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ORIGINAL ARTICLE

Inappropriate acute neurosurgical bed occupancy and short falls in rehabilitation: implications for the National Service Framework

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Abstract

Patients undergoing neurosurgical intervention may require different types of organized rehabilitation. A prospective study was performed of the care needs of neurosurgical inpatients between the ages of 16 and 70 years who were in acute wards for more than 2 weeks. Only 58% of bed occupancy days were devoted to essential acute neurosurgical ward management. This figure was even lower for patients admitted with subarachnoid haemorrhage (36%) or traumatic brain injury (38%). Overall, 21% of bed days would have more appropriately spent in 'rapid access'/acute rehabilitation beds, 13% in 'active participation' rehabilitation beds and 5% in cognitive/behavioural rehabilitation units. Addressing this unmet need would increase the availability of acute neurosurgery beds, without needing to build and staff more neurosurgery wards.

Key words: *Head injury, rehabilitation, subarachnoid haemorrhage.*

Introduction

The recently published National Service Framework document for long-term conditions[1] states that; 'people with long term neurological conditions who would benefit from rehabilitation are to receive timely, ongoing rehabilitation services in hospital or other specialist setting in order to meet their continuous and changing needs'.

Patients undergoing elective or emergency neurosurgical treatment may develop physical and cognitive impairments. The appropriate treatment of these deficits will often require the utilization of specialist rehabilitation facilities involving a multi-disciplinary goal-orientated approach to continuing patient care.[2] A Royal College of Surgeons working party in 1999 recommended that appropriate provision of services was made available for those patients who no longer required acute neurosurgical care.[3] Such patients should 'not be cared for on acute general surgical, orthopaedic or general medical wards'. A large retrospective Canadian study demonstrated that delays in the transfer of patients from acute neurosurgical facilities to specialist rehabilitation units were associated with poorer long-term outcomes.[4]

A number of different care pathways for patients in the post-acute phase of neurosurgical treatment have been identified.[5] Among these is the concept of 'rapid access' ('acute') rehabilitation,[6] which can provide multidisciplinary management of spasticity, contractures, nutrition, continence, pain, agitation, pressure areas and tracheostomies for those with physical impairments, and continuous intensive supervision in a secure environment for ambulant disorientated patients, who are still in period of post-traumatic amnesia. This early active management of non-life threatening complications, which do not require surgical intervention, intravenous therapy or ventilation, could optimally be provided in a dedicated unit adjacent to the neurosurgical ward. This would shorten length of stay in the acute neurosurgical ward, and allow acute medical, nursing and therapy staff to concentrate on treating patients with problems that require neurosurgical care. A study of such an acute rehabilitation facility in a large London neurosciences centre[7] has demonstrated that total length of stay in hospital was not increased by the use of an acute rehabilitation unit and that subsequent referral to community-based rehabilitation facilities was significantly increased in this group of patients.

Rehabilitation services in each area have developed in a highly variable manner depending on local geography and expertise. The need for appropriate services for different groups of patients has not been formally quantified and, to facilitate this, definitions of rehabilitation needs of patients with neurological disability have been developed.[5] These allow the

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unmet need for each type of service to be easily documented and, hence, will inform discussions about how to develop appropriate rehabilitation services. This study documents the need for different rehabilitation facilities for inpatients occupying acute neurosurgical beds in a large tertiary referral centre.

Materials and methods

The study was carried out in a single site regional neurosurgical unit of 60 in-patient beds, serving a population of 3.5 million people. This unit also encompasses a 20-bedded neurocritical care unit and 10 neurorehabilitation beds devoted to 'active participation' rehabilitation of patients aged 16–70. Over a 5-month period, all patients between the ages of 16 and 70 who had been admitted to the regional neurosurgical unit, occupying acute neurosurgical beds for over 2 weeks, were followed through their admission. The need for appropriate inpatient care facilities for each patient for each day on the neurosurgical ward was identified and coded in accordance with established categories,[5] as shown in Table I.

The total number of bed occupancy days (BODs) required for each category was then identified. Assessments were carried out on a weekly basis by single observer (LB) analysis of the hospital records. Where determination of the current clinical status could not be derived from the hospital notes, the medical team looking after the patient in the acute ward setting was consulted.

Patients from outside this age range were not included in the study, as other rehabilitation or discharge pathways were appropriate (paediatrics or care of the elderly).

The number of BODs taken up by different clinical need was calculated as a proportion of the total bed occupancy for this age group.

Results

In this 5-month period, a total of 9000 neurosurgical BODs were available with approximately 6500 occupied by patients between 16 and 70 years. A total of 2948 BODs were occupied by patients between 16 and 70 staying for longer than 2 weeks on acute neurosurgical wards. This represents 45% of the total neurosurgical BODs used by this age group in this time period. The patient's clinical need did not require acute neurosurgical ward management in 1250 or 42% of these 2948 BODs. This represents 20% of all neurosurgical BODs occupied by patients of 16–70 years. The type of facility where they would have been most appropriately managed is shown in Table II.

The proportion of total BODs occupied by the whole group of patients, and by diagnosis is shown in Fig. 1.

Of patients admitted to hospital with a subarachnoid haemorrhage, only 36% of BODs were appropriately spent in acute beds. For trauma, this figure was 38%.

