Predictors of Rehabilitation Efficiency and Effectiveness in a Community Hospital

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Introduction

- Rehabilitation improves functional recovery and quality of life in disabled elderly[1-5], especially if started early[6] and intensively[7].

1. Werner RA, Kessler S. Effectiveness of an intensive outpatient rehabilitation programme for post-acute stroke patients. Am J Phys Med Rehabil. 1996;75:114-20.
2. Tangeman PT, Banaitis DA, Williams AK. Rehabilitation of chronic stroke patients. Changes in functional performance. Arch Phys Med Rehabil. 1990;71:876-80.
3. Wade DT, Collen FM, Robb GF, Warlow CB. Physiotherapy intervention late after stroke and mobility. BMJ. 1992;304:609-13.
4. Shyu YI, Liang J, Wu CC, Su JY, Cheng HS, Chou SW, Yang CT. A pilot investigation of the short-term effects of an interdisciplinary intervention program on elderly patients with hip fracture in Taiwan. J Am Geriatr Soc 2005;53(5):811-8.
5. Stahle A, Mattsson E, Ryden L, Unden A, Nordlander R. Improved physical fitness and quality of life following training of elderly patients after acute coronary events. A 1 year follow-up randomized controlled study. Eur Heart J 1999;20(20):1448-50.
6. Paolucci S, Antonucci G, Grasso MG, Morelli D, Troisi E, Coiro P, Bragoni M. Early versus delayed inpatient stroke rehabilitation: a matched comparison conducted in Italy. Arch Phys Med Rehabil 2000;81:695-700.
7. Salter K, Jutai J, Hartley M, Foley N, Bhogal S, Bayona N, Teasell R. Impact of early vs delayed admission to rehabilitation on functional outcomes in persons with stroke. J Rehabil Med 2006;38(2):113-7.

Introduction

- Geriatric rehabilitation in Singapore is provided mainly by community hospitals (CHs).
- There are 4 CHs in Singapore:
  - Ang Mo Kio Thye Hua Kwan Hospital (AMKTHKH).
  - St Luke's Hospital (SLH).
  - St Andrew's Community Hospital (SACH).
  - Bright Vision Hospital (BVH).
- All CHs use the 100-point Shah-Modified Barthel Index to quantify functional impairment, as recommended by our Ministry of Health.[1]

1. Ministry of Health (Singapore), Elderly and Continuing Care Division. Healthcare Services for the Elderly. An information booklet for healthcare professionals. 1st Edition. Singapore. Ministry of Health. 2004

Introduction

- Challenges faced by multi-disciplinary team in rehabilitation:
  - How well can we predict rehabilitation efficiency and effectiveness in our patients?
  - What are the associated factors and independent predictors of rehabilitation efficiency and effectiveness?
  - Are any of these predictors modifiable?
- Answers will aid early discharge planning and guide multi-disciplinary team when counseling patients and family expected functional recovery.

Introduction

Rehabilitation **E**fficienc**y** (**REy**)[1]

- The degree of functional improvement (e.g. using the 100-point Shah-Modified Barthel Index[2]) divided by the duration of rehabilitation .
- It is the improvement in BI score, divided by the days between time point T_x and a later time point T_y:

$$\mathbf{REy} = \frac{\mathbf{BI_y - BI_x}}{\mathbf{[\ Days\ bet\ T_x\ and\ T_y)\ ]}}$$

- REy is multiplied by 30 days to obtain the improvement in BI score in a month.

1. Shah S, Vanclay F, Cooper B. Efficiency, effectiveness, and duration of stroke rehabilitation. Stroke 1990:21:241-6.
2. Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. J Clin Epidemiol. 1989;42(8):703-709.

Introduction

Rehabilitation **E**ffectiveness **(REs)**[1]

- The degree of functional improvement divided by potential functional improvement.
- It is the improvement in BI score, divided by the maximum possible functional recovery (between time point T_x & a later time point T_y) where the maximum score for the Shah-Modified Barthel Index[2] is 100:

$$\mathbf{REs} = \frac{\mathbf{BI_y - BI_x}}{\mathbf{(100 - BI_x)}} \times \mathbf{100\%}$$

- The value is multiplied by 100% to obtain a percentage.

1. Shah S, Vanclay F, Cooper B. Efficiency, effectiveness, and duration of stroke rehabilitation. Stroke 1990:21:241-6.
2. Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. J Clin Epidemiol. 1989;42(8):703-709.

Introduction

Rehabilitation Efficiency (REy)

Predictors of REy:

- Baseline functional status[1]
- Medical co-morbidities (using CIRS)[2]
- Depression[3] (but not dementia[4])
- Age [conflicting findings[1(No),5(Yes)]].

1. Luk JKH, Cheung RTF, Ho SL, Li L. Does age predict outcome in stroke rehabilitation? A study of 878 Chinese subjects. Cerebrovasc Dis 2006;21(4):229-34.
2. Patrick L, Knoefel F, Gaskowski P, Rexroth D. Medical comorbidity and rehabilitation efficiency in geriatric patients. J Am Geriatr Soc 2001;49(11):1471-7.
3. Gillen R, Tennen H, McKee TE, Gernert-Dott P, Affleck G. Depressive symptoms and history of depression predict rehabilitation efficiency in stroke patients. Arch Phys Med Rehabil 2001;82(12):1645-9.
4. Yu F, Evans LK, Sullivan-Marx EM. Functional outcomes for older adults with cognitive impairment in a comprehensive outpatient rehabilitation facility. J Am Geriatr Soc 2005b;53(9):1624-6.
5. Yu F, Richmond T. Factors affecting outpatient rehabilitation outcomes in elders. J Nurs Scholarsh 2005a;37(3):229-36.

