
NATIONAL
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Specialist Rehabilitation following major Injury (NCASRI)

Final Audit Report Executive summary only

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The National Clinical Audit for Specialist Rehabilitation following Major Injury (NCASRI) was commissioned in 2015 by the Healthcare Quality Improvement Partnership (HQIP), as part of its National Clinical Audit and Patient Outcomes Programme (NCAPOP).

NCASRI set out to determine the scope, provision, quality and efficiency of specialist rehabilitation services across England and improve the quality of care for adults with complex rehabilitation needs following major trauma.

A key component of NCASRI was to link data from the Trauma Audit Research Network (TARN) and the UK Rehabilitation Outcomes Collaborative (UKROC) datasets through NHS numbers, in order to track patients along their journey from the MTCs to the specialist (Level 1 and 2) rehabilitation services and to examine the outcomes and cost efficiency of rehabilitation for patients with major trauma.

1.1 Aims and objectives

The **overarching aim** of NCASRI was to provide a national comparative audit of the organisation and access to, quality, outcomes and cost-efficiency of specialist rehabilitation services provided for adults with complex needs following major injury in the English NHS.

The audit was designed to drive improved and equitable access to specialist rehabilitation services for patients with complex needs following major trauma, in order to improve their physical and psychological recovery, and reduce long-term disability and dependency.

A key aspect of NCASRI was to link the two major national clinical datasets for major trauma and for specialist rehabilitation in order to track patients down the care pathway and to consider how the findings may be used to stimulate change both locally and nationally.

1.2 The three NCASRI elements

NCASRI had 3 main elements:

1. An **organisational audit** to identify the current provision of specialist rehabilitation for trauma patients and to map the pathways of care into and out of these services (1).
2. A **prospective clinical audit** of new patients presenting within NHS Major Trauma Centres who have complex needs and receive specialist inpatient rehabilitation.
3. A **feasibility study** for identifying the pathway and outcomes for patients who require specialist inpatient rehabilitation on discharge from MTCs, but do not subsequently attend.

Reports

- The **First NCASRI Report** in October 2016 presented the findings from the organisational survey and a retrospective analysis of UKROC data on outcomes from rehabilitation following major trauma (1).
- The **Second NCASRI Report** in November 2017 described the challenges of NCASRI and the steps taken to overcome them. It also presented preliminary data from the MTCs (2).
- This **Final NCASRI Report** presents the findings from Elements 2 and 3 (the prospective clinical audit and feasibility study) and makes recommendations for future work.

1.3 Key standards for the audit

Key reference standards and indicators were drawn from several major national standards and guidelines documents published by the Department of Health, NHS England, the British Society of Rehabilitation Medicine (BSRM) and National Institute for Health and Care Excellence (NICE) (see Section 4.4 for details).

Key performance indicators included:

- Process of care, including the identification of patients' rehabilitation needs while in the MTCs.
- Timely assessment and transfer to Level 1 and 2 specialist rehabilitation units.
- Quality of care, including outcomes and cost-efficiency within the specialist rehabilitation services.

As with other clinical audits within the NCAPOP programme, the NCASRI audit included elements of service evaluation. One of the key questions was whether current bed capacity within the specialist rehabilitation services was sufficient to meet demand and, if not, then what additional bed capacity was required to meet the needs of patients with complex rehabilitation needs following major trauma and what types of rehabilitation intervention were required.

1.4 Key findings from the NCASRI audit

1.4.1 Prospective audit

The prospective NCASRI audit was conducted in the 18-month period between July 2016 and December 2017, with recruitment of patients in the MTCs from 1st July 2016 to 31st August 2017.

Within the rehabilitation pathway, the majority of patients have relatively simple (Category C/D) needs that can be met by their local general (Level 3) rehabilitation services. Patients with more complex (Category B needs) may require specialist rehabilitation in a local district (Level 2) service, and a small number of patients with highly complex (Category A needs) may require the specialist skills and facilities of a tertiary (Level 1) rehabilitation service.

