehabilitation settings to reduce length of stay whilst achieving the same functional gains.

Ann Acad Med Singapore 2013;42:579-84

Key words: Critical pathway, Length of stay, Recovery of function, Subacute care

Introduction

Hip fractures are an increasingly common problem and a significant cause of mortality, morbidity and functional dependence. The incidence of hip fracture has increased in recent decades in countries with ageing populations and Singapore is no exception. Hip fracture incidence rates in Singapore have risen rapidly over the past 30 to 40 years, particularly in women, and are among the highest in Asia. The age-adjusted hip fracture rates amongst Singapore residents aged 50 years and over for 1991 to 1998 (per 100,000) were 152 in men and 402 in women.[1]

The mortality rates at 1 year post-hip fracture in Singapore were found to be 26% and 27.1% respectively in 2 studies,[2,3] which are comparable to international published rates. Functional recovery was poor compared to other countries with only 24.3% achieving pre-fracture ambulatory status and 18% bedbound or wheelchair bound.[3] Postoperative complications were found in 33.3% of patients in another study, which were associated with a longer length of stay.[4]

There is therefore a need for innovations to improve care for hip fracture patients so that there would be fewer adverse outcomes, less functional dependence and lower cost. One such innovation is the use of integrated care pathways (ICPs).

The usefulness of ICPs has been the subject of much debate. A recent meta-analysis of 22 studies on the use of care pathways in joint replacement (hip and knee) showed that care pathways resulted in shorter lengths of stay and fewer postoperative complications although cost-effectiveness could not be demonstrated.[5]

Unlike other conditions which have been managed with care pathways, hip fracture patients form a very heterogeneous group. This makes developing a single care pathway that meets the needs of most patients rather difficult. It also presents a challenge in selecting appropriate outcome measures for every patient.[6]

The success of ICPs for hip fractures has been found to be variable. Some have demonstrated a reduction in

[1]Medical Division, St Luke's Hospital, Singapore
[2]Rehabilitation Division, St Luke's Hospital, Singapore
[3]Department of Psychological Medicine, Yong Loo Lin School of Medicine, National University of Singapore, Singapore
[4]Nursing Division, St Luke's Hospital, Singapore
Address for Correspondence: Dr Tsung Wei Chong, 2 Bukit Batok St 11, Singapore 659674.
Email: chongtw@slh.org.sg

postoperative complications,[7,8] while others have not.[9-11] One trial showed a decrease in mortality[12] while others did not.[7,10,11,13] While some decreased the length of stay (LOS),[8,9,11-13] others resulted in an increase[10] or in no change.[7] The studies on ICPs for hips fractures so far, have themselves been very heterogeneous, each with its own particular agendas and strategies.

While all the reported studies have been conducted in acute hospital settings, there are no studies of the effectiveness of ICPs on hip fracture care in subacute rehabilitative settings that we are aware of. In Singapore, community hospitals play an important role in the post-acute rehabilitative care for elderly patients, particularly those with comorbidities. There is therefore a need to look into how hip fracture outcomes could be further improved in community hospitals. In this study, we sought to assess if an ICP might benefit hip fracture patients after transfer from an acute hospital to a subacute rehabilitation setting. The emphasis of the care pathway and the focus of outcome measurements were on functional goals and successful reintegration into the community, while minimising length of stay. Our hypothesis was that a hip fracture care pathway compared to usual (standard) care would result in better functional outcomes and fewer patients admitted into institutional home nursing care.

The study was submitted for ethical review and approved by the hospital's Medical Advisory Committee. Informed consent was taken by the principal investigators from participants.

Materials and Methods

Participants

All patients admitted to St Luke's Hospital, a 185-bed hospital in Singapore providing multidisciplinary step-down care, from 8 September 2004 to 14 June 2006 for the purpose of rehabilitation after a new hip fracture were included. Patients were excluded if any of the following criteria were present: (i) Pre-morbid non-ambulatory status, (ii) nursing home residents, (iii) palliative care patients, and (iv) patients previously enlisted for the trial.

Randomisation and Allocation

Administrative staff allocated patients to either ICP or usual care according to the last digit of their National Registration Identity Card (NRIC) numbers, odd numbers to the intervention group and even numbers to the control group. Patients were then admitted to 1 of 2 intervention wards or 1 of 3 control wards. Patients were enrolled by the principal investigators only after moving into their respective wards because of workflow limitations. Those who refused consent or were excluded remained in their assigned wards and received usual care.

