National Clinical Audit of Specialist Rehabilitation following major Injury (NCASRI)

Preliminary analysis of TARN data from the Major Trauma Centres

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Background

The National Clinical Audit for Specialist Rehabilitation following major Injury (NCASRI) has been set up to determine the scope, provision, accessibility, outcomes and efficiency of specialist rehabilitation services across England to improve the quality of care for adults with complex rehabilitation needs following major trauma.

NCASRI aims to enrol all adult patients in England who require specialist inpatient rehabilitation to maximise their recovery from severe injury following acute treatment in a major trauma centre (MTC).

- Eligible patents are severely injured adults (16+ years with ISS ≥9) who have complex (category A or B) needs requiring further specialist in-patient rehabilitation at discharge from an MTC.
- We wish to determine the proportion of eligible patients who are subsequently admitted to a Level 1 or 2 specialist rehabilitation service. We will examine how well their needs are met and the outcomes from rehabilitation in terms of functional gain and cost-efficiency.

A key question has been how to identify patients with complex needs in a systematic way that is feasible to implement in routine practice in the MTCs.

Initially it was envisaged that patients with complex rehabilitation needs would be reviewed by a consultant in rehabilitation medicine (CRM), as per the NHSE Service Specification for Major Trauma (1), who would confirm their category of need and expedite their referral and transfer to an appropriate specialist rehabilitation service.

However, the NCASRI first year report (2) revealed a lack of CRM input into many of the MTCs (some having no input at all), which poses a risk for the success of the audit. We therefore need to explore alternative approaches to the identification of patients with complex rehabilitation needs.

The Rehabilitation Prescription and data recording

The NHSE service specification for Major Trauma mandates collection of a 'Rehabilitation Prescription' (RP) for patients who have ongoing rehabilitation needs following discharge from the MTCs (1). At present this requires only the completion of four mandatory tick boxes on the Trauma Audit and Research Network (TARN) database, confirming the presence of physical, cognitive and/or psychosocial needs, and whether the patient had an RP.

Work is progressing in parallel to the NCASRI audit to develop the RP to provide a more detailed description of the patients requirements and recommendations. It is anticipated that data from the NCASRI project will help to inform that development.

For patients with highly complex needs requiring further inpatient rehabilitation in a Level 1 or 2 specialist unit, the BSRM Core Standards for Specialist Rehabilitation following Major Trauma (3) recommended completion of a Specialist Rehabilitation Prescription (SpRP). This does not replace the RP, but builds on it through the addition of four validated standardised tools to identify patients with complex needs and to describe and justify the requirement for specialist rehabilitation. These are:

1. The Neurological Impairment Set for Trauma **(NIS-Trauma)** details the type and severity of impairment,
2. The Patient Categorisation Tool **(PCAT)** details the types and complexity of rehabilitation need
3. The Rehabilitation Complexity Scale **(RCS-ET)** describes and quantifies the rehabilitation resource requirements for medical, nursing and therapy inputs
4. The Northwick Park Dependency Score and Care Needs Assessment **(NPDS/NPCNA)** details nursing and care needs and ongoing estimated the costs of care in the community.

However, the BSRM core standards also recommends a simple Complex Needs Checklist **(CNC)** for completion by the MTC team as triage tool to help decide who to refer on for specialist rehabilitation. MTC teams are also asked to record their clinical impression of whether a patient has category A, B, C or D needs for rehabilitation.

Utility

It was originally anticipated that the MTC teams would use the CNC and RCS-ET to identify patients likely to have complex rehabilitation needs, who would then be assessed by a consultant in RM. If category A or B needs were confirmed (using the PCAT), they would then complete the other tools in the SpRP (the NIS-T, and NPDS) and expedite referral to a Level 1 or 2 specialist rehabilitation service (see **Appendix 1**).

Feedback from the MTC teams in the first few months of the NCASRI prospective audit has demonstrated that the therapy teams are generally comfortable with completing the CNC and the RCS-ET. They find these tools easy to use and relevant to decision-making – indeed one MTC is using it for all categories of rehabilitation need (including C and D) within 72 hours of admission

However, many units are struggling to complete the PCAT, NIS and NPDS, especially where there is little CRM input, but we do have some cases in which all five tools have been used in parallel.

The purpose of this analysis to explore the rates of completion for the various tools and to determine whether the CNC and RCS-ET could provide sufficient information alone to identify patient's rehabilitation needs, and could usefully be incorporated as core tools into the standard RP going forward.

Key questions were:

1. What numbers of each of the five tools are currently recorded across the various units?
2. Who records them – consultants in RM or Allied health professionals?
3. Can the CNC reliably identify patients with category A and B needs
4. What is the relationship between:
    a. the complexity of need (as measured by the CNC and PCAT),
    b. the resource requirements (as measured by the RCS-ET)
    c. the level of impairment (as measured by the NIS-trauma)
    d. dependency on needs for care as measured by the NPDS (to be added when data available)

Methods

Setting

The survey in Element 1 revealed wide variation in the implementation of rehabilitation prescriptions and the methods used to collect and collate data within the MTCs. In order to maximise response rates NCASRI supports data collection using a range of methods including:

- Electronic data collection using the TARN database
- Electronic data collection using the Integrated Rehabilitation Management Application (IRMA/Orion)
- Electronic data collection using the UKROC software
- Paper forms which are then entered into the UKROC database by the NCASRI staff.