Eligible patients were severely injured adults (16+ years with ISS ≥ 9) who required specialist in-patient rehabilitation (Category A or B needs) at the "transfer-ready" point or on discharge from an MTC.

Key objectives were:

- To recruit as many of the eligible patients as possible within the MTCs and to describe and document their rehabilitation needs using the tools within the Specialist Rehabilitation Prescription (SpRP).
- To determine the proportion of eligible patients who were subsequently admitted to a Level 1 or 2 specialist rehabilitation service.
- To examine how well their needs were met and the outcomes from rehabilitation in terms of functional gain and cost-efficiency.

Unfortunately it was beyond the scope of the audit, as commissioned, to determine in detail what happened to those patients who required specialist rehabilitation but did not subsequently receive it. However, we explored the feasibility of obtaining information about alternative pathways of care (i.e. the other forms of inpatient rehabilitation that patients access) from existing NHS datasets such as the Hospital Episode Statistics (HES) and Office for National Statistics (ONS) mortality data.

1.4.11 Major Trauma Centres

The key standards within the MTCs focussed substantially on the process for completion of a Rehabilitation Prescription (RP) and Specialist RP (SpRP) tools to evaluate and describe the rehabilitation needs of patients requiring further inpatient specialist rehabilitation.



NHSE NATIONAL STANDARDS

The standards required that all patients with Injury Severity Scores ≥ 9 should have a standard RP. Those thought likely to have complex needs should be screened using the complex needs checklist (CNC). If this suggested Category A or B needs, they should be seen by a consultant in rehabilitation medicine (RM) who would complete the remainder of the SpRP, which consists of five tools.

Completion rates for the five individual SpRP tools ranged from 39-74%.

Standard RP: We found that recording rates for the standard RP were roughly the same overall in 2014/15 and 2016/17 (89% and 90% respectively) with all centres now achieving over 80%. They were slightly higher for the patients enrolled in NCASRI (96%).

Specialist RP: In the course of the first round it became clear that these standards (and indeed the full dataset) were unworkable due to the lack of RM consultants and time pressures for the clinical team. Completion rates for the five individual SpRP tools ranged from 39-74%. Nevertheless, this has created a rich dataset to characterise the rehabilitation needs of severely injured patients following major trauma.

A core minimum SpRP dataset was agreed for use in any future audit rounds. Data are presented in this report to illustrate the added value of even this minimum dataset to describe the rehabilitation needs of this group, compared with the information available prior to NCASRI.

- The most robust categorisation of rehabilitation need is made using the Patient Categorisation Tool (PCAT). However, the data show that the simpler Complex Needs Checklist (CNC) identified complex needs with reasonable accuracy.
- Conversely, the clinical categorisation of rehabilitation needs within the TARN dataset correctly identified just **38%** of patients who were subsequently confirmed as having Category A/B needs, and incorrectly identified **31%** of them as having Category C/D (25%) or no (6%) rehabilitation needs. In other words, the clinical categorisation alone was incorrect as often as it was correct, and thus not sufficiently accurate for standalone use.

These findings emphasise the importance of using either the CNC or the PCAT to confirm the categorisation of rehabilitation needs for any future rounds of audit – although the CNC is simpler and quicker to complete, and so more likely to be practical for implementation in a busy clinical setting.

1.4.1.2 Recruitment in the MTCs and case ascertainment

Only 16/22 adults MTCs participated in this audit. 4 of the remaining 6 had no RM consultant input.

Only 16 of the 22 MTCs that admit adult trauma patients participated in this first round of NCASRI. Of the six non-participating MTCs, four had no RM consultant input. Because the identification of patients with Category A/B needs relied significantly on RM consultant input, it is likely that eligible patients were significantly under-identified, even within the participating MTCs. To maximise recruitment in this first audit round, we accepted a variety of different criteria for identification of Category A/B needs, including clinical impression.