Interventions

Both intervention and control groups were under the care of multidisciplinary teams but the intervention group had structured assessments and checklists in addition to usual care while the control group had usual care alone. Usual care consisted of 2 half hourly therapy sessions per day from Monday to Friday and medical ward rounds 3 times a week. Multidisciplinary rounds were conducted every 2 weeks. Any specific goals or interventions were at the discretion of the managing team.

The intervention group had the following as part of the integrated care pathway:

1. Medical assessment on admission for risk factors for falls. This was done using a template so as not to miss any important factors.
2. A protocol was developed for the early detection and management of complications. It consisted of a weekly assessment of complications including pain, deep venous thrombosis, anaemia, wounds and pressure ulcers, depression, delirium, constipation, urinary retention and malnutrition, and interventions for osteoporosis. We utilised the Confusion Assessment Method[14] to screen for delirium and the Geriatric Depression Scale[15] to screen for depression. Patients who reported any pain were started on pain assessment and monitoring charts.
3. The therapists coordinated their work through the use of a combined physiotherapy and occupational therapy assessment form. This facilitated goal setting and helped to avoid duplication of work. Five-week physiotherapy and occupational therapy guidelines with recommended milestones were developed and applied by the therapists. Different milestones were set for the full, partial and non-weight bearing groups
4. Physiotherapy Clinical Outcome Variables Scale (PTCOVS)[16] was used by the physiotherapists in the intervention group to assess the baseline mobility, to define outcome goals and to direct treatment plans.
5. A postoperative hip precaution handout was given to patients and their caregivers. This handout provides information on avoiding hip prosthesis dislocation in patients with total hip replacement or hemi-arthroplasty.

Measurements

The following were assessed at the respective times:

1. Modified Barthel's Index (MBI),[17] which scores the degree of independence of a subject from any

assistance up to a maximum score of 100 (admission, discharge, 6 months, 1 year).

2. Ambulatory status (pre-morbid, admission, discharge, 6 months, 1 year).
3. Mini Mental State Examination (MMSE),[18] a 30-point questionnaire that is used to screen for cognitive impairment (admission, discharge, 6 months, 1 year).
4. Geriatric Depression Scale (GDS),[15] a 15-item questionnaire that is used as a screening tool for depression in the elderly (admission, discharge, 6 months, 1 year).
5. Patient satisfaction scale, a 15-item questionnaire with a 5-point Likert scale, devised for the participants in our trial (discharge).
6. Quality of life scale—SF 12 including Physical Component Summary (PCS) and Mental Component Summary (MCS),[19] a multipurpose, generic measure of health status (6 months, 1 year).

Outcomes

The primary outcome measures were:

1. Montebello Rehabilitation Factor Score at discharge, at 6 months and at 1 year.
2. Proportions of patients achieving pre-morbid ambulatory status at discharge, at 6 months and at 1 year.
3. Length of stay in hospital.
4. Admission to nursing home, up to 1 year after discharge.

The Montebello Rehabilitation Factor Score[20] (MRFS) is a recognised measure of hip fracture patients' functional outcome.[21] It is calculated with the following formula, using the Modified Barthel Index (MBI) scores:

$$\text{MRFS} = \frac{(\text{MBI score at discharge} - \text{MBI score at admission}) \times 100\%}{(\text{Highest possible MBI score} - \text{MBI score at admission})}$$

Our secondary outcome measures were:

1. Readmissions to an acute hospital for any reason during stay and cumulatively up to 1 year post-discharge.
2. Cumulated mortality at 1 year.
3. SF12 score at 6 months and at 1 year.

Clinical assessments were performed by trained nurses and therapists, and research baseline and outcome assessments were performed by trained research assistants, the latter being blinded with respect to the patient's allocation to either intervention or control group. The data collection included a combination of chart review, face-to-face interviews, as well as on site assessment of patients in both control and intervention groups. The research assistants made telephone call reviews at 3 and 9 months post-enrolment and conducted assessments in person at their places of dwelling at 6 and 12 months post-enrolment.