This was a retrospective analysis of data collected on TARN database. Data were extracted for all patients recruited to the NCASRI audit between July 2016 and March 2017 (9 months data).

Anonymised data were received in Excel format from TARN. Descriptive and statistical analyses were carried out using SpSS v22.

Results

Of a total of 22 MTCs in England, 14 are currently submitting data to the NCASRI audit, of which 10 MTCs are submitting their data through TARN. These are listed in Table 1:

Table 1: Contributing MTCs and recruitment starting dates

MTC	MTN	CRM sessions	Start date
Hull Royal Infirmary	North Yorkshire and Humberside	0	July 2016
James Cook University Hospital	Northern – Middlesborough & South	0 (vacant)	July 2016
Nottingham University Hospital	East Midlands	4	July 2016
Queen Elizabeth Hospital, Birmingham	Birmingham BC, Hereford an Worcs	10	Sept 2016
Royal Victoria Infirmary, Newcastle	Northern –North East and Cumbria	3	July 2016
Sheffield Teaching Hospitals	South Yorkshire	10	Oct 2016
Southampton University Hospital	Wessex	1	Dec 2016
Southmead Hospital, Bristol	Severn	10 (started Sept16)	July 2016
University Hospital of Coventry & Warwickshire	Central England	5	Sept 2016
Walton Centre for Neurology, Liverpool	Cheshire and Merseyside	0	Feb 2017

Tables 2 and 3 summarise the number of each of the five tools complete by each unit and by whom.

A total of **938 patients** had at least one of the five NCASRI tools completed at discharge from the MTC.

- One unit collected data on patients with all categories of rehabilitation need (A, B, C and D) using the CNC and RCS-ET[1]. They collected data for 719 patients, 136 of which were categorised as A or B
- The remaining nine units, collected data for patients with category A or B needs only.
  - The total number of episodes ranged from 1-48 per MTC (Mean 24)
  - Approximately a quarter (26%) where thought to have category A or B needs.

Table 2: The number of tools completed by each of the MTC

	Total	Clinical categorisation				Core tools		Specialist RP tools		
Stage	Episodes	A/B	C /D	Missing	% A/B	CNC	RCS - ET	PCAT	NPDS	NIS-T
Hull	31	7	2	22	23%	9	20	-	-	-
Middlesborough	10	8	2	2	67%	8	8	8	8	10
Nottingham	27	27	0	0	100%	27	27	27	27	27
Birmingham	48	-	-	48	-	-	46	44	41	33
Newcastle	19	-	-	19	-	-	16	18	19	19
Sheffield	1	-	-	1	-	-	-	1	-	-
Southampton	40	36	-	4	90%	35	33	19	15	15
Bristol	719	136	334	249	19%	498	693	-	-	-
Coventry	33	33	0	0	100%	33	33	32	33	33
Liverpool	10	9	-	1	90%	9	10	-	-	-
Total	**938**	**256**	**338**	**379**	**26%**	**619**	**886**	**149**	**143**	**137**
Total Excl Bristol	**219**				**55%**	121	193	149	143	137
						55%	**88%**	**68%**	**65%**	**63%**

[1] In this unit, CNC data were collected at 72 hrs after admission, rather than at discharge and although the PCAT was not formally recorded item by item, it was used to inform categorisation of needs at discharge from the MTC.

Table 3: The proportion of tools completed by MTC teams and by consultants in RM

	All		Excluding Bristol	
Tool	Therapists/ Nurses	CRM or deputy	Therapists/ Nurses	CRM or deputy
Complex Needs checklist (CNC)	**81%**	18%	**65%**	34%
Rehabilitation Complexity Scale (RCSE-ET)	**79%**	18%	**69%**	26%
Patient Categorisation tool (PCAT)	**54%**	44%		
Northwick Park Dependency Scale (NPDS)	**71%**	21%		
Neurological Impairment Scale – (NIS-T)	**42%**	52%		

Therapy and nursing staff completed the majority of CNCs and RCS-ETs (as expected), but also approximately half of the PCAT and NIS-T scores.

Table 4 shows the number of patients with complex needs according to the mandatory tick boxes recorded on TARN. The CNC provides some further sub-types within each of the three TARN types of 'complex needs'.

- 44% had complex physical needs of which the commonest were a requirement for complex neurological or musculoskeletal rehabilitation
- 25% had complex cognitive or emotional needs, including cognitive assessment and mood evaluation
- 21% had complex psychosocial needs, including complex discharge planning or major family support

Table 4: The number of patients with complex needs according to the three TARN categories and the subcategories

	Rehabilitation Prescription types of complex needs	N=	%
Type	**Complex physical needs**	**412**	**44%**
Sub-types	Complex amputee rehabilitation needs	6	1%
	Complex musculoskeletal management	144	15%
	Complex neuro-rehabilitation	149	16%
	Complex pain rehabilitation	39	4%
	Profound disability / neuropalliative rehabilitation	5	<1%
	Re-conditioning / cardiopulmonary rehab	66	7%
Type	**Complex cognitive / emotional needs**	**236**	**25%**
Sub-types	Challenging behaviour management	6	1%
	Cognitive assessment/management	73	8%
	Complex communication support	19	2%
	Complex mood evaluation / support	101	11%
	Evaluation of low awareness state	35	4%
Type	**Complex psychosocial needs**	**194**	**21%**
Sub-types	Complex discharge planning	94	10%
	Emotional load on staff	7	1%
	Major family distress / support	91	10%

NB - The NASRI audit provides potentially useful additional detail on the types of needs under each heading, At the time of the provisional data analysis we only analysed one category selected under each heading. In future, all categories selected will be included in the analysis to enable more detailed information.