Of a total of 1468 patients identified as 'eligible' across all 22 MTCs, **1381 had Category A or B Needs** by at least one of the criteria and were thus **recruited for the NCASRI audit** within the participating MTCs. However this was almost certainly an under-estimation of the total number of patients with complex needs.

In light of the challenges to recruitment within the MTCs, data linkage between TARN and UKROC databases was conducted in two directions:

- a. 'Forward selection' identified the number of recruited patients identified in the MTCs as requiring specialist rehabilitation who did and did not receive this.
- b. 'Backward selection' identified the number of patients who received specialist rehabilitation, having been treated within the MTCs during the recruitment period, but who were not recruited in the MTCs (for example because their needs were not recognised or they were treated in a non-participating MTC).

Just 550/1381 (40%) of patients with category A/B identified in the MTCs were admitted to specialist rehabilitation. Only HES data were available for the remainder.

Of the 1381 patients recruited in the participating MTCs, 550 (40%) were admitted for specialist rehabilitation, leaving 831 (60%) in the 'non-rehabilitation' group, for whom only HES data were available regarding their further hospital treatment and outcomes.

However, backward selection identified a total of **1154 patients admitted to specialist rehabilitation** following admission to an MTC, of whom just over half (**56%**) had Category A/B needs identified in the MTCs. The remainder were thought to have Category C/D needs, or had no rehabilitation needs identified in the MTCs. Just over three-quarters (77%) had come from participating MTCs, which is roughly in proportion to their representation ($16/22 = 73\%$) in this audit round.

Recruitment rates varied widely between MTCs – a detailed breakdown by trauma network is given in Section 8 of the report.

1.4.1.3 Timely transfer to rehabilitation



NHSE NATIONAL STANDARDS

The standards require that patients who are thought to have complex needs for rehabilitation should be assessed within 10 days of referral and transferred to specialist rehabilitation within 6 weeks of being fit for transfer.

Within the prospective audit, overall compliance with the standard for waiting time for assessment (< 10 days) was **57%**.

- **86%** of patients were transferred to specialist rehabilitation within 6 weeks of referral.
- **91%** were admitted within 6 weeks of being ready for transfer.

However, these findings require some interpretation. For patients admitted to specialist rehabilitation, the mean time from onset to admission was 70 days (95% CI 58-90) but with outliers stretching more than 6 months for a minority (4%) of patients.

A proportion of this time, however, was taken with stabilising the patients before they were ready for rehabilitation. The mean time from referral to assessment was 6 days, and from assessment to admission 20 days – although the mean waiting time after being **ready for admission** was just 7 days.

There had been a modest improvement in response times since the first year retrospective analysis. The mean waiting time for assessment had reduced from 9 to 6 days and the overall waiting time from referral to admission reduced by 6 days.

1.4.1.4 Functional gain and cost-efficiency



NHSE NATIONAL STANDARDS

The standards required that, by discharge, all patients should have achieved some measurable gain or goal achievement, as measured by UK Functional Assessment Measure (UK FIM+FAM), Northwick Park Dependency Scale (NPDS) or Goal Attainment Scale (GAS) T-score (or other approved measure), or the reason for no gain recorded. Discharge destination should also be recorded.

Key goals for rehabilitation are often (but not always) improved independence in self-care and other activities of daily living. The UK FIM+FAM and NPDS are standardised measures of independent function within the UKROC dataset and GAS is a measure of the attainment of individual goals for rehabilitation. Of 1154 admissions for specialist rehabilitation, a total of 1044 episodes were completed at the time of linkage. Of these, **984 (94%)** showed some 'functional gain' captured by one or more of these measures, and the discharge destination was recorded in 99% across all providers.

There has been substantial improvement in reporting rates for most outcome measures across the individual rehabilitation service providers since Year 1 (see electronic Appendices 5a and 5b).