Sample size calculations were made using WHO-sample size determination in health studies (Epi Info ver 3.3 and EpiCalc ver 1.02). All sample size calculations were based on a confidence level of 95% (2-sided test) with 10% of tolerated type-2 error.

Statistical Methods

Baseline characteristics and outcomes were analysed on an intention-to-treat basis. To compare subjects in both groups, we used 2-tailed t-tests for continuous variables, and if they were not normally distributed, Mann-Whitney tests were used instead. For categorical variables, we used the Pearson X^2 statistic and Fisher's exact test to evaluate differences in the proportion of subjects in each group. The level of significance was set at $P < 0.05$ in this study. Data were analysed using SPSS for Windows version 17.0.

Results

One hundred and sixty-two trial participants were recruited from 8 September 2004 to 14 June 2006. Ninety-two were randomised to the intervention group while 70 were in the control group. The participant flow is illustrated in Figure 1 while the baseline characteristics of both groups are shown in Table 1.

Baseline Characteristics

Both groups showed similar baseline characteristics, except for visual impairment. More participants in the intervention group had visual impairment (46.7% vs 28.6%, $P = 0.02$). The intervention group had a marginally lower mean MMSE score and the control group had a higher percentage of participants with hypertension (statistically non-significant).

Outcomes

The outcomes of the 2 groups are shown in Table 2. Sixteen participants died during the trial period and 24 participants refused follow-up after enrolling into the trial.

There were no significant differences between the 2 groups in their Montebello Rehab Factor Scores and in the proportion achieving pre-morbid ambulatory status at discharge 6 months and 12 months. There was a significant

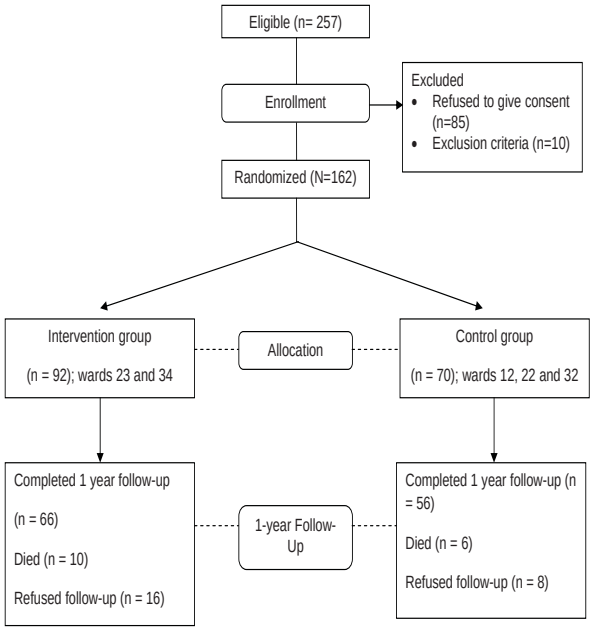

Fig. 1. Participant flow.

Table 1. Baseline Characteristics of Control and Intervention Groups

	Control group (n = 70)	Intervention group (n = 92)	*P* value
Age, mean (SD)	79.0 (9.6)	77.1 (11.6)	0.27
Female, n (%)	49 (70.0)	62 (67.4)	0.72
Fracture type, n (%)			0.91
Intertrochanteric	36 (51.4)	46 (50.0)	
Neck of femur	31 (44.3)	43 (46.7)	
Subtrochanteric	3 (4.3)	3 (3.3)	
Surgical type, n (%)			0.95
Bipolar Hemiarthroplasty	15 (21.7)	16 (19.5)	
Moore's Hemiarthroplasty	11 (15.9)	15 (18.3)	
Dynamic Hip Screw	35 (50.7)	40 (48.8)	
Others	8 (11.6)	11 (13.4)	
Medical comorbidity, n (%)			
Hypertension	56 (80.0)	61 (66.3)	0.054
Diabetes Mellitus	33 (47.1)	38 (41.3)	0.46
Ischaemic Heart Disease	23 (32.9)	25 (27.2)	0.43
Stroke	22 (31.4)	23 (25.0)	0.37
Dementia	11 (15.7)	17 (18.5)	0.65
Arthritis	8 (11.4)	16 (17.4)	0.29
Congestive Cardiac Failure	5 (7.1)	7 (7.6)	0.91
Chronic Obstructive Pulmonary Disease	3 (4.3)	8 (8.7)	0.35
Number of medical comorbidities, mean (SD)	3.2 (1.5)	3.0 (1.5)	0.50

