

Risk factors for extended disruption of family function after severe injury to a child

Xiaohan Hu, MB, MPH, PhD; David E. Wesson, MD, FRCSC; Brian D. Kenney, MD, MPH; Mary L. Chipman, BSc, MA; Laura J. Spence, BScN

Objective: To identify risk factors for long-lasting disruption of family function following pediatric trauma that can be measured at the time of trauma.

Design: Prospective, exploratory study. Personal interviews were conducted at the time of admission and 6 months and 1 year after discharge.

Setting: Level I regional pediatric trauma centre.

Participants: One hundred and five families (86% of those eligible) with a child admitted to hospital for severe trauma with an Abbreviated Injury Scale (AIS) score of 4 or higher or with two or more injuries in different body parts and AIS scores of 2 or higher were recruited; 13 families were lost to follow-up at 6 months or 1 year, so their data were not included in the analyses.

Main outcome measures: Family function status (normal or abnormal compared with function before the injury), demographic characteristics of the parents and child, injury severity, presence of maternal psychologic disorder, presence of child behaviour abnormality and functional status of the child.

Main results: At 6 months and at 1 year 41 families (45%) and 21 families (23%) respectively reported that their family lives had not returned to normal. The relative odds for disruption of family life were about five times higher (95% confidence limits [CL] 1.4 and 19.7) and four times higher (95% CL 1.1 and 14.0) for single-parent families than for families with married parents living together at 6 months and 1 year respectively. The presence of maternal psychologic disorders at admission and increased age of the injured child were also significantly associated with extended disruption of family function. Injury severity and functional status at discharge were not good predictors of family function.

Conclusions: Severe injury to a child places a heavy strain on normal family function. In particular, single parents and parents experiencing mental or emotional problems at the acute stage of the injury need help in coping with their reactions to the trauma and may benefit from individual or group counselling.

Objectifs : Identifier les facteurs de risque de perturbation prolongée du fonctionnement familial après un traumatisme pédiatrique pouvant être mesuré au moment de sa survenue.

Conception : Étude prospective et exploratoire. Des entrevues personnelles ont eu lieu au moment de l'admission et 6 mois et une année après la sortie.

Contexte : Centre de traumatologie pédiatrique régional de niveau I.

Participants : On a recruté 105 familles (86 % des familles admissibles) dont un enfant a été admis à l'hôpital en raison d'un traumatisme grave d'une valeur de 4 ou plus sur l'Abbreviated Injury Scale (AIS) ou de deux lésions ou plus sur diverses parties du corps et des valeurs

Dr. Hu is an epidemiologist with the Hospital for Sick Children + Kiwanis Injury Prevention and Research Program, Department of Surgery, Hospital for Sick Children, Toronto, Ont.; Dr. Wesson is a surgeon and director of the Trauma Program, Hospital for Sick Children; Dr. Kenney is a research fellow with the Hospital for Sick Children + Kiwanis Injury Prevention and Research Program; Professor Chipman is a member of the Department of Preventive Medicine and Biostatistics, Faculty of Medicine, University of Toronto, Toronto, Ont.; and Ms. Spence is assistant director of the Hospital for Sick Children + Kiwanis Injury Prevention and Research Program.

Reprint requests to: Dr. Xiaohan Hu, Department of Surgery, Hospital for Sick Children, 555 University Ave., Toronto, ON M5G 1X8

AIS de 2 ou plus; après 6 mois ou une année, on a perdu de vue 13 familles, ainsi leurs données sont exclues des analyses.

Principales mesures des résultats : État fonctionnel de la famille (normal ou anormal par comparaison avec le fonctionnement avant la lésion), caractéristiques démographiques des parents et de l'enfant, gravité de la lésion, présence d'un trouble psychologique chez la mère, présence d'une anomalie du comportement chez l'enfant et état fonctionnel de l'enfant.