The mean net life-time savings from rehabilitation amounted to £504,106 per patient, generating a total of £582 million savings from this one-year cohort alone.

- Overall compliance with the standards for reporting cost-efficiency was 74%.
- The mean length of stay was 65 (Standard Deviation (SD) 56) days.
- The mean episode cost was **£39,398** and the mean cost saving was **£536 per week**, so that the mean time taken to offset the cost of rehabilitation by savings in the cost of ongoing care was **17 months**.
- The average age of this sample was 50 years, which means that the population (and society in general) have many years over which to benefit from these cost savings, even though life expectancy is reduced in severely disabled patients.
- Applying the life expectancy algorithm that is now integrated into the UKROC dataset, the mean net life-time savings after deducting for the cost of the rehabilitation programme amounted to £504,106 per patient, which would generate a total saving of £582 million from this small one-year cohort alone.

1.4.2 Implications for bed capacity



CAPACITY TO MEET DEMAND

A key question underpinning the work of NCASRI was whether the existing bed capacity for specialist in-patient rehabilitation was sufficient to meet demand within the patient population with complex rehabilitation needs following major trauma, and if not to estimate the additional bed capacity that would be required.

The total bed occupancy of the 1154 patients who received specialist rehabilitation was **75839 bed days** (equivalent to **218 beds** at 95% bed occupancy).

Approximately 40% of the 1381 recruited patients completed a specialist in-patient rehabilitation programme, suggesting that the existing bed capacity catered for about 40% of patients with Category A/B needs.

Approximately 330 additional specialist rehabilitation beds are needed to meet the shortfall in capacity, but would still generate annual savings of >£500 million.

The total capacity required to meet demand may therefore be estimated at approximately 2.5 times the existing capacity to cater for approximately **2885 patients per year**. This would require a total allocation of approximately **547** Specialist Level 1 and 2 beds in England (i.e. an increased provision of **328 beds**) bringing the total average bed numbers to **8.2 per million population**.

The total cost of this increased capacity would be circa £53m. For this investment to be made, it is necessary to demonstrate significant cost savings arising from rehabilitation. The figures suggest, however, that this one-year cohort alone generated estimated life-time savings of over £582m, so that the annual net cost benefit of investment in these additional rehabilitation beds would still be in excess of £500m. Few other interventions in healthcare have the potential to generate this level of ongoing savings.

1.4.3 The Non-rehabilitation group

The non-rehabilitation group consisted of **831** patients with confirmed complex needs who were not admitted to a Level 1 or Level 2 specialist rehabilitation service.

1.4.3.1 Patients in services that are registered with UKROC but not designated as Level 1 or 2

Out of these 831 patients, **89** were identified as having received rehabilitation in other services registered with UKROC, which include both slow-stream and Level 3 rehabilitation services, as well as newly developed services awaiting signposting and designation as Level 1 or Level 2 services. Data on caseload complexity and functional outcomes are presented for this group in Section 12 of this report.

Some existing rehabilitation units would be eligible for designation as Level 1 or 2 to meet the additional demand for bed capacity.

As with the existing Level 1 and 2 services, these 89 patients made significant functional gains. Some had similar levels of complexity and dependency to those in the designated Level 1 and 2 services, suggesting that there are additional rehabilitation units out there that would be eligible for designation and commissioning as a Level 1 or Level 2 service to help meet the requirement for additional bed capacity. The findings also demonstrate the feasibility of capturing information on caseload complexity and functional outcome in non-designated services, provided that this is collected and reported systematically.

1.4.3.2 Patients identified in HES data

This left **742** patients for whom data were requested from NHS Digital's Data Access and Request Service (DARS). Data were received for **677** surviving patients.

Of these, **420 (62%)** had further inpatient treatment after leaving the MTC. The mean length of stay was about 6 weeks. Unfortunately, it was not possible to extract any meaningful data from HES on either the rehabilitation activity or outcomes for these patients. Approximately **16%** appeared to have had at least one episode within their ongoing spell of treatment where rehabilitation was the 'sole' or 'predominant' reason for admission (it was not possible to say which) but, as no dates were attached to these episodes, neither was it possible to tell how long they remained in the rehabilitation service.