Table 1. Baseline Characteristics of Control and Intervention Groups (Con't)

	Control group (n = 70)	Intervention group (n = 92)	*P* value
Sensory functioning, n (%)			
Hearing impairment	13 (18.6)	24 (26.1)	0.26
Visual impairment	20 (28.6)	43 (46.7)	0.02
Inpatient complication, n (%)			
Pain	56 (80)	78 (84.8)	0.43
Anaemia	37 (52.9)	51 (55.4)	0.74
Wound	20 (28.6)	32 (34.8)	0.40
Chest infection/ Urinary Tract Infection	11 (15.7)	16 (17.4)	0.78
Urinary retention	13 (18.6)	14 (15.2)	0.57
Constipation	5 (7.1)	4 (4.3)	0.50
Depression	2 (2.9)	6 (6.5)	0.47
Deep vein thrombosis	2 (2.9)	4 (4.3)	0.70
Any complication, n (%)	68 (97.1)	88 (95.7)	0.70
Number of inpatient complications, mean (SD)	2.1 (1.0)	2.2 (1.2)	0.40
Weight-bearing status (on admission), n (%)			0.60
Full weight bearing	20 (28.6)	26 (28.3)	
Non-weight bearing	32 (45.7)	48 (52.2)	
Partial weight bearing	18 (25.7)	18 (19.6)	
Physical functioning on admission, n = 149			
MBI score, mean (SD)	50.3 (17.1)	48.0 (19.4)	0.43
MBI score <50 (max assistance or totally dependent), n (%)	31 (44.3)	45 (50.0)	0.47
Cognitive function on admission, n = 146			
MMSE score, mean (SD)	18.7 (5.9)	16.7 (6.8)	0.057
MMSE score <24 (cognitive impairment), n (%)	52 (76.5)	71 (80.7)	0.52
GDS score ≥5 on admission, n (%)	37 (53.6)	52 (57.8)	0.60

Table 2. Health-related Outcome Comparison Between Control and Intervention Groups

	Control group (n = 70)	Intervention group (n = 92)	*P* value
Length of stay, days			
Median (min, max)	48.0 (10, 382)	35.0 (5, 402)	0.009
Hospital readmission, n (%)			
During stay	14 (20.0)	15 (16.3)	0.54
Within 3 month (n = 143)	5 (7.9)	4 (5.0)	0.51
Within 1 year (n = 120)	3 (5.5)	6 (9.2)	0.51
Physical functioning, MBI score*			
Average changes over time, mean (SD)			
At discharge (n = 149)	23.9 (19.7)	22.2 (17.5)	0.58
At 6 month follow-up (n = 129)	27.7 (20.6)	32.6 (21.3)	0.18
At 12 month follow-up (n = 121)	31.8 (19.5)	33.4 (22.9)	0.68
Montebello Rehab Factor score, mean (SD)			
At discharge (n = 149)	49.0 (34.0)	45.6 (30.5)	0.51
At 6 month follow-up (n = 129)	61.2 (38.7)	67.2 (34.9)	0.36
At 12 month follow-up (n = 121)	70.2 (36.7)	68.3 (37.5)	0.77
Achieving pre-morbid ambulatory status, n (%)			
At discharge	15 (21.4)	21 (22.8)	0.83
At 6 months	22 (31.4)	33 (35.9)	0.55
At 12 months	27 (38.6)	32 (34.8)	0.62
SF12-Quality of life, mean (SD)			
At 6 month follow-up (n = 129)			
PCS Score	38.3 (9.1)	39.0 (9.5)	0.67
MCS Score	51.0 (9.2)	53.2 (9.3)	0.18
At 12 month follow-up (n = 119)			
PCS Score	40.9 (9.7)	40.7 (9.9)	0.91
MCS Score	53.4 (11.1)	52.0 (10.6)	0.49
Weight bearing at discharge, n (%)			0.091
Full weight bearing	39 (55.7)	36 (39.1)	
Non-weight bearing	10 (14.3)	22 (23.9)	
Partial weight bearing	21 (30.0)	34 (37.0)	
Any nursing home stay after discharge, n (%)	9 (12.9)	6 (6.5)	0.17
Patient satisfaction*, on discharge			
Mean (SD)	60.2 (8.0)	61.4 (8.6)	0.37
Died, n (%)	6 (8.6)	10 (10.9)	0.63

*Higher MBI or Patient Satisfaction scores reflect better functional status or better patient satisfaction respectively.