Identification of category A and B needs

A total of 84 cases had separate assessments of the category of need, based on both:

- a CNC completed by the MTCs
- a PCAT completed by a Consultant in RM (or deputy).

Table 5 shows the agreement between the CNC and the PCAT in the identification of category A and B needs.

Overall there was 96% agreement. The CNC assessment identified category A needs (as confirmed by the PCAT) with a sensitivity of 98% and specificity of 91%, confirming that the CNC alone provided a useful basis for the accurate identification of patients with category A and B needs.

Table 5: Agreement between the CNC and PCAT in the identification of category A and B needs

	PCAT Category A	**PCAT** Category B	**Total**	**Predictive value**
CNC Category A	60	2	62	Positive 97%
CNC Category B	1	21	22	Negative 95%
Total	61	33	84	
	Sensitivity 98%	**Specificity** 91%		

Table 6 gives a breakdown of the frequency of the six principal items in the CNC checked to indicate a requirement for further inpatient rehabilitation. The commonest requirements were for:

- Ongoing specialist medical/psychiatric intervention (60%)
- Coordinated inter-disciplinary input (45%)
- Longer stay in rehabilitation - 3 months of more (44%)
- Specialist rehabilitation facilities (26%)

Table 6: Frequency of items ticked on the checklist of complex needs

Item	Description	No. checked	% within item	% of whole
1	**Specialist rehab medical (RM) or neuropsychiatric needs**	**439**		**71%**
Details	Complex / unstable medical/surgical condition	42	10%	7%
	Complex psychiatric needs	8	2%	1%
	On-going specialist investigation/ intervention	373	85%	60%
	Risk management or treatment under section of the MHA	8	2%	1%
2	**Specialist rehabilitation environment**	**471**		**76%**
Details	Co-ordinated inter-disciplinary input	277	59%	45%
	Highly specialist therapy /rehab nursing skills	57	12%	9%
	Structured 24 hour rehabilitation environment	126	27%	20%
3	**High intensity**	**358**		**58%**
Details	1:1 supervision	26	7%	4%
	4 or more therapy disciplines required	24	7%	4%
	High intensive programme (>20 hours per week)	26	7%	4%
	Length of rehabilitation 3 months or more	273	76%	44%

4	**Specialist Vocational Rehabilitation**	**200**		**32%**
Details	Complex support for other roles (eg single parenting)	10	5%	2%
	Multi-agency vocational support (for return to work/etc)	88	44%	14%
	Specialist vocational assessment	97	49%	16%
5	**Medico-legal issues**	**132**		**32%**
Details	Complex Best interests decisions	23	17%	4%
	Complex mental capacity / consent issues	38	29%	6%
	DoLs / PoVA applications	38	29%	6%
	Litigation issues	28	21%	5%
6	**Specialist facilities and equipment**	**213**		**32%**
Details	Customised / bespoke personal equipment needs	46	22%	7%
	Specialist rehabilitation facilities	158	74%	26%

Once again, only one category of detail was available for analysis per patient. In future, all categories will be included to allow multiple analysis

Table 7 shows a breakdown of the percentage of each of the six principal CNC items ticked in patients with each category of need. As expected the proportions are highest in patients with category A and B needs. Nevertheless it is notable that a smaller number of patients with category C or D needs also have requirements under one of more principal item of the checklist, which require further exploration.

Table 7: Breakdown of the percentage of each principal CNC item ticked for patients within each category of need

CNC Item	Item Description	Category A	Category B	Category C/D	Not specified
Total number of patients in each category (N=630)		**136**	**120**	**336**	**38**
1	Specialist rehab medical or neuropsychiatric needs	85%	78%	34%	34%
2	Specialist rehabilitation environment	97%	82%	65%	50%
3	High intensity	94%	69%	40%	32%
4	Specialist Vocational Rehabilitation	56%	38%	21%	16%
5	Medico-legal issues	60%	23%	5%	66%
6	Specialist facilities and equipment	61%	43%	23%	66%

