

## ISSUES IN THE MANAGEMENT OF BEHAVIOUR DISTURBANCE AS A CONSEQUENCE OF SEVERE HEAD INJURY

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**ABSTRACT.** The management of organic psychosocial deficit following severe head injury has been a neglected area of rehabilitation. Behavioural modification programmes are being utilised increasingly to ameliorate inappropriate behaviours within the rehabilitation framework. Patterns of organic psychosocial deficits in the head injured are described and issues in the management of behaviour disturbances and the constraints that operate in the application of psychological techniques to the population who suffer acquired brain damage are discussed.

*Key words:* head injury, brain damage, rehabilitation, behaviour modification.

The severe head injured have a number of features, both epidemiological as well as neurological, that make them an important group for the development of treatment methods extending beyond traditional rehabilitation procedures. Epidemiologically, head injuries are of major importance. The United States survey revealed an annual incidence in the order of 200 per 100 000 population with the most vulnerable group aged between 15 and 24 years (13). Thus each year there are an increasing number of traumatically brain damaged adolescents and young adults, who were previously healthy and who, as London (19) has observed will probably have a normal life expectancy. While the prevalence of those suffering the more severe forms of head injury resulting in permanent and handicapping sequelae is not known with accuracy, authorities such as Krauss (14) estimate it to be a significant proportion. Neurologically, the group of severe head injured patients requiring ongoing rehabilitation following their acute hospitalisation, tends to be the very severely injured, who have significant durations of coma followed by a period of post-traumatic amnesia, usually in excess of one week. In general, these individuals experience continuing deficit in the longer term, with varying degrees and combinations of physical, cognitive and organic psychosocial or behavioural disturbances (5).

Recovery patterns following injury are largely specific to the individual, although it has been demonstrated that most of the improvements which will significantly affect the individual's final outcome have taken place by some six months post-trauma (3, 12, 21).

Studies examining outcome after severe head injury are not, however, generally optimistic. While the prospects for motor-sensory recovery are good, with the majority of each reported series from various countries ultimately having little or no physical deficit (5, 8, 12, 22), many patients experience permanent residual deficits of a cognitive and behavioural nature, which cause significant disablement to the individual (3, 19, 24), and are of great consequence to those who care about him (6, 7, 15, 23).

### *Patterns of behavioural disturbance after severe head injury*

The nature and management of the behavioural sequelae of severe head injury have not received the same degree of attention as other organically based impairments, such as motor-sensory and cognitive deficits. In general terms, the behavioural disturbances refer to the personality changes commonly observed after the more severe degrees of injury, and as Lishman (18) notes, "bears a definitive stamp which in large measure cuts across differences in circumstances and differences in pre-morbid personality". While Bond (4) has rightly pointed to the interplay between organically determined personality change and that personality change which is a reaction to the particular adverse circumstances of the trauma and the ensuing years, it would be misleading to underestimate the contribution and significance of the organic factors in behavioural disturbance.

The organic psychosocial deficits that occur as a result of severe blunt head injury of the acceleration-deceleration type, such as a motor vehicle



accident, are in large part due to damage incurred to the frontal lobes and the connections to and from this area, particularly the limbic system (1). The range of organic psychosocial disturbances that occur following brain trauma to the frontal lobes has been well documented (2, 20, 25). The deficits may be conveniently categorised as the disorders of control, which are characterised by disinhibition, impulsivity and facetiousness. At the other extreme are the disorders of drive, where inertia, inflexibility and adynamia will predominate. Both these types of deficits are localised to the basomedial aspects of the prefrontal lobes bilaterally.

As with motor-sensory and cognitive deficits, the organic psychosocial deficits span an enormous range between patients, both in type as well as degree. However, largely as a result of the mechanism of the trauma, which produces a diffuse and bilateral neuropathological picture, severe head injured patients tend to have a combination of both disorders of control and drive, rather than isolated forms of each type, which may occur in other more focal neurological conditions.

The behavioural manifestations of organic psychosocial disturbances may take a variety of forms. Those who experience marked degrees of such deficits may present as extremely threatening, aggressive and unpredictable. Others may only be able to respond and relate in the most rigid, literal and concrete manner. Some exhibit witzelsucht being tiresomely fatuous and flippant with a running pattern of puerile, inappropriate jokes, and still others exhibit an overwhelming inertia and adynamia being unable to initiate or sustain behaviour and interactions to any socially acceptable degree. In general, such people relate on an immature emotional level, they frequently lack insight into their altered behaviour and are insensitive to the needs of others. At the other extreme head injured victims with mild psychosocial deficits generally have changes in their interpersonal skills and behaviour to a lesser degree than those with severe disturbances, although the directions that such changes take will be similar. For example, as a result of disinhibition they may have lost some of their premorbid frustration tolerance. The temper outbursts, however, will generally not be as frequent or as devastating in their consequences as in those who have more severe forms of the disturbance. Often people with milder forms of organic psychosocial disturbance will pass as normal, and their acquired deficit in

this area will only be recognised and appreciated by those who knew them premorbidly.