Discussion

There is a large unmet need for the 'specialist, high quality' rehabilitation facilities, outlined in the

TABLE I. Inpatient rehabilitation patient definitions[5]

Facility (code)	Appropriate patient group
Acute Medical ward care (20)	Medically unstable, not requiring acute neurosurgical or critical care.
Rapid access rehabilitation (30)	Medically stable, not (necessarily) able to actively participate due to PTA, confusion, rejection, low response or awareness.
Active participation rehabilitation (40)	Medically stable, able to actively participate with and benefit from therapy.
Cognitive/behavioural rehabilitation (50)	Medically stable, but prolonged confusion, amnesia or behavioural difficulties, requiring specialist behavioural management, intensive supervision and secure environment with minimal physical disability.
Slow stream rehabilitation (60)	Medically stable, but low awareness or response persists beyond, e.g. 3 weeks after sedation withdrawn, ICP corrected and medically stable. Able to benefit from medical and physical therapy to prevent complications and support recovery.
Maintenance (100)	Medically stable, but permanent (usually pre-existing) disability. Aiming to prevent complications, rather than improve independence.

TABLE II. Number of bed occupancy days on acute neurosurgical wards over a 5-month period for patients aged between 16 and 70 years

	Acute care	Rapid access	Active participation	Cognitive/ behavioural	Slow stream	Maintenance
All Patients ($n = 2948$)	1679	628	395	143	31	72
Subarachnoid haemorrhage ($n = 400$)	142	159	60	39	0	0
Traumatic brain injury ($n = 686$)	267	166	127	40	31	55

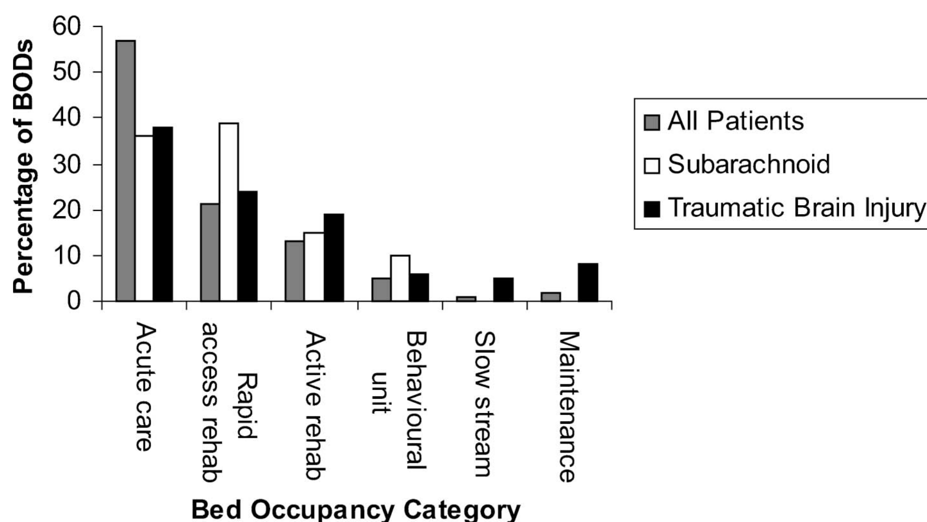

FIG. 1. Appropriate inpatient care facilities for all neurosurgical ward patients between the age of 16 and 70 years, by diagnosis, in hospital for more than 2 weeks.

National Service Framework,[1] following acute neurosurgical intervention. Although there is no 'acute' rehabilitation available in the majority of neurosurgical centres, there is clearly a demand for such a facility. The value of in-patient rehabilitation delivered in a unit-based manner, rather than by an outreach team or similar service has been clearly demonstrated in the context of stroke care,[8,9] and this would also apply for the rehabilitation process following other neurological injury or neurosurgical intervention. Indeed, retrospective studies on head-injured patients undergoing formalized rehabilitation programmes have demonstrated a benefit in outcome related to early intervention and the avoidance of a delay in transfer to a formal rehabilitation programme.[10] Further prospective studies are needed to demonstrate the long-term value of acute rehabilitation in patient recovery.[7]

This study does not document the total unmet need for different types of rehabilitation in the total neurosurgical catchment population, as patients from outside the rehabilitation catchment population are often transferred back to their local district general hospitals for long-term management. Clearly, patients with multiple complex deficits as seen in subarachnoid haemorrhage and trauma have a large unmet need for organized inpatient rehabilitation. Where this is not available, such patients may be managed on orthopaedic or general surgical wards, or sometimes stroke units and care of the elderly facilities.

Provision of four 'rapid access' rehabilitation beds, two more active rehabilitation beds and one bed on a behavioural unit for the 5-month period analysed would free up enough acute neurosurgical capacity to allow an additional 350 short stay elective procedures (such as cranioplasty or spinal laminectomy) to take place. This equates to 240 extra elective procedures per million of population served per year.

Conclusion

The provision of greater resources for inpatient rehabilitation would allow acute neurosurgical services to be used more appropriately and the analysis of the appropriateness of inpatient care facilities in the acute setting will inform the optimum planning of future rehabilitation services.

Authors contributions

L. J. Bradley collected the data and wrote the original paper. S. G. B. Kirker, J. D. Pickard and P. J. Hutchinson designed this study, assisted with data analysis, confirmed the clinical status of the patients and co-chaired the groups defining the rehabilitation codes. E. Corteen assisted with coding categories. H. M. Seeley was involved in formulating the coding categories.

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