ORIGINAL ARTICLE

Rehabilitation outcomes in people with pre-morbid mental health disorders following spinal cord injury

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Study design: Case series, consecutive sample.

Objective: To investigate the rehabilitation outcomes of patients with spinal cord injury (SCI) suffering from preexisting mental health disorders (MHD).

Setting: National Spinal Injuries Centre (NSIC), Stoke Mandeville Hospital, UK.

Method: Twenty-eight newly injured SCI patients: 14 with preexisting MHD and a matched cohort of 14 patients without MHD who were admitted between 2000 and 2006. All patients were involved in a multidisciplinary Goal Planning and Needs Assessment Rehabilitation Programme. Rehabilitation outcomes were measured using the Needs Assessment Checklist (NAC), which has been specifically designed for use with people with SCI. It is a reliable and valid clinical assessment tool, which provides a means to assess and facilitate the delivery of an individually tailored rehabilitation programme.

Results: No significant difference was found between the MHD and non-MHD groups for rehabilitation outcomes. The MHD group showed higher achieved independence scores in psychology for the first needs assessment. Overall, both groups were found to make significant improvements in their level of independence for all nine areas of need between the first and second NAC administration.

Conclusion: Results suggest that rehabilitation can be tailored to meet the individual needs of patients with SCI having MHD; however, further research comparing these outcomes with other rehabilitation approaches is required. The function of timely psychological support for MHD patients on admission to the NSIC has been suggested as a potential explanation for rehabilitation performance. Most importantly, rehabilitation outcomes of patients with MHD have not been found to differ significantly compared with those without MHD.

Spinal Cord (2009) 47, 290–294; doi:10.1038/sc.2008.116; published online 16 September 2008

Keywords: spinal cord injuries; rehabilitation; mental health disorders

Introduction

There is reasonably a high prevalence of people with preexisting mental health disorders (MHD) in the spinal cord injury (SCI) population. The MHD reported in the literature are schizophrenia, depression, personality disorder, alcohol and substance abuse and mood disorder.¹ There are two possible explanations for people with preexisting MHD being at increased risk of sustaining an SCI. First, a high percentage of people with SCI have sustained their injury through attempted suicide, for which the majority of the sample has been reported to have MHD.² This supports the relationship between the presence of an MHD and the incident of suicide attempt.

The high percentage of people who were admitted to a spinal injury centre following attempted suicide underscores cause for concern: 6.8% in one research sample.³ In Stanford *et al.*'s study, 48% of the cases in a sample who have attempted suicide had an MHD; 29% were schizophrenic and 25% had depression.¹ Interestingly, the method chosen for attempted suicide was 'jumping', which may account for the higher percentage of those with schizophrenia who attempt suicide than in the general population. This suggests that an MHD may influence the selected method, which if unsuccessful, may result in physical injury.⁴ For suicide attempt within the SCI population, the ratio is higher in women compared with men.⁵ Additionally, the complexity of MHD experienced within a suicidal group was observed through the high prevalence of comorbid MHD diagnoses.¹ This is also significant because of the observed elevated incidence of SCI owing to suicide attempt, which has been observed across time.³ Long-term follow-ups have revealed a high percentage of deaths because of suicide: 2%.¹ This may assist

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Received 20 May 2008; revised 17 July 2008; accepted 31 July 2008; published online 16 September 2008

to explain the leading cause of death as suicide in the SCI population³ and the higher incidence of suicide in the SCI population compared with the general population.⁶ Overall, studies have shown that the majority of those who have sustained their injury through a suicide attempt have not made a further suicide attempt, which suggests that the problems may have been overcome. However, there are still a small but significant number of people who have made a further attempt, which underscores cause for concern (7.3%).⁴

Second, indirect injury causes have been attributed to concentration loss, higher levels of risk-taking behaviour and substance abuse, which have been found to be associated with an MHD. It is important to recognize this subgroup of patients who have sustained an SCI⁴ and to examine their long-term outcomes and rehabilitation performance. Positive long-term outcomes were reported with regard to domiciliary arrangements, for which a high percentage (70%) of home arrangements were prepared post-discharge.¹

The majority of research has focused on the long-term outcomes for people who have sustained their injury through suicide attempt, which may indicate an underlying cause of MHD. However, little research has included people with preexisting MHD, who sustain an injury through non-suicidal causes. Research has also mainly neglected assessment of people with MHD and their success in rehabilitation.