Principaux résultats : Après 6 mois et après une année, 41 familles (45 %) et 21 familles (23 %) respectivement ont signalé que leur vie familiale n'était pas revenue à la normale. Les risques relatifs de perturbation de la vie familiale étaient environ cinq fois plus élevés (limites de confiance [LC] de 95 %, 1,4 et 19,7) et quatre fois plus élevés (LC de 95 %, 1,1 et 14,0) pour les familles monoparentales que pour les familles où les parents étaient mariés et vivaient ensemble après 6 mois et après un an respectivement. La présence de troubles psychologiques à l'admission chez la mère et l'âge accru de l'enfant atteint étaient aussi significativement liés à une perturbation prolongée du fonctionnement familial. La gravité de la lésion et l'état fonctionnel à la sortie n'étaient pas de bons prédicteurs du fonctionnement familial.

Conclusions : Un traumatisme pédiatrique grave peut sérieusement perturber le fonctionnement familial normal. Les parents seuls et les parents en proie à des problèmes mentaux ou affectifs au stade aigu de la lésion ont particulièrement besoin d'aide pour faire face à leurs réactions aux traumatismes, et ils peuvent tirer parti du counselling personnel ou collectif.

Research in pediatric trauma has been primarily concerned with the plight of the injured child, focusing on such topics as factors predisposing to trauma and the physical environment in which injuries occur.¹⁻³ Rehabilitation and the sequelae of trauma have also been studied.⁴⁻⁶ The effect of pediatric trauma on family life, however, has received relatively little attention. Injury to a child has been associated with increased emotional disturbance among uninjured siblings, deterioration in the parents' marital relationship and a significant financial burden.⁷ Adaptation to injury often necessitates a change in roles for other family members.⁸ In a prospective study examining physical, psychosocial and socioeconomic costs of severe pediatric trauma we found that severe injury caused a great deal of disability among children and adversely affected their family life for at least 1 year.⁹ The study also suggested the need for earlier supportive intervention.

The objectives of the present study were twofold: to explore risk factors for long-lasting disruption of family function following pediatric trauma that can be measured at the time of trauma, so that families at risk who might benefit from psychologic counselling can be identified; and to examine the aspects of family dysfunction present during follow-up that are attributable to trauma, so that counsellors can better help these families strengthen their coping capacity and readjust their expectations about their lives.

Methods

We presented a detailed study design and description of subjects in a previous report.⁹ Briefly, the subjects included 92 children aged 5 to 16 years who were consecutively admitted to a regional pediatric trauma centre from 1987 to 1989 for the treatment of blunt or penetrating injuries. They all had either one injury with an Abbreviated Injury Scale (AIS)¹⁰ score of 4 or higher

or at least two injuries in different body parts with AIS scores of 2 or higher. The AIS quantifies the extent of anatomic insult to each of six body regions using a range from 1 to 6. The AIS scores can be further summarized as an overall score: the Injury Severity Score (ISS).¹¹ Children were excluded if they had been abused (which occurred in two cases) or had pre-existing psychiatric disorders (there were none) or if their mothers were unable to communicate in English (which was the case for 21 children). Families were interviewed while the child was in hospital and again 6 months and 1 year after discharge. The interviews were conducted by a trained research assistant who had a background in psychology. Because of its length and its potential to be stressful, the interview was conducted in the home whenever possible. Both parents were encouraged to participate in the interviews. Interview schedules were kept flexible so that the mother was always present. In one family (which was lost to follow-up) the father was the sole caregiver.