#### *Management approaches for behavioural disturbances*

Organic psychosocial deficits can make the severe head injured person extremely difficult for nurses to manage, therapists to treat, and, after discharge, for families and the community to accept. Yet there is little to suggest that management techniques aimed at the rehabilitation of such deficits have effectively infiltrated rehabilitation agencies.

The observations Bond (3) made a decade ago still apply today: "methods of restoration of function are usually heavily biased towards physical disabilities with scant attention to the long lasting and chronically-disabling mental changes which occur so frequently". Traditional "management" approaches for organic psychosocial deficits, such as heavy sedation, admission to a psychiatric unit or premature discharge home, are hardly compatible with all the time, effort and expertise expended on the rehabilitation of other more tangible aspects of the patient's brain damage, such as improving his spasticity, speech or competence at dressing. In the light of outcome studies which repeatedly demonstrate the significance of residual "mental" disturbances as being the major factor in patients' difficulties in resuming their premorbid lifestyles, the remediation of motor-sensory deficits should be but one facet of the rehabilitation process.

There has been a growing number of reports on the successful amelioration of behaviour disturbance and the acquisition of new behaviours utilising a behavioural approach with the population who suffer acquired brain damage of various aetiologies (10, 11, 17, 24, 27-30).

The early reports are important for their demonstration of the potential application of psychological techniques in altering the functional outcome of a range of behaviours including the acquisition of motor-sensory skills, the reduction of behaviour disturbance and the shaping of other organically determined deficits, such as intelligibility of speech.

The reports describing the traumatically head injured have usually focussed on the amelioration of behavioural disturbances and they demonstrate the dramatic effects of a behavioural approach for this problem, although evidence for the maintenance of



such changes in the longer term has not been reported. Hollon (10) observed that the severe howling, hitting, scratching and profanities exhibited by his patient ceased within one week. Lincoln (17) noted that within several weeks the physiotherapist was able to treat in a normal fashion a patient who previously was uncooperative and refused to comply with therapy requests. Within 2½ days Wood (28) effected change in a patient who refused to dress, and in another patient abusive behaviour ceased in less than three weeks with a systematic behaviour programme.

Even with more intractable cases where inappropriate behaviours had been evident for some years following the trauma, and which generally do not show the immediate response as noted in the above cases, there is usually a significant improvement over a number of months in the behaviours targeted for change (29, 30).

#### *Constraints imposed by the damaged brain and implications for management*

The successful application of behavioural procedures to medicine in general, and head injury rehabilitation in particular, requires careful consideration. Recent work in the behavioural rehabilitation of the traumatically brain injured (see especially the reports of procedures adopted at the Kemsley Unit (29, 30)) has addressed some of the broader issues involved in the application of psychological techniques developed on groups with intact brain functioning to the population suffering brain impairment. One of the constraints Wood & Eames (29) and Wood (30) stress concerns the very assumptions of the learning theory model which is the basis of behavioural modification approaches, i.e. that the organism needs the neural capacity to learn or acquire new information and skills and to retain the knowledge of such new learning the next time he is required to exhibit the particular behaviour in question. It is common knowledge that one of the most frequent disabilities after severe head injury of the acceleration-deceleration type is the impairment of recent memory functioning; in particular, the capacity to acquire, retain and retrieve new information. This constraint has implications for the way in which behaviour change is to be effected with the population who suffer acquired brain damage. For instance, the patient will be required to experience many more repetitions of the behaviour to be learned than may usually be the case. Hence con-

tinuous reinforcement schedules are the method of choice, with trials of overlearning built in to the programme.

Other issues which require particular consideration if appropriate programmes are to be devised to manage maladaptive behaviours as a result of severe head injury include an assessment of a variety of factors, and particularly the limitations posed by:

- (i) the aetiology, nature and extent of the brain damage;
- (ii) the individual patient and his particular set of circumstances, including his family's reaction to the injury and his deficits.