The Needs Assessment Checklist (NAC), which is a clinically valid and reliable rehabilitation assessment tool, enables us to compare and contrast rehabilitation performance between MHD and non-MHD patients in this study. In the development of the NAC, the importance of evaluation outcomes⁷ for these patients has been considered and incorporated within the design of the NAC. The NAC has been previously used to compare rehabilitation outcomes in older and younger adults.⁸ Liang *et al.*'s study assessed the rehabilitation outcomes for people with schizophrenia and SCI. Positive outcomes were reported once psychiatric problems were managed.⁹ It has also been suggested that the further research is needed to assess engagement of people with MHD in the rehabilitation process and possible problems; for example, because of self-neglect (secondary complications) or withdrawal from rehabilitation on account of the experience of symptoms.⁴ For example, goals have been reported to be affected because of symptoms.⁹ Earlier history of depression was reported to predict depression following SCI,^{10,11} which highlights the importance of considering preexisting MHD.

This study is a retrospective audit, which investigates the rehabilitation outcomes of patients with MHD before SCI when compared with the outcomes of a matched cohort of patients with SCI.

Materials and methods

Participants

Data were collected from 28 newly injured patients with SCI, who were admitted to the National Spinal Injuries Centre

Figure 1 Causes of injury for the MHD ($n=14$) and non-MHD patient groups ($n=14$).

(NSIC) between 2000 and 2006. Fourteen patients were diagnosed with MHD before SCI, which had been documented in their medical records and a cohort of 14 non-MHD patients were matched according to gender, age (± 5 years), injury level and completeness. The diagnoses observed for the MHD group were depression in seven patients (39%), psychosis in three patients (21.4%), schizophrenia in three patients (21.4%) and personality disorder in one patient (7.1%). The age range at injury was 18–68 years, with a mean of 34 years ($s.d. = 13.84$). The sample consisted of 50% male and 50% female participants. Within the sample, 29% were paraplegic incomplete, 29% were tetraplegic incomplete, 21% paraplegic complete and 21% had sustained tetraplegic complete injuries. The means for cause of injury are detailed in Figure 1, which shows the most frequent cause of SCI in the MHD group was because of attempted suicide. The mean time between the first NAC on mobilization and second NAC was 13 weeks and 2 days ($s.d. = 6$ weeks and 6 days).

Measures

The rehabilitation outcomes were assessed using the NAC. This is a structured multidisciplinary framework used at the NSIC, which is specifically designed for use with people with SCI to provide a means of assessment and facilitate the delivery of an individually tailored rehabilitation programme.¹² The checklist includes 199 behavioural indicators separated across eight key areas of rehabilitation: activities of daily living, skin management, bladder management, bowel management, mobility, wheelchair and equipment, community preparation, discharge coordination and psychological issues. Each domain is subdivided into three levels: the domain (that is, activities of daily living (ADL)), the goal (independent in food management) and the specific target (using feeding utensils independently at meal time).¹³ Rating scores range from 0 to 3 (0 = completely independent, 1 = mostly dependent, 2 = moderately dependent or 3 = completely independent or not applicable). No distinction is made between those who are verbally and physically independent, which enables the patient to achieve full independence regardless of severity of injury. Overall scores

for each domain are computed and an 'overall percentage achieved' score is obtained to indicate the patient's level of independence in each area of rehabilitation against their optimal independence level. The NAC has been found to correlate well with existing functional outcome measures, such as the spinal cord independence measure (SCIM), when compared with the validity on functional outcomes.¹⁴ Psychometric assessment of the NAC has revealed high internal consistency coefficients (mean $\alpha = 0.859$, s.d. = 0.918). All domains on the checklist revealed an α -coefficient above 0.7. Psychometric analysis revealed the NAC to be a reliable and valid clinical measure for rehabilitation outcome.¹²

Procedure

Data were taken from the NAC database for this study. During the patient's stay at the spinal centre, they are engaged in a Needs Assessment and Goal Planning Programme, which is jointly undertaken by the patient and multidisciplinary team (MDT) with the use of a person-centred approach. Four weeks after mobilization, the patient will complete the first NAC with a named member of staff from the MDT (physiotherapist, occupation therapist, named nurse, discharge coordinator or psychologist). This person is known as the key worker, who will also coordinate regular goal planning meetings, whereby appropriate goals and targets are identified by the patient and MDT. The second NAC is usually administered when the patient is on the pre-discharge ward to evaluate progress and identify any areas that may need to be addressed before discharge.