Introduction

Rehabilitation Effectiveness (REs)

Predictors of REs:

- Age[1]
- Stage of arm motor recovery[1]
- Adherence to clinical practice guidelines[2]

1. Lin JH, Chang CM, Liu CK, Huang MH, Lin YT. Efficiency and effectiveness of stroke rehabilitation after first stroke. J Formos Med Assoc 2000;99(6):482-90.
2. Micieli G, Cavallini A, Quaglini S. Guideline compliance improves stroke outcomes: a preliminary study in 4 districts in the Italian region of Lombardia. Stroke 2002;33:1341-7.

Aim

To study the predictors of REy and REs during rehabilitation in a community hospital

Methods

- Study design:
  - Retrospective longitudinal study.
- Study population:
  - All first admissions for rehabilitation and whose length of hospital stay was ≥ 14 days from 1998 to 2005.

* Data from only one CH is presented here. This study is part of an ongoing study involving all 4 community hospitals in Singapore.

Methods

- Measurement:
  - 100-point Shah Modified Barthel Index
  - Administered by attending physiotherapists and occupational therapists.
- Data collection:
  - From case records.
  - Manual extraction by a trained nurse.
  - Data transcribed into data collection form (DCF).
  - DCF read by a optical scanner to minimize data entry error.

Predictors studied

- Age
- Gender
- Ethnicity
- Social support
- Primary cause of disability:
  - Stroke (ischemic v.s. hemorrhagic)
  - Fracture (femoral, vertebral & others)
  - Amputation (forefoot, BKA, AKA & others)
  - Other
- Charlson Co-Morbidity Index (CCMI)

Co-morbidities Studied

- Chronic obstructive lung disease
- Heart failure
- Myocardial infarction
- Ischemic heart disease*
- Peripheral vascular disease
- Stroke
- Dementia
- Hypertension*
- Diabetes mellitus
- Hyperlipidemia*
- Chronic renal disease
- Chronic liver disease
- Malignant solid tumors
- Leukemia
- Malignant lymphomas

* Not part of CCMI.

Statistical analysis

- Bi-variate analysis:
  - *One-Way ANOVA used.*
- *Multi-variate analysis:*
  - *Multiple linear (backward) regression used.*
  - Associated predictors whose $p \leq 0.15$ was entered into the model.
- All reported p-values are two-tailed was $p<0.05$ is taken as statistically significant.

Results

Study Population

- Out of 3,395 eligible subjects, only 2,322 subjects had both admission and discharge BI scores recorded (68.4%).
- Mean age ± SD = 74.1 ± 11.1 yrs
- Gender: Male : Female = 42.7% : 57.3%
- Ethnicity:
  - Chinese 88.2%
  - Malay 7.1%
  - Indian 3.8%
  - Others 0.9%

Socio-Demographics

Table 6: Demographic profile of the valid study population (N=2,322)

Demographic Variable	n (%)*
Age (years)	
≤ 60	242 (10.4)
> 60 to 70	502 (21.6)
> 70 to 80	851 (36.6)
>80	727 (31.3)
Mean ± SD	74.1 ± 11.1
Median (Inter-quartile range)	75.0 (67.4 – 82.0)
Gender	
Male	991 (42.7)
Female	1329 (57.3)
Ethnicity	
Chinese	2048 (88.2)
Malay	165 (7.1)
Indian	89 (3.8)
Others	20 (0.9)
Marital Status	
Single, widowed or divorced	1339 (57.8)
Married	979 (42.2)
Religion	
No	341 (14.7)
Yes	1981 (85.3)
Government Subsidy Level	
Low or no subsidy	307 (13.2)
High subsidy	2015 (86.8)
Primary diagnosis for admission	
Stroke (infarct or haemorrhage)	1067 (46.0)
Fracture	575 (24.8)
Amputations	50 (2.2)
Others	630 (27.1)
No. of carers available	
None	235 (10.1)
One	456 (19.6)
Two	784 (33.8)
Three or more	847 (36.5)
Charlson Co-Morbidity Index	
Mean ± SD	3.7 ± 2.5
Median (Inter-quartile range)	3 (2 – 6)
Admission BI score (units)	
0 – 25	341 (14.7)
26 – 50	542 (23.3)
51 – 75	885 (38.1)
76 - 100	554 (23.9)
Mean ± SD	55.3 ± 24.1
Median (Inter-quartile range)	59 (39 - 75)

