A Prospective Audit of Inappropriately Occupied Hospital Beds in Patients with Newly Acquired Traumatic Spinal Cord Injury

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Abstract

Aim
To quantify the inappropriate bed occupancy amongst patients with traumatic spinal cord injury (TSCI) awaiting transfer of care from the acute to community.

Methods
A prospective audit was carried out, of all newly acquired cases of TSCI in 2017, who progressed through acute care and specialist rehabilitation.

Results
Forty-four patients who were audited spent a total of 3915 days occupying a hospital bed, inappropriate for their phase of care, 78 awaiting admission to specialist acute care, 3126 awaiting admission to rehabilitation and 711 awaiting discharge from rehabilitation.

Conclusion
Valuable health-care resources are being wasted because TSCI patients cannot move seamlessly from one phase of care to the next. This impacts negatively on the quality of care being delivered to this patient cohort.

Introduction

Traumatic spinal cord injury (TSCI) is a rare condition with an incidence of around 13 per million per year in Ireland, one of the lowest in the developed world.1,2 TSCI is a complex medical condition resulting in a sudden change in physiological status, motor and sensory function, adjustment difficulties and a range of secondary complications. TSCI is often, although not always, accompanied by spinal fracture. TSCI management usually involves a spinal surgery opinion with or without operative management and medical management of the secondary physiological sequelae which occur. It is recognised that, for the best outcomes, TSCI should be managed in specialist acute and rehabilitation facilities.3 In Ireland, the majority of cases of TSCI are managed in the National Spinal Injuries Unit (NSIU), Mater Misericordiae University Hospital (MMUH) and the National Rehabilitation Hospital (NRH) for the acute and rehabilitative phases of care, respectively. An appropriate standard of care is that patients are admitted directly and
Globally, the admission of TSCI patients into rehabilitation and their discharge back to the community pose a challenge for a range of reasons. A systematic approach to the definition of barriers to discharge from rehabilitation has been developed. Bed availability, staffing and lack of single rooms have all been cited as reasons for delayed admission to rehabilitation. Funding for home care packages, lack of accessible accommodation and of nursing home beds are reported as reasons for delayed discharge from rehabilitation.

It is perceived in Ireland that there are worsening barriers to the effective and timely transfer of TSCI patients from the acute setting to rehabilitation and back to their communities. As a result, patients are occupying beds in inappropriate settings resulting in a waste of valuable health-care resources and poorer outcomes. A prospective audit was planned, with the objective of quantifying the exact number of bed-days which are being lost in this patient cohort throughout the continuum of care.

Methods

All cases of TSCI newly acquired in 2017, where there was progression through an acute hospital (regardless of location) and specialist rehabilitation at the NRH were included in this audit. The following time points were recorded: date of presentation to local hospital; date of referral to NSIU at MMUH; date of arrival at NSIU (if applicable); date deemed ready for specialist rehabilitation at the NRH; date of repatriation from NSIU to local hospital (if applicable); date of admission to NRH; anticipated and actual dates of discharge from rehabilitation; where isolation facilities were required, date ready for admission to rehabilitation and actual date of admission.

A patient was deemed ready for rehabilitation based on assessment by a Consultant in Rehabilitation Medicine or on receipt of written reports from therapists in local hospitals outlining patient progress in therapy. Patients were deemed ready for discharge from rehabilitation when all achievable goals had been achieved. Reasons for delay in each stage of care and the discharge destination from the NRH were recorded.

From the time points listed above, the following were calculated: total number of bed-days between arrival at local hospital and admission to NSIU; total number of bed-days between being deemed fit for rehabilitation and admission to NRH; total number of bed-days between being ready for discharge from rehabilitation and actual discharge; the additional number of bed-days waiting in an acute hospital, which were attributed to the need for isolation facilities in rehabilitation.

Results

In 2017, 61 patients sustained TSCI. Only 44 of these progressed through an in-patient rehabilitation programme at the NRH and are included in this audit. Of these, 33 patients were referred from a local hospital to NSIU; 11 patients were managed acutely at the local hospital and referred directly to NRH.