Fourteen patients were identified from the Psychology department's historic referrals between 2000 and 2006, and the diagnosis of MHD was obtained from the clinical notes. The data for the first and second NACs were retrieved from a Microsoft Access Database, including gender, age, injury level and completeness, injury cause, date of both NACs and the date of injury. A matched-sample pool was identified for each MHD patient, in which 14 non-MHD patients were identified. Information from both NACs was collected and data for all 28 participants were analyzed in statistical package for the social sciences (SPSS). We can certify that authors adhered to local ethical guidance and practice.

Results

Degree of match between MHD group and matched group

A χ^2 -square test was employed to test the degree of statistical difference between the MHD and non-MHD groups, in which no significant difference was found for gender, injury level and injury completeness ($P > 1.00$). Mann-Whitney *U*-test revealed no significant statistical difference in mean age for the MHD ($M = 34.29$) and for the non-MHD group ($M = 34.19$; $U = 97$, $n = 28$, $P > 0.05$).

Overall independence achieved at first and second needs assessment

A Wilcoxon signed-rank test was employed to compare overall percentage of independence achieved at the first and second NAC across both groups. This score was the achieved

independence score, as a percentage of the optimal independence for each area of need and, scores were found to be significantly increased between the first and the second NAC for all nine areas of need ($-4.6 < Z < -2.9$, $n = 28$, $P < 0.01$).

Comparison of independence-achieved scores within the MHD and non-MHD groups

A Wilcoxon signed-rank test was employed to compare percentage achieved NAC scores within the MHD and non-MHD groups. For the MHD group, significant increases in eight areas of need were observed ($3.04 < Z < 3.29$, $n = 14$, $P < 0.002$); however, the increase in psychology scores was not found to be significant ($Z = -0.97$, $P > 0.05$). However, the non-MHD group revealed significant increases in all nine areas of need ($2.94 < Z < 3.30$, $n = 14$, $P < 0.002$).

Comparison of independence-achieved scores between the MHD and non-MHD groups

A Mann-Whitney *U*-test was performed to compare the two groups on 'percentage achieved' scores. The first NAC was found to have no significant difference in overall percentage achieved scores between groups ($67.5 < U < 96.5$, $n = 28$, $P > 0.05$). However, MHD group scores were found to be lower compared with the non-MHD group in eight areas of need and higher in the area of psychology compared with the non-MHD group. The Mann-Whitney *U*-test revealed no significant differences in 'percentage achieved' scores between the MHD and non-MHD groups for the second NAC ($77.5 < U < 92$, $n = 28$, $P > 0.05$). Similar scores were observed for both groups in all nine areas of need; however, the non-MHD was observed to have slightly higher percentage achieved scores compared with the MHD group.

Comparisons were made between the groups for the percentage participants had improved by between the first and second NAC. A Mann-Whitney *U*-test was employed to examine the difference between groups for overall percentage increase and both groups showed similar increased percentage scores in all nine areas of need ($U = 60.5$, $n = 28$, $P > 0.05$). The MHD group showed the greater increase in six areas, as shown in Figure 2.

Figure 2 Increase percentage-achieved scores for the MHD ($n = 14$) and the non-MHD patient groups ($n = 14$).

Figure 3 Allocation of key workers by profession to the MHD ($n=14$) and non-MHD patient groups ($n=14$).

Descriptive results revealed a higher frequency of Psychology professionals allocated as key worker to MHD patients, as shown in Figure 3.

Discussion

Overall, both groups were found to have a significant increase in 'achieved independence' between their first and second NAC. This highlights that patients with SCI having MHD can perform as well in this setting as those without MHD and all patients can achieve improved rehabilitation scores after they have participated in the Needs Assessment and Goal Planning Rehabilitation Programme. The improvement in achievement of independence in areas of need after this rehabilitation framework has been found previously in the literature, and rehabilitation scores in these patient groups were found to be representative of the acute SCI population found in earlier studies.¹³

The MHD group was observed to have higher 'achieved independence scores' in the area of psychology than in the non-MHD group. This was also the area, in which no significant increase was observed between the first and second NAC. This may be attributed to a higher baseline score compared with the non-MHD group. One possible explanation for the higher baseline score may be attributed to the psychological needs of patients with SCI having preexisting MHD being assessed and identified on admission through psychology/psychiatry whereby goals may be set and independence achieved before the first NAC. Early psychological contact is routinely provided for patients with MHD, and the importance of such prompt support has been accentuated in Kennedy *et al.*'s study,⁴ who highlighted the importance of allocation to psychology and psychiatric liaison on admission. This was further supported in the literature for which all the schizophrenic samples received psychological support on admission and exhibited good rehabilitation outcomes.⁹ Please note that these suggestions would need to be investigated with the use of correlation analysis to examine a relationship between time of psychology intervention and outcome scores.