Clinical Profile

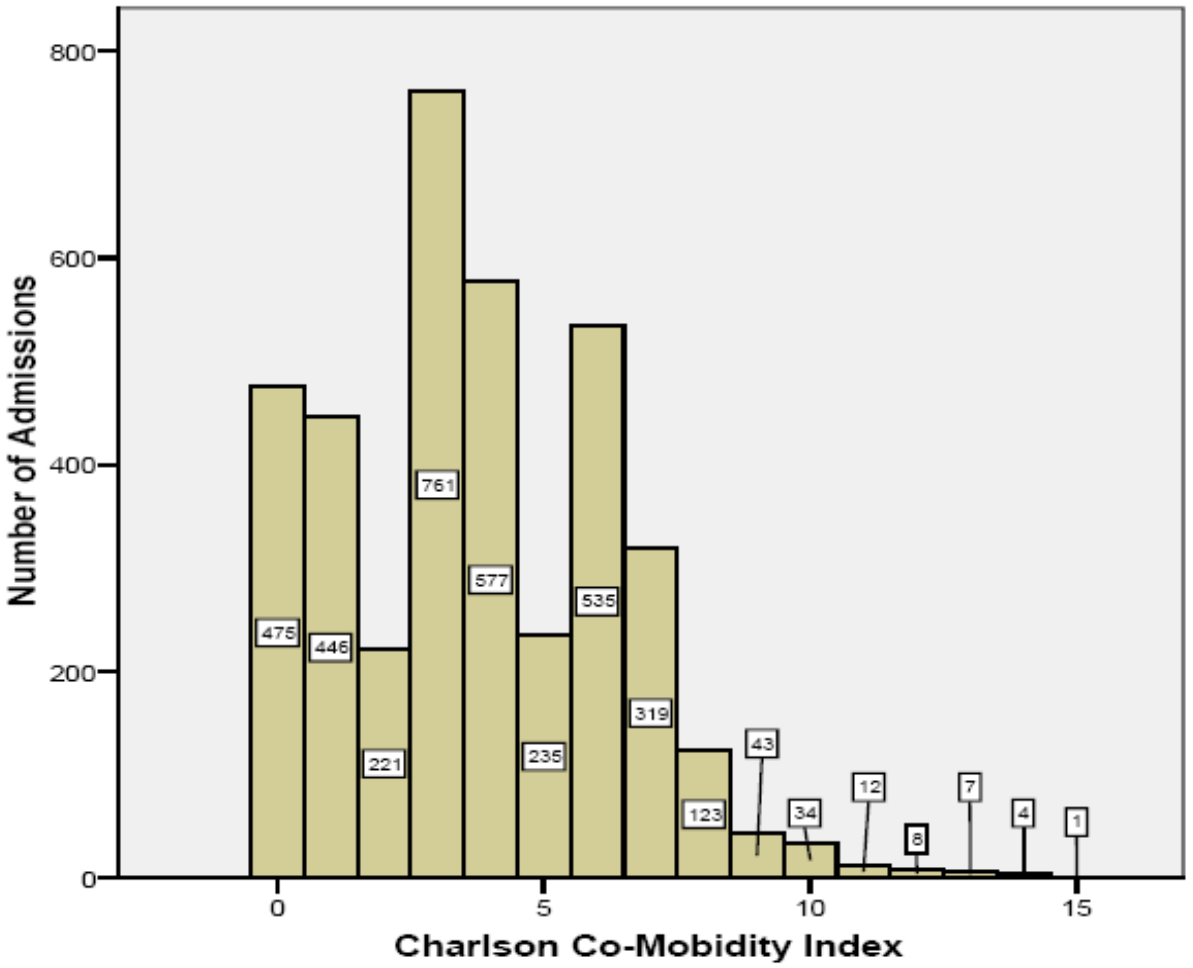
Table 7: Specific co-morbidities in valid study population (N=2,322)

Co-Morbidity	n (%)
AIDS	9 (0.4)
Cerebrovascular disease	1338 (57.6)
Chronic pulmonary disease	132 (5.7)
Congestive heart failure	122 (5.3)
Connective tissue disease	39 (1.7)
Dementia	456 (19.6)
Hemiplegia	1341 (57.8)
Leukaemia	26 (1.1)
Lymphoma	32 (1.4)
Myocardial infarct	103 (4.4)
Peripheral vascular disease	184 (7.9)
Ulcer disease	419 (18.0)
Diabetes	
Without end organ damage	132 (5.7)
With end organ damage	742 (32.0)
Liver disease	
Mild	21 (0.9)
Moderate or severe	10 (0.4)
Renal Disease	
Mild	2272 (97.8)
Moderate or severe	50 (2.2)
Malignant tumour	
Non-metastatic	117 (5.0)
Metastatic	32 (1.4)
Hypertension*	1651 (71.1)
Hyperlipidaemia*	864 (37.2)
Ischaemic heart disease (with or without myocardial infarct)*	634 (27.3)

* Co-morbidities not considered in calculation of Charlson Co-Morbidity Index.

Charlson Co-Morbidity Index

Figure 3: Charlson co-morbidity index scores



Socio-Demographic Profile (9)

- Discharge Destination:
  - Home: 80.7%.
  - Nursing home: 12.7%.
  - Re-admission to acute hospital: 5.7%
  - Transfer to another CH: 0.2%
  - AOR Discharge: 0.2%
  - Sheltered home: 0.1%
  - Death in CH: 0.1%

Rehabilitation Indices

Rehabilitation Efficiency (REy)