NHS Digital does not currently collate any outcome data for rehabilitation other than discharge destination.

NHS Digital does not currently collate any meaningful outcome data for rehabilitation patients, other than simple discharge destination. A total of 466 (61%) had been discharged home or to temporary accommodation by 6 months after discharge from the MTC. This number had risen to 577 (79%) by the time of data linkage in December 2017, but 10% were still in hospital.

1.5 Challenges addressed during NCASRI

NCASRI is unusual in that it is the first NCAPOP audit to address an area of practice mainly within the specialised services. These high cost/low volume services encompass a very small number of patients with highly diverse needs, managed across an equally diverse range of services. A number of challenges were therefore recognised from the outset that have required the NCASRI team and HQIP to work closely together to overcome. These and the steps taken to address them are described in detail in our **Second NCASRI report**, but included the following:

Challenge	Solutions
The very low starting base of knowledge, data recording and service provision – including a total lack of reliable data collection within existing NHS datasets.	Building on the assets of existing data collection within TARN and UKROC , we added data fields to address the information gaps and then linked these datasets using the NHS number to track patients along their journey from the MTCs to the specialist rehabilitation services.
The absence of an agreed audit dataset , or established data collection tools for rehabilitation following major trauma.	Working closely with the MTC teams , we piloted the SpRP tools to develop a uniquely rich dataset for analysis in the first round, but then agreed a more manageable core minimum dataset for use in future rounds of audit.
The lack of consultants in rehabilitation medicine to support the MTC teams in identification of patients with complex needs.	The data collection procedures were adjusted to accept data completed by any member(s) of the team including doctors, nurses and allied health professionals (AHPs)
The need to engage MTC teams and accept data from a range of different platforms for data entry to minimise data burden.	To support engagement in this first round , we accepted data from several different computer platforms as well as paper versions of the tools. While not sustainable going forward, this inclusive approach enabled us to recruit over twice the anticipated number of patients.
The limited timescale of the programme to support robust data linkage to maximise case ascertainment.	The challenges of the limited timescale were highlighted at an early stage and a bid was prepared to extend the audit to include two rounds of audit , both with the requisite 2-year timescale to capture all patients receiving rehabilitation.
Unable to secure funding for the second-round audit , which has limited the opportunity to take forward and apply the lessons learned from this first round audit.	Through a no-cost extension , we have worked with HQIP to salvage the detailed Round 1 dataset to support further linkage outside of NCASRI programme, to maximise the benefit to patients with complex rehabilitation needs following major trauma.

1.6 Summary and Conclusions

The table below summarises the key findings, conclusions and recommendations. Further details are listed in Section 14.

Provision for specialist hyper-acute and complex musculoskeletal rehabilitation was particularly short.