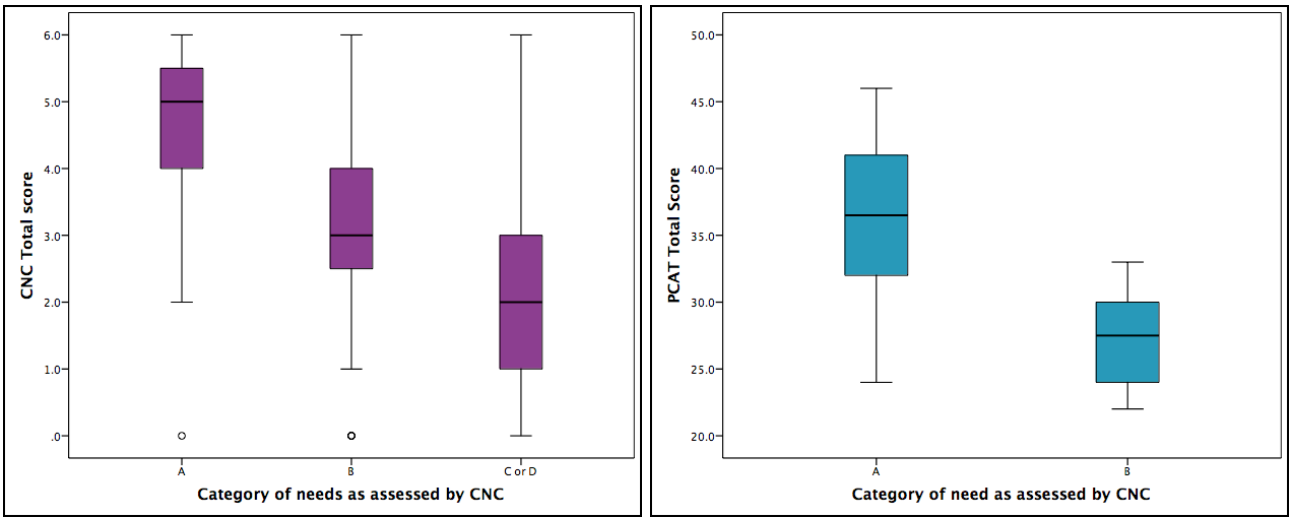
Scaling of the CNC

As the CNC is not a numerical tool, the sensitivity analysis above still relied on the judgement of the MTC or CRM staff to interpret the findings and derive a clinical categorisation of needs. However, we were interested to examine whether the checklist could be summed into an ordinal scale and, if so, to describe the relationship between the ordinal CNC and the PCAT tools.

Allocating scores of 'Yes'=1 and 'No'=0 to each of the six principal items created a CNC Total score with range 0-6 – the total score being higher when more of the items are chosen

Figure 1 and Table 8 summarise the distribution of total ordinal CNC and PCAT scores within the different categories of rehabilitation need. They suggest that the CNC total score may provide a basic ordinal level scale.

Figure 1: Boxplots of the total 6-item CNC and PCAT Total scores in relation to the category of needs



NB These data and the analysis on page 8 should be interpreted with some caution as the majority of the CNC data come from Bristol where the CNC was recorded at 72 hours and the Categorisation of need at discharge.

Table 8: The median and interquartile ranges for each of the needs categories as identified by the total CNC and PCAT score

		Total scores	
Category of need		**CNC**	**PCAT**
A	**Median (IQR)**	5 (4-6)	3 (32-41)
	n=	135	62
B	**Median (IQR)**	3 (2-4)	28 (24-30)
	n=	120	22
C	**Median (IQR)**	2 (1-3)	
	n=	335	-
	Total N	**590**	**84**

Statistical testing

Mann Whitney tests were used to determine whether there were significant differences in the CNC and PCAT scores between the different categories of need. They demonstrated statistically significant differences between all categories for both tools as follows:

- **CNC:** Between Category **A** (n=135) and **B** (n=120): **z-7.2, p<0.001**
- **CNC:** Between Category **B** (n=120) and **C** (n=335): **z-7.7, p<0.001**
- **PCAT:** Between Category **A** (n=62) and **B** (n=22): **z -5.9, p<0.001**

(The lower statistical strength for the PCAT reflects the smaller number)

Receiver operating characteristic (ROC) curves are graphical plots to determine the sensitivity and specificity of a tool as a binary classifier for identifying a given characteristic (in this case category A needs).

- The area under the ROC curve was 0.85 for the CNC Total score and 0.93 for the PCAT (indicating good and excellent accuracy respectively).
- Optimal cut- off scores for identifying patients with category A needs were '>=4' for the CNC Total score and '>=31' for the PCAT Total score.

Sensitivity analyses are shown in Table 9. Although a PCAT score of >=31 provided a more accurate identification of patients with category A and B needs, a CNC Total score of >=4 still identified category A patients with 83% sensitivity and with 66% positive predictive value, which is a very creditable performance in relation to many other simple clinical scales.

Table 9: Sensitivity analyses for identification of patients with category A needs

	CNC Category A	CNC Category B	Total	Predictive value
CNC Total score >=4	112	58	170	Positive 66%
CNC Total score <=3	23	62	85	Negative 73%
TOTAL	135	120	255	
	Sensitivity 83%	**Specificity** 52%		
PCAT >=31	54	2	56	Positive 96%
PCAT <=30	8	20	28	Negative 71%
TOTAL	62	22	84	
	Sensitivity 87%	**Specificity** 91%		

Relationship between the measures

Table 10 shows the correlations between the various measures. All were significant at p<0.001. As expected the strongest correlation was seen between the PCAT and the CNC, which are designed to measure the same construct (complexity of need). But there were also moderate positive correlations between these two tools and the NIS-T (severity of impairment) and the RCS-ET (resource requirements).