Information collected and used in this report included demographic characteristics of both the parents and the child, injury severity, child behaviour, presence of maternal psychologic disorder, child's functional status and financial cost. Information on family income was not collected for each family; instead, we used the average family income (based on 1985 census data) by the postal zone where the family resided.¹² (The number of families in each postal zone varies widely; on average there are 8889 families in each zone in Metropolitan Toronto but fewer in each zone outside it.¹²) Of the 92 families included in this analysis 27 (29%) were Metropolitan Toronto residents. Information related to circumstances before the injury occurred was collected at the time of admission. Injury severity was measured with the ISS and the Glasgow Coma Scale (GCS).^{11,13} Child behaviour was assessed by means of the Children's Behavior Inventory, an 18-item questionnaire that allows parents to rate the presence or absence of specific be-

havioural symptoms in their children on a three-point ordinal scale (absent, mildly present or very much present).¹⁴ A score of 13 or above has been found to be associated with behaviour abnormalities.¹⁵ The child's functional status was determined by means of the Rand Health Insurance Survey (HIS).¹⁶ This instrument, which has a scale range from 0 to 13 for children aged 5 to 17 years, measures physical limitations in the areas of mobility and of physical, role and self-care activities. Maternal anxiety and depression were assessed with the Maternal Malaise Inventory,¹⁷ a checklist of 24 items referring to the emotions or to aspects of the physical state considered to have an important psychological component; a score of 7 or more indicates the presence of psychological disorder. The presence of disruption in family life was determined through the parents' own assessment. At 6 months and at 1 year they were asked whether, compared with before the trauma, they thought that their family life was back to normal. If the answer was positive, the parents were asked when family life had returned to normal. Otherwise their family function was classified as abnormal, and they were asked which of the changes the trauma had brought to their lives persisted.

Statistical analysis

Families with and without disruption at 6 months

and at 1 year after discharge were compared with respect to demographic characteristics, injury severity, child's behaviour and presence of maternal psychological disorder, all measured at the time of the injury. Student's *t*-test was used to test significance for continuous variables, the χ -squared test for categorical variables. Fisher's exact test was used for an expected value less than 5. In multivariate analysis an unconditional logistic regression model was fitted for each occasion to examine the net contribution of each risk factor while controlling for potential confounding factors. We also compared the two groups with respect to variables measured at the two follow-up visits using these statistical methods. A *p* value less than 0.05 was considered statistically significant.

Results

A total of 105 families (86% of those that met the entry criteria) were recruited into the study. Four families were lost to follow-up at 6 months after discharge and another 9 at 1 year, so that 92 families were left in the study. Of the 92, 41 (45%) reported 6 months after discharge that their life had not yet returned to normal; by 1 year there were still 21 families (23%) in this category. Table 1 shows patient and family characteristics measured at the time of injury for the families with and without disruption at 6 months. Only the variables considered potentially important in terms of their effects on

Table 1: Relationship of family function 6 months after discharge of a severely injured child to potential risk factors measured at the time of injury

Variable	Family group		<i>p</i> value*
	Normal function (n = 51)	Abnormal function (n = 41)	
Continuous, mean (and standard deviation [SD])			
Injury Severity Score (ISS)	21.2 (10.3)	20.9 (7.5)	0.84
Glasgow Coma Scale (GCS) score	13.2 (3.2)	12.9 (3.2)	0.65
Health Insurance Survey (HIS) score	6.5 (4.4)	8.2 (4.1)	0.05
Mother's age, yr	37.7 (6.3)	37.1 (5.4)	0.60
Child's age, yr	10.3 (3.4)	12.0 (3.4)	0.02
Family income, \$	43 624 (8500)	42 951 (7930)	0.73
Categoric, % of families			
Single parent	12	37	< 0.01
English/French origin	65	61	0.71
Less than secondary school education	28	37	0.35
Mother working for pay	76	58	0.07
More than one sibling	63	61	0.86
Presence of maternal psychological disorder			
Before trauma	15	17	0.78
During admission	46	75	0.01
Presence of child behaviour abnormality before trauma			
	22	17	0.53

*Student's *t*-test was used with continuous variables and the χ^2 test with categoric variables.

long-term family function are listed. The distribution of the same variables for the families with and without disruption at 1 year is presented in Table 2.