MBI: Modified Barthel Index; PCS: Physical Component Summary; MCS: Mental Component Summary

reduction in the median length of stay in the intervention group (35.0 days) compared to the control group (48.0 days, $P = 0.009$). Both groups showed similar proportions of discharged patients who required nursing home admission up to one year after discharge.

The frequencies of readmissions to acute hospitals were similar in both groups during rehabilitation stay, within 3 months and within 12 months. There were no significant differences between the groups for mortality at 1 year and for SF12 scores at 6 months and at 1 year.

Discussion

Our study is the only pseudo-randomised control trial of ICPs for hip fracture in community rehabilitation hospitals since the study by Choong et al.[9] The impracticality of randomising individual patients in trials of this sort was highlighted previously by Parker[22] and Nagile.[6] The alternative is cluster randomisation which requires a large number of wards or institutions. Other trials have used either before and after study designs or historical controls and therefore the prevailing hospital or unit practices at the time may bias the results. It was difficult to avoid cross-over contamination between the trial wards. There was some control of this problem in that there were separate medical, nursing and rehabilitation teams for the intervention and control wards, although inevitably some cross-over coverage and experience might have occurred. The long recruitment period for the trial also allowed for more contamination between wards.

Because most trials of the effectiveness of ICPs in hip fracture patients were conducted in acute care settings, few studies have examined their effects on functional outcomes after rehabilitative care. Roberts et al[10] did show a significant increase in the ability to walk alone on discharge. Our study showed little or no differences in functional outcome except a shorter length of hospital stay.

In our community hospital-based care setting, where there is already a high degree of multidisciplinary care for our patients, the added effect of an ICP may be small. As mentioned above, cross-over effects between wards may also be a factor. Another factor that may have negated the benefits of ICPs was that about half the patients were non-weight bearing on admission. Moreover, a higher percentage of patients in the intervention group remained non-weight bearing at discharge (23.9%) as compared to the control group (14.3%). The differences in weight bearing status at discharge failed to reach significance ($P = 0.091$). The non-weight bearing status was determined by the primary decision made by the acute hospital orthopaedic surgeons when the patient was admitted into rehabilitative care.

Although the ICP did not produce any significant

additional functional gains over usual care as postulated, the same functional gains were achieved with a shorter length of stay. The shorter length of stay for ICP intervention could have arisen from the more structured, multidisciplinary rehabilitation inputs. The difference in length of stay (13 days) was substantial.

Opinions on ICPs for hip fractures remain divided. On the one hand, it is suggested that time and resources should not be wasted on hip fracture ICPs while the evidence does not support any substantial impact on clinical outcomes.[22] On the other hand, some see the benefit of ICPs in increasing adherence to best practice guidelines.[23] Still, others highlight the need for evidence for the generalisability and cost-effectiveness of ICPs.[24] ICPs could be improved by identifying the components of care which provide the most benefit. In a review of hip fracture rehabilitation practices in the elderly, clinical pathways involving intensive occupational therapy and/or physiotherapy exercises, mobilisation, early supported discharge, high-frequency occupational therapy/physiotherapy, and additional occupational therapy combined with physiotherapy, were associated with improved functional recovery during acute care.[25] Another possible area of study is the effect of a collaborative ICP between care providers, which oversees patient care from the time of admission to the acute hospital, through the period of inpatient rehabilitation, all the way to phase of community reintegration.

Conclusion

Our study supports the use of ICPs for hip fracture in subacute rehabilitation settings. Integrated care pathways can help to reduce length of stay while achieving the same functional gains.

Acknowledgements

We thank all participants and staff involved.