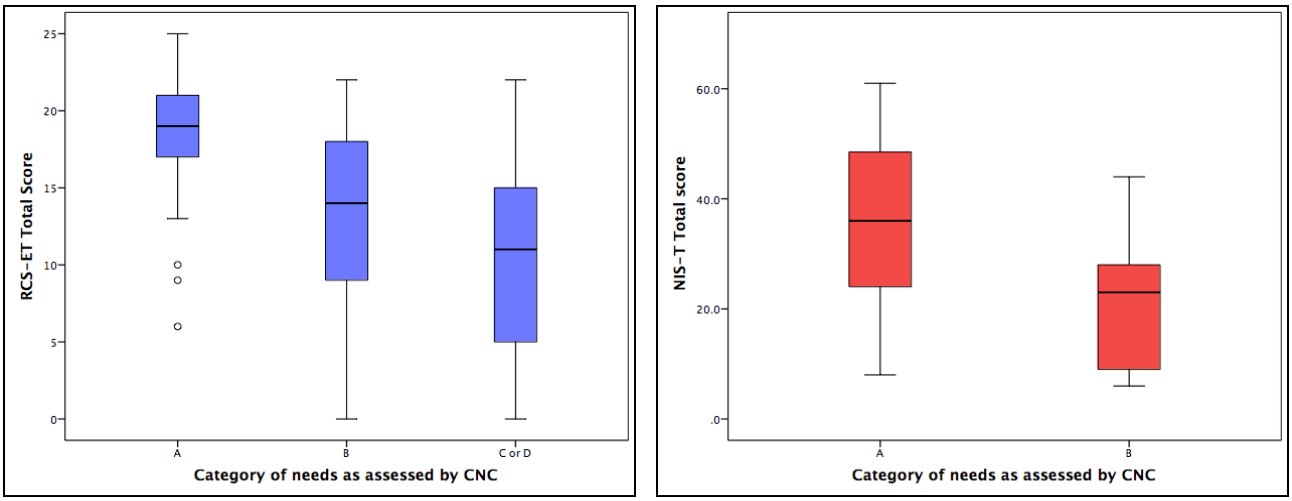
Table 10: Spearman rank correlations between the various measures

Total Scores	RCS-ET	PCAT	NIS-T	NPDS
CNC **n=**	**0.469** 589	**0.738** 84	**0.466** 82	To be added
RCS-ET n=		**0.590** 143	**0.532** 130	To be added
PCAT n=			**0.594** 130	To be added
NIS-T n=				To be added

All correlations were significant at p<0.001

Figure 2 shows the distribution of RCS-ET and NIS-T total scores within the different categories of rehabilitation needs.

Figure 2 Boxplots of the RCS-ET and NIS-T total scores in relation to the category of needs



Mann Whitney tests show statistically significant differences between all categories for both tools as follows:

- **RCS-ET:** Between Category **A** (n=124) and **B** (n=112): **z-7.7, p<0.001**
- **RCS-ET:** Between Category **B** (n=112) and **C** (n=236): **z-4.8, p<0.001**
- **NIS-T:** Between Category **A** (n=63) and **B** (n=19): **z -4.0, p<0.001**

Exceptional reporting

As noted above, one MTC (Bristol) has reported many more cases than the other units put together by 4-6 fold. But also the timing of data recording is also atypical in that unit, the CNC being recorded at 72 hours and the Categorisation of need at discharge. Therefore it is difficult to make any meaningful comparison with other services.

Suffice to say, however that, Bristol is one of the few units to have recorded data systematically for all levels of need A-D). Approximately one third of their reported cases (n=136) were identified as having category A or B needs at discharge, while two-thirds (n=333) had category C or D needs. We are told that this categorisation is based on the PCAT tool, but unfortunately the details are not recorded, so it is not possible to determine whether Bristol has a similar threshold for identifying category A and B needs to other services.

We have not yet presented data on the proportion of admissions to other MTCs are categorised as A or B, but the much lower rates of data cording suggest that the figure may be around 5-10%. These figures could suggest either that systematic categorisation of rehabilitation needs at discharge leads to the identification of more patients with category A and B needs, or that Bristol has a lower threshold for identifying these needs. Unfortunately in the absence of comparable data it is not possible to know which of these explanations is the more likely.

Resource requirements – data from the RCS-ET

The Rehabilitation Complexity Scale (RCS-ET) measures resource requirements in terms of medical, nursing and therapy inputs. The Medical score (RCS-M) can be used to identify the R point at which the patient is ready to leave the MTC and transfer to a trauma unit (RCS-M score=5) or a rehabilitation unit (RCS-M <=4). It also provides a description of the resource needs that can be used to plan rehabilitation inputs as shown in Table 11. As expected category A patients had substantial needs for these clinical inputs.