No differences were observed between the two groups in injury severity, as measured with both the ISS and the GCS score, at either follow-up point. The child's functional status at discharge differed only marginally between the two groups at both follow-up points ($p = 0.05$). Significantly more abnormally functioning than normally functioning families were single-parent families (the parent was not married or was married but separated at the time of the child's injury) ($p < 0.02$). Mothers

who reported persistence of disrupted family life were significantly more likely to have displayed psychological disorders at admission ($p < 0.03$). They also appeared more likely to be unemployed; however, this difference was not significant at either follow-up point. Children in the families with disrupted family life were significantly older at the time of injury than those in the normally functioning group ($p = 0.02$). The two groups were similar with respect to the other variables studied (mother's age, family income, English/French origin, education level, number of siblings and presence of child behaviour abnormality before the injury). Both the direc-

Table 2: Relationship of family function 1 year after discharge to potential risk factors measured at the time of injury

Variable	Family group		<i>p</i> value*
	Normal function (n = 71)	Abnormal function (n = 21)	
Continuous, mean (and SD)			
ISS	20.7 (9.5)	22.2 (7.7)	0.46
GCS score	13.2 (3.2)	12.5 (3.3)	0.36
HIS score	6.8 (4.3)	8.9 (4.2)	0.05
Mother's age, yr	37.0 (6.2)	39.0 (4.4)	0.11
Child's age, yr	10.6 (3.6)	12.4 (2.8)	0.02
Family income, \$	43 575 (8167)	42 470 (8451)	0.61
Categoric, % of families			
Single parent	17	43	0.01
English/French origin	66	52	0.25
Less than secondary school education	30	38	0.46
Mother working for pay	72	57	0.20
More than one sibling	59	71	0.31
Presence of maternal psychologic disorder			
Before trauma	16	14	0.71
During admission	52	81	0.02
Presence of child behaviour abnormality before trauma	20	19	0.90

*Student's *t*-test was used with continuous variables and the χ^2 test with categoric variables, except for presence of maternal psychologic disorder before trauma (Fisher's exact test).

Table 3: Adjusted odds ratios of disrupted family function 6 months and 1 year after discharge, based on measurements at the time of injury

Variable*	Odds ratio (and 95% confidence limits); follow-up point	
	6 months	1 year
ISS	1.02 (0.95, 1.08)	1.04 (0.97, 1.12)
GCS score	0.95 (0.79, 1.12)	0.91 (0.75, 1.09)
HIS score	1.03 (0.91, 1.17)	1.06 (0.91, 1.06)
Single parent	5.24 (1.39, 19.74)	3.92 (1.10, 13.95)
Presence of maternal psychologic disorder	3.45 (1.23, 9.64)	3.80 (1.09, 14.32)
Child's age	1.18 (1.01, 1.36)	1.20 (0.99, 1.44)

*The variables were coded as follows: ISS, 9-59; GCS score, 3-15; HIS score, 0-13; single parent, 1 = yes, 0 = no; presence of maternal psychologic disorder, 1 = yes, 0 = no; child's age (years), 5-16.

tions and the quantitative values for the same variables in Tables 1 and 2 are remarkably consistent.

Table 3 shows the odds ratios of abnormal family function associated with severity of trauma and other child and family characteristics at 6 months and at 1 year after discharge. Seven observations were excluded from the model because of missing values, which left 85 observations in the final models. Although ISS and GCS score were not significant in the univariate analysis, they were included because they are biologically important in the course of recovery from injury. Functional disability, marital status, presence of maternal psychologic disorder and child's age were all included in the models tested. Potential confounding effects from other variables listed in Tables 1 and 2 were also assessed. Since their presence did not substantially change the relative odds of the variables already in the model, they were removed from the final models.

In both models single-parent family was the highest risk factor for disruption of family life, followed by presence of maternal psychologic disorder and child's age. The ISS and GCS score were not significant predictors of family function at either follow-up point. The HIS score, although positively related to family function status, did not reach statistical significance when the effects of other variables were taken into account. In general, these results were consistent with those of the univariate analysis. The odds ratios from the results at 1 year were also very close to those obtained at 6 months. Slightly wider confidence intervals were observed for the 1-year follow-up model, owing to the fact that fewer families had disrupted family function at that point. Additional analysis showed no significant two-way interactions among the variables in the final models.

To help explain why parents felt their family life was disrupted, we compared the two groups with respect

to variables measured at the two follow-up points and considered as contributing to the disruption (Tables 4 and 5). At 6 months children in families with disrupted function had significantly higher HIS scores than those in the normally functioning group, more mothers had psychologic disorders, and more children had behaviour abnormalities. On average these families also spent more money on their children, and a greater proportion of their children were in rehabilitation programs (physical or occupational therapy). Findings at 1 year showed that out-of-pocket expenses put a significant strain on family life and that a significantly greater proportion of children in families with disrupted function were still receiving rehabilitation treatment. The presence of child behaviour abnormalities was less strongly associated with family function. The effects of the other variables were unchanged.

Discussion

Recent studies of the effects of injuries in children have generally shown as unfounded the conventional notion that children, presumably more resilient than adults, either die from trauma or survive with few long-lasting effects.⁴⁻⁹ Reports of the psychosocial consequences of injuries have usually focused on adults with certain types of injury, such as burns and brain and spinal injuries.¹⁸⁻²¹ To our knowledge there are no published data on factors that predispose to disruption of family function after severe pediatric trauma. Although one would suspect that its prevalence following a severe injury to a child would be high, the length and extent of such disruption have not previously been documented.

Our results indicate that severe injury in children has significant, long-lasting effects on family life: nearly 50% of the families reported disruption of family func-

Table 4: Variables measured 6 months after discharge that were considered to contribute to disruption of family function

Variable	Family group		p value*
	Normal function (n = 51)	Abnormal function (n = 41)	
Continuous, mean (and SD)			
HIS score	2.0 (2.5)	6.4 (4.5)	< 0.01
Out-of-pocket expenses, \$†	3587 (6340)	5786 (16 473)	0.33
Categoric, % of families			
Presence of maternal psychologic disorder	36	64	0.01
Presence of child behaviour abnormality	29	54	0.02
Child receiving rehabilitation treatment‡	41	54	0.23

*Student's *t*-test was used with continuous variables and the χ^2 test with categoric variables, except for out-of-pocket expenses (natural logarithm transformation was done for the test).
†Parental estimate of total financial cost due to trauma, other than medical expenses.
‡Parental report of rehabilitation treatment the child was receiving.

tion 6 months after discharge, and one of four families still experienced this disruption 1 year after discharge. Disruptions of family function may take a variety of forms. Each family is likely to have its own routine for daily activities and its own standards of normality in daily life. Instead of listing long-term effects of the injury,⁹ we focused our analysis on the factors predisposing to disruption of family life. Our results showed that marital status at the time of injury was the most significant variable in predicting an extended effect of trauma on family function. Married couples living together appeared to adjust more readily to an injury to their child, likely because the support and comfort that provide stability in family life are not always available to single parents. Studies have shown that married couples are likely to break up following a severe injury to one of the spouses²² and that marital relationships tend to deteriorate following severe injury to a child.⁷ In our study only two couples broke up over the 1-year follow-up period, and in one case the couple said they had been planning to divorce before the injury occurred.

Although one could argue that measurement of family function is not objective and that a single parent may have subconsciously viewed his or her life as abnormal all along, we asked parents specifically to compare their life before and after the injury rather than with the lives of their colleagues or neighbours. The validity of the parents' subjective judgement is supported by the close association found between the self-assessed family function status and several objective measurements taken during the follow-up period, including functional status of the child (HIS), use of a rehabilitation program and amount of out-of-pocket expenses. In addition, the original study design included 58 children with uncomplicated appendicitis who required appendectomy.⁹ They were used as a control group. All the parents of children

in this group reported that their lives had returned to normal at both follow-up points, which indicates that unexpected admission to hospital and recovery from surgery do not necessarily lead to long-term disruption of family function.