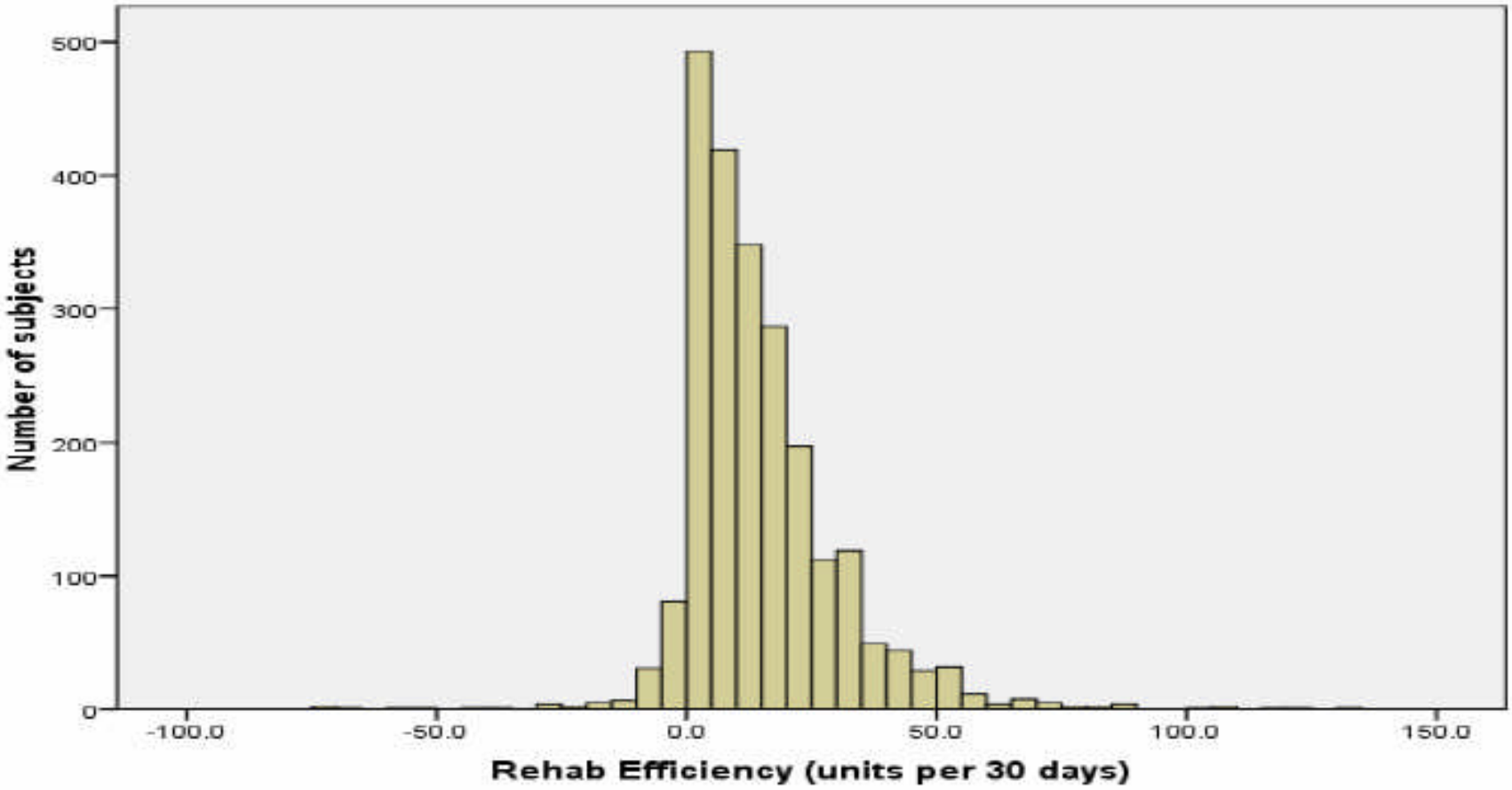
- Mean: 14.1 (95%CI: 13.0 – 15.2] (SD=28.2)
- Unit: Units of BI score improvement per 30 days.

Rehabilitation Effectiveness (REs)

- Mean: 42.6% [95%CI: 41.1 – 44.1] (SD=36.4)
- Unit: % of maximum possible BI score improvement.

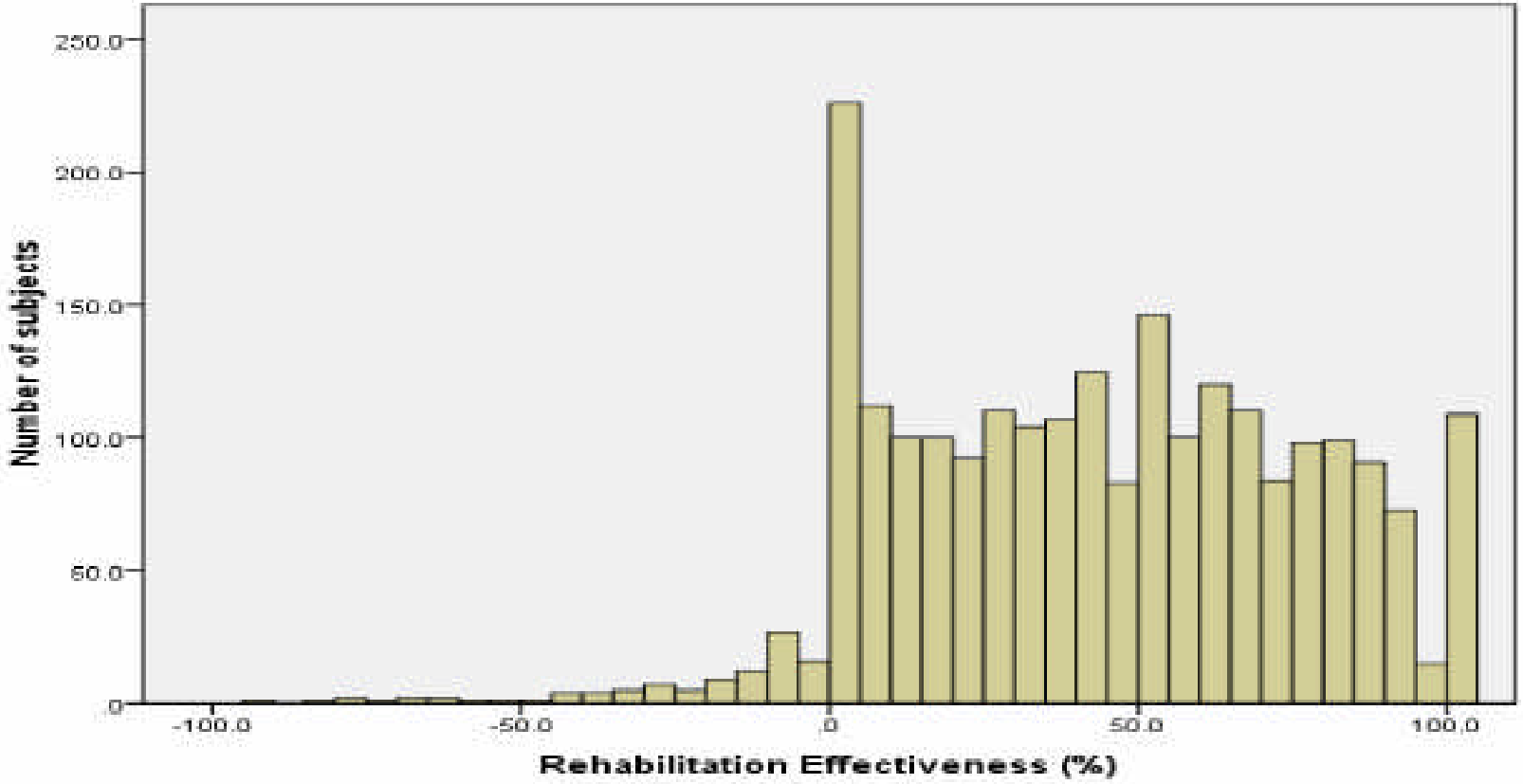
Distribution of REy Scores

Figure 16: Overall REy Score



Distribution of REs Scores

Figure 4: Overall REs score (%)



Predictors of Rehabilitation Efficiency (REy)

Assoc'd Predictors of Rehab Efficiency (1)

Age

Age group (years)	Mean REy (units per 30 days)	95% CI of mean (units per 30 days)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
≤ 60	16.8	13.4 -20.2		6.5	2.4 – 10.6	0.002
> 60 to 70	17.0	14.9 – 19.1	< 0.001	6.7	3.5 – 9.9	< 0.001
> 70 to 80	14.7	13.5 – 16.0		4.4	1.7 – 7.2	0.002
>80	10.3	7.5 – 13.1		0.00	-	-

Rehabilitation efficiency begins to decline after the age of 70 years.

Assoc'd Predictors of Rehab Efficiency (2)

Marital Status

Marital Status	Mean REy (units per 30 days)	95% CI of mean (units per 30 days)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value (s) for unstandardized β coefficient
Single, widowed or divorced	12.5	10.7 – 14.2	0.001	-3.8	-6.1 to -1.5	0.001
Married	16.2	14.9 – 17.5		0.0	-	-

Rehabilitation efficiency is greater in those married than those who are either single, widowed or divorced.

Assoc'd Predictors of Rehab Efficiency (3)

Primary Diagnosis for Admission

Primary Diagnosis for Admission	Mean REy (units per 30 days)	95% CI of mean (units per 30 days)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
Strokes	14.4	13.2 – 15.5	0.010	-1.1	-3.9 to 1.7	0.428
Fractures	12.9	9.3 – 16.4		-2.6	-5.8 to 0.6	0.109
Lower Limb Amputations	2.4	-11.5 to 16.4		-13.1	-21.2 to -5.0	**0.002**
Others	25.5	13.8 – 17.1		0.0	-	-

Rehabilitation efficiency was significantly lower in patients whose primary diagnosis for admission was lower limb amputations.

Assoc'd Predictors of Rehab Efficiency (4)

Number of Potential Carers Available

Number of carers available	Mean REy (units per 30 days)	95% CI of mean (units per 30 days)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
None	9.6	3.1 – 16.1	0.011	-4.9	-8.7 to -1.1	0.011
One or more	14.6	13.5 – 15.6		0.0	-	-

Rehabilitation efficiency was greater in those who had no carer compared to those who had one or more carers.

Assoc'd Predictors of Rehab Efficiency (5)

Charlson Co-Morbidity Index

Charlson Co-Morbidity Index Score	Number of subjects	Mean REy (units per 30 days)	95% CI of mean (units per 30 days)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
0	295	17.2	15.5 – 18.9		4.72	1.11 – 8.33	**0.003**
1 – 3	898	15.0	13.2 – 16.9	**0.017**	2.51	0.04 – 4.98	**0.002**
≥ 4	1123	12.5	10.7 – 14.2		0.0	-	-

Rehabilitation efficiency decreases with increasing co-morbidity burden in a patient.

Assoc'd Predictors of Rehab Efficiency (5)

Dementia

Co-Morbidity	Mean REy (%)	95% CI of mean (%)	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value
Dementia					
No	15.5	14.5 – 16.4	0.0	-	< 0.001
Yes	8.2	3.8 – 12.5	-7.3	-10.2 to 4.5	

On bivariate analysis, only patients with dementia had lower rehabilitation efficiency than those who did not have them.