Findings	
Structure and organisation	
There was poor integration of rehabilitation medicine within many of the MTNs: 45% of MTCs had less than the 2-3 visits per week from a consultant in RM, and 18% had none at all. This has impacted negatively on implementation of the RP and SpRP.	All MTNs, commissioners and MTC service providers should review their processes and referral pathway for rehabilitation following major trauma and ensure that standards for rehabilitation provision and RM consultant involvement in the MTCs are fully met. This should form part of regular review of the service specifications for Major Trauma and Specialist Rehabilitation.
There is a shortage of consultants and specialists in RM trained in the acute rehabilitation needs of major trauma patients.	Workforce planning policies should be reviewed - To develop a sufficient supply of RM consultants. - To consider development of advanced clinical practice and consultant roles for AHP and nursing staff to work alongside them.
There was wide variation in the provision of specialist inpatient rehabilitation – bed numbers ranging from 1-8 per million population. The overall shortfall in bed capacity was estimated at approximately 330 beds. Specialist provision for hyper-acute rehabilitation and for complex musculoskeletal rehabilitation was particularly short.	It is unclear from this single audit what the relationship is between bed provision and outcomes. Further work is required in this area to establish patient-centric and cost effective means of delivering specialist rehabilitation.
Process within the MTCs	
Implementation of the standard RP has continued to develop. The overall completion rate was 90%, ranging from 81-100% across the MTCs. At the outset of NCASRI, however, the RP included only very scant information on rehabilitation needs.	A parallel stream of work to develop the standard RP has led to expansion of its content with some additional fields relating to rehabilitation now a mandated requirement for the enhanced tariff. Further development is required, however, to ensure systematic identification of patients with complex needs.
From the initial data collection of five tools, a minimum SpRP dataset has been developed comprising: - The Complex Needs Checklist (CNC). - The Rehabilitation Complexity Scale (RCS-ET). - The clinical category of rehabilitation need. However, the other tools proved useful for clinical decision-making and, once familiar with them, many clinicians wished to continue to use them.	All patients who have complex needs requiring further specialist in-patient rehabilitation at discharge from the MTC should have this SpRP minimum dataset recorded on TARN. The other SpRP tools (PCAT, NPDS and NIS) should remain available on TARN for optional use by the MTC teams.

Findings	
Within the specialist rehabilitation services	
Response times for assessment and transfer improved slightly in the course of the NCASRI audit. 57% of patients were assessed within 10 days of referral. 91% were transferred within 6 weeks of being ready for transfer. Identification of complex Category A/B needs shortened the overall waiting time by 6 days.	Despite this improvement, these standards still represent a long delay, creating pressure on the acute services. Once the capacity issues outlined above have been addressed (including the development of additional hyper-acute rehabilitation capacity to support early transfer), the standards for response times will require review. Continued comparative data reporting of response times through TARN and UKROC should be provided to support further service improvement.
Reporting of functional gain and cost-efficiency improved during the course of the audit: 94% of complete episodes showed some improvement in independence. 75% recorded cost-efficiency. The mean weekly saving in cost of care was £536, offsetting the cost of rehabilitation in just 17 months. This gave a mean life-time saving of >£500K per patient, generating a total saving of £582 million from this one-year cohort alone	Specialist rehabilitation for patients with complex needs following major trauma is both effective and highly cost efficient for those who receive it. Despite improvements, the reporting of cost-efficiency is still variable across providers and further work is required to ensure consistency in reporting of this important information
Going forward	
This first and only round of NCASRI has generated a rich dataset that describes the rehabilitation needs of patients following major trauma. This level of detail will not be collected again and there are important opportunities to learn from its further analysis and linkage.	HQIP, TARN and UKROC are now working together to transfer the data controllership to TARN and support future applications for permission for future linkage and analysis.

1.7 Future work

This first and only round of NCASRI audit has provided useful information about patients with complex rehabilitation needs and how they are currently managed within the trauma networks.

Some modest improvements in practice have been made during the short time-frame of this audit as outlined above, but there is still a great deal to be done.

Patients who get to specialist rehabilitation do well, but a large number with similar needs miss out on this service.

The results presented in this report demonstrate that we do not serve the needs of this complex and vulnerable group of patients particularly well. Those who actually get to specialist rehabilitation make good functional gains within their potential capability, but there is a large cohort of patients with similar needs who miss out on this service. Some of these patients may improve spontaneously and make the transition home without this specialist treatment, but others do not. Apart from having a somewhat better idea of the numbers that fall into each category, and their needs at discharge from the MTC, we still know very little about what happens to those patients who do not receive rehabilitation.

As the programme is not continuing it is not possible to define any clear future work programme as part of NCASRI. However, there are still some important opportunities to embed the lessons into routine clinical practice for future evaluation to improve the quality of services offered to patients with complex needs for rehabilitation, which is outlined in Section 13 of this report.