Importantly, no significant statistical difference was found in the achieved independence scores for the second NAC between the MHD and non-MHD groups. This suggests that the MHD patients are not at a disadvantage in rehabilitation after an SCI and their mental health does not seem to severely impact their rehabilitation performance. There are several possible explanations for this. First, it may be because of the NSIC multidisciplinary approach to rehabilitation with integrated psychological support for people with MHD. However, to conclude this, more research with the use of a matched-control group would need to be undertaken. Patients without MHD may also benefit from early psychological support, which has been suggested that after reported high depression and anxiety levels in the acute stage of SCI.¹⁵ It is noteworthy that all patients can have access to psychology services at the NSIC at any period in their rehabilitation and, therefore, it may be interesting for further research to examine the benefits of early psychological intervention for patients with SCI generally and not just those with preexisting MHD.

Another explanation may be attributed to MHD patients being key worked by members of the psychology team and setting appropriate goals and targets tailored to the individual through goal planning. It is important to note that although MHD patients were more likely to be allocated psychologists as key workers, patients also had regular access to other members of the MDT as part of their rehabilitation programme and the goal planning process. The higher scores for the MHD group on a number of domains is an interesting observation and may be attributed to the more extensive MDT input they receive. Another explanation for positive outcomes in rehabilitation may be attributed to the event of an SCI, which may enable patients in the MHD group to reevaluate their lives more positively because of a change in situation.¹ This alternative explanation should be explored in future research to identify any differences in the way those with MHD respond to disability compared with those without MHD.

Limitations of this study include the use of a small sample size, which makes it difficult to generalize to the SCI population. Results may need to be taken with caution because of the power and validity of a smaller sample size. Further investigation would also be invited to assess, if the improvement in rehabilitation outcomes is specific to the NAC and goal-planning programme, or if similar improvements would be observed from other rehabilitation approaches. Therefore, we acknowledge the importance of comparing outcomes against a control group to validate these findings. Another area of exploration could be to examine the differences in rehabilitation outcome with regard to the cause of injury for MHD patients (self-harm versus accidental), as the current literature neglects to differentiate between these two subgroups of MHD patients.

The study also does not consider other outcome measures, which do not feature on the NAC, such as secondary complications, mortality rates and further suicide ideation. Therefore, further research should examine the long-term outcomes for patients with SCI having MHD to examine the

effectiveness of rehabilitation to meet their long-term needs. It would also be important to examine the reintegration of people with MHD who have an SCI, particularly as difficulties in participation may be experienced generally before injury. For example, 60% of a sample were reported to be living alone following discharge.³ Further research should perform a larger cross sectional investigation of the rehabilitation outcomes for this specific patient group to determine the robustness of this study's results. Further research should also examine other subgroups of patients, who may potentially have difficulties in rehabilitation, for example, comparisons in rehabilitation outcomes with patients who have intellectual impairments or those who have sustained a brain injury. This will enable us to examine further quality of the rehabilitation process and its suitability to meet individual needs.

In conclusion, rehabilitation can be tailored to meet the individual needs of patients with MHD, which can be supported by the improvements in all areas of need after they have undergone the rehabilitation programme. Patients with MHD receive timely psychological support on admission to the NSIC, which may be reflected in their high psychology scores. No statistical significant difference was found between rehabilitation outcomes of patients with MHD and without MHD. This suggests that the people with significant mental health problems pre-injury, when given the opportunity to engage in rehabilitation will seem to benefit to a similar degree as matched controls. A possible explanation for this may be attributed to integrated psychological support within the multidisciplinary rehabilitation framework; however, this requires further investigation, including comparisons against alternative rehabilitation programmes.

Acknowledgements

All participants and the key workers involved in the rehabilitation process.

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