REFERENCES

1. Koh LK, Saw SM, Lee JJ, Leong KH, Lee J; National Working Committee on Osteoporosis. Hip fracture incidence rates in Singapore 1991-1998. Osteoporos Int 2001;12:311-8.
2. Wong MK, Arjandas, Ching LK, Lim SL, Lo NN. Osteoporotic hip fractures in Singapore–costs and patients' outcomes. Ann Acad Med Singapore 2002;31:3-7.
3. Lee AY, Chua BS, Howe TS. One-year outcome of hip fracture patients admitted to a Singapore hospital: quality of life post-treatment. Singapore Med J 2007;48:996-9.
4. Merchant RA, Lui KL, Ismail NH, Wong HP, Sitoh YY. The relationship between postoperative complications and outcomes after hip fracture surgery. Ann Acad Med Singapore 2005;34:163-8.
5. Barbieri A, Vanhaecht K, Van Herck P, Sermeus W, Faggiano F, Marchisio S, et al. Effects of clinical pathways in the joint replacement: a meta-analysis. BMC Med 2009;7:32.
6. Naglie IG, Alibhai SM. Improving outcomes in hip fracture patients: are care pathways the answer? J Rheumatol 2000;27:2068-70.
7. Beaupre LA, Cinats JG, Senthilselvan A, Lier D, Jones CA, Scharfenberger A, et al. Reduced morbidity for elderly patients with a hip fracture after implementation of a perioperative evidence-based clinical pathway. Qual Saf Health Care 2006;15:375-9.
8. Olsson LE, Karlsson J, Ekman I. The integrated care pathway reduced the number of hospital days by half: a prospective comparative study of patients with acute hip fracture. J Orthop Surg Res 2006;1:3.
9. Choong PF, Langford AK, Dowsey MM, Santamaria NM. Clinical pathway for fractured neck of femur: a prospective, controlled study. Med J Aust 2000;172:423-6.
10. Roberts HC, Pickering RM, Onslow E, Clancy M, Powell J, Roberts A, et al. The effectiveness of implementing a care pathway for femoral neck fracture in older people: a prospective controlled before and after study. Age Ageing 2004;33:178-84.
11. Gholve PA, Kosygan KP, Sturdee SW, Faraj AA. Multidisciplinary integrated care pathway for fractured neck of femur. A prospective trial with improved outcome. Injury 2005;36:93-8.
12. Koval KJ, Chen A, Aharonoff GB, Egol KA, Zuckerman JD. Clinical pathway for hip fractures in the elderly: the Hospital for Joint Diseases experience. Clin Orthop Relat Res 2004;425:72-81.
13. March LM, Cameron ID, Cumming RG, Chamberlain AC, Schwarz JM, Brnabic AJ, et al. Mortality and morbidity after hip fracture: can evidence based clinical pathways make a difference? J Rheumatol 2000;27:2227-31.
14. Inouye SK, van Dyck CH, Alessi CA, Balkin S, Siegal AP, Horwitz RI. Clarifying confusion: the confusion assessment method. A new method for detection of delirium. Ann Intern Med 1990;113:941-8.
15. Sheikh JI, Yesavage JA. Geriatric Depression Scale (GDS): recent evidence and development of a shorter version. In: Brink TL, editor. Clinical Gerontology: A Guide to Assessment and Intervention. New York: The Haworth Press,1986.
16. Seaby L, Torrance G. Reliability of a physiotherapy functional assessment used in a rehabilitation setting. Physiother Can 1989;41:264-71.
17. Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. J Clin Epidemiol 1989;42:703-9.
18. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 1975;12:189-98.
19. Ware JE, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: Construction of scales and preliminary tests of reliability and validity. Med Care 1996;34:220-33.
20. Drubach DA, Kelly MP, Taragano FE. The Montebello rehab factor score. J Neurol Rehabil 1994;8:92-96.
21. Jones GR, Miller TA, Petrella RJ. Evaluation of rehabilitation outcomes in older patients with hip fractures. Am J Phys Med Rehabil 2002;81:489-97.
22. Parker MJ. Care pathways for hip fractures: a useful tool or passing fashion? Age Ageing 2004;33:93-4.
23. Syed KA, Bogoch ER. Integrated care pathways in hip fracture management: demonstrated benefits are few. J Rheumatol 2000;27:2071-3.
24. Swanson CE, Yelland CE, Day GA. Clinical pathways and fractured neck of femur. Med J Aust 2000;172:415-6.
25. Chudyk AM, Jutai JW, Petrella RJ, Speechley M. Systematic review of hip fracture rehabilitation practices in the elderly. Arch Phys Med Rehabil 2009;90:246-62.