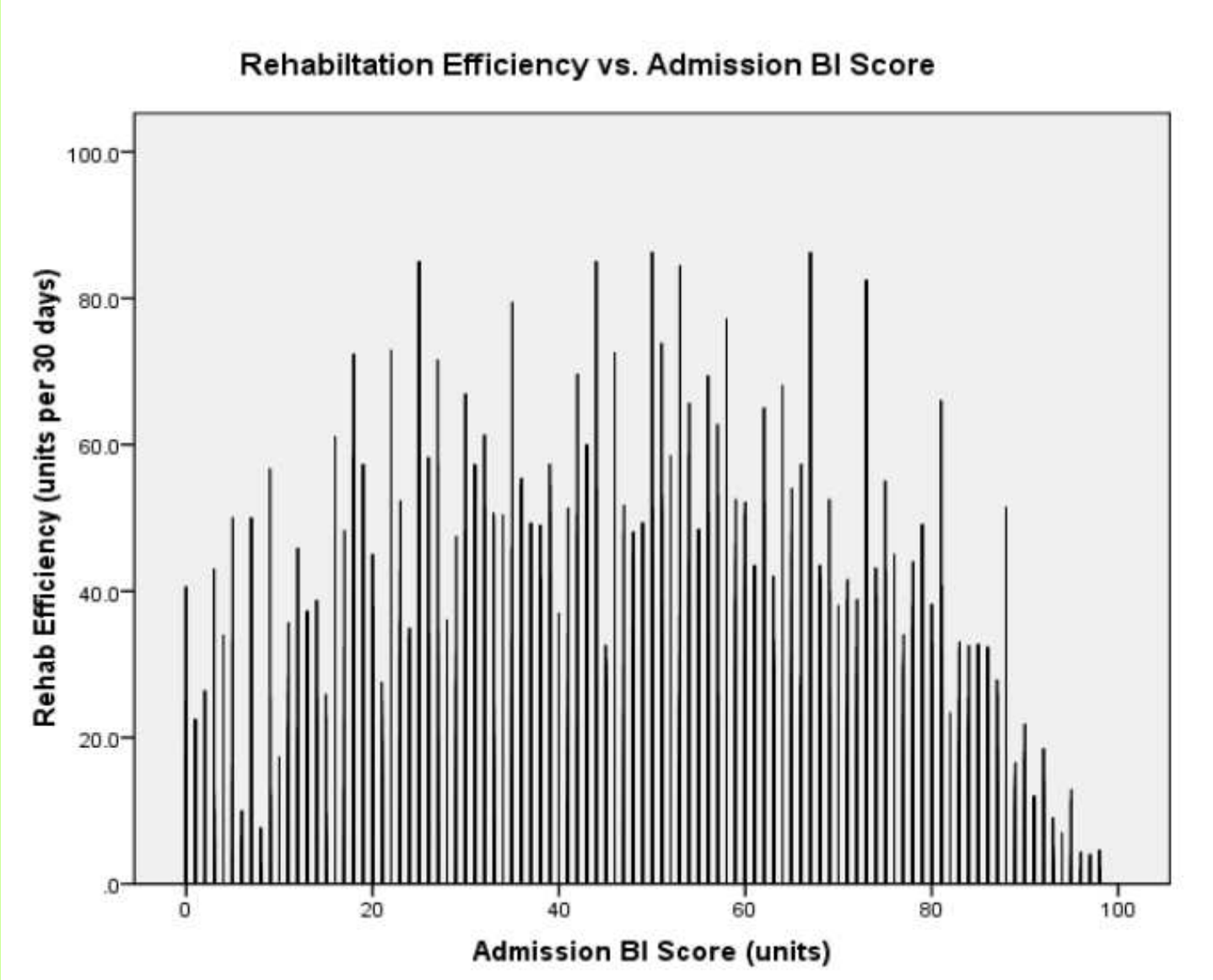
Assoc'd Predictors of Rehab Efficiency (6)

Admission BI Score

Admission BI Score (units)	Mean REy (%)	95% CI of mean (%)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
0 – 25	14.3	11.5 – 17.1	0.000	5.2	1.4 – 11.5	0.007
26 – 50	17.4	15.7 – 19.1		8.2	4.9 – 11.6	< 0.001
51 – 75	15.0	12.9 – 11.6		5.9	2.9 – 8.6	< 0.001
76 - 100	9.1	12.9 – 15.2		0.0	-	-

Rehabilitation efficiency appeared to follow an inverted U-shape with regards to admission BI. This relationship was confirmed when a histogram between rehabilitation efficiency and admission BI scores was plotted with the latter as a continuous variable instead of a categorical variable) (Figure 17).

Assoc’d Predictors of Rehab Efficiency (7)



Assoc'd Predictors of Rehab Efficiency (8)

Summary

1. Older age
2. Marital status (single, widowed or divorced)
3. Lower limb amputations as the primary diagnosis for admission
4. More carers available
5. Higher Charlson Co-Morbidity Index score
6. Dementia
7. Extremes of admission BI score

Independent Predictors of Rehab Efficiency

Multivariate Analysis for REy

Variable	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value
Dementia	-7.45	-10.38 to -4.54	< **0.001**
Peripheral vascular disease	-4.31	-8.54 to -0.08	**0.046**
Admission BI score	-2.80	-3.99 to -1.62	< **0.001**
Age	-2.29	-3.49 to -1.08	< **0.001**
Primary diagnosis for admission	1.10	0.16 to 2.04	**0.022**

Only 3% of the variance (R2) was explained by the model.

Predictors of Rehabilitation Effectiveness (REs)

Assoc'd Predictors of Rehab Effectiveness (1)

Age

Age group (years)	Mean REs (%)	95% CI of mean (%)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
≤ 60	56.9	53.0 – 60.7	< 0.001	19.9	14.7 to 25.1	< 0.001
> 60 to 70	44.7	41.3 – 48.0		7.70	3.6 to 11.8	< 0.001
> 70 to 80	42.1	39.5 – 44.6		5.08	1.5 to 8.6	0.005
>80	37.0	34.5 – 39.4		0.00	-	-

Rehabilitation effectiveness decreases with increasing age.

Assoc'd Predictors of Rehab Effectiveness (2)

Primary Diagnosis for Admission

Primary Diagnosis for Admission	Mean REs (%)	95% CI of mean (%)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
Strokes	38.7	36.9 – 40.9	0.000	-4.3	-7.9 to -0.7	0.002
Fractures	49.2	46.4 – 51.9		6.0	1.9 to 10.1	0.004
Lower Limb Amputations	38.3	29.7 – 46.9		-4.9	-15.4 to 5.6	0.000
Others	43.2	39.8 – 46.6		0.0	-	-

Rehabilitation effectiveness was highest in patients with fractures. The rehabilitation effectiveness for strokes and lower limb amputations were similar.

Assoc'd Predictors of Rehab Effectiveness (3)

Number of Potential Carers Available

Number of carers available	Mean REs (%)	95% CI of mean (%)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
None	50.6	45.4 – 55.9	**0.000**	13.0	7.7 – 18.2	**< 0.001**
One	46.8	43.4 – 50.3		9.2	5.0 – 13.3	**< 0.001**
Two	43.0	40.6 – 45.5		5.4	1.9 – 8.9	**0.003**
Three or more	37.7	35.3 – 40.0		0.0	-	-

Rehabilitation effectiveness was higher in those who had no carer and lowest in those who had 3 or more carers. It appears that rehabilitation effectiveness decreases with increasing number of caregivers available. This could be explained by the possibility that a patient without any carer was more motivated in rehabilitation because he had nobody to rely one. A patient who had many carers may be less motivated to actively participate in rehabilitation, resulting in lower REs.

Assoc'd Predictors of Rehab Effectiveness (4)

Charlson Co-Morbidity Score

Charlson Co-Morbidity Index Score	Number of subjects	Mean REs (%)	95% CI of mean (%)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
0	293	55.7	51.4 – 59.9	0.000	24.7	19.2 – 30.5	< 0.001
1 – 3	898	45.1	42.8 – 47.4		14.3	9.7 – 18.8	< 0.001
4 – 6	806	39.7	37.3 – 42.1		8.9	4.3 – 13.6	< 0.001
≥ 7	319	30.8	26.5 – 35.1		0.0	-	-

Rehabilitation effectiveness decreases with increasing co-morbidity burden in a patient.

Assoc'd Predictors of Rehab Effectiveness (5) Co-Morbidities

Co-Morbidity	Mean REs (%)	95% CI of mean (%)	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value
Cerebrovascular disease					
No	48.8	46.5 – 51.1	0.0	-	**< 0.001**
Yes	38.0	36.1 – 39.9	-10.9	-13.8 to -7.9	
Dementia					
No	46.5	44.8 – 48.0	0.0	-	**< 0.001**
Yes	26.7	23.1 – 30.2	-19.8	-23.4 to -16.1	
Hemiplegia					
No	49.0	46.7 – 51.4	0.0	-	**< 0.001**
Yes	37.9	36.0 – 39.8	-11.2	-14.2 to -8.2	
Diabetes					
No	43.7	41.8 – 45.6	4.5	1.3 to 7.7	**0.006**
Without end organ damage	49.7	44.3 – 55.0	10.6	3.8 to 17.3	**0.002**
With end organ damage	39.2	36.5 – 41.9	0.0	-	-
Ischaemic heart disease (inclusive of previous myocardial infarct)*					
No	44.2	42.5 – 45.9	0.0	-	**0.001**
Yes	38.3	35.4 – 41.2	-5.8	-9.2 to -2.5	

On bivariate analysis, subjects with cerebrovascular disease, dementia, hemiplegia, diabetes mellitus (with end organ damage) and ischaemic heart disease had lower rehabilitation effectiveness than those who did not have them.

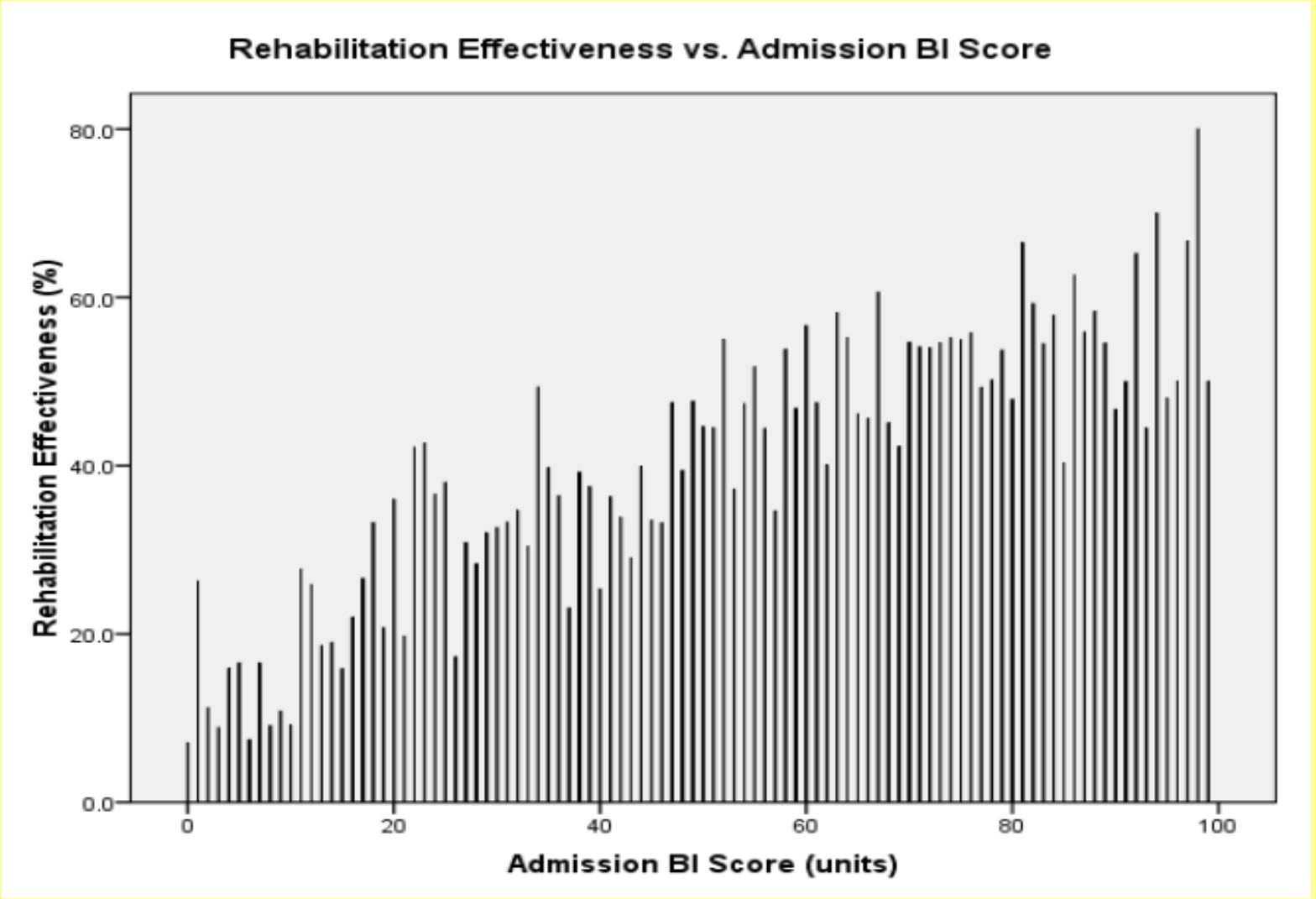
Assoc'd Predictors of Rehab Effectiveness (6)

Admission BI Score

Admission BI Score (units)	Mean REs (%)	95% CI of mean (%)	p-value for difference in means	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value(s) for unstandardized β coefficient
0 – 25	22.1	19.5 – 24.8	0.000	-29.5	-34.2 to -24.8	< 0.001
26 – 50	35.6	33.2 – 38.1		-16.0	-20.1 to -11.9	< 0.001
51 – 75	49.1	46.9 – 51.3		-2.5	-6.3 to 1.2	0.182
76 - 100	51.6	47.7 – 55.5		0.0	-	-

Rehabilitation effectiveness is lowest among subjects with low admission BI scores and increases as admission BI scores increases. This linear relationship is represented graphically in a histogram between rehabilitation effectiveness and admission BI scores (as a continuous variable instead of a categorical variable) (Figure 5).

Assoc'd Predictors of Rehab Effectiveness (7)



Assoc'd Predictors of Rehab Effectiveness

Summary

1. Older age
2. Stroke & lower limb amputations as primary diagnoses for admission
3. More carers available
4. Higher Charlson Co-Morbidity Index
5. Stroke
6. Dementia
7. Hemiplegia
8. Diabetes mellitus
9. Ischaemic heart disease
10. Lower admission BI score

Independent Predictors of Rehab Effectiveness

Multivariate Analysis for REs

Variable	Unstandardized β coefficient	95% CI of unstandardized β coefficient	p-value
Dementia	-14.10	-17.68 to -10.52	< **0.001**
Hemiplegia	-10.30	-13.82 to -6.78	< **0.001**
Admission BI score	7.77	6.29 to 9.25	< **0.001**
Peripheral vascular disease	-6.95	-12.11 to -1.78	**0.008**
Age	-4.54	-6.02 to -3.06	< **0.001**
Ischaemic heart disease	-3.60	-6.71 to -0.49	**0.023**
Number of carers available	-2.02	-3.50 to -0.60	**0.006**
Primary diagnosis for admission	-1.60	-2.97 to -0.23	**0.022**

Only 14% of variance (R^2) was explained by model.

Discussion

Key Findings (1)

- The small variance in final models suggest that it is very difficult to predict REy and REs at admission.
- Many predictors of REy and REs are related to atherosclerosis and are modifiable:
  - Stroke
  - Lower limb amputations
  - Peripheral vascular disease
  - Ischaemic heart disease

Key Findings (2)

- Dementia is the strongest predictor of both REy and REs.
- There was a linear relationship between REs and admission BI score, but an inverted U-shape relationship between REy and admission BI score.
- Patients with more potentially available carers had poorer REs.

Comparison with Other Studies (1)

Rehabilitation Efficiency (REy)

- Older age is a predictor of poorer REy (same finding as Yu et al [n=201]; contrary to Luk et al [n=878]).
- Dementia is a predictor of poorer REy (contrary to Yu et al [n=201]).

Comparison with Other Studies (2)

Rehabilitation Effectiveness (REs)

- Newly identified predictors of REs in this study are:
  - Primary diagnosis for admission.
  - Number of potential carers available.
  - Peripheral vascular disease.
  - Ischaemic heart disease.
  - Dementia.

Strength & Limitations (1)

Strengths

- Complete sampling of population.
- Large sample size.
- Wide range of variables studied.

Strength & Limitations (2)

Limitations

- REs and REy could not be calculated for 31.7% of eligible subjects because of missing BI scores. (However, demographic variables which were significantly different between these 2 groups were government subsidy levels, renal disease, hypertension and hyperlipidaemia, and none were predictors of REs or REy.)

- As the study was limited to only one community hospital, the results cannot be fairly extrapolated to other community hospitals or other inpatient rehabilitation settings.

Conclusions

In a local community hospital:

- It is difficult to predict REs and REy at admission.
- Many predictors of REy and REs are related to atherosclerosis and are modifiable.
- Dementia is a strong predictor of REy and REs.
- REy is lowest at extremes of functional disability.

Acknowledgments

This study was supported by the following grants:

•NMRC Grant WBS No. R-186-000-076-214.

•NUS Provost Grant WBS No. R-186-000-076-133.

•ARF Grant WBS No. R-186-000-085-112.