#### *(i) Aetiology of brain damage*

The concept of the unitary nature of brain damage was outmoded long ago, leading to both a more sophisticated understanding of the multitude of neurological and neuropsychological deficits and syndromes that may arise from impaired brain functioning, together with an appreciation of the contribution made by the aetiological factors in the particular pattern of deficits observed. This being the case, the severe head injured should be respected for their difference from other groups of the neurologically impaired. The aetiology of the condition to be treated is a variable which influences outcome, and thence the goals of any management programme. In particular, the organic deficits produced by traumatic conditions (such as severe head injury) differ with respect to both the nature and extent of patterns of deficits commonly demonstrated, as well as the prognosis for the ultimate outcome.

The nature and extent of the deficits experienced within the group of severe head injured vary dramatically between individuals. Some, who are rendered dependent in all basic activities of daily living as a function of marked motor-sensory deficit, may have their neuropsychological functioning relatively spared. Others who have no significant physical deficit may be rendered dependent as a result of cognitive dysfunction, while others who look and sound quite normal to the casual observer may have such a profound change in personality that they are precluded from any semblance of their normal premorbid existence.

The severe head injured also differ from other groups suffering acquired brain damage by virtue of age of onset, being a predominantly young population, which in turn has implications for the recovery



process following the trauma and return of function.

Another major consideration in dealing with the severe head injured is an appreciation of the significance of the localisation of much of the damage. Because of the vulnerability of the frontal lobes in severe head injury of the acceleration-deceleration type, the victims invariably have behaviour disturbance as a direct consequence of their brain damage. Yet because of the multi-focal, neuropathological disturbances throughout the remainder of the brain they generally will not have large areas of intact brain which can be marshalled to compensate for particular deficits.

The individual variation between severe head injured victims underscores the importance of accurate assessment of the range and type of deficits. Neuropsychological assessments, of the type recommended by Walsh (25, 26), should be able to provide pertinent information regarding the parameters of disturbances of drive and control, as well as the interplay between organic psychosocial disturbances and more cognitively-related deficits. The presence of dysphasia, impaired memory and planning abilities, disturbances of the body image or apraxia, in addition to the range of motor-sensory impairments, may mask behavioural disturbances related to drive, consequently making their delineation difficult. On the other hand, patients who do not exhibit functional disturbances of basic neuropsychological abilities may suffer significant impairment of their adaptive or executive cognitive abilities, and often these disturbances will be masked by the preservation of social skills at a superficial level. Of particular importance is the differentiation of the functional depressed reaction from the features of disturbances of drive, such as inflexibility and adynamia, notwithstanding the fact that it is entirely possible for the two to co-exist. Programmes for behaviour change with this population should be based upon the choice of appropriate and realistic goals and methods of attaining such goals, which in turn will depend upon the delineation of patterns of neuropsychological strengths and deficits.

#### (ii) *The patient and his circumstances*

While the organic nature of the brain damage is of overwhelming importance, head injuries do not happen in a vacuum, and the person will bring with

him all his own past experiences and aspirations, his own personal reaction to the head injury as well as those of the people with whom he relates.

Reactive psychosocial responses (such as depression, anger, anxiety, low self esteem, poor frustration tolerance) are normally accepted reactions to an adverse set of circumstances. They are not peculiar to severe head injured persons alone, and commonly accompany any serious illness, crisis or prolonged stress. Reactive difficulties are commonly observed after, among other things, hospitalisation. The head injured person however, not only has rehabilitation and uncertainty of outcome to contend with, but he invariably has organic brain deficits, perhaps involving motor-sensory abilities, but certainly affecting his cognitive and psychosocial functioning. With a reduction in these abilities the head injured victim will not have the personal resources he once had at his disposal in order to manage reactive difficulties which are commonly masked. This may well result in behaviour disturbances, manifested by an indifference and/or poor frustration tolerance which may appear similar to the organic psychosocial deficits.

It stands to reason that central to the success of any programme is its appropriateness to the individual. Much has been written on the importance of reinforcers being meaningful for the patient. In learning theory terms, the severe head injured person is in a continual punishment situation and nothing he or anyone else can do will turn off the punishment (i.e. be as he was prior to the head injury). In examining this thesis Fordyce (9) has commented that "the conditions defining punishment characterise the situation for a person who has recently and suddenly incurred a significant disability", and that a common response of an organism that is being punished is escape or avoidance behaviour, which is likely to occur in situations such as therapy, where the patient is confronted by the effects of the punishment he has received. In constructing behaviour programmes it is not difficult to manipulate the focus of the target behaviours; e.g. rather than punish for aggressive behaviour, one can reward for time intervals of absence of aggressive behaviour. Experience with behavioural approaches for the management of behaviour disturbance after severe head injury would suggest that positively reinforcing appropriate behaviours is not only an effective method by which to obtain behaviour change, but also that given the



circumstances it is more humane and readily accepted by the patient and his family.

Further, such an orientation is the method of choice to actively encourage positive behaviours and retrain the patient in ways to adaptively interact and deal with his environment as opposed to methods which restrict retraining to the eradication of those behaviours which are not acceptable or appropriate.

The recency of the lesion, or the time that has elapsed post-trauma, is an additional constraint in the adoption of particular behavioural management techniques. Lezak (16) has described the psychological stages that the family pass through in their coming to terms with the effects of the injury. In the early stages families often focus upon the physically-related changes that have occurred and issues related to the nursing management of the patient. It usually takes a considerable period of time before family members are prepared to address the issue of neuropsychological changes the patient may experience, including cognitive dysfunction. A certain amount of behavioural disturbance will be tolerated in the early months and can be readily explained away by relatives relieved to see their loved one alive.

The relatives' position regarding their perceptions and acceptance of the existence and nature of the patient's brain damage may have the effect of radically modifying both the goals of behavioural management programmes, and particularly the methods to be used. The methods to which relatives take exception can be as innocuous as requirements for staff to adopt a consistent response to the behaviours targeted for change, when relatives may feel that there are extraneous reasons to account for the behaviour on a particular occasion. Explanation and discussion of deficits and management techniques with relatives prior to the implementation of a programme usually defuse potential misunderstanding and malcontent. Behavioural programmes invariably require families' cooperation, and frequently active participation, if they are not to founder.

### CONCLUSIONS

Organic psychosocial deficits are common sequelae of severe head injury and they often result in the patient exhibiting marked behavioural disturbance which may make his nursing management problematic and therapy programmes difficult, if not impos-

sible, to conduct. Those behaviour disturbances that have an organic aetiology should be viewed in the same manner as are other deficits such as spasticity, dysphasia and apraxia.

Preliminary reports of the implementation of behaviour programmes with this population have shown promise in the amelioration and, in some cases, eradication of such behavioural deficit, and it can be expected that their use as adjuncts in rehabilitation will increase. At this stage, therefore, the further development of efficacious treatment strategies for organic psychosocial sequelae requires a sophisticated knowledge of the neurological and neuropsychological constraints that operate with the head injured population. This includes cognizance of the ultimate limiting factor, the severity of the brain damage itself. The individual's patterns of deficits will dictate not only the goals of the particular treatment programmes, but also the way in which such goals are to be obtained.

### REFERENCES

1. Adams, H. & Graham, D. I.: The pathology of blunt head injuries. *In* Scientific Foundations of Neurology (ed. M. Critchley, J. L. O'Leary & B. Jennett), pp. 478-491. Heinemann, London, 1972.
2. Blumer, D. & Benson, D. F.: Personality changes with frontal and temporal lobe lesions. *In* Psychiatric Aspects of Neurologic Disease (ed. D. F. Benson & D. Blumer), pp. 151-170. Grune & Stratton, New York, 1975.
3. Bond, M. R.: Assessment of the psychosocial outcome after severe head injury. *In* Outcome of Severe Damage to the Central Nervous System (CIBA Foundation Symposium 34—new series), pp. 141-157. Elsevier, Amsterdam, 1975.
4. Bond, M. R.: The psychiatry of closed head injury. *In* Closed Head Injury. Psychological, Social and Family Consequences (ed. N. Brooks), pp. 148-178. Oxford University Press, Oxford, 1984.
5. Broe, G. A., Tate, R. L., Ross, G., Tregeagle, S. & Lulham, J.: The nature and effects of brain damage following severe head injury in young subjects. *In* Head Injuries: An Integrated Approach (ed. T. A. R. Dinning & T. J. Connelley), pp. 92-97. John Wiley, Brisbane, 1981.
6. Brooks, D. N. & McKinlay, W.: Personality and behavioural change after severe blunt head injury—a relative's view. *J Neurol Neurosurg Psychiatry* 46: 336, 1983.
7. Brooks, N. (ed.): Closed Head Injury. Psychological, Social and Family Consequences. Oxford University Press, Oxford, 1984.
8. Fahy, T. J., Irving, M. H. & Millac, P.: Severe head injuries: a six-year follow-up. *Lancet* 2: 475, 1967.
9. Fordyce, W. E.: Behavioural methods in rehabilita-

- tion. *In Rehabilitation Psychology* (ed. W. S. Neff), pp. 74-108. American Psychological Association Inc., Washington, 1971.
10. Hollon, T. H.: Behaviour modification in a community hospital rehabilitation unit. *Arch Phys Med Rehab* 54:65, 1973.
  11. Horton, A. M. & Howe, N. R.: Behavioural treatment of the traumatically brain-injured: a case study. *Percept Mot Skills* 53:349, 1981.
  12. Jennett, B., Snoek, J., Bond, M. R. & Brooks, N.: Disability after severe head injury: observations on the use of the Glasgow Outcome Scale. *J Neurol Neurosurg Psychiatry* 44:285, 1981.
  13. Kalsbeek, W. D., McLaurin, R. L., Harris, B. S. H. & Miller, J. D.: The National Head and Spinal Cord Survey: major findings. *In Report on The National Head and Spinal Cord Injury Survey* (ed. D. W. Anderson & R. L. McLaurin), pp. S19-S31. *J Neurosurg (Suppl)* 53:1980.
  14. Krauss, J. F.: Epidemiological features of head and spinal cord injury. *In Advances in Neurology*, vol. 19, Neurological Epidemiology: Principles and Clinical Applications (ed. B. S. Schoenberg), pp. 261-279. Raven, New York, 1978.
  15. Lezak, M. D.: Living with the characterologically altered brain injured patient. *J Clin Psychiatry* 39:592, 1978.
  16. Lezak, M. D.: Coping with head injury in the family. *In Brain Impairment. Proceedings of the Fifth Annual Brain Impairment Conference* (ed. G. A. Broe & R. L. Tate), pp. 5-15. The Post-graduate Committee in Medicine of the University of Sydney, Sydney, 1982.
  17. Lincoln, N. B.: Behaviour modification in physiotherapy. *Physiother* 64:265, 1978.
  18. Lishman, W. A.: Organic psychiatry. The psychological consequences of cerebral disorder. Blackwell, Oxford, 1978.
  19. London, P. S.: Some observations on the course of events after severe injury of the head. *Ann Roy Coll Surg Eng* 41:460, 1967.
  20. Luria, A. R.: *The Working Brain*. Penguin, Middlesex, England, 1973.
  21. Mandelberg, I. A.: Cognitive recovery after severe head injury. 3. WAIS Verbal and Performance IQs as a function of post-traumatic amnesia duration and time from injury. *J Neurol Neurosurg Psychiatry* 39:1001, 1976.
  22. Najenson, T., Mendelson, L., Schecheter, I., David, C., Mintz, N. & Grosswasser, Z.: Rehabilitation after severe head injury. *Scand J Rehab Med* 6:5, 1974.
  23. Oddy, M., Humphrey, M. & Uttley, D.: Stresses upon the relatives of head-injured patients. *Br J Psychiatry* 133:507, 1978.
  24. Tate, R. L.: The nature, management and rehabilitation of psychosocial deficits as a consequence of brain damage following severe head injury. *In Brain Impairment. Proceedings of the 1983 Brain Impairment Conference* (ed. B. Fenelon & H. P. Pfister), pp. 11-25. Australian Society for the Study of Brain Impairment, Newcastle, 1984.
  25. Walsh, K. W.: *Neuropsychology. A Clinical Approach*. Churchill Livingstone, Edinburgh, 1978.
  26. Walsh, K. W.: *Understanding Brain Damage. A Primer of Neuropsychological Evaluation*. Churchill Livingstone, Edinburgh, 1985.
  27. Wilson, B.: A survey of behavioural treatments carried out at a rehabilitation centre for stroke and head injuries. *In Brain Function Therapy* (G. E. Powell), pp. 256-275. Gower, Great Britain, 1981.
  28. Wood, M.: Behavioural methods in rehabilitation. *In Head Injuries: An Integrated Approach* (ed. T. A. R. Dinning & T. J. Connelley), pp. 224-230. Wiley, Brisbane, 1981.
  29. Wood, R. L. & Eames, P.: Application of behaviour modification in the rehabilitation of traumatically brain-injured patients. *In Applications of Conditioning Theory* (ed. G. Davey), pp. 81-101. Methuen, London, 1981.
  30. Wood, R. L.: Behaviour disorders following severe brain injury: their presentation and psychological management. *In Closed Head Injury. Psychological, Social and Family Consequences* (ed. N. Brooks), pp. 195-219. Oxford University Press, Oxford, 1984.

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