Table 11: The frequency of RCS scores across the different categories of need

Score	Description	Category A	Category B	Category C/D	ALL
RCS-Medical scores – Medical environment		**N=136 %**	**N=120 %**	**N=336 %**	**N=938 %**
0	No medical needs	1	12	28	20
1	Low level monitoring only	2	17	15	15
2	Active investigation or treatment	10	8	4	7
3	Medically unstable – emergency out of hours are available	8	9	6	6
4	Medically / surgically unwell - emergency out of hours treatment	7	8	13	13
5	Requires on-going care in a trauma unit setting	14	21	24	19
6	Requires full medical facilities of an MTC	58	26	11	20
RCS-Care scores – Care needs					
0	No care needs	8	7	3	5
1	1 carer for most tasks	4	3	13	9
2	2 carers for most tasks	33	28	44	32
3	>= 3 carers or high risk	12	41	34	35
4	1: 1 care	43	8	3	5
RCS-Nursing scores – special nursing needs					
0	No special nursing needs	2	7	21	15
1	Care from a qualified nurse	2	9	29	25
2	Care from a rehabilitation nurse	15	21	10	13
3	Specialist nursing care (tracheostomy, behavioural)	30	13	22	22
4	High acuity nursing setting (eg HDU)	42	24	15	20
RCS-TD scores – No. of therapy disciplines					
0	No therapy required	0	3	11	7
1	1 therapy discipline only	0	8	23	15
2	2-3 therapy disciplines	24	51	50	45
3	4-5 therapy disciplines	40	28	12	21
4	>=6 therapy disciplines	28	5	1	7
RCS-TI scores – Intensity of therapy input					
0	No therapy required	0	3	11	7
1	Low level – less than daily – or group therapy only	0	12	25	18
2	Daily intervention with one therapist at a time	30	52	36	41
3	Daily plus assistant / additional group sessions	45	33	28	29
4	Highly intensive – 2 trained therapists to treat	26	1	1	5
RCS-E Equipment needs					
0	No equipment required	10	20	19	19
1	Basic off the shelf equipment only	42	65	74	64
2	Specialist equipment - customised	38	13	6	15
3	Highly specialist equipment only available in MTC	9	2	1	3

Summary of findings and recommendations

This preliminary analysis of the NCASRI recruitment data entered into TARN to date confirms considerable variation between MTCs both in the approach to identifying patents with complex rehabilitation needs and in the number of patients reported, which was not unexpected given the variation in baseline resources.

Generally the teams report that the CNC and RCS-ET are easy to use and relevant to decision-making, but the detailed SpRP tools have been more challenging to collect and hence this analysis has explored both reporting practice and what the tools actually tell us.

Of the nine MTCs that are recruiting patients regularly for NCASRI, six collected the SpRP tools for at least a proportion of their patients. Three MTCs with only sporadic input from consultants in CM at the time of data collection have recorded only the CNC and RCS-ET. However, in clinical practice, even when a CRM attends regularly, the PCAT tool is often completed by the MTC allied health professionals, rather than the CRM.

One MTC (Bristol) has helpfully collected the CNC and RCS-ET for all patients with on-going rehabilitation needs (including category C or D). Although they were not able to collect the SpRP tools, this expanded dataset has provided some very useful information about these patients with lower categories of need.

We also noted that Bristol reports some 4-6 times more patients with category A or B needs than any of other MTCs. In the absence of full PCAT scores we do not know why this is, but one explanation would be that the other MTCs may not be identifying all the patients with rehabilitation needs - probably due to the burden of data collection. This emphasises the need for a much simpler approach going forward as well as for a consistent approach to data collection.

In the 84 episodes for which both a CNC and PCAT were recorded, there was excellent agreement in the categorisation of needs. The findings suggest the CNC applied by MTC Teams can identify patients with complex needs with very acceptable accuracy. Even though it was designed primarily to provide descriptive data to inform clinical decision-making, it also performs well as a simple numerical tool.

The RCS-ET complements the CNC by providing a measure of the resource requirements in terms of medical, therapy and nursing input. It offers the opportunity to identify the 'R-point' (the point at which the patient is medically fit for transfer to rehabilitation). It can also potentially be used to calculate staffing requirements.

Suggested recommendations going forward for NCASRI and the standard Rehabilitation Prescription

Learning from this preliminary analysis, we suggest the following proposals:

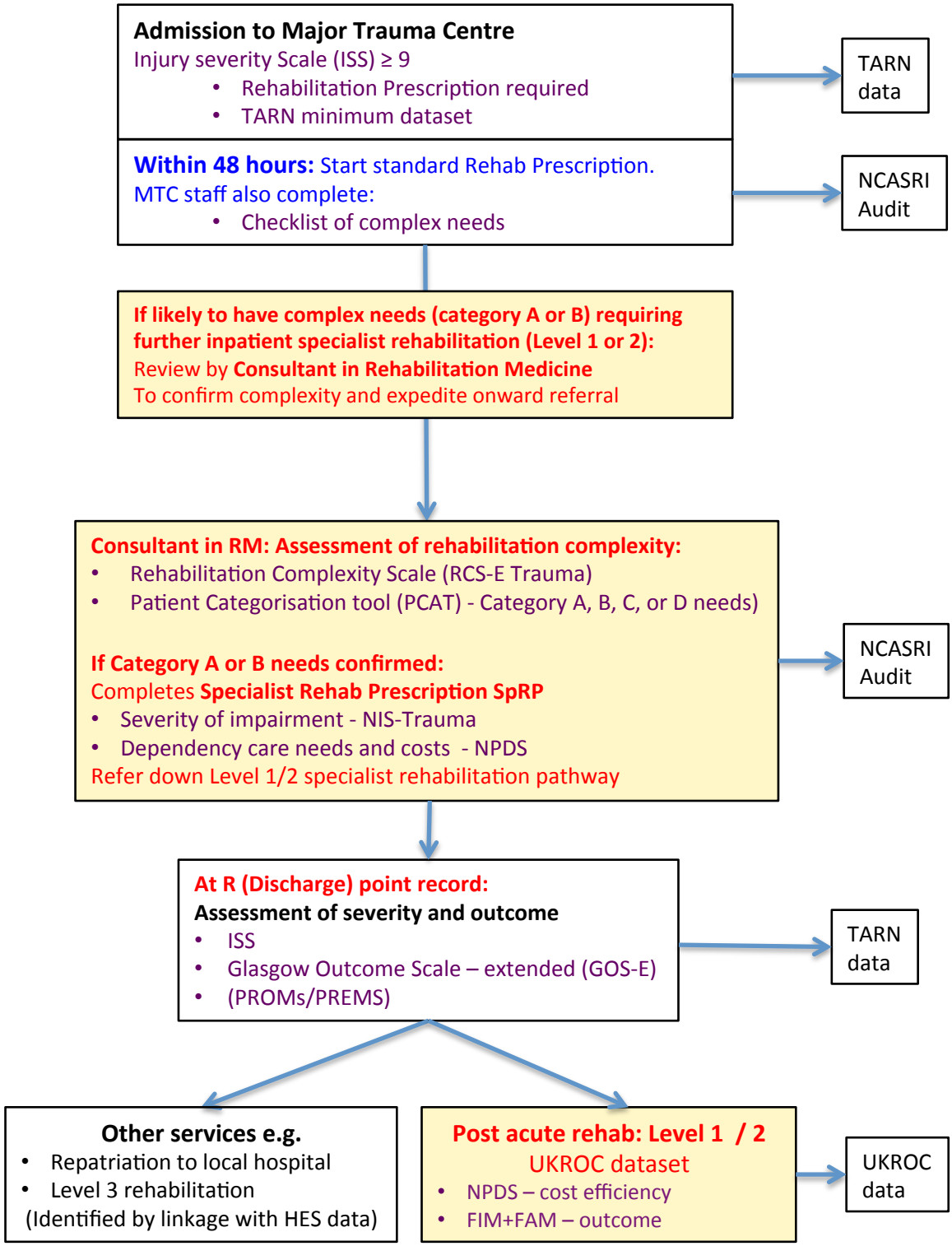
1. That the CNC and RCS-ET should be incorporated as core data within the standard RP for mandatory collection in patients who still require rehabilitation at any level on discharge from the MTC (see data collection form in Appendix 2).
2. That, for future cycles of NCASRI, the CNC should form the basis for identifying patients with category A and B needs, the other SpRP tools continuing to be available as an option within TARN
    a. The PCAT remains the gold standard and we encourage its continued use for detailing complex needs – and to improve our understanding of complex non-neurological needs
    b. The NIS-T and NPDS could be incorporated as an optional part of the standard RP, their use being promoted in patients with category A or B needs for standardised assessment of impairment and dependency (replacing the non-standardised elements in many locally-develop RPs that currently relate to these areas of assessment).

References

1. NHS Standard contract for Major Trauma Service (all ages). London: NHSE; 2013.
2. National Clinical Audit of Specialist Rehabilitation following Major Injury. First year report. 2016
3. Specialist Rehabilitation in the Trauma pathway: BSRM core standards. British Society of Rehabilitation Medicine London: 2013.
4. NHS Standard contract for Specialist Rehabilitation for Patients with Highly Complex Needs (all ages). London: NHSE; 2013.

Appendix 1: Data collection scheme for NCASRI

Figure A1 summarises the patient pathway and data collection according to the standards as originally proposed in the BSRM Core Standards for Rehabilitation following Major Trauma



The NCASRI audit builds on the existing mandated data collection within the TARN and UKROC datasets, but adds a limited set of tools to identify and describe patients with complex rehabilitation needs in the MTCs.

This data collection is operationalised within the actual patient pathway for NCASRI in brief:

- Patients admitted to the MTCs with severe injury (Injury Severity Score ISS ≥9) require a Rehabilitation Prescription (RP) which is recorded on TARN as part of the minimum dataset to receive Best Practice Tariff as a major trauma centre
- The RP should be commenced within the first 48 hours, but it is often completed once the rehabilitation needs of the patient has been assessed and defined to enable referrals to appropriate rehabilitation units
- MTC staff complete the Complex Needs (CN) Checklist and the Rehabilitation Complexity Scale for Trauma (RCS-ET) for patients whom they consider to have complex rehabilitation needs.
- If the CN checklist indicates that the patient is likely to have category A or B needs, then they request that the patient is assessed by a Consultant in Rehabilitation Medicine (RM).
- The Consultant in RM (or designated deputy) uses the Patient Categorisation Tool (PCAT) to confirm whether or not the patient has complex needs requiring further in-patient rehabilitation in a Level 1 (category A needs) or Level 2 (category B needs) specialist rehabilitation unit.
- Subsequently the rest of the specialist rehabilitation prescription (SpRP) is completed for patients with category A or B needs. It describes and quantifies their impairments, level of dependency and their types of need for rehabilitation their requirements for medical nursing and therapy input, which are collected using validated standardised tools:
    - The Neurological Impairment Set for Trauma (NIS-Trauma) details the severity of impairment,
    - The Northwick Park Dependency Score and Care needs assessment (NPDS/NPCNA) details nursing and care needs and ongoing costs of care in the community
- At the end of the patient's acute care episode, they should ideally either be transferred to rehabilitation, discharged home. In practice, they are frequently repatriated to their local hospital or TU to relieve pressure on MTC beds whilst they wait to be admitted for inpatient rehabilitation.
- Patients who are subsequently admitted to a specialist Level 1 or 2 rehabilitation service have the UKROC dataset completed on admission and discharge, which is a commissioning requirement for these services. This includes evaluation of their outcome from rehabilitation in terms of change in their levels of functional independence and reduction in the ongoing costs of caring for them in the community (measured using the UK Functional Assessment Measure (UK FIM+FAM) and NPDS/NPCNA) respectively. Cost efficiency is measured in terms of the time taken for savings in going care to offset the cost of the rehabilitation episode.

Appendix 2: Proposed data for inclusion in the standard RP going forward

Screening checklist for patient categorisation – all Levels

Pt Name:	NHS Number	DOB:	ISS:

TARN Minimum dataset	**On-going Trauma Care requirements:**	
Rehabilitation Prescription ❒ Required ❒ Not required **Presence factors affecting activities/participation** ❒ Physical ❒ Cognitive / mood ❒ Psycho-social	❒ Orthopaedic / trauma ❒ Neurology / neurosurgery ❒ Vascular ❒ Abdominal ❒ Cardiothoracic ❒ Urology	❒ Plastics ❒ Burns ❒ ENT ❒ Max-fax ❒ Other……

Does the patient have COMPLEX clinical needs?		
Complex Physical eg	**Complex Cognitive / Mood** eg	**Complex Psychosocial** eg
❒ Complex musculoskeletal management ❒ Complex neuro-rehabilitation ❒ Complex amputee rehabilitation needs ❒ Re-conditioning / cardiopulmonary rehab ❒ Complex pain rehabilitation ❒ Profound disability / neuropalliative rehabilitation	❒ Complex communication support ❒ Cognitive assessment/management ❒ Complex mood evaluation / support ❒ Challenging Behaviour management ❒ Evaluation of Low Awareness state	❒ Complex discharge planning eg ○ Housing / placement issues ○ Major financial issues ○ Uncertain immigration status ❒ Major family distress / support ❒ Emotional load on staff

Checklist of needs that are likely to require specialist rehabilitation (tick any that apply) **(Examples)**		**Specialist needs?**
Specialist rehab medical (RM) or neuropsychiatric needs	❒ On-going specialist investigation/ intervention ❒ Complex / unstable medical/surgical condition ❒ Complex psychiatric needs ❒ Risk management or Treatment under section of the MHA	❒ Yes ❒ No
Specialist rehabilitation environment	❒ Co-ordinated inter-disciplinary input ❒ Structured 24 hour rehabilitation environment ❒ Highly specialist therapy /rehab nursing skills	❒ Yes ❒ No
High intensity	❒ 1:1 supervision ❒ ≥4 therapy disciplines required ❒ High intensive programme (>20 hours per week) ❒ Length of of rehabilitation ≥ 3 months	❒ Yes ❒ No
Specialist Vocational Rehab	❒ Specialist vocational assessment ❒ Multi-agency vocational support (for return to work /re-training /work withdrawal) ❒ Complex support for other roles (eg single parenting)	❒ Yes ❒ No
Medico-legal issues	❒ Complex mental capacity / consent issues ❒ Complex Best interests decisions ❒ DoLs / PoVA applications ❒ Litigation issues	❒ Yes ❒ No
Specialist facilities / equipment needs	❒ Customised / bespoke personal equipment needs (eg Electronic assistance technology, communication aid, customised seating, bespoke prosthetics/orthotics) ❒ Specialist rehabilitation facilities (eg treadmill training, computers, FES, Hydrotherapy etc)	❒ Yes ❒ No

Provisional Categorisation of Rehabilitation Needs	
❒ **Category A** (requiring Level 1 or 2a Rehabilitation) ❒ **Category B** (requiring Level 2 Rehabilitation) ❒ **Category C or D** (requiring RR&R pathway)	**If probable category A or B needs,** refer for specialist rehabilitation review: **Referred** Yes / No Date……/……./…….. **Reviewed** Yes / No Date……/……./……..

Rehabilitation Complexity Score (RCS-E Trauma)						
Care / Risk	**Nursing**	**Medical**	**Therapy-Disciplines**	**Therapy-Intensity**	**Equipment**	**Total Score (0-25)**
0 1 2 3 4 / 0 1 2 3 4	0 1 2 3 4	0 1 2 3 4 5 6	0 1 2 3 4	0 1 2 3 4	0 1 2 3	**……../25**

Assessor (Print Name)	Signed:	Date: