

Functional outcome in patients sustaining moderate and major trauma

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KEY MESSAGES

1. Compared with the Hong Kong norm, initial survivors of moderate and major trauma had reduced mean SF-36 physical component score persisting for at least a year.
2. The SF-36 physical component score is most reduced and slowest to recover in patients with spinal and extremity injury.
3. Compared with the Hong Kong norm, initial survivors of moderate and major trauma had reduced mean SF-36 mental component score initially but it exceeded the norm by 6 months after injury.
4. Hong Kong possibly lags behind Australia in

terms of potential improvement in 6- and 12-month post-injury functional outcome, but a larger study is required to confirm this.

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Introduction

Implementation of a trauma system may improve survival and functional outcome in trauma patients.¹ In 2003, the Hospital Authority in Hong Kong designated five hospitals as trauma centres. The potential survival rate in Hong Kong still lags behind that in Australia,² and survivors of trauma patients often experience late sequelae that affect their everyday life.³

This study aimed to (1) evaluate physical and mental health status and functional outcome in adult patients following moderate and major trauma in Hong Kong, and (2) compare functional outcome in the Hong Kong Registry with the Victoria State Trauma Outcome Registry (VSTR) in Australia.

Methods

This study was conducted between 1 January 2010 and 30 November 2011. Ethical approval was obtained. Patients aged ≥ 18 years with moderate or major trauma (defined as an injury severity score [ISS] ≥ 9) who survived the first 48 hours of injury in three regional hospitals (the Prince of Wales Hospital, Queen Elizabeth Hospital, and Tuen Mun Hospital) were included.

The VSTR is a population-based registry for all major trauma patients in Victoria. Patients aged ≥ 18 years who sustained an injury between 1 July 2009 and 30 June 2010 with an ISS > 15 were selected for comparison.

The physical and mental health status of

trauma patients was evaluated using the physical component summary (PCS) and mental component summary (MCS), respectively, of the Short-Form 36 (SF-36) health questionnaire and Glasgow Outcome Scale-Extended (GOSE).^{4,5} The Hong Kong norm for the PCS is 52.83 and for the MCS is 47.18. This is comparable with the United States norm (50 for both PCS and MCS). For comparison between Hong Kong and VSTR, the Short-Form 12 was used.

Demographic data including age, sex, and mechanism of injury, ISS, Revised Trauma Score, probability of survival, Glasgow Coma Scale (GCS), and hospital and intensive care unit length of stay were recorded. Isolated injury was defined as a single abbreviated injury scale (AIS) ≥ 3 . Multiple injury was defined as ≥ 2 regions with AIS ≥ 3 . Working status was defined as a GOSE ≥ 5 .

The end point was 12 months post injury. The primary outcome was post-traumatic SF-36 score at 30 days, 6 months, and 12 months. The secondary outcomes were GOSE score and return to work.

A univariate analysis was conducted to identify predictors of 12-month functional outcome and quality of life. Significant parameters ($P < 0.05$) were then entered into a multiple logistic regression model.

Results

A total of 400 patients (69.5% male) aged 18 to 106 (mean, 53.3) years were recruited. In patients with isolated or multiple injury, the mean PCS gradually increased with time and peaked at 12 months but

was still lower than the Hong Kong norm; none of the subgroup injuries reached the level of the Hong Kong norm at 12 months. Nonetheless, the mean MCS exceeded that of the Hong Kong norm at 6 months; the mean MCS in subgroups of primary extremity and abdominal injury reached the level

of the Hong Kong norm by 1 month, and that in all subgroup injury exceeded the Hong Kong norm by 6 months (Figs 1 and 2).