The remaining 17 did not participate in in-patient rehabilitation at the NRH for the following reasons: 7 did not survive beyond acute care; 5 were deemed too frail for specialist rehabilitation and were discharged directly to a nursing home or back to a local referring hospital; 2 declined specialist rehabilitation; 2, with mild injuries, had rehabilitation in elderly care facilities; 1 did not have permanent status in the country and was re-patriated to his home country.

Table 1 below summarises the number of inappropriately used bed-days during acute and rehabilitative care for the 44 cases audited. Reasons for delays in admission to the NSIU was lack of bed availability in all cases. Reasons for delay in admission to rehabilitation was lack of bed availability in all cases, in 6 instances exacerbated by the requirement for an isolation room. Table 2 displays the reasons for delays in discharge from rehabilitation.
Table 1. Number of bed-days inappropriately used during the acute care and rehabilitation of 44 patients with traumatic spinal cord injury, acquired in 2017

<table>
<thead>
<tr>
<th>Description</th>
<th>No. of bed-days</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of bed-days awaiting admission from a local/regional hospital to NSIU</td>
<td>78</td>
</tr>
<tr>
<td>No. of bed-days in an acute hospital awaiting admission to NRH (N=44)</td>
<td>3126</td>
</tr>
<tr>
<td>No. (%) of these bed-days spent in NSIU</td>
<td>629 (20.1%)</td>
</tr>
<tr>
<td>No. (%) of these bed-days spent in other acute hospital</td>
<td>2497 (79.9%)</td>
</tr>
<tr>
<td>Estimated no. (%) of bed-days awaiting admission in acute hospital for rehab due to lack of isolation facilities (N = 6)</td>
<td>402 (12.9%)</td>
</tr>
<tr>
<td>No. of bed-days lost at the end of rehabilitation awaiting discharge (N=44)</td>
<td>711</td>
</tr>
<tr>
<td>Total no. of bed-days lost throughout acute &amp; rehabilitative care (N = 44)</td>
<td>3915</td>
</tr>
</tbody>
</table>

Discharge locations:
- Home: 35
- Nursing Home: 2
- Return to acute hospital: 7

Table 2. Reasons for delayed discharge from rehabilitation amongst patients with traumatic spinal cord injury during 2017

<table>
<thead>
<tr>
<th>Reason for delayed discharge</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family negotiations</td>
<td>2</td>
</tr>
<tr>
<td>Awaiting housing adaptations</td>
<td>2</td>
</tr>
<tr>
<td>Awaiting home care package provision</td>
<td>6</td>
</tr>
<tr>
<td>Awaiting nursing home bed</td>
<td>2</td>
</tr>
<tr>
<td>Awaiting bed in acute hospital</td>
<td>5</td>
</tr>
</tbody>
</table>

Discussion

This audit describes the inappropriate bed-occupancy in the Irish health-care system for a very small but complex group of patients who acquired a TSCI during 2017. The term “inappropriate” refers to the fact that patients are medically ready for transfer of care to another setting but transfer has been delayed.

The first point worth noting is that 11 patients with a TSCI, which was severe enough to require specialist rehabilitation, were not managed at a specialist acute site, due to inadequate capacity at the NSIU. The usual reason cited for non-admittance to the NSIU is that surgical fixation is not required and beds must be prioritized for those requiring surgery. However, this results in the inappropriate management of all other aspects of the TSCI and the development of avoidable complications. 6, 7

The 78 bed-days lost while awaiting admission the NSIU may not seem exceptional compared with other figures in this audit. However, this delay applies to patients with an unstable spine awaiting specialist spinal orthopaedic management to prevent further neurological damage. Early and direct admission to a specialist acute spinal injuries unit is favorable as it has been shown to result in fewer medical complications and shorter total length of stay. 8 In addition, non-neurologic post-operative complications have been shown to occur at a higher rate where surgery is delayed.9