Contrary to our expectations, neither injury severity, as measured with the ISS and the GCS, nor functional status at discharge was significantly associated with family function status at either follow-up point. These findings indirectly suggest that measures of injury severity do not accurately predict the degree or duration of physical disability, since functional disability at follow-up was closely associated with disruption of family function. MacKenzie and colleagues²³ showed that the ISS was not a good predictor of functional disability. In a review of the psychologic consequences of spinal injury Craig and associates¹⁸ showed that injury severity did not appear to be a strong factor in the patient's adjustment to spinal cord injury.

The presence of maternal psychologic disorder in the first few days after a child's injury (measured at admission) proved to be an important factor in predicting disruption of family function. The validity of this finding was strengthened by the fact that essentially the same proportion of women in the two groups had psychologic problems before the injury occurred. The finding also highlighted the need for earlier intervention. Women who had psychologic problems during the acute stage of their child's injury seemed to have difficulty coping with the distress and anxiety. Of the 17 women in the abnormally functioning group considered to have psychologic problems at the acute stage of the injury, only 4 (24%) had recovered from them 1 year after discharge. Over the same period 12 (34%) of the 35 mothers in the normally functioning group who had a postinjury psychologic disorder recovered from it. However, there was no

Table 5: Variables measured 1 year after discharge that were considered to contribute to disruption of family function

Variable	Family group		p value*
	Normal function (n = 71)	Abnormal function (n = 21)	
Continuous, mean (and SD)			
HIS score	2.2 (1.4)	4.7 (3.6)	0.001
Out-of-pocket expenses since last follow-up visit, \$	641 (1847)	8021 (14 428)	< 0.001
Categoric, % of families			
Presence of maternal psychologic disorder	34	68	0.01
Presence of child behaviour abnormality	39	47	0.49
Child receiving rehabilitation treatment	24	52	0.01

*Student's *t*-test was used with continuous variables and the χ^2 test with categoric variables, except for out-of-pocket expenses since last follow-up visit (natural logarithm transformation was done for the test).

statistically significant difference between the two groups.

Increased age of the injured child also seemed to be associated with disruption of family function. This association was found, however, because age was positively correlated with the child's functional status score at both follow-up points (6 months: $r = 0.31$, $p < 0.001$; 1 year: $r = 0.33$, $p < 0.001$), which was itself associated with disruption of family life.

There was some indication that the mother's employment status was correlated with family function. However, we were unable to correlate family income with family function status, likely because of the nondifferential misclassification of family income information derived from census data. Unemployment coupled with out-of-pocket expenses for forms of support other than medical treatment seemed to put a considerable strain on family life 1 year after discharge. On average the out-of-pocket expenses of families in the abnormally functioning group were 10 times higher than those of families in the normally functioning group.

Our study had some limitations. First, family function status was determined through the parents' own assessment. Although the validity of this assessment may be open to question, we feel that parents' subjective judgement about their family life does reflect the quality of life. Second, the association between family function status and the presence of maternal psychological disorders found at follow-up can be interpreted in two ways: either family dysfunction led to these disorders, or women with such disorders reported dysfunctions in family life that did not exist. We believe that the former is true, as essentially the same proportions of women in the functional and dysfunctional families had psychological disorders before the injury. Furthermore, at 6 months and at 1 year 12% and 7% respectively of women in the appendectomy control group were classified as having psychological disturbance, and none reported dysfunction in their family life. Finally, deriving mean family income from postal zones could be a poor indicator of individual family income. Because the single-parent families tended to have low incomes, some association between family function status and marital status may be confounded by family income level.

Conclusions

Our study has shown that severe injury to a child places a heavy strain on normal family function. In particular, single parents and parents experiencing mental or emotional problems at the acute stage of the trauma need help in coping with their reactions to the injury and may benefit from individual or group counselling. Factors to be considered in planning early intervention should include perceptions of future family life, projected functional disability, likelihood of changes in child behaviour, coping strategies and potential exhaustion of savings.

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References

1. Troop PA: Accidents to children: an analysis of inpatient admissions. *Public Health* 1986; 100: 278-285
2. Fife D, Barancik JI, Chatterjee BF: Northeastern Ohio Trauma Study: 2. Injury rates by age, sex, and cause. *Am J Public Health* 1984; 74: 473-478
3. Rivara FP, Mueller BA: The epidemiology and causes of childhood injuries. *J Soc Issues* 1987; 43: 13-31
4. Wesson DE, Williams JI, Spence LJ et al: Functional outcome in pediatric trauma. *J Trauma* 1989; 29: 589-592
5. Gans BM, di Scala C: Rehabilitation of severely injured children. *West J Med* 1991; 154: 566-568
6. Tate RL, Lulham JM, Broe GA et al: Psychosocial outcome for the survivors of severe blunt head injury: the results from a consecutive series of 100 patients. *J Neurol Neurosurg Psychiatry* 1989; 52: 1128-1134
7. Harris BH, Schwaizberg SD, Seman TM et al: The hidden morbidity of pediatric trauma. *J Pediatr Surg* 1989; 24: 103-105
8. Slater EJ, Rubenstein E: Family coping with trauma in adolescents. *Psychiatr Ann* 1987; 17: 786-794
9. Wesson DE, Scorpio R, Spence LJ et al: The physical, psychosocial and socio-economic costs of pediatric trauma. *J Trauma* 1992; 33: 252-255
10. Committee on Injury Scale, American Association for Automotive Medicine: *The Abbreviated Injury Scale*, 1985 rev, AAAM, Des Plaines, Ill, 1985
11. Baker SP, O'Neill B, Haddon W Jr: The Injury Severity Score: a method for describing patients with multiple injuries and evaluating emergency care. *J Trauma* 1974; 14: 187-196
12. Statistics Canada: *1986 Census Directory* (cat no 99-101E), Publishing Services Group, Canadian Government Publishing Centre, Ottawa, 1987
13. Teasdale G, Jennett B: Assessment of coma and impaired consciousness. A practical scale. *Lancet* 1974; 2: 81-84
14. Rutter M, Graham P, Yule W: *A Neuropsychiatric Study in Childhood* (*Clinics in Developmental Medicine* ser, no 35/36), Heinemann, London, 1970: 240
15. Rutter M, Tuma AH, Lann IS: *Assessment and Diagnosis in Child Psychopathology*, Guilford Pr, New York, 1988: 113-155
16. Eisen M, Donald CA, Ware JE et al: *Conceptualization and Measurement of Health for Children in the Health Insurance Study*, Rand Corp, Santa Monica, Calif, 1980
17. Rutter M, Graham P, Yule W: *A Neuropsychiatric Study in Childhood* (*Clinics in Developmental Medicine* ser, no 35/36), Heinemann, London, 1970: 158-162
18. Craig AR, Hancock KM, Dickson H et al: Psychological consequences of spinal injury: a review of the literature. *Aust N Z J Psychiatry* 1990; 24: 418-425
19. Soderstrom S, Fogelsjoo A, Fugl-Meyer KS et al: A program for crisis-intervention after traumatic brain injury. *Scand J Rehabil Med Suppl* 1988; 17: 47-49
20. Landsman IS, Baum CG, Arnkoff DB et al: The psychosocial consequences of traumatic injury. *J Behav Med* 1990; 13: 561-581
21. Rivlin E: The psychological trauma and management of severe burns in children and adolescents. *Br J Hosp Med* 1988; 40: 210-215
22. DeVivo MJ, Fine PR: Spinal cord injury: its short-term impact on marital status. *Arch Phys Med Rehabil* 1985; 66: 501-504
23. MacKenzie EJ, Shapiro S, Moody M et al: Predicting posttrauma functional disability for individuals without severe brain injury. *Med Care* 1986; 24: 377-387