In terms of the GOSE score, only 16.5% of patients achieved upper good recovery by 12 months; 56% achieved a GOSE of ≥ 5 by 12 months

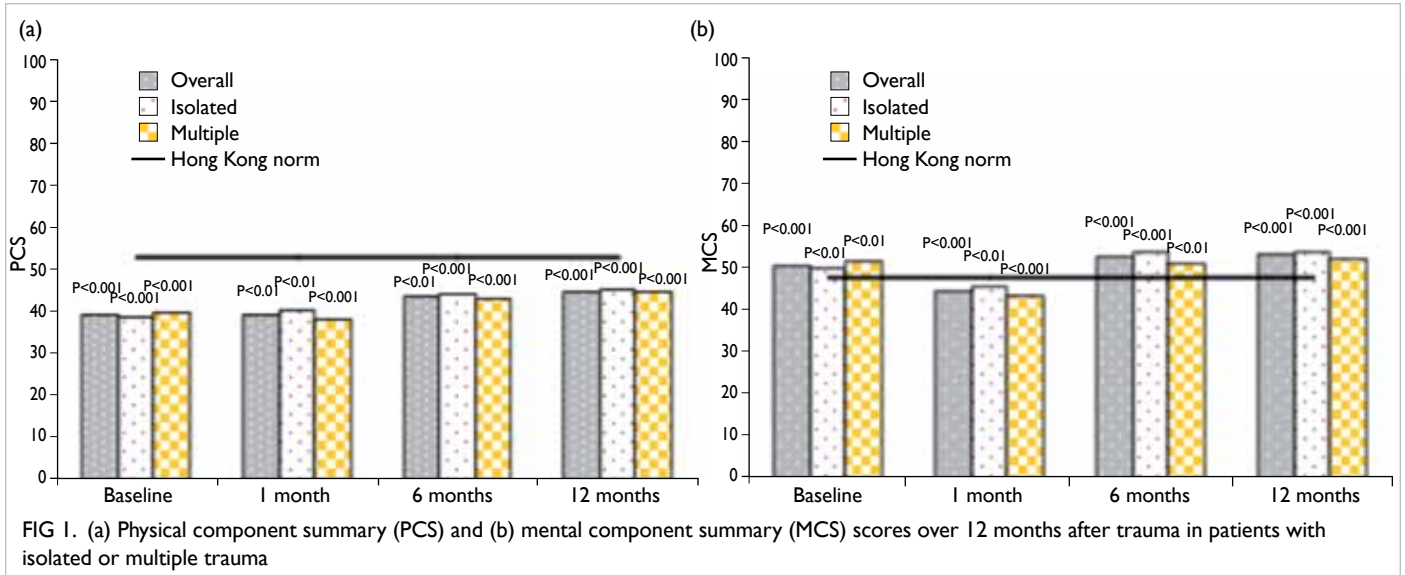


FIG 1. (a) Physical component summary (PCS) and (b) mental component summary (MCS) scores over 12 months after trauma in patients with isolated or multiple trauma

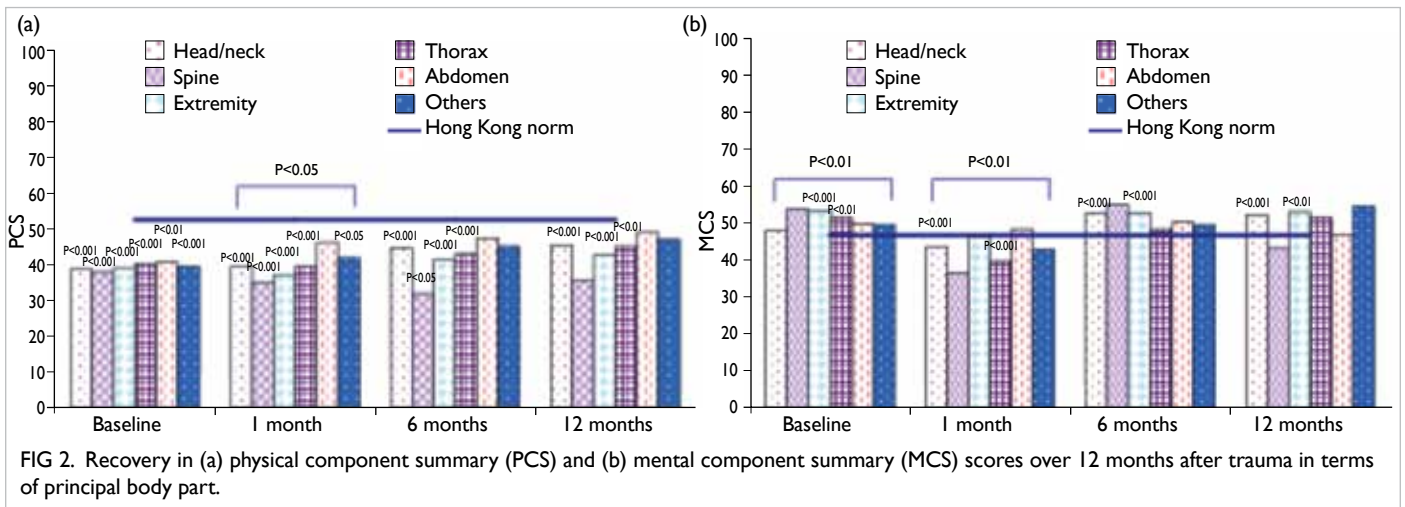


FIG 2. Recovery in (a) physical component summary (PCS) and (b) mental component summary (MCS) scores over 12 months after trauma in terms of principal body part.

TABLE I. Post-injury Glasgow Outcome Scale-Extended outcome in Hong Kong patients

Glasgow Outcome Scale-Extended (score)	No. (%) of patients (n=400)			
	Baseline (n=398)	1 month (n=341)	6 months (n=280)	12 months (n=237)
Upper good recovery (8)	14 (3.5)	33 (9.7)	45 (16.0)	39 (16.5)
Lower good recovery (7)	7 (1.8)	23 (6.7)	40 (14.3)	37 (15.6)
Upper moderate disability (6)	9 (2.3)	16 (4.7)	24 (8.6)	25 (10.5)
Lower moderate disability (5)	26 (6.5)	46 (13.5)	62 (22.1)	36 (15.2)
Upper severe disability (4)	128 (32.3)	115 (33.7)	31 (11.1)	23 (9.7)
Lower severe disability (3)	145 (36.3)	49 (14.4)	22 (7.9)	16 (6.8)
Vegetative state (2)	68 (17)	22 (6.5)	1 (0.4)	1 (0.4)
Death (1)	1 (0.3)	37 (10.9)	55 (19.6)	60 (25.3)

indicating independent activities of daily living and partial return to work (Table 1).

Respectively in the VSTR and Hong Kong, 1955 and 261 patients were compared, 10.4% and 13.9% of them were in-hospital deaths, and 89.6% and 85.1% were survivors. With the VSTR patients as a reference, the adjusted odds of a better functional outcome in Hong Kong patients was 0.88 (95% confidence interval [CI]=0.66-1.17) at 6 months and 0.83 (95% CI=0.60-1.12) at 12 months (Table 2).

Respectively in the VSTR and Hong Kong, valid SF-12 scores were recorded in 855 and 102 patients at 6 months and 861 and 76 patients at 12 months. The VSTR and Hong Kong patients were comparable in terms of the mean PCS-12 score at 6 months (mean difference=1.1, 95% CI= -1.3-3.4, P=0.39) and at 12 months (mean difference= -0.3, 95% CI= -3.1-2.5, P=0.82) and the mean MCS-12 score at 6 months (mean difference=1.3, 95% CI= -1.1-3.6, P=0.29) and at 12 months (mean difference=1.9, 95% CI= -0.7-4.6, P=0.15) [Fig 3].

Discussion

For all trauma patients, the mean MCS exceeded that of the Hong Kong norm by 6 months. This may be due to the positive effect of an awareness of surviving trauma, with a greater sense of well-being. The mean PCS improved gradually but did not reach the level of the Hong Kong norm. Compared with the VSTR patients, the trend in functional recovery

TABLE 2. Multivariate analysis of the association between trauma characteristics and Glasgow Outcome Scale-Extended at 6 months (n=1853) and 12 months (n=1840)

Covariate	Adjusted odds ratio (95% CI)	
	6 months (n=1853)	12 months (n=1840)
Setting		
Victoria (reference)	1	1
Hong Kong	0.88 (0.66, 1.17)	0.83 (0.60, 1.12)
Sex		
Male (reference)	1	1
Female	0.87 (0.72, 1.06)	0.80 (0.66, 0.98)
Age (years)	0.972 (0.967, 0.976)	0.967 (0.963, 0.972)
Injury Severity Score	0.95 (0.90, 1.01)	0.96 (0.95, 0.97)
Mechanism		
Fall (reference)	1	1
Motor vehicle	1.23 (0.96, 1.58)	1.11 (0.87, 1.42)
Motorcycle	1.37 (1.01, 1.84)	1.49 (1.10, 2.01)
Pedal cyclist	2.03 (1.33, 3.10)	2.97 (1.89, 4.65)
Pedestrian	1.20 (0.85, 1.69)	1.11 (0.79, 1.56)
Other	1.17 (0.89, 1.53)	1.25 (0.95, 1.64)
Glasgow Coma Scale		
13-15 (reference)	1	1
9-12	0.44 (0.32, 0.59)	0.51 (0.38, 0.70)
3-8	0.12 (0.09, 0.17)	0.13 (0.10, 0.18)
Comorbid status		
Healthy	1	1
Pre-existing condition	0.90 (0.75, 1.07)	0.87 (0.73, 1.04)

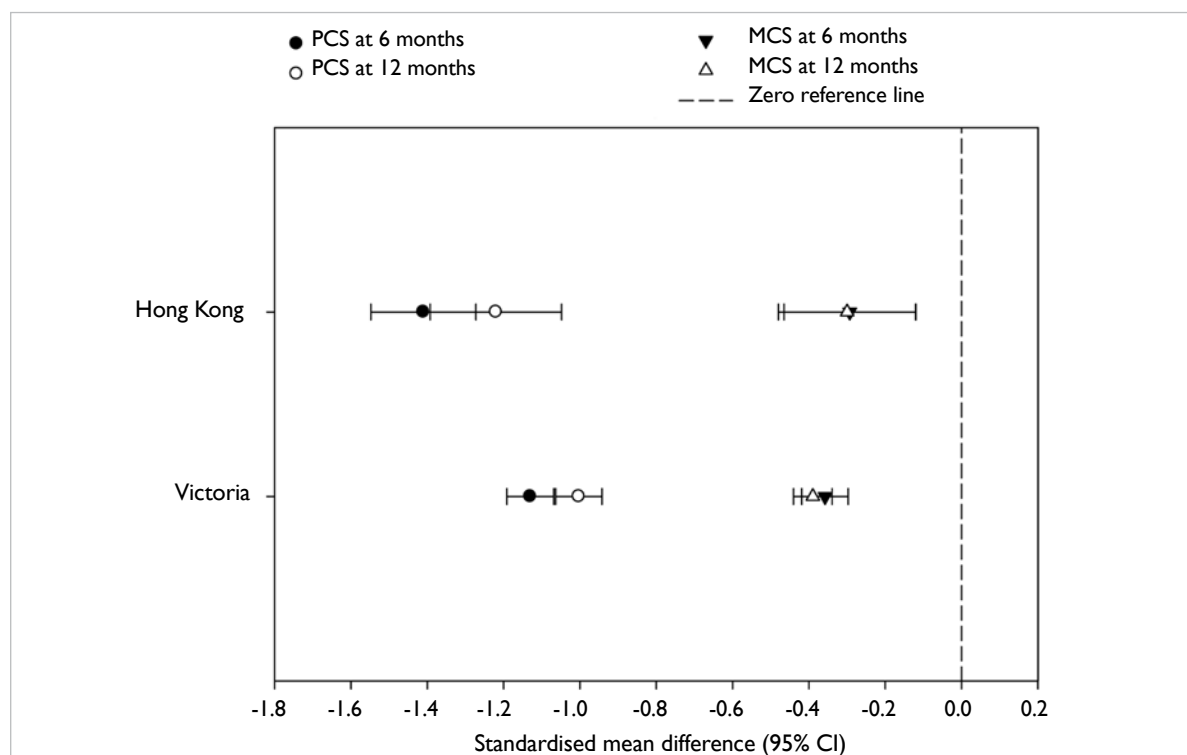


FIG 3. Adjusted standardized mean difference for the physical component summary (PCS) and mental component summary (MCS) scores of the SF-12 at 6 months and 12 months

at 12 months in Hong Kong was less favourable (but not significantly). The successful follow-up rate at 12 months in Hong Kong was only 44%.

Acknowledgement

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