The number of bed-days lost, while awaiting rehabilitation in acute hospitals either the NSIU or other acute hospitals, is the most shocking figure in this audit, totaling more than 3000. This is due to inappropriate occupancy of specialist rehabilitation beds while awaiting admission (as discussed below) and an inadequate number of specialist rehabilitation facilities. A rehabilitation programme for patients with SCI in Ireland commenced in the NRH in 1961 primarily to deal with TSCI and in an era when non-traumatic spinal cord injury (NTSCI) was rare. However, NTSCI is now more than twice as common as TSCI in this country 10 without any expansion in services to deal with this. Delay in admission to rehabilitation for patients with SCI, whether traumatic or non-traumatic has been shown to be associated with worse functional outcomes.11

Following completion of rehabilitation, there were 711 bed-days used by TSCI patients awaiting discharge from the NRH. The Spinal Cord System of Care (SCSC) programme at the NRH reported that 14.6% of bed-days were lost to
delayed discharges in 2017,\textsuperscript{12} which equates with approximately 1,600 bed-days. The differential can be explained by the fact that this audit did not include patients with NTSCI (who now make up more than half of the admissions to the SCSC programme) and by the fact that some of the bed-days lost in 2017 are attributed to patients injured and admitted during 2016, which was a more challenging year in terms of the number of complete tetraplegic injuries that occurred.\textsuperscript{2} The loss of 711 specialist rehabilitation bed-days is not acceptable and has a dual effect – it impacts on those awaiting discharge and on patients awaiting admission. This number (711) would have been even higher, had 7 patients not been repatriated to local acute hospitals, which are unsuitable discharge destinations, at the end of rehabilitation. This inevitably resulted in additional inappropriate occupation of acute hospital beds and further loss of bed-days but we were not able to quantify this.

The most commonly reason cited for delayed discharge from NRH was the wait for home care packages. It is not unusual for patients with SCI especially those with tetraplegia to require home care packages of the order of 80 – 100 hours per week or greater. In the current system, these care packages are funded at a local level by the HSE, from the disability or older persons’ budgets. Usually, local budgets are too small to deliver these care packages, resulting in delays while awaiting approval of additional funds. The HSE plan to move towards a national system of funding for complex discharges (with which the authors are involved) is eagerly awaited.

Just over 400 acute bed-days were lost due to inadequate isolation facilities in the NRH. There were 6 cases where patients were in contact with a multi-drug resistant organism in a referring hospital and consequently, required a single room to facilitate admission. Lack of isolation facilities at NRH compounded the delay for these patients. The new phase 1 development at the NRH, with an expected completion date of March 2020, is very welcome, as it will consist exclusively of single rooms.

While this audit focuses on lost bed-days, there is a more important issue concerning quality of care for patients with life-changing injuries. TSCI management is a very specialist area. In only the NSIU and the NRH, are there nursing staff with the appropriate skillset and post-graduate qualification to care for these patients. The situation is similar with regard to therapists. The 11 patients who did not have acute care in a specialist setting have already been commented upon. The decision to repatriate patients after spine surgery is regrettable but is necessary to maintain flow of patients through the NSIU. In this audit, the patients who remain at the NSIU were local referrals from the catchment area of the Mater Hospital or may have had very specialist requirements to remain there. For the majority of patients, once returned to a local acute hospital to await admission to the NRH, typically they do not have appropriate bowel, skin, musculoskeletal or spasticity management. Therefore, complications on admission to rehabilitation are very common.\textsuperscript{6, 7, 8}

In conclusion, there was substantial inappropriate bed-occupancy throughout the continuum of care for patients who sustained TSCI in Ireland during 2017. Just under 4000 bed-days, in total, were lost in this small patient cohort. It is likely that this number is multiplied several times for all major trauma patients in Ireland. There is substantial room for improvement in the delivery of service for patients with TSCI. The implementation of a major trauma service for Ireland,\textsuperscript{13} if funded appropriately and delivered effectively, should result in improvements for all trauma patients including those with TSCI. Acute, sub-acute and community-based rehabilitation must be given due consideration as part of the development of trauma networks.

Once major trauma centres and trauma networks are operational, it will be worth re-auditing inappropriate bed-occupancy for TSCI patients.

\textbf{Declaration of Conflict of Interest:}

The authors declare no conflict of interest

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References: