Transforming Trauma Rehabilitation

Recommendations for the North East Region

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Major Trauma Rehabilitation in the Northern Region

Executive Summary

Purpose

This report has been prepared on behalf of the North East Strategic Health Authority (SHA) in order to provide information and recommendations to support commissioning for the future development of rehabilitation services for major and serious trauma.

Background

Major trauma describes serious and often multiple injuries where there is a strong possibility of death or disability. It is estimated that there are 20,000 cases of major trauma in England each year with a further 28,000 not classified as major trauma but still with significant rehabilitation needs. In the North East there are approximately 800 people with major trauma per annum and more than 1,100 people with serious trauma. Regional trauma networks have been developed to improve survival management and flow of major trauma patients through the trauma care system. However it is still nationally recognised that rehabilitation is the weakest most under-resourced part of the trauma pathway resulting in increased human and financial costs. This was reinforced by the Clinical Advisory Group (CAG) for major trauma who identified that rehabilitation was suboptimal and uncoordinated and therefore Professor Keith Willet stated that 'rehabilitation should be a priority area for improvement'.

The Project

Two work streams were established to review the musculoskeletal (MSK) and neurological rehabilitation provision following major trauma, across the North East region. The work included mapping the current pathways, data collection and analysis, stakeholder consultation, identification of models of best practice and gap analysis. A model has been proposed as a best practice pathway (page 18) for trauma patients with a series of recommendations.

Key Findings

- No Consultants in Rehabilitation Medicine in MSK and insufficient within Neurotrauma services.
- Lack of communication, co-ordination and leadership across the pathway leading to disjointed care and inadequate management of patients.

- No specialist inpatient beds for MSK rehabilitation resulting in longer lengths of stay in acute beds or transfer to inappropriate settings.
- No specialist community Multi-Disciplinary Team (MDT) for MSK rehabilitation leading to suboptimal outcomes and longer lengths of rehabilitation.
- Insufficient level 1 and 2 beds for Neurological patients.
- Insufficient specialist community teams for Neurotrauma patients.
- No robust system for data collection to indicate the number of patients requiring specialist and non-specialist Recovery, Rehabilitation & Reablement (RR&R).
- Lack of vocational rehabilitation resulting in no focus on reablement, return to work and social reintegration.
- No standardised or consistent approach to the use of outcome measures which makes it difficult to evaluate rehabilitation.

Recommendations

1. Provide additional Consultant level leadership in rehabilitation in order to promote inter-speciality working and improve patient management and outcomes e.g. Consultants in Rehabilitation Medicine/Consultant Allied Health Professionals.

2. Explore workforce options to improve coordination and communication across the whole pathway for example Rehabilitation Coordinators/Facilitators.

3. Devise robust, flexible, fit for purpose systems to collect data and inform future commissioning and service provision.

4. Develop specialist rehabilitation inpatient beds for major trauma MSK patients. This would also ensure the capacity to provide intensive therapy. Further work is recommended to identify the number of beds required.

5. Create specialist MDTs which would deliver specialist rehabilitation for MSK major and serious trauma patients (inpatient and outpatient/community).

6. Provision of more level 1 and 2 rehabilitation beds for Neurotrauma patients in line with national recommendations.

7. Increase the current number of specialist community teams for rehabilitation of Neurotrauma patients to cover all areas.

8. Undertake robust and committed service redesign to deliver a best practice pathway, with particular focus on strengthening Recovery, Rehabilitation and Reablement services.

9. Ensure regional implementation of the rehabilitation prescription process for all major trauma patients across all services, from injury to re-enablement. This should include the redesign of the current Rehabilitation Prescription.

10. Integrate vocational rehabilitation into the trauma pathway.

11. Undertake further work to develop recommendations for the use of outcome measures for the trauma rehabilitation pathway.

12. Develop a Directory of Rehabilitation Services with identified administrative support to maintain and update

Implementation of these recommendations requires a coordinated approach involving commissioners, expert clinicians and service users.

Introduction

Trauma is the fourth leading cause of death in the western world and a major cause of disabling long term injuries (Chaira, Cimbanissi 2003). For every trauma death there are two survivors with significant or permanent disability (TARN). Several international publications have declared that access to rehabilitation is a basic human right (World Health Assembly 2005). The cost to the NHS of treating major trauma patients is £0.4 billion per annum with costs to society estimated at £3 - 4 billion. It is recognised that rehabilitation is an essential part of care for patients who have suffered major trauma and can reduce length of stay, minimise readmission rates and reduce the use of primary care resources. (National Audit Office 2010) Despite this rehabilitation varies throughout the country and there is insufficient evidence upon which to plan future rehabilitation services (Tennant 2005).

This project has therefore been undertaken in order to look at the rehabilitation of patients following Major Trauma across the North East region and develop a best practice pathway in line with the NHS Outcomes Framework indicator 3.3 'Effective recovery following injury or trauma'. This report will provide information and recommendations to support the future development and commissioning of rehabilitation services for major and serious trauma patients.

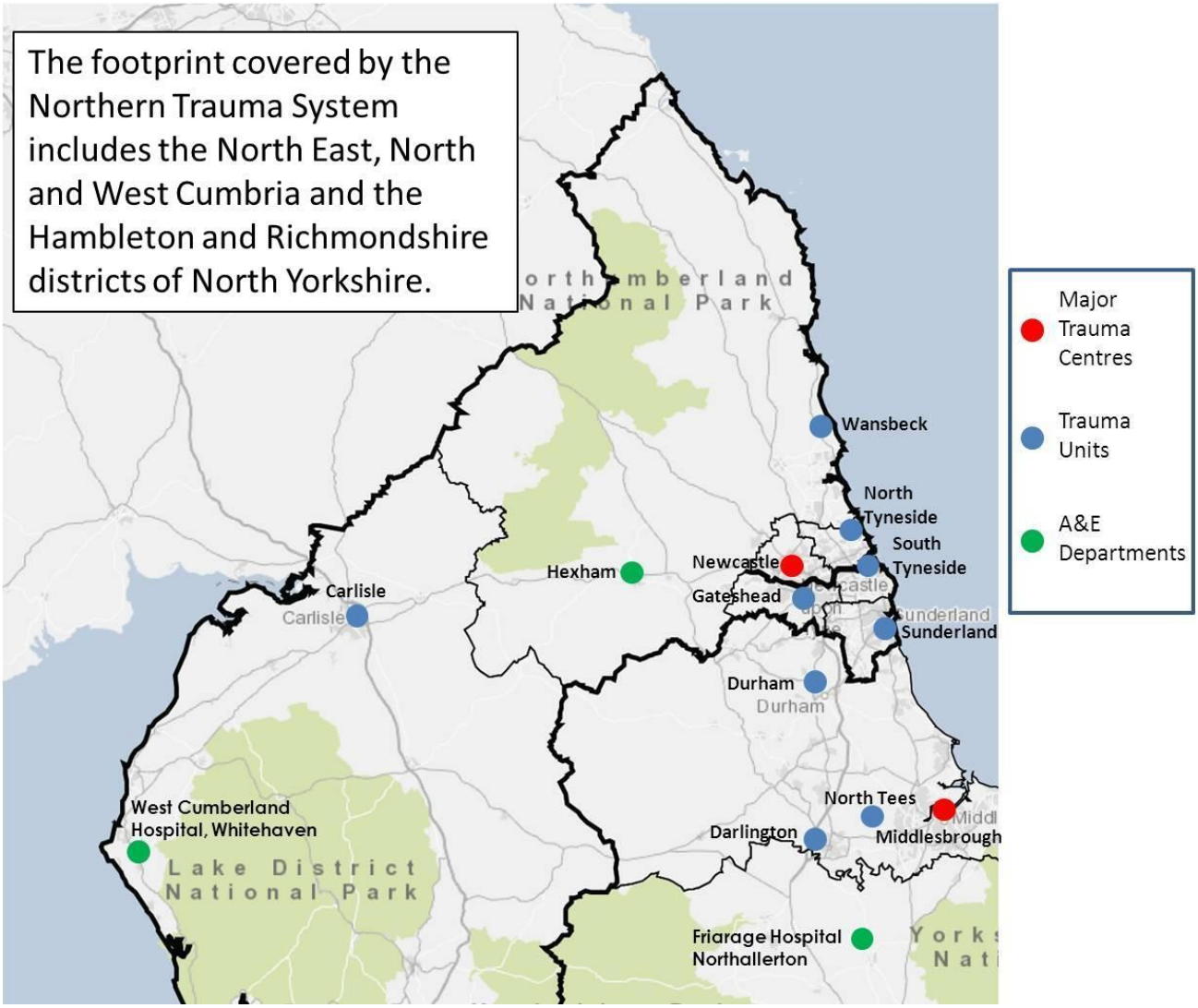
A regional Steering Group was formed by the SHA to lead and deliver on this piece of work. Two work streams were established to review the musculoskeletal (MSK) and neurological trauma rehabilitation pathways. As there are existing pathways in place for other categories of trauma patients e.g. Spinal injuries, amputees and burns, it was agreed by the steering group that these would not be the main focus of this work. The MSK work stream commenced in July 2012 and the Neurotrauma work stream in October 2012 (Appendix 1). The detail from the work streams will be presented in separate sections in this report. An interim report which included initial findings and commissioning priorities was submitted in October 2012 (Appendix 2).

The scope of the project does not include workforce planning or detailed analysis of outcome measures.

The Neurotrauma work stream used the British Society of Rehabilitation Medicine (BSRM) Standards for Rehabilitation Services Mapped onto the National Service Framework for Long-term conditions2009 to review services (referred to as BSRM standards throughout the report). As there were no standards for MSK Trauma Rehabilitation a combination of the relevant BSRM standards, Yorkshire and Humberside major trauma standards and department of health guidance were used. After the project had commenced the BSRM produced a draft copy of further standards entitled "Specialist Rehabilitation in the Trauma Pathway" 2012 (referred to as Trauma standards throughout the report). These were also incorporated into the analysis.

Background

Deficiencies were highlighted in the treatment and care of major trauma patients including below optimum rehabilitation (Darzi 2008). A Clinical Advisory Group (CAG) for major trauma was established, chaired by Professor Keith Willett, which led to the development of Regional Trauma Networks. The aim of the networks was to improve the survival, management and flow of major trauma patients through the system, facilitated by the introduction of the new rehabilitation prescriptions. In the North East there are 2 Major Trauma Centres (MTCs) at James Cook University Hospital (JCUH), Middlesbrough in the South and the Royal Victoria Infirmary (RVI), Newcastle upon Tyne, in the North. These both act as hubs for surrounding Trauma Units (TUs)



The CAG also identified that rehabilitation provision was suboptimal and uncoordinated (CAG 2010), so Professor Willett stated that 'rehabilitation should be a priority area for improvement.' In the BSRM standards, rehabilitation is defined as

the process of assessment, treatment, and management with on-going evaluation, by which the individual (and their family/carers) are supported to achieve their maximum potential for physical, cognitive, social and psychological function, participation in society and quality of living.

Complex musculoskeletal injuries account for over half of hospital admissions following major trauma (Urquhart 2006) while neurological injury is the commonest cause of mortality and disability after major trauma and requires specialist rehabilitation. There is evidence that early coordinated rehabilitation results in better outcomes and reduces use of NHS resources across the patient pathway (National Audit Office 2010). Investment in rehabilitation services will reduce dependency, facilitate return to work and therefore lead to a significant reduction in health and social care costs.

The impact of the MTCs on rehabilitation services in the North East is emerging but the ability of existing services to meet the demands of seriously injured trauma patients across the region is currently not clear (Wilson 2011). Trauma networks are intended to reduce mortality rates by over 20%. If this is achieved, then even greater pressure can be anticipated on already stretched services delivering rehabilitation in specialist and recovery, rehabilitation and reablement (R, R &R) pathways. The resources required to provide successful rehabilitation should not be based on diagnoses, but on patient need, which is individual and therefore difficult to measure.

Categories of Trauma Patients

Trauma is measured on a scale known as the Injury Severity Score (ISS) and is calculated by the Trauma Audit and Research Network (TARN). The ISS assigns a value to injuries according to their severity and is calculated retrospectively after discharge from hospital.

Major Trauma: ISS greater than 15

Serious Trauma: ISS of 9 – 15.

Rehabilitation after Major and Serious Trauma

Historically Neurological services have had defined levels of rehabilitation according to patient need. The rehabilitation of MSK trauma patients has not been categorised in this way.

The BSRM standards defined how neurological rehabilitation services have developed over the last two decades, to form in a 3-tier structure as described below:

- **Tertiary 'specialised' rehabilitation services (Level 1)** are high cost / low volume services, which provide for patients with highly complex rehabilitation needs that are beyond the scope of their local and district specialist services. These are normally provided in coordinated service networks planned over a

regional population of 1-3 million through collaborative (specialised) commissioning arrangements. At the time of writing level 1 facilities are only available at Walkergate Park Centre for Neurorehabilitation and Neuropsychiatry which is in the north of the region.

- **Local (district) specialist rehabilitation services (Level 2)** are typically planned over a district-level population of 250-500K, and are led or supported by a consultant trained and accredited in Rehabilitation medicine (RM), working both in hospital and the community setting. The specialist multidisciplinary rehabilitation team provides advice and support for local general rehabilitation teams. Level 2 facilities are currently available at Sunderland, South Tees and Carlisle.

- **Local non-specialist rehabilitation teams (Level 3)** - within each locality who provide general multi-professional rehabilitation and therapy support for a range of conditions within the context of acute services (including stroke units), intermediate care or community services. The rehabilitation pathway is not complete until the patient has re-joined society having reached optimum functional potential e.g. employment and leisure. Level 3 services include community based rehabilitation teams which are significantly under resourced. Therefore there needs to be a much stronger focus on AHP led rehabilitation and reablement when re-designing services.

Major Trauma Rehabilitation Project

The Trauma Rehabilitation Steering Group included representation from commissioning, expert clinicians, service development and SHA (Appendix 3). The intention of the two work streams was to gather information regarding the local pathways from key staff members and patients and in particular examine what happens at each interface. The information from the two work streams is detailed in the separate MSK and neurological sections of the report.

Data collection and analysis

In order to establish the potential impact of Regional Trauma Networks on rehabilitation, an analysis of current data sources was carried out.

The aim was to identify:

- The numbers of people in the North East who have suffered major and serious trauma
- The number of people requiring rehabilitation following major or serious trauma

- Rehabilitation needs of major and serious trauma patients (see MSK and Neurotrauma sections)

Sources of data used:

- North East Ambulance Service (NEAS)
- Trauma Audit and Research Network (TARN)
- Rehabilitation Prescriptions

All of the data sources used have no accurate historical data to compare against therefore for the purpose of this report the data analysed is from the introduction of the MTCs in April 2012.

North East Ambulance Service (NEAS)

The ambulance service triages patients who potentially have had a major trauma using the mechanism of injury (Major Trauma Bypass Protocol).

Electronic patient report forms from accident scene region-wide – April to September 2012: (NEAS 2012)

	April	May	June	July	Aug	Sept	Total
Total Trauma	3729	5097	4916	5041	4799	4885	28,467
Total Major Trauma	106	207	164	171	198	193	1,039

Patients Triaged as Major Trauma and directed to MTCs:

	April	May	June	July	Aug	Sept	Total
JCUH	20 (19%)	69 (33%)	47 (29%)	56 (33%)	55 (28%)	64 (33%)	311
RVI	77 (73%)	128 (62%)	96 (58%)	101 (59%)	125 (63%)	109 (57%)	636
Other	9 (8%)	10 (5%)	21 (13%)	14 (8%)	18 (9%)	20 (10%)	92

The data above identifies potential major trauma but as some of these patients subsequently have their injuries downgraded it doesn't indicate the actual number of patients suffering major or serious trauma or their rehabilitation need. Other limitations with this data include failure to capture certain groups of patient's e.g. self -presenters and patients who do not trigger the major trauma bypass protocol but have more severe injuries than initial assessment indicated.

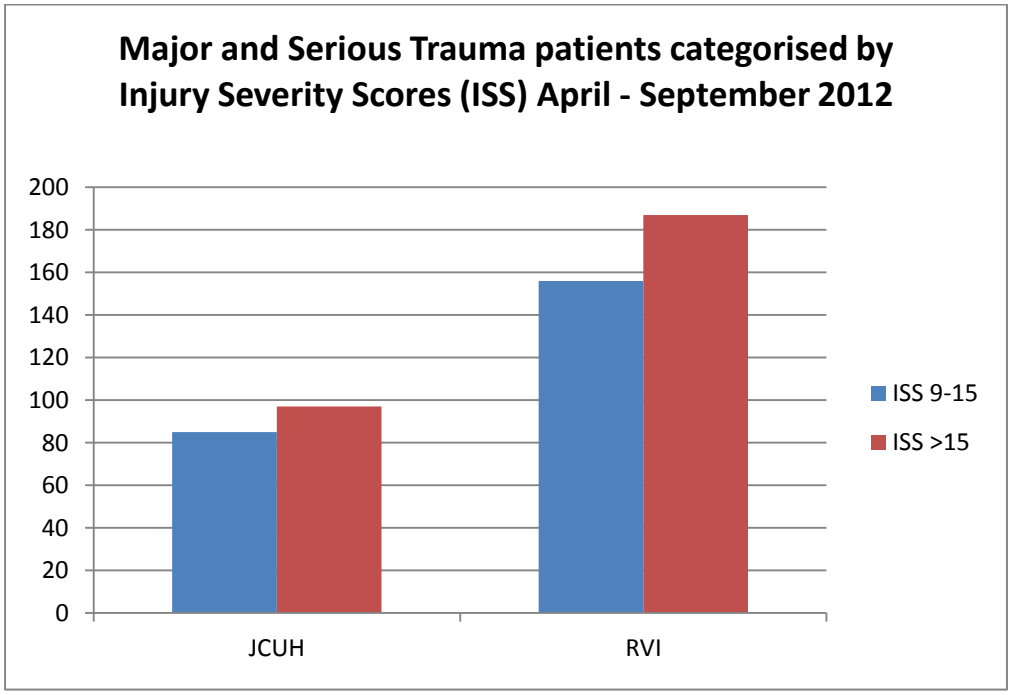
Trauma Audit and Research Network (TARN)

The ISS is calculated by the Trauma and Audit Research Network (TARN) and two levels of best practice tariff are paid to the major trauma centres accordingly. The TARN data tabulated below represents the actual number of major and serious trauma patients admitted to the two MTCs between April and September 2012.

Major and Serious trauma patients categorised by Injury Severity Scores (ISS) April-September 2012:

MTC	ISS 9-15	ISS 16+	Totals
JCUH	85	97	182
RVI	156	187	343

This tabulated data is illustrated in the graph below. The above data does not include patients awaiting post mortem who have not had an ISS validated.



TARN data represents the number of actual major and serious trauma patients based on ISS and therefore the number of patients potentially requiring rehabilitation. However it still does not reflect the rehabilitation needs of these patients. Due to the retrospective nature of TARN data collection has been restricted to April to September 2012 as current live data is not available.

Many of the serious trauma patients (ISS 9 – 15) will go direct to a TU and will require rehabilitation. The table below shows trauma patients taken directly to TUs-.

Patients admitted to TUs April to September 2012 (TARN)

Site	ISS 9-15	ISS 16-75
Cumberland Infirmary	15	11
Darlington Memorial Hospital	20	21
North Tyneside General Hospital	41	11
Queen Elizabeth Hospital (Gateshead)	40	4
South Tyneside District Hospital	16	10
Sunderland Royal Hospital	58	21
University Hospital of North Durham	24	6
University Hospital of North Tees	30	6
Wansbeck General Hospital	58	20
West Cumberland Hospital*	18	14
Total admitted to TUs	**320**	**124**
Total including MTCs	**561**	**408**

*West Cumberland Hospital is not a Trauma Unit but is included because there have been trauma admissions.

The table above shows that the MTCs receive 70% of patients with ISS 16 and above and 43% of patients with ISS of 9-15. 30% of patients with an ISS of 16 and above do not appear to go to an MTC, possibly these are elderly patients with fractures as a result of falls who subsequently are found to have an associated brain injury which raises the ISS above 16. Future development of rehabilitation services thus needs to include TUs and their supporting community services in addition to those using MTCs.

Number of patients admitted to each MTC from each geographical area from April to September 2012 (based on address of patients General Practitioner, GP)

Local Area	RVI		JCUH	
	ISS 9-15	ISS 16-75	ISS 9-15	ISS 16-75
County Durham and Darlington	9	21	9	20
North Cumbria	13	26	0	2
Newcastle	49	27	0	1
Northumberland	46	42	0	1
South of Tyne and Wear	27	47	0	3
South and North Tees (inc N Yorks)	1	1	70	61
Other (out of area or GP unknown)	12	23	8	9

This data provides information of where the patients with major and serious trauma reside at the time of their admission to the MTC. It gives an indication of the potential demand for rehabilitation services by geographical area.

Rehabilitation Prescriptions

Rehabilitation prescriptions were introduced to document the rehabilitation needs of the patients and identify how they will be addressed (Appendix 4). The Rehabilitation Prescription (RP) is completed for all major and serious trauma patients and therefore should indicate the number of patients requiring rehabilitation.

Number of Rehabilitation Prescriptions May to Oct 2012

	MSK	Neurological	All Other	Total
JCUH	161	50	35	246
RVI	240	223	38	501

The figures in the table above give the number of rehabilitation prescriptions completed in the MTCs from May to October 2012. This time period was used as there were no rehabilitation prescriptions completed at JCUH in April 2012 due to trauma staff not being in place. There are no guidelines on how injury should be categorised and so for the purpose of this report an agreed standardised process was used to collate the information (Appendix 5).

This data illustrates that MSK and neurological patients are the largest groups of trauma patients requiring rehabilitation prescriptions. This data does not reflect ISS for each group so the ratios of one group to another and prediction of rehabilitation need is not clear. Caution must be applied therefore when making any assumptions from this data.

Identification of actual major trauma patients is problematic due to the retrospective calculation of ISS by TARN and lack of a robust process in place. Currently the identification of these patients is dependent upon skills and experience of key members of staff who may not have had training in TARN.

TARN outputs relating to Rehabilitation for RVI and JCUH MTCs April – Dec 2012

Further Tarn data taken from information recorded on the rehabilitation prescriptions is tabulated below to give further information on rehabilitation needs.

Age distribution

Age	Number of patients RVI	Number of patients JCUH
Under 16 years	38	23
16-65	337	239
Over 65	136	88

The data in the table above shows that approximately 70% of patients of trauma patients admitted to an MTC are of working age.

Overall ISS scores

ISS Score	Number of patients RVI	Number of patients JCUH
8 and below	115	78
9-15	208	137
16 and above	228	135

This tabulated data above on ISS demonstrates that about 20% of patients with an ISS of 8 and below either have rehabilitation needs but don't meet the best practice tariff or the process for identification of patients requiring RPs is wrong.

Level of Rehabilitation Services Required

The rehabilitation prescription contains an assessment of level of rehabilitation required. Data taken from a local data base at the RVI describes the level of

rehabilitation needed on basis of Initial Rehabilitation Prescription filled in by the Band 7 physiotherapists *__April- December 2012__. Comparative data from the JCUH is not available due to differences in recording methods.

Level of Rehabilitation	**Specialist Rehabilitation**		**RR&R pathway**	**Unknown**
	1	**2**	**3**	
ISS 9-15	4	52	132	18
ISS 16 and above	47	63	104	14

*9 months data

The data in the table above shows 48% of patients with an ISS 16 and above and 27% of patients with an ISS 9-15 and require specialist rehabilitation (Level 1 or 2).

The RPs' other function was to highlight gaps in current provision of rehabilitation services (Professor Keith Willet DOH 2012). Comparable data from each part of the region was not available due to differences in TARN administration. A sample of rehabilitation prescriptions was audited from those completed in the South Tees region relating to MSK rehabilitation and are discussed in the MSK chapter of this report.

Conclusions from the data

- TARN is the most accurate indicator of the number of patients who suffer major and serious trauma all of whom may potentially require significant rehabilitation.
- Rehabilitation services should be considered at TUs and their surrounding areas not just the MTCs. Provision needs to take in to account the geographical catchment areas of each MTC and the need for specialist services close to home. **Recommendations 4 to 8**
- Approximately 70% of trauma patients admitted to an MTC are of working age therefore vocational rehabilitation should be an integral part of the trauma rehabilitation pathway. **Recommendation 10**
- The process for identification of major and serious trauma patients in MTCs and TUs who require a RP needs to be improved. This should also include early identification of ISS (within 7 days), which would trigger completion of the RP for appropriate patients, **Recommendations 3 & 9**
- This analysis of current data sources showed that consistent comparable data for all areas of the pathway is lacking and no audit process or tracking system is currently in place. **Recommendation 3**.

Pathway Mapping

In order to gather the appropriate information to map the current pathway and identify gaps a number of approaches were adopted including:

- Visits to areas of best practice
- Visits to MTC's outside the region
- Attendance at major trauma conferences
- One to one/team meetings with key people involved in trauma rehabilitation.
- Stakeholder consultation for knowledge sharing and pathway mapping in the North and South of the region.
- Patient experience information gathering
- Mapping of current service provision against standards and guidance
- Contact was made with key people across each area by telephone, email, and postal surveys
- Audit of MSK rehabilitation prescriptions (JCUH MTC only)

All the information collected from the different sources mentioned above has been collated and presented in the maps, pathways and grids within the MSK and Neurotrauma sections of this report.

Stakeholder Consultation

Allied Health professional (AHP), Nursing and Medical colleagues attended information sharing and mapping events that were held in the north and south of the region (Appendix 6). There was representation from the following areas Newcastle, South of Tyne & Wear, County Durham & Darlington, North Cumbria, Northumberland and North Tyneside, North & South Tees including North Yorkshire.

The purpose of the workshops:

- Provide information on national agendas and local work to date
- Introduction to the Rehabilitation Prescription and its purpose
- Map the current rehabilitation pathway for trauma patients
- Identify gaps in the rehabilitation pathway
- Explore outcomes for trauma patients
- Explore potential models of rehabilitation/solutions to gaps in pathway

The information obtained was used to inform the gap analysis and will be summarised in the MSK and Neurotrauma sections.

Outcome Measures

Rehabilitation has a different emphasis at each point in the pathway. Currently a variety of outcome measures are used throughout the pathway but there is no standardisation or consistent approach. Rehabilitation commences as early as

possible and continues in varying provision as is required. Ideally in the early stages, the focus of rehabilitation is on reducing impairment and preventing secondary complications, whilst post-acute rehabilitation would address the restoration of function and mobility. In the community the emphasis should be more on extended activities of daily living, social integration and return to work. Therefore, despite the fact that a number of well-validated generic outcome measures are in existence, no single outcome measure will adequately reflect change at all stages of rehabilitation.

It is important to measure change in order to confirm the effectiveness of rehabilitation as well as prove any cost benefits. Work is currently on-going nationally to look at what outcome data should be collected. Although this is not yet finalised the recommendations are likely to include the EQ5D (www.euroqol.org)and the Glasgow Outcome Score (extended) as well as a measure of patient experience (Wade 2013).The current use of outcome measures in the northern region and suggestions for the best practice pathway from the stakeholder events is detailed in (Appendix 7).

UKROC

UKROC is a multi-centre database of standardized outcomes which measure complexity of rehabilitation need, therapy and nursing inputs and outcomes across the three levels of rehabilitation service provision. Collection of data allows the application of a tiered tariff based on scores of complexity and bed occupancy. Initial sign-posting of services has taken place ahead of adoption of UKROC for commissioning in 2013-14. Staffing ratios may significantly affect scoring and the model continues to be refined. A national audit is planned in 2013 for patients requiring specialist neurological rehabilitation linking TARN data and UKROC (Trauma Standards). Recommendations for the use of specific outcome measures in the pathway are beyond the scope of this project and further work is required. Recommendation 11.

Best Practice pathway

Pathway for patients with major trauma

The best practice pathway for each geographical area will have variations depending on current provision and ad hoc services as well as capacity and demand issues. A national framework for commissioning and understanding trauma rehabilitation which encompasses all groups of patients (those requiring specialist and non-specialist services) provides a model for trauma rehabilitation. The pathway illustrated on page 20 is the model identified by the trauma standards and provides a framework for a best practice pathway.

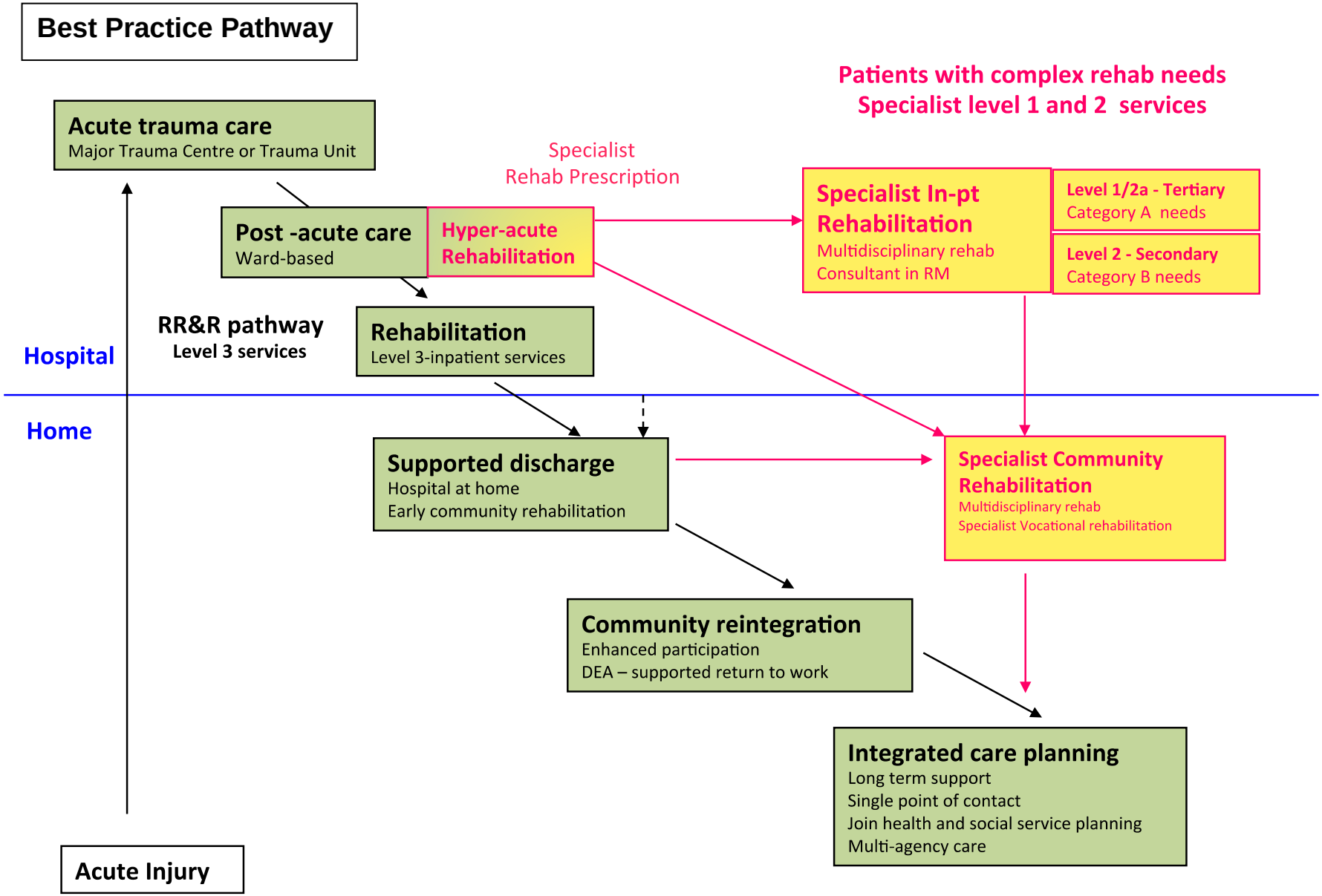
The model illustrates two defined pathways; specialist rehabilitation (defined earlier in the report) and **recovery, rehabilitation and reablement (RR &R)** which is for

less complex patients. RR&R describes the theoretical pathway for those patients with less complex needs who require input from an MDT with some specialist skills. This pathway should be more straightforward and predictable with higher volume, lower costs than for those patients requiring specialist rehabilitation. There are currently significant problems with this pathway due to lack of capacity, coordination and MDT input. **Recommendation 8.**

Some complex MSK trauma patients will require specialist rehabilitation in order to ensure appropriate rehabilitation of sufficient intensity and to optimise patient flow through the pathway. It is likely however that the majority of patients with MSK trauma alone will follow the RR&R pathway and conversely many of those with neurotrauma will require a specialist pathway due to cognitive and psychosocial problems in addition to physical difficulties.

Rehabilitation services should be planned and delivered through coordinated pathways with specialist rehabilitation teams working in both hospitals and the community to deliver services and support local rehabilitation and reablement teams. **Recommendations 2, 4, 5, 6 and 7.**

Despite recommendations from the Darzi report (2008) access to community rehabilitation remains unequal and inequitable due to chronic under resourcing (Royal College Physicians 2010). As people with increasingly complex disabilities are supported in the community the demands for rehabilitation services will be even greater and will require further investment. The application of this pathway will be detailed in the MSK and Neurotrauma sections.


Best Practice Pathway
Patients with complex rehab needs
Specialist level 1 and 2 services
Acute trauma care
Major Trauma Centre or Trauma Unit
Specialist
Rehab Prescription
Post -acute care
Ward-based
Hyper-acute Rehabilitation
Specialist In-pt Rehabilitation
Multidisciplinary rehab
Consultant in RM
Level 1/2a - Tertiary
Category A needs
Level 2 - Secondary
Category B needs
RR&R pathway
Level 3 services
Hospital
Rehabilitation
Level 3-inpatient services
Home
Supported discharge
Hospital at home
Early community rehabilitation
Specialist Community Rehabilitation
Multidisciplinary rehab
Specialist Vocational rehabilitation
Community reintegration
Enhanced participation
DEA – supported return to work
Integrated care planning
Long term support
Single point of contact
Join health and social service planning
Multi-agency care
Acute Injury

Conclusion

Rehabilitation is an essential part of care for patients who have suffered major trauma and can reduce length of stay, minimise readmission rates and reduce the use of primary care resources. It is clear therefore that coordinated rehabilitation will result in better outcomes and reduce the use of NHS resources across the pathway. Rehabilitation is important for trauma patients of all ages to return them to a productive and fulfilling life. Many trauma patients are of working age and vocational rehabilitation should therefore be a key component of a robust rehabilitation pathway.

The current issues regarding rehabilitation of trauma patients in the North East region include lack of specialism, capacity, coordination, leadership and communication across a patchy, disjointed pathway. More information to support this is detailed in the separate MSK and Neurotrauma sections of this report.

Consistent and comparable data for all areas of the pathway is lacking however current available data has been collated and analysed for the purpose of this report.

A set of recommendations has been produced to address the issues highlighted throughout the report. Following further consultation these recommendations will form part of an implementation plan which will create a platform for improving rehabilitation services for trauma patients.

Musculoskeletal Work Stream

Introduction

Complex MSK injuries account for over half of hospital admissions following major trauma. The CAG report (2010) identified that patients with complex MSK injuries did not have the rehabilitation services in place to meet their multi-faceted needs. Rehabilitation services are fragmented, poorly integrated and are not part of a joined up pathway of care.

This work stream was therefore commissioned by the Trauma Rehabilitation Steering Group to look at the rehabilitation pathway for major and serious MSK trauma. In the initial meetings of the Trauma Rehabilitation Steering group it was highlighted that, MSK trauma rehabilitation was the biggest current deficit in terms of both knowledge and service provision in the Northern region.

Scope of Work

Services for adults aged 16 and over with MSK injury following major and serious trauma. As there are existing pathways in place for other categories of trauma patients e.g. Amputees and burns, it was agreed by the steering group that these would not be the main focus of the work.

The aims and objectives of the MSK work stream are detailed below

Aims:

To identify best practice in trauma rehabilitation

To obtain a baseline mapping of current practice and gap analysis

To establish trauma rehabilitation network

Objectives:

1. Map the current care pathway of major trauma MSK patients (ISS score of 16 and above) who access North East MTCs.
2. Map the current care pathway of MSK patients with an ISS score of 9 to 15 who access North East MTC's/TU's.
3. Collate examples of practice elsewhere and identify a best practice, evidence-based pathway
4. Compare and contrast the current North East pathway with the best practice pathway
5. Produce recommendations for the commissioning of trauma rehabilitation services.
6. Develop and establish a trauma rehabilitation community of interest which will act as a platform to implement recommendations and drive improvement.

The method and outputs from the aims and objectives are tabulated in Appendix 8.

Information was gathered on current pathways, identification of gaps and the requirements for a best practice pathway in the following ways:

- Mapping of current pathway and gap analysis
    - Stakeholder consultation
    - Mapping of services and facilities
    - Mapping against service standards
    - Rehabilitation Prescription audit
    - Patient/staff experience
    - Summary of gap analysis

- Best practice pathway
    - Examples of good practice
    - Requirements for a Best Practice Pathway
    - Proposed Best Practice Pathway

Limitations of the work

There is no data available specific to MSK trauma patients therefore the data collated and analysed relevant to MSK trauma is presented in the main data section of this report.

Mapping of current pathway and gap analysis

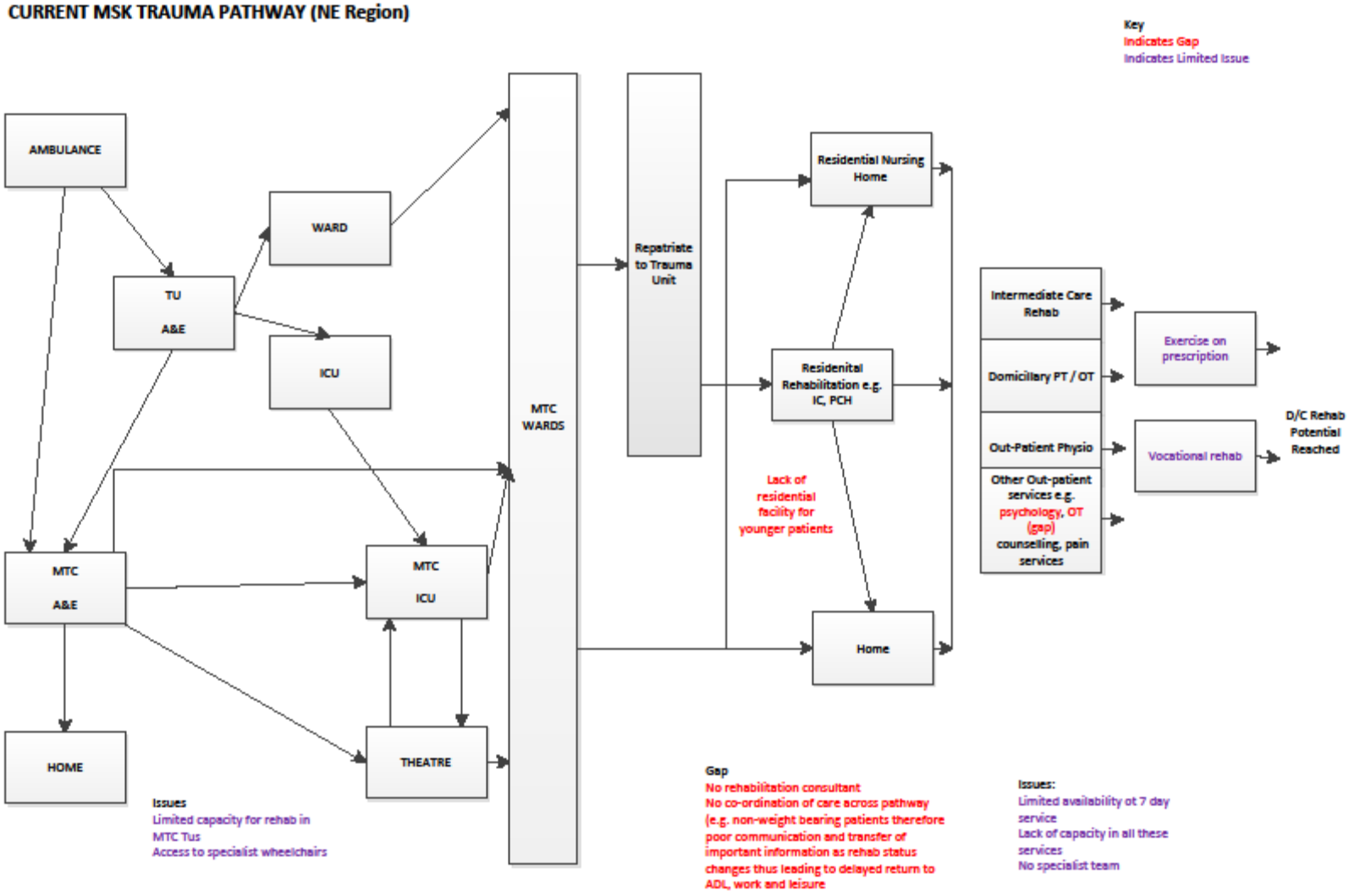
Stakeholder Consultation

Two stakeholder events were held one in Newcastle and the other in Middlesbrough in order to map the current pathway for MSK trauma patients, identify gaps and explore potential solutions.

Pathway Mapping

A draft current MSK pathway was produced and taken to the stakeholder events to ensure accuracy and add further detail. Although services differ according to geographical area it was agreed at the stakeholder events that a generic pathway was applicable across the region. A schematically simplified version of this generic MSK pathway was produced and then emailed to attendees of the events and other key staff for sense checking and comments. The final version of the current pathway is illustrated below and represents the current MSK trauma pathway for the northern region. Some specific issues and gaps are highlighted on the pathway.

CURRENT MSK TRAUMA PATHWAY (NE Region)



Gap analysis from Stakeholder Consultation

From the stakeholder consultation events the following themes were identified:

Specialism

No Consultant level rehabilitation input (Medical or Allied Health Professional)

No specialist multidisciplinary team or specialist facility

No facility geared towards rehab of younger age group i.e. under 65 years.

Non weight bearing patients are not offered rehabilitation until they are allowed to weight bear.

No vocational rehabilitation for MSK patients.

Lack of psychology/psychiatry/counselling input including outreach

Communication

Poor communication across the pathway

Poor communication between Orthopaedic/Trauma Consultant and therapists.

Insufficient clinical information follows the patient across the pathway e.g. .weight bearing status, return to work, driving etc.

No specific priority given to trauma patients when referred to rehabilitation services.

Duplication of referrals, assessments and documentation

Lack of awareness of rehabilitation services available.

No integrated IT system to support rehabilitation.

Coordination

No coordination and leadership across the pathway

Lack of responsibility for reintegration e.g. Return to work and leisure.

Delays in access to social care packages

Capacity

Insufficient capacity in existing rehabilitation services e.g. outpatient and domiciliary therapy

Limited 7 day service provision outside MTC/TU

No capacity to provide intensive rehabilitation e.g. .in patient

Lack of capacity to provide long term rehabilitation where needed.

Geography can affect service provision.

Equipment

Insufficiencies in equipment provision e.g. short term provision of specialist wheelchairs

Difficulty in providing equipment for patients outside the MTC/TU catchment area.

Patients not always discharged with the equipment required.

A detailed account of the results of the stakeholder events is in Appendix 9.

The north and south regions have different geographical make ups but the themes and feedback from both workshops were similar. Thus issues with the current pathway are multifaceted however improving coordination and communication could potentially have a positive impact on all other areas. Recommendations 2. and 12. Potential solutions were explored at the Stakeholder events and they were used to inform the development of the best practice pathway later in this section of the report.

Mapping of services and facilities

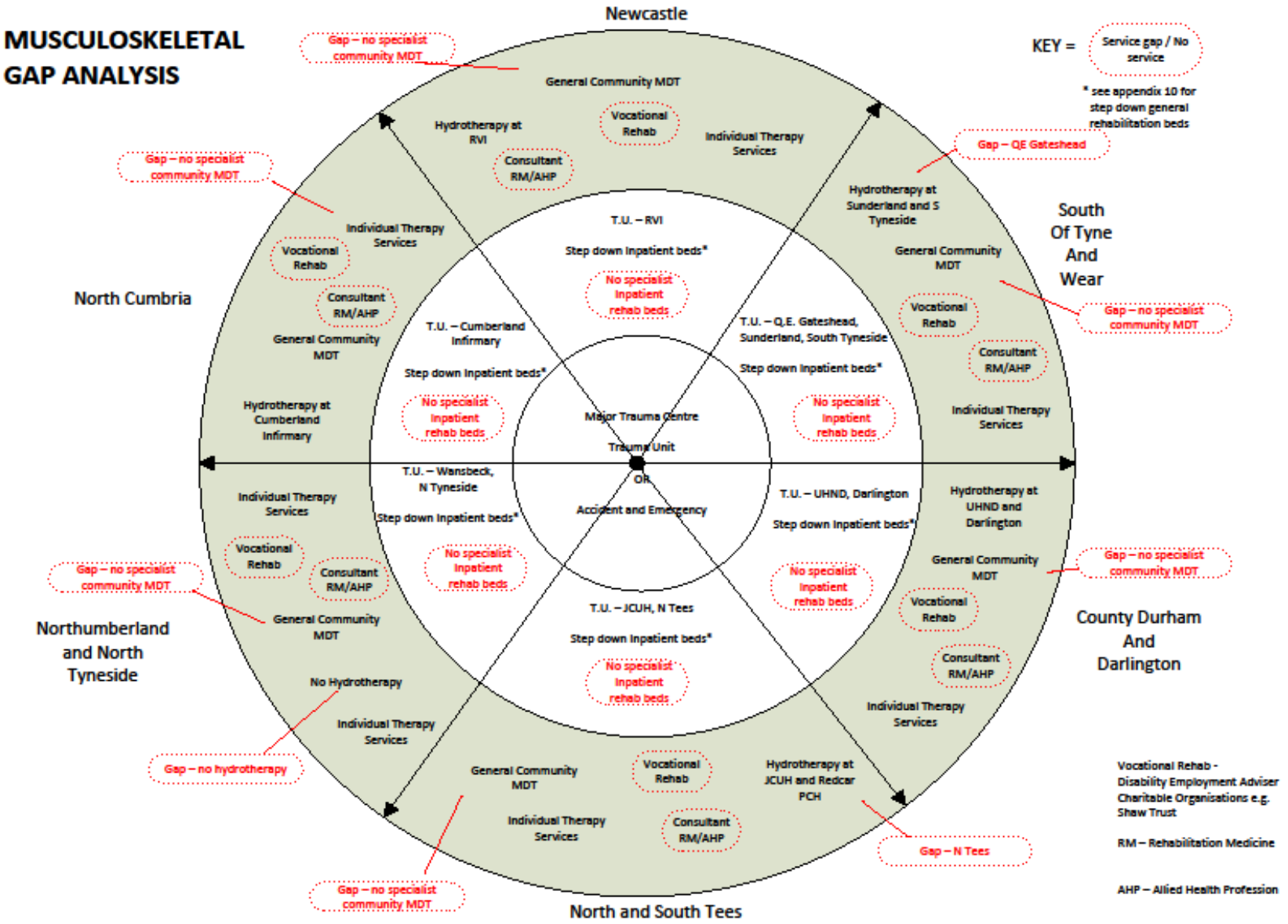
As well as gathering information from the two regional workshops a mapping template was sent out to key people across the region to collect further detail on current rehabilitation services and facilities for MSK trauma patients.

A gap analysis was then completed from this information and summarised below:

- No specialist inpatient rehabilitation beds
- No consultant level rehabilitation input (Medical/AHP)
- No specialist community MDT

- Individual therapy services in many areas and not MDT
- Limited availability of hydrotherapy in some areas
- No vocational rehabilitation integrated within the current pathway for MSK trauma patients

This has been represented visually in a hub and spoke map on the following page and step down beds are listed in Appendix 10.


MUSCULOSKELETAL GAP ANALYSIS
Newcastle
Gap – no specialist community MDT
General Community MDT
Hydrotherapy at RVI
Vocational Rehab
Individual Therapy Services
Consultant RM/AHP
KEY =
Service gap / No service
* see appendix 10 for step down general rehabilitation beds
Gap – QE Gateshead
Hydrotherapy at Sunderland and S Tyneside
South Of Tyne And Wear
General Community MDT
Gap – no specialist community MDT
Vocational Rehab
Consultant RM/AHP
Individual Therapy Services
Gap – no specialist community MDT
Individual Therapy Services
Vocational Rehab
Consultant RM/AHP
North Cumbria
General Community MDT
T.U. – RVI
Step down Inpatient beds*
No specialist Inpatient rehab beds
T.U. – Cumberland Infirmary
Step down Inpatient beds*
No specialist Inpatient rehab beds
T.U. – Q.E. Gateshead, Sunderland, South Tyneside
Step down Inpatient beds*
No specialist Inpatient rehab beds
Hydrotherapy at Cumberland Infirmary
Major Trauma Centre
Trauma Unit
OR
Accident and Emergency
Individual Therapy Services
T.U. – Wansbeck, N Tyneside
Step down Inpatient beds*
No specialist Inpatient rehab beds
T.U. – UHND, Darlington
Step down Inpatient beds*
No specialist Inpatient rehab beds
Individual Therapy Services
Hydrotherapy at UHND and Darlington
Gap – no specialist community MDT
Vocational Rehab
Consultant RM/AHP
Gap – no specialist community MDT
General Community MDT
Northumberland and North Tyneside
T.U. – JCUH, N Tees
Step down Inpatient beds*
No specialist Inpatient rehab beds
General Community MDT
Vocational Rehab
Consultant RM/AHP
County Durham And Darlington
No Hydrotherapy
Individual Therapy Services
Individual Therapy Services
Gap – no hydrotherapy
General Community MDT
Vocational Rehab
Hydrotherapy at JCUH and Redcar PCH
Individual Therapy Services
Consultant RM/AHP
Gap – N Tees
Gap – no specialist community MDT
North and South Tees
Vocational Rehab - Disability Employment Adviser Charitable Organisations e.g. Shaw Trust
RM – Rehabilitation Medicine
AHP – Allied Health Profession

Mapping against service standards:

There are no definitive standards on which to evaluate MSK rehabilitation trauma services. Therefore an audit tool was constructed based on the Yorkshire & Humber Major Trauma Network Rehabilitation Service Level Standards, relevant BSRM standards and Department of Health Guidance.

A gap analysis from this information is summarised below and illustrated in the grid on the following pages.

- Poor coordination and communication across the pathway.
- The rehabilitation prescription is not utilised outside the MTCs and therefore it does not fulfil its role to direct the patient's rehabilitation across the pathway.
- Patients are not receiving a copy of the rehabilitation prescription.
- The majority of Trauma Units do not have a pathway for serious trauma patients (ISS 9-15), unless they are a fractured neck of femur.
- There is no access to a Consultant in Rehabilitation Medicine for MSK trauma patients.
- There are no specialist rehabilitation facilities for major trauma MSK patients
- There is minimal use of outcome measures for major trauma patients throughout the pathway.
- There is no regularly maintained directory of rehabilitation services in the majority of areas.

Cross Reference BSRM core standards, Yorks and Humber Standards and Rehab Prescription Guidance

Audit Tool	Description	RVI	JCUH	Wansbeck	N. T'side	S. T'side	Gateshd	Sundland	Durham	Darlngtn	N. Tees	Carlisle	Link to York and Humb	Link to BSRM	Link to DoH Guidance	No link
Q1	There is a multidisciplinary meeting for major trauma patients.	Y	Y	Y	Y	Y	Y	Y	n/a	N	Y	Y	MDT needs assess	S19	Yes	
Q2	There is a pathway for major trauma patients	Y	Y	N	P	N	N	N	n/a	N	N	N	No	S19	No	
Q2a	The pathway for major trauma patients is multidisciplinary	P	P	n/a	P	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	S19	No	
Q3	There is awareness of the Rehabilitation Prescription	Y	Y	Y	N	N	N	N	Y	N	N	Y	No	No	No	x
Q3a	The Rehabilitation Prescription is completed for all patients with major and serious trauma	Y	Y	N	N	N	N	N	N	N	N	N	No	No	Yes	

Q3b	There is a MDT needs assessment for all major trauma patients	N	N	Y	N	N	N	N	N	N	N	Y	MDT needs assessment	No	Yes	
Q3c	The MDT assessment leads to a rehabilitation prescription	N	N	N	N	n/a	n/a	n/a	n/a	n/a	n/a	N	MDT needs assessment	No	Yes	
Q3d	The Rehabilitation Prescription leads to rehabilitation goals and a treatment plan.	Y	N	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	x
Q3e	The Rehabilitation Prescription is reviewed during the rehabilitation process	N	N	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	Yes	
Q3f	Trauma Units only: A copy of the Rehabilitation Prescription is received when a major trauma patient is transferred from an MTC	n/a	n/a	N	N	N	N	N	Y	N	N	Y	No	No	Yes	
Q3g	The patient receives a copy of the Rehabilitation Prescription	N	N	N	N	N	N	N	N	N	N	N	No	No	Yes	
Q4	Trauma Units only: A discharge summary is received from the MTC	n/a	n/a	N	N	N	N	N	Y	Y	N	N	No	S21	No	
Q5	There is a mechanism in place to identify major trauma patients	Y	Y	N	N	N	N	N	N	N	N	N	No	No	No	x
Q6	Screening is done for mood and cognition	Y	N	Y	Y	N	N	N	P	N	Y	N	Mood & cognition screen	S1, S7, S27	Yes	

Q6a	Patients with identified mood/cognitive disorders are referred for psychology assessment/intervention	P	P	P	P	P	P	P	P	P	P	P	Mood & cognition interven	S1, S7, S27	No	
Q7	There is access to a Consultant in Rehabilitation Medicine for musculoskeletal major trauma patients	N	N	N	N	N	N	N	N	N	N	N	Access to Rehab Consultant	S1, S6, and S26	No	
Q8	There is access to a rehabilitation co-ordinator	N	N	N	N	N	N	N	N	N	N	N	Access to Rehab Coordinator	S19, S27	No	
Q9	There is specialist staff in post for major trauma patients	Y	Y	N	N	N	P	P	N	P	P	N	No	No	No	x
Q10	There is a regularly updated directory of care and rehabilitation services	N	N	N	N	N	P	N	N	P	P	N	Directory of Services	No	No	x
Q10a	A directory of care and rehabilitation services would be useful	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Directory of Services	No	No	
Q11	A discharge communication summary is completed when the patient is transferred or discharged	Y	Y	Y	Y	Y	N	P	Y	Y	Y	Y	No	S21	Yes	
Q12	The rehabilitation prescription does follow the patient to the next stage of rehabilitation	Y	P	N	N	N	N	N	P	N	N	N	No	No	Yes	

Q13	There is co-ordinated follow up of the patient along the pathway	N	N	N	N	N	N	N	N	N	N	N	Access to Rehab Coordinator	S2, S7, S19, S22, S27, S30	No	
Q14	There are specialist rehabilitation facilities for major trauma MSK patients.	N	N	N	N	N	N	N	N	N	N	N	No	S1	No	
Q15	Outcome measures are used for major trauma MSK patients	Y	N	N	N	N	N	N	N	Y	Y	N	No	S19	Yes	
Q16	Trauma Units only: There is access to outreach sessions by a Consultant in Rehabilitation Medicine linked to a MTC	n/a	n/a	N	N	N	N	N	N	N	N	N	Access to Rehab Consultant	S6, table 1, S26	No	

Rehab Prescription audit and review

The purpose of the rehabilitation prescription is to ensure that all major trauma patients have an early multidisciplinary assessment enabling their rehabilitation needs to be identified. It will also allow the collation of data to describe where some of these needs are not currently being met (Keith Willet 2012).

The RP design and process was reviewed and an audit of a sample of MSK rehabilitation prescriptions was carried out. An audit tool was devised based on Department of Health Guidance (DOH 2012). The sample size was 15% of the total number of rehabilitation prescriptions completed at JCUH between May and October 2012. There were no prescriptions completed in April as there was no Trauma Coordinator in post. The results of the audit are summarised as follows:

The key findings of the audit are summarised as follows:

- There was poor documentation of the rehabilitation prescription. Many sections of the rehab prescription were either not assessed or left incomplete.
- 92% of rehabilitation prescriptions were not reviewed
- 30% had patient's wishes recorded and only 8% of families wishes were recorded
- Rehabilitation prescriptions should be completed within 48 hours of medical stabilisation. The audit showed only 17% were definitely completed within this time frame.
- 30% of patients did not have any assessment of cognitive or mood factors

There are problems with the current RP design and the process by which it is used.

Design:
The RP identifies patients' needs but does not indicate if the required service is available. It does not have outcome measures or screening tools to underpin its use thus some rehabilitation needs may not be assessed or identified.

Process:
The audit demonstrated that most patients did not have their RP reviewed even though the greatest need for an up to date RP is on discharge from the MTC.

All patients with serious and major trauma should receive a core rehabilitation prescription whilst those with complex needs will require an additional specialist rehabilitation prescription (Trauma standards). It is recommended therefore that the RP is redesigned and the process implemented to ensure it is a useful clinical tool that is incorporated into the patient pathway. **Recommendations 3 & 9 .**The success of this process is also dependent upon identified key staff to coordinate and implement, **Recommendation 2.**

Patient and Staff Experience

A variety of methods were used to gain patient and staff experience of the current trauma rehabilitation pathway including an online survey, discussion groups and stakeholder events. However there was no response from patients to the surveys and discussion groups which was likely due to the tight timescales of the project limiting the amount of advertising we could do. Gaining permission to talk to patients was extremely problematic as there was initially no consensus on whether the project was research or service evaluation. Eventually agreement was reached with the host organisation and the SHA that it was service evaluation but the delay meant we did not have as much patient and public involvement as we would have liked.

A small number of patients volunteered to complete a hard copy of the survey and one patient asked a therapist to complete the survey on his behalf. Anonymous quotes from the information the patients provided have been included in this report to give further evidence of the current rehabilitation pathway from a patient's perspective. It is recognised that patient's views are key to this piece of work so this initial information was collated to inform the service evaluation by providing evidence to support the recommendations. Further consultation will take place at the launch event where the recommendations will be presented and their implementation discussed. .

Staff experience of the rehabilitation pathway for this group of patients was captured at stakeholder events and recorded as anonymous quotes within the report. Two anonymous case presentations by staff members about patients who had suffered major trauma have been used to compare and contrast the current rehabilitation pathway with the military model.

A Comparison of two models of care

Patient Story 1

Mr G is a 55-year-old Electrician who was admitted to hospital (now an MTC) after being involved in a road traffic accident RTA. He sustained poly-trauma with several severe fractures. Following surgery Mr G spent 2 weeks in ITU and was then stepped down to an acute orthopaedic ward where he remained for seven months. During this time he had problems with mood and behaviour, which affected his rehabilitation.

Issues:

Mr G remained on an acute orthopaedic ward for rehabilitation because he was unable to weight bear for 6 months and therefore did not meet the criteria for community rehabilitation settings.

Post injury Mr G had problems with mood and behaviour, which affected his co-operation with rehabilitation. There was no psychology service available for MSK trauma patients. Mr G was seen by liaison psychiatry as he had been investigated previously for mental health problems. The input however was very limited and Mr G had recurrent problems during his stay.

At 6 ½ months post injury Mr G was allowed to weight bear and was referred to intermediate care (IMC). An inpatient bed became available 2 weeks later and he was transferred. The MDT at the IMC had very limited orthopaedic experience and their usual client group were elderly patients requiring general rehabilitation. The rehabilitation facilities at the IMC were limited. Staff reported Mr G became bored and quite reclusive during his stay and he did not engage with the other elderly patients. Mr G stayed at the IMC for 7 months spending the last 2 months in an independent living flat within the IMC before he was discharged home.

Issues:

Options for step down inpatient facilities are limited for younger trauma patients. The MTC was also the patients TU. Other options within the area were a G.P bed in community hospital. However this would have been an elderly rehabilitation ward.

Experience of rehabilitation staff and rehabilitation facilities were very limited. There was no hydrotherapy or gym facility.

Communication throughout the rehabilitation pathway was poor. Staff at the IMC reported that they received limited information from the MTC on discharge and also from follow up appointments at fracture clinics.

All of the above hindered rehabilitation and likely resulted in a longer stay in the Intermediate Care Centre.

At 15 months post injury Mr G is not driving or returned to work. A social worker is helping Mr G look at other work/training options. The therapy staff at the IMC are not involved in this area of his rehabilitation.

Issues:

There is limited advice and support available for vocational rehabilitation

Patient Story 2

JP is a 24-year-old soldier who was involved in a RTA whilst on leave from the army. The soldier was admitted to an MTC with fractures to a lower limb, upper limb and ribs. The lower limb fracture was fixed surgically and the other fractures were treated conservatively. Post-operatively JP was non-weight bearing through the lower limb and had significant problems with range of movement of the knee joint. JP was

discharged from the MTC 12 days postoperatively mobilising independently with a gutter frame. Follow up rehabilitation was arranged with the military rehabilitation services.

On discharge from the MTC, JP was to attend a Primary Casualty Receiving Unit for assessment. It was then intended that JP would be assessed further and treated at a Regional Rehabilitation Unit. Discussions with military staff about the patients rehabilitation needs indicated that initial rehabilitation would be every day (Mon-Fri) with individual and group sessions for 2-3 hours. When the weight bearing status increased it was intended JP would attend for intensive rehabilitation for three weeks tailored to JP's individual needs. During this period patients attend all day, working on different areas of their rehabilitation and fitness. The end of the rehabilitation plan was to be focussed on army training tests, battle activities etc. to ensure fitness to return to operational duty.

JP returned to active service in a timely manner when deemed fit by military rehabilitation staff.

- JP was discharged from the MTC quickly to an appropriate rehabilitation facility.
- In depth MDT individual needs assessment
- Specialist MDT rehabilitation was available
- A key worker was assigned to co-ordinate and oversee the rehabilitation plan
- There is a strong emphasis even at an early stage on vocational rehabilitation (return to operational duty).
- Intensive rehabilitation was available at appropriate points in the military pathway.
- Timely return to work

Patient Stories Comparison

Patient Story 1	**Patient Story 2**
Civilian	Soldier
Delayed discharge from MTC as no rehabilitation facility available for non-weight bearing patients	No delayed discharge from MTC
No specialist inpatient rehabilitation facility therefore discharged to IMC	Discharged from the MTC to a military rehabilitation facility
Generic Physiotherapy and Occupational Therapy assessment and rehabilitation	Specialist MDT assessment and rehabilitation
No psychology available in the MTC very limited access in community settings	Psychology available if required
Lack of communication from MTC on discharge and follow up	Specific detailed information requested by the military however some lack of communication from MTC on discharge

	and follow up
Lack of capacity to provide intensive rehabilitation	Provision of intensive rehabilitation when required
No integration of vocational rehabilitation into the pathway	Early vocational rehabilitation

Quotes taken from patient surveys and staff consultation

The quotes below have been included to illustrate patient and staff experience of the current MSK trauma pathway:

*With the physio I am receiving I feel I am starting to make progress and improve and this has given me hope of making a full recovery"…**Major trauma patient***

*"No one told me what was going to happen to me. If they had told me what was happening it would have helped" ……**Major trauma patient***

*A social worker arranged some counselling but they only came twice. It helped but now all the fears have come back"……..……**Major trauma patient***

An acute orthopaedic ward is not the right place to rehabilitate patients"

*……..**Consultant Orthopaedic Surgeon MTC***

*"We don't fill the rehabilitation prescriptions in because we don't know what we are doing with them, there was no instruction"….**Band 7 therapist Trauma Unit***

*"We didn't get enough information from the major trauma centre. There was very limited rehabilitation information about what the patient could and couldn't do. We had to make phone calls to find out. Also when patients go back to fracture clinic we get no feedback and it can take a week or two to find out. This delays the patients progress"……...**Physiotherapist – Intermediate care***

*"The end of the rehab pathway is poor. We don't get involved in issues around return to work as we don't know much about them. **Physiotherapist – Intermediate care***

Summary of Gap Analysis

The gap analysis comprised of stakeholder consultation, mapping of services and facilities, mapping against service standards, Rehabilitation Prescription review and audit plus patient/staff experience.

It is apparent that there are significant gaps in the current pathway. There is a lack of leadership and no coordinated pathway for patients following MSK trauma. **Recommendations 1 & 2.** The RP is not utilised as a clinical tool outside the MTCs and there are problems with its current design as well as the implementation process. **Recommendation 9.**

In all areas there is no current provision for younger adults needing on-going inpatient or intensive rehabilitation. Inpatient rehabilitation beds are primarily suitable for elderly patients requiring generic rehabilitation. Non weight bearing patients who cannot be discharged home are often deemed unsuitable for current inpatient rehabilitation facilities for example Intermediate Care settings. This can result in inappropriate increased lengths of stay for patients in acute settings. Older patients may be discharged to a residential care facility where due to poor communication and no coordination there is little or no rehabilitation or follow up. **Recommendation 4.**

There are no specialist MDTs for MSK trauma patients and outpatient MSK physiotherapy services are the main referral option once discharged. However these services do not have the capacity to meet the intensive rehabilitation needs of trauma patients. Also not all outpatient MSK physiotherapy departments have the appropriate facilities for the rehabilitation of trauma patients e.g. Gym and Hydrotherapy. **Recommendations 5.**

There is very limited access to psychology and counselling services for MSK trauma patients. Post traumatic stress disorder (PTSD) occurs in 30% of people experiencing a threatening or catastrophic traumatic event (NICE 2005). PTSD is associated with functional impairments and is the strongest predictor of adverse outcome (Zatzick et al 2002). **Recommendation 5.**

There is no consistent use of outcome measures and no vocational rehabilitation integrated within the current MSK trauma pathway. **Recommendation 10 & 11.** There is no regularly maintained Directory of Rehabilitation Services in most areas however all areas felt this would be useful, **Recommendation 12.**

The gap analysis illustrates a suboptimal pathway which has detrimental effect on a patient's ability to return to their previous activities of daily living and return to work. The implications of this include significant on-going health and social care costs.

Best Practice Pathway

Examples of good practice

Visits to other MTCs and rehabilitation centres were carried out to share information and look at models of trauma rehabilitation pathways. These visits included Manchester Royal Infirmary, Salford Royal Infirmary, Wythenshawe, Hull Royal Infirmary and Hedley Court. Visits were also carried out to other specialities e.g. Regional Spinal Injuries Unit, Walkergate Park and Stroke Unit JCUH to explore other rehabilitation pathways. Information gathered from the visits is detailed in Appendix 11

The common elements in successful models of care included:

- Clearly defined pathway
- Locally adapted rehab prescription (electronic)
- Rehabilitation Coordinators
- Specialist inpatient rehabilitation
- Facilities and staffing for Intensive rehabilitation
- Coordinated MDT approach
- Importance of hydrotherapy
- Vocational rehabilitation
- Psychological rehabilitation
- Directory of rehabilitation
- Use of outcome measures

Requirements for a Best Practice Pathway

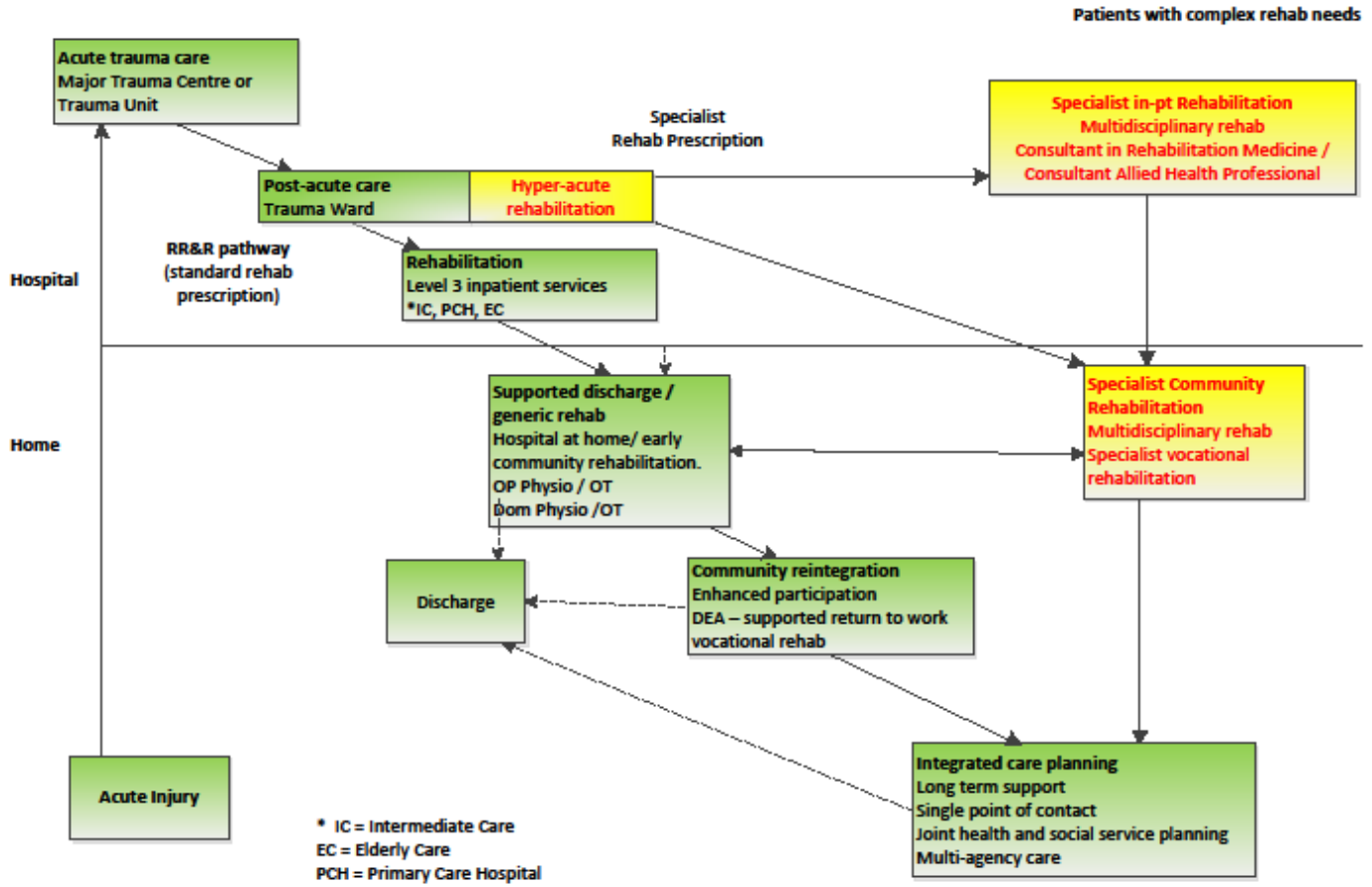
The information gathered from stakeholder consultation and mapping exercises suggest that a best practice pathway should include:

- Co-ordination at all stages of the pathway e.g. Rehabilitation Co-ordinator.
- Good communication between Orthopaedic/Trauma Consultant and therapists
- Leadership across the pathway e.g. Consultant in Rehabilitation Medicine/Consultant Allied Health Professional.
- Patient held rehabilitation notes to improve communication
- Regular review and updating of the rehabilitation prescription throughout the pathway with inclusion of permitted activities such as weight bearing, return to work/leisure.
- Specialist Multidisciplinary Team (MDT)
- Specialist rehabilitation facilities e.g. in patient/outpatient facility, hydrotherapy
- Appropriate and timely provision of equipment e.g. specialist wheelchairs.
- Directory of rehabilitation services
- Vocational rehabilitation

It is recommended that the best practice pathway should include all the requirements as detailed above. The draft Trauma standards produced in 2012 includes a suggested pathway for patients with trauma (see page 20 of this report). This model has been adapted to reflect how it can be applied to the MSK trauma pathway and this is illustrated on the following page.

The majority of MSK trauma patients will follow the R R & R pathway which is more straight forward with higher volume and lower costs, however there are currently significant problems with this pathway due to lack of capacity, coordination and MDT input, **Recommendation 8.**. Some complex MSK trauma patients will require specialist rehabilitation in order to ensure appropriate rehabilitation of sufficient intensity and optimise patient flow through the pathway, **Recommendations 4 & 5.** The inpatient element of this model could be provided by beds within an appropriate existing facility and suitable outpatient rehabilitation units could be utilised for patients following discharge.

Proposed Best Practice Pathway MSK Trauma



Conclusion

Following extensive mapping, consultation and gap analysis the key recommendations for MSK Trauma Rehabilitation are as follows:

- Devise data collection systems to collect information regarding the numbers requiring specialist and R R & R rehabilitation services **Recommendation 3.**
- Develop specialist rehabilitation inpatient beds, **Recommendation 4.**
- Create specialist MDTs (inpatient and outpatient/community). **Recommendation 5.**
- Integrate vocational rehabilitation into the trauma pathway**. Recommendation 10**
- Service redesign to deliver a best practice pathway with emphasis on strengthening R R & R services, **Recommendation 8.**

Strong leadership, coordination and communication are also key in the development of a best practice pathway for MSK trauma patients. Regional implementation of the rehabilitation prescription process and redesign of the current proforma is needed to facilitate the pathway. Together these recommendations will provide a cost effective, fit for purpose rehabilitation pathway that delivers high quality care and improved patient outcomes.

-

Neurotrauma work stream

Introduction

Neurological injuries are the most common and most complex seen after major trauma. After traumatic brain injury (TBI) patients' needs are often complex, requiring physical, psychological, cognitive, emotional and social support to return to full functioning. Unlike other types of trauma, the timescale to recovery is unpredictable. In-patient rehabilitation and community provision should be provided in high cost, low volume services with a defined population base commissioned as specialised services.

Evidence demonstrates that early coordinated rehabilitation provided by specialist services led by Consultants in Rehabilitation Medicine (Level 1 and Level 2 services), and timely referral to appropriate specialist community teams results in better outcomes and reduces the use of NHS resources across the patient pathway, including decreased length of hospital stay (BSRM 2009). All patients with severe and moderate brain injury should have an assessment of their rehabilitation needs carried out in this context as generic (Level 3) rehabilitation services are not equipped to meet the needs of this group.

Nationally, services for survivors of traumatic brain injury have developed piecemeal and on the basis of local geography and commissioning arrangements, rather than by co-ordinated design.

Scope of Work

Services for adults of working age (16-65) with traumatic brain injury (TBI) in the North were the focus of the work. This part of the trauma project commenced in October 2012, later than the musculoskeletal work stream. Paediatric Neurotrauma Rehabilitation is provided for the region by the specialist Paediatric Neurology team at the RVI and details of the service are provided in appendix 12. Patients over 65 receive rehabilitation after brain injury through elderly care or local services.

Traumatic spinal cord injuries are managed by the regional spinal injuries unit and in depth study is out-with the scope of this report.

The regional pathways and services for neurotrauma patients were explored using:-

- Mapping of current pathways
- Stakeholder events
- Gap analysis project
- Patient experience examples
- Exploring examples of good practice from other national units
- Available Data relevant to the trauma rehabilitation

Limitations of Data

Currently no standardised recording measures of rehabilitation needs, numbers requiring each level of rehabilitation and “leakage” of patients from each step of the pathway exists because:-

Rehabilitation need is not based on diagnosis, but in deficits of functioning and participation in society which are difficult to measure as they differ from individual to individual and at various stages of the process.

The different available data systems – NEAS, TARN, and specialist rehabilitation referral data are not designed to focus on rehabilitation need so are not fit for purpose for this work. Also as different data systems are in operation at each MTC, direct comparison is not appropriate. No bespoke regional system yet exists. TARN data is retrospective and detailed information for rehabilitation is not available from every unit.

Specialist rehabilitation outcomes, recorded in the UKROC dataset (the commissioning tool from 2014) are not adopted by all centres and all areas of the pathway.

The rehabilitation prescription is not yet functional region-wide as a data-recording tool.

Current Pathways Findings

Rehabilitation Provision for Neurotrauma Patients at the Major Trauma Centres

No formal co-ordinated multidisciplinary rehabilitation service specifically for TBI patients currently exists at either MTC separate to provision for other neurological conditions. Models of care have developed ad hoc and there are significant differences between the two centres.

Available data sources are used as proxy measures for those requiring rehabilitation as there is currently no formal method of recording rehabilitation needs.

James Cook University Hospital, Middlesbrough has 18 in-patient beds on the main hospital site for neurorehabilitation. The unit is staffed by a single-handed (1 WTE) Consultant in RM supported by a staff grade in rehabilitation medicine. No formal pathway exists for neurotrauma patients separate to other patient groups. Referrals are made on an ad hoc basis and the Consultant in RM plays no role in the rehabilitation prescription process. This role is carried out by a Band 7 Physiotherapist.

The Royal Victoria Infirmary, Newcastle has no inpatient beds for neurorehabilitation. There are 1.5 sessions of Consultant in Rehabilitation Medicine for Neurosciences Liaison/In- reach provided by Northumberland Tyne and Wear NHS Trust from the Level 1 Regional Rehabilitation Centre at Walkergate Park. A

weekly multidisciplinary rehabilitation ward round takes place on neurosurgery and critical care. Therapy staffing ratios are designed for delivery of acute services. Referral to specialist rehabilitation is currently an ad hoc process (including specialist community teams). Rehabilitation prescriptions are filled in by Band 7 physiotherapists but are not repeated or used to aid transfer or discharge. There is no tracking system for patients within the MTC or following onward transfer.

Currently there are no pro-active processes to adequately identify all major trauma patients and their rehabilitation needs at either centre or to ensure referral to specialist rehabilitation when needed. No formal coordinated discharge planning or onward support at discharge is provided.

An 18 year old man with a traumatic brain injury and tibial fracture was discharged directly home to the care of his parents from acute care to an area with no community services. Two years later, when referred to the rehabilitation clinic by his GP, he was socially isolated, spending his time at home playing computer games. He had not returned to training or employment due to problems with frustration, concentration and short term memory. His walking and physical activity remained limited. Early coordinated involvement of specialist rehabilitation services could have addressed these issues and enabled exploration of return to community involvement and employment.

Feedback from Consultant in RM

Hyper-acute Rehabilitation

There are currently no facilities for very early coordinated specialist rehabilitation when patients may still be medically stable or have highly complex needs (for example tracheostomy or low awareness states) at either MTC. Specialist facilities are not available for patients in acutely disturbed or severely agitated states on site. The management of this group depends on liaison psychiatry and urgent transfer to the regional neuropsychiatry service at Walkergate Park (Northumberland Tyne and Wear Foundation Trust), Provision of specialist care for this complex sub-group of neurotrauma patients is currently lacking region-wide.

Examples of Innovative Practice from other Centres:-

East of England Major Trauma Network – establishment of new 6 bedded hyper-acute rehabilitation unit at the MTC (Addenbrooke's Cambridge) including appointment of new Rehabilitation Medicine lead for trauma. Dedicated database and support staff to monitor patients and their outcomes throughout the trauma pathway for 1 year after injury.

Greater Manchester Major Trauma Network – increase in capacity of hyper-acute rehabilitation unit proactively accepting all patients with neurological conditions direct from critical care including aggressive tracheostomy decannulation team and formal

onward referral pathways to acute rehabilitation and community services in the wider region.

East Midlands Major Trauma Network- appointment of Lead Consultant for Rehabilitation and establishment of electronic rehabilitation prescription process and transfer documentation including standardised recording of outcome measures within the UKROC framework linking directly with rehabilitation services in the Trauma Units

Data relating to Neurotrauma Rehabilitation at the MTCs

The data described below has been used to provide inferred information by proxy and actual numbers requiring rehabilitation may be considerably higher.

Coordination of trauma patients in the MTCs

In Newcastle and South Tees MTCs, the brain injury specialist nurses have a lead role in monitoring patients in these hospitals. Numbers of referrals give an indication of those with ongoing needs. Patients are referred on an ad hoc basis via the clinical teams and there is no inclusive system.

1. Patients requiring assessment by Head Injury Nurse Specialist at the RVI following neurological trauma.

	Critical care & Neurosurgery wards	A&E and Trauma Ward	Other (e.g. plastic or general surgery)	Total For RVI
Jan-March - pre MTC	34	11	1	46
April -June	42	28	4	72
July - Sept	37	28	4	69

Data source – Dept. of Neurosurgery, RVI

Data was only available from the RVI due to the services being more established. This information shows an increase in number of patients requiring assessment and coordination across the pathway since MTC formation. Many of these patients require full assessment by the multidisciplinary team (MDT) and Consultant in Rehabilitation Medicine (CRM) to accurately assess rehabilitation need and appropriate onward placement.

2. Patients seen by CRM on Neurosurgery MDT Rehabilitation Ward round at RVI MTC

Month	**Number of patients seen**
January 2012	28
February 2012	26
March 2012	23
April 2012	19
May 2012	31
June 2012	22
July 2012	24
August 2012	23
September 2012	20
October 2012	29
November 2012	24
December 2012	16
January 2013	22

Data source – Therapy services, RVI

Numbers reflect only those patients referred by members of the MDT and Consultant Neurosurgeons and do not capture all patients with TBI who require assessment by CRM and onward referral for specialist rehabilitation.

Nature and number of Patients' Principal Injuries requiring rehabilitation at the RVI

Data source – TARN local database RVI April – September 2012

Data for those with an ISS greater than 16

	CNS injury predominant	MSK injury predominant	Mixed	Other injuries predominant – chest , vascular, abdominal	Total
Children less than 16 years	9	0	2	1	12
Adults 16-65	81*	14	27*	47	169
People over 65 years	28	3	8	7	47
Total					228

*Adult neurotrauma is the biggest group in this ISS category, with a total of 108 (47%) requiring specialist rehabilitation and assessment by a Consultant in RM in the first 6 months of MTC operation.

Data for those with an ISS 9-15

	CNS injury predominant	MSK injury predominant	Mixed	Other injuries predominant – chest, vascular, abdominal	Total
Children < 16 years	3	9	0	1	13
Adults 16-65	41	74	1	26	142
Older people > 65 years	17	26	1	9	53
Total					208

20 % (42) of this group are recorded in the same 6 month period as having neurotrauma requiring the issuing of a rehabilitation prescription on TARN so may also require specialist rehabilitation and the input of a Consultant in Rehabilitation Medicine.

Rehabilitation Provision for Neurotrauma at the Trauma Units

Trauma units receive neurotrauma patients requiring rehabilitation in 2 ways:-

1. Following transfer back from the MTCs during their recovery period
2. Direct admissions that have neurotrauma not requiring surgery remaining at the TU.

Data about these groups in Northern Region is limited and no formal rehabilitation pathways currently exist for trauma patients in any trauma unit. Specialist (Level 2) provision including the input of a Consultant in Rehabilitation is only currently available at 2 TUs (Sunderland and Carlisle), with patients elsewhere coming under the care of a variety of specialties (for example general surgery, general medicine, orthopaedics, stroke and elderly care). Examination of the provision of rehabilitation for these groups is currently on-going in South of Tyne (Barr. 2011).

Limited data about the rehabilitation needs of patients in the TUs is available from TARN due to the absence of the best practice tariff rehabilitation inputs at TUs. For example in the Sunderland area 9 patients with neurotrauma did not transfer to the MTC. It is not clear where their rehabilitation needs were met locally as routine referral to the Consultant in RM at Sunderland does not currently take place.

Stakeholder Consultation

Common themes that emerged from the stakeholder consultation are:-

Lengthy Waiting times to access specialist rehabilitation from both MTCs

Lack of provision of specialist neurorehabilitation beds

Inappropriate use of acute beds with lack of specialist multi-disciplinary team and Consultants in Rehabilitation Medicine input whilst waiting

Lack of follow on care from specialist rehabilitation which delays discharge

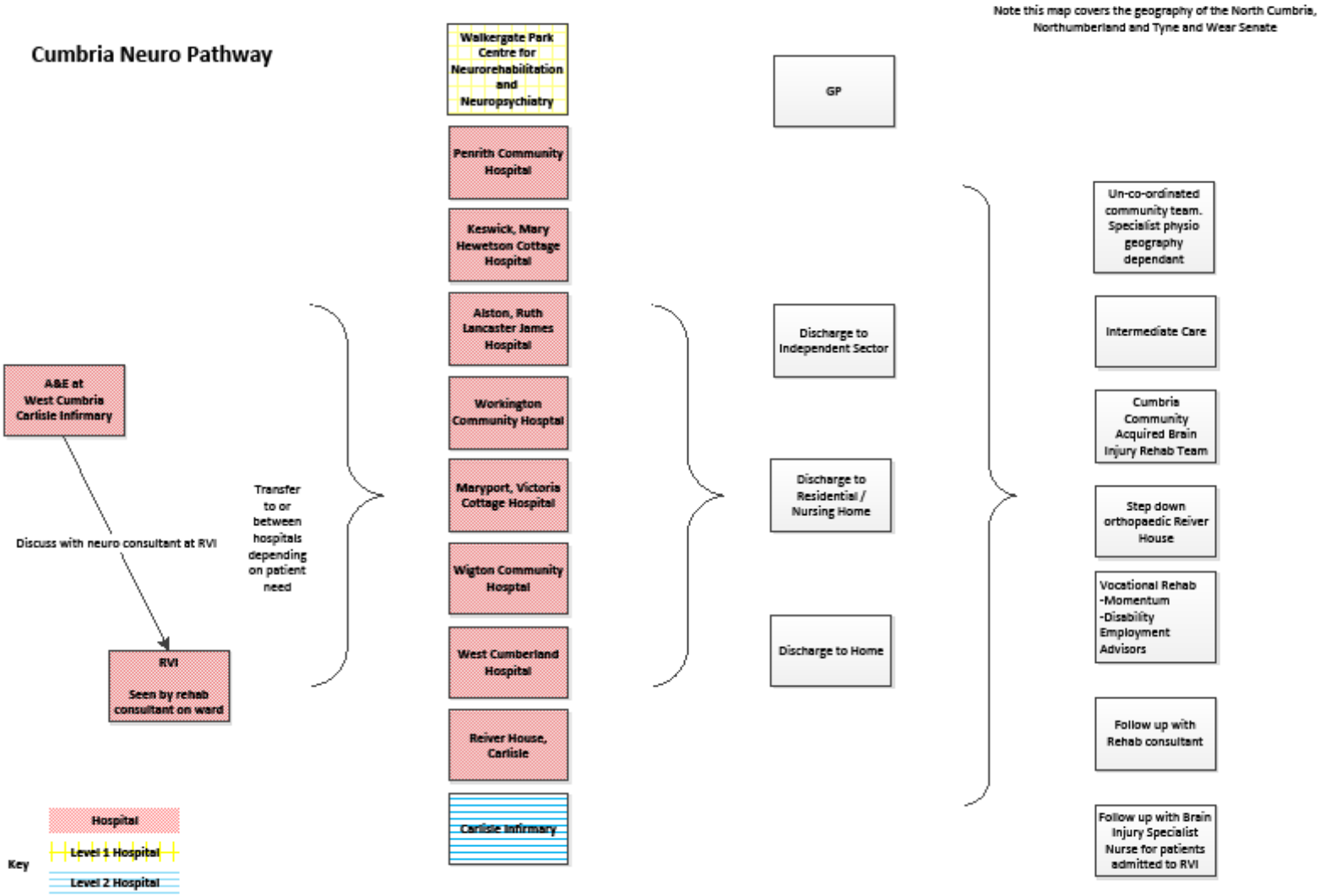
Lack of coordination across the pathway and between teams

Need for earlier involvement of Consultants in Rehabilitation Medicine in the patient's pathway

Lack of specialist community teams in many areas

Lack of Consultants in Rehabilitation Medicine and dedicated multi-disciplinary teams at many trauma units

In addition to the stakeholder consultations, telephone contact was made with allied health professionals or service leads in all of the local areas in the region. From these two processes we were able to generate a schematically simplified Traumatic Brain Injury pathway map (Appendix 13) an example of which is shown.


Cumbria Neuro Pathway
Note this map covers the geography of the North Cumbria, Northumberland and Tyne and Wear Senate
A&E at West Cumbria Carlisle Infirmary
Discuss with neuro consultant at RVI
RVI
Seen by rehab consultant on ward
Transfer to or between hospitals depending on patient need
Walkergate Park Centre for Neurorehabilitation and Neuropsychiatry
Penrith Community Hospital
Keswick, Mary Hewetson Cottage Hospital
Alston, Ruth Lancaster James Hospital
Workington Community Hospital
Maryport, Victoria Cottage Hospital
Wigton Community Hospital
West Cumberland Hospital
Reiver House, Carlisle
Carlisle Infirmary
GP
Discharge to Independent Sector
Discharge to Residential / Nursing Home
Discharge to Home
Un-co-ordinated community team. Specialist physio geography dependant
Intermediate Care
Cumbria Community Acquired Brain Injury Rehab Team
Step down orthopaedic Reiver House
Vocational Rehab -Momentum -Disability Employment Advisors
Follow up with Rehab consultant
Follow up with Brain Injury Specialist Nurse for patients admitted to RVI
Key
Hospital
Level 1 Hospital
Level 2 Hospital

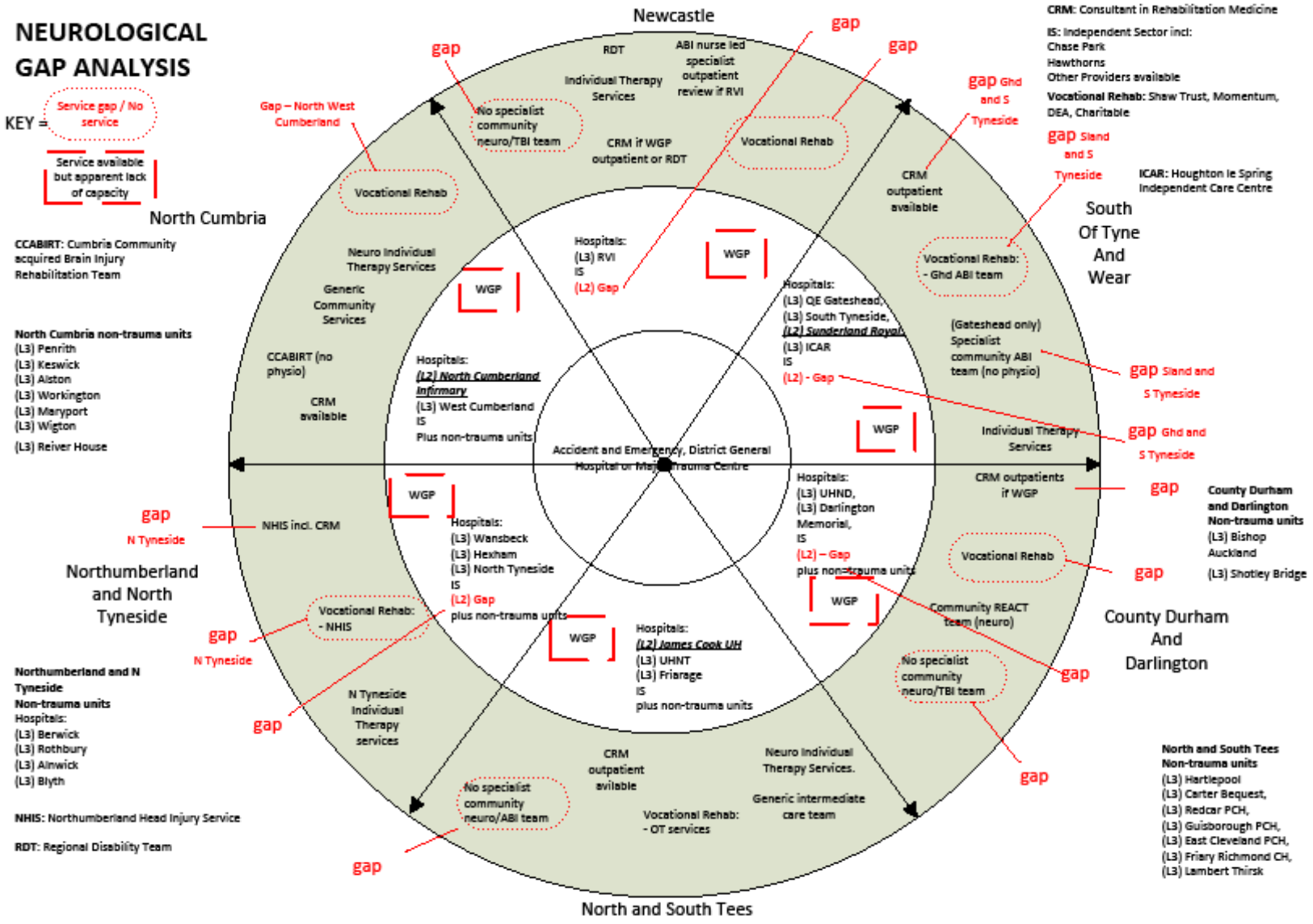
To assess current provision for Traumatic Brain Injured patients in the North East to that recommended nationally we used the BSRM standards to generate gap analysis grids. The maps along with gap analysis grids, were sent to Stakeholders (appendix 14) within the local areas for comment and an overall gap analysis for the region was generated:

Early and specialist rehabilitation services: Quality Requirement 4	**Northumberland and North Tyneside**		**Newcastle**	**South of Tyne and Wear**		**County Durham and Darlington**	**North and South Tees**	**Cumbria**
S1. Provision of rehabilitation services for people with neurological conditions should be available including:								
Specialist in-patient neurorehabilitation services led by a consultant trained and accredited in Rehabilitation Medicine (RM) (Level 3 competencies in neurological rehabilitation).	None		None	None	*All	None	All	All
Out-patient and day rehabilitation services, supported by adequate transport systems	Some		Some	Some		Some	Some	Some
Home-based /domiciliary rehabilitation services for people who require them	All	some	Some	*Most	Some	Some	Some	Some
S2 Co-ordinated service planning and delivery should ensure that:								
Suitable services are available within a reasonable traveling distance,	Most		Most	Most		Some	Some	Some

Rehabilitation services work together through planned network arrangements, where specialist neurorehabilitation services support local teams in the management of more complex patients, for example through the establishment of in-reach/out-reach, satellite services or peripatetic teams	All	None	Some	*Most	None	None	Some	Most
S5 Current BSRM recommendations for Specialist rehabilitation service provision recommendations should be followed covering:								
A minimum of 60 beds per million population for specialist in-patient rehabilitation medicine. (This figure assumes other services are locally available for stroke rehabilitation and for rehabilitation of older people),	None	None	None	*Most	None	Most	Most	
The minimum size of an inpatient specialist rehabilitation unit should normally be around 20 beds to achieve critical mass	None	None	None	*Most	None	Most	Most	
The beds must be co-located, together with therapy facilities (see S10), to provide a rehabilitative environment and to support co-ordinated inter-disciplinary team-working between nursing therapy and medical teams	None	None	None	*All	None	All	All	
In addition, complex specialised rehabilitation (tertiary) services should be provided for patients with complex rehabilitation needs e.g. severe brain or spinal cord injury, low awareness states, challenging behaviour or concurrent complex medical needs.	Some	Some	Some		Some	Some	Some	
•These should:								
be provided in co-ordinated service networks over a population of 1-3 million								
be expected to have special facilities and to take a demonstrably more complex case-load, for which higher staffing levels will be require do be subject to specialised commissioning arrangements (see Warner Report)								

S6 All specialist rehabilitation services should be supported by dedicated sessions from a consultant specialist in rehabilitation medicine												
A minimum of 6 WTE consultant specialists in rehabilitation medicine (RM) per million population including:	Some		Some		Some		None		Some		Some	
3.6 WTE for district specialist inpatient rehabilitation services and their associated out-reach activities	None		None		None	*Some	None		None		Some	
2.4 WTE for specialist community rehabilitation services (These figures assume additional contributions from other specialties to support local rehabilitation in the context of Stroke Medicine and Care of the Elderly settings)	Most	None	Some		None		None		None		None	
S7/8/9 Specialist rehabilitation should cover all relevant clinical disciplines, with an inter-disciplinary team with access to specialist advice with an establishment to meet patient needs.	Some		Some		Some	*Most	Some		Most		Most	
S10 In-patient specialist rehabilitation services should provide an appropriately adapted environment, which facilitates rehabilitation and includes the relevant special facilities to suit the needs of the patient group. These may include: • Exercise equipment, such as hydrotherapy, harness-treadmill • Wheelchairs, Facilities to assess activities of daily living, etc.	Some		Some		Some	*Most	Some		Most		Most	
3. Referral assessment and transfer to specialist rehabilitation should be timely as inpatient, after discharge, complex needs assessment. Written summary provided to referrer and response times audited.												
4. The rehabilitation process in specialist rehabilitation services should be 24 hour, involve the family, co-ordinated and longer term outcomes followed up.												

Person centred care and integrated care planning: Quality Requirement 1 & Community rehabilitation and support: Quality Requirement 5								
1. Joined-up working between healthcare and social services should be established, including partnership working, explicit responsibilities and established funding arrangements.	All	None	None	None		Some	Some	Some
2. Provision of specialist community rehabilitation services for people with LTNC should be supported by dedicated sessions from a consultant in Rehab Medicine, be inter-disciplinary and adequately staffed.	All	None	Some	None		None	None	None
3. Community rehabilitation and support should be provided in a timely manner by named individual or team with adequate skills. Family and carers should be involved and joint health and social care needs assessed at least annually.	All	some	Some	*Most	Some	Some	Some	Most
Vocational rehabilitation: Quality Requirement 6								
1. Vocational rehabilitation services for people with LTNC should be considered as routine part of rehabilitation and should have access to local or specialist vocational rehabilitation services.	All	some	Some	Some		Some	Some	Some
2. The vocational rehabilitation process should include assessment, work with Disability Employment Advisors and/or employer and also support those unable to return to work.	All	some	Some	*Most	Some	Some	Some	Some


NEUROLOGICAL GAP ANALYSIS
KEY =
Service gap / No service
Service available but apparent lack of capacity
Newcastle
RDT
ABI nurse led specialist outpatient review if RVI
Individual Therapy Services
CRM if WGP outpatient or RDT
No specialist community neuro/TBI team
Vocational Rehab
gap
gap
gap
Gap – North West Cumberland
gap Ghd and S Tyneside
gap Sland and S Tyneside
North Cumbria
CCABIRT: Cumbria Community acquired Brain Injury Rehabilitation Team
North Cumbria non-trauma units
(L3) Penrith
(L3) Keswick
(L3) Alston
(L3) Workington
(L3) Maryport
(L3) Wigton
(L3) Reiver House
Neuro Individual Therapy Services
Generic Community Services
CCABIRT (no physio)
CRM available
Vocational Rehab
WGP
Hospitals:
(L3) RVI
IS
(L2) Gap
Hospitals:
(L2) North Cumberland Infirmary
(L3) West Cumberland
IS
Plus non-trauma units
WGP
Hospitals:
(L3) QE Gateshead,
(L3) South Tyneside,
(L2) Sunderland Royal
(L3) ICAR
IS
(L2) - Gap
WGP
CRM outpatient available
Vocational Rehab:
- Ghd ABI team
South Of Tyne And Wear
ICAR: Houghton le Spring Independent Care Centre
(Gateshead only) Specialist community ABI team (no physio)
gap Sland and S Tyneside
gap Ghd and S Tyneside
Individual Therapy Services
Accident and Emergency, District General Hospital or Major Trauma Centre
CRM: Consultant in Rehabilitation Medicine
IS: Independent Sector incl:
Chase Park
Hawthorns
Other Providers available
Vocational Rehab: Shaw Trust, Momentum, DEA, Charitable
gap
NHIS incl. CRM
N Tyneside
Northumberland and North Tyneside
WGP
Hospitals:
(L3) Wansbeck
(L3) Hexham
(L3) North Tyneside
IS
(L2) Gap
plus non-trauma units
Hospitals:
(L3) UHND,
(L3) Darlington Memorial,
IS
(L2) – Gap
plus non-trauma units
WGP
CRM outpatients if WGP
gap
County Durham and Darlington Non-trauma units
(L3) Bishop Auckland
(L3) Shotley Bridge
Vocational Rehab
gap
Vocational Rehab:
- NHIS
gap
N Tyneside
Northumberland and N Tyneside
Non-trauma units
Hospitals:
(L3) Berwick
(L3) Rothbury
(L3) Alnwick
(L3) Blyth
NHIS: Northumberland Head Injury Service
RDT: Regional Disability Team
WGP
Hospitals:
(L2) James Cook UH
(L3) UHNT
(L3) Friarage
IS
plus non-trauma units
Community REACT team (neuro)
gap
gap
N Tyneside Individual Therapy services
No specialist community neuro/TBI team
gap
CRM outpatient avilable
Neuro Individual Therapy Services.
Generic intermediate care team
Vocational Rehab:
- OT services
No specialist community neuro/ABI team
gap
North and South Tees
County Durham And Darlington
North and South Tees Non-trauma units
(L3) Hartlepool
(L3) Carter Bequest,
(L3) Redcar PCH,
(L3) Guisborough PCH,
(L3) East Cleveland PCH,
(L3) Friary Richmond CH,
(L3) Lambert Thirsk

Gap Analysis Findings:

The gaps identified in major and serious trauma rehabilitation in the North East Region as of March 2013 are:

Specialist Rehabilitation Inpatient Beds in Northern Region (March 2013)

Level 2 Services

The BSRM standards recommend 60 specialist beds per million population i.e. level 2 rehabilitation for long term neurological conditions. The total regional population is approximately 3 million (ONS 2010) which translates to a need for 180 beds.

Current level 2 rehabilitation beds are identified in the table below:

Unit	**Number of beds**
Sunderland Royal Hospital	**19**
Carlisle Infirmary	**10**
James Cook University Hospital	**18**
Total	**47**

Based on a comparison of the available resource (n = 47) and the BRSM standard (n = 180) there is a shortfall of 133 specialist rehabilitation beds in the Northern Region.

Evidence indicates the cost savings that can be made through reduction in length of stay and ongoing care needs due to early intensive coordinated rehabilitation (RCP, 2010). As there is limited level 2 rehabilitation across the region, there is a large gap in appropriate onward transfer of MTC neurotrauma patients and this results in the blocking of acute beds. (**Recommendation 6**).

Level 1 Rehabilitation

Level 1 rehabilitation services are required for the most complex patients and are defined as services managing patients with >85% category A needs. These services should be provided to serve a population of 1-3 million in addition to level 2 services and are subject to specialized commissioning arrangements.

Currently in Northern region services are based at the 35 bedded neurorehabilitation unit at Walkergate Park Centre for Neurorehabilitation and Neuropsychiatry. This is based in the north of the region in Newcastle.

Referrals and Waiting list Information from the Centre's single point of access database show significant capacity issues with 36-70% of suitable referrals for inpatient admission rejected at source due to a lack of available bed. Between April

and September 2012 the number of patients on the waiting list for a neurorehabilitation bed ranged from13 -24 per month.

Referrals from the RVI MTC resulting in actual admissions to the Level 1 Rehabilitation Services

Month	Trauma	Non-trauma
April	1	6
May	6	8
June	2	5
July	3	3
August	5	4
September	3	4

Data source – WGP Single Point of Access Database

UKROC Outputs

Rehabilitation Complexity Scores for neurorehabilitation inpatients 2012-13

The tables below reflect the level of complexity of patients according to UKROC median Rehabilitation Complexity Scores for 2011/2012. Scores are influenced by staffing levels and are used at this stage to inform future commissioning arrangements so levels may change.

Walkergate Park Centre for Neurorehabilitation & Neuropsychiatry (sign-posted level 1.1)

very low (0-3)	Low (4-6)	Medium (7-9)	High (10-12)	very high (above12)	Total
1%	4%	14%	42%	39%	100%

Neurorehabilitation Unit, James Cook University Hospital (sign-posted level 2b)

very low	Low (4-6)	Medium (7-9)	High (10-	very high (above12)	Total

(0-3)			12)		
6%	23%	46%	22%	3%	100%

All patients admitted to the level 1 unit during this period had level 1 needs which are detailed in the table below:-

Patient Categorisation Walkergate Park Centre for Neurorehabilitation and Neuropsychiatry, April – November 2012

Category A Needs (n=88)

Medical care in the context of Rehabilitation – out of hours cover, specialist procedures	78
Tracheostomy/need for ventilatory support	6
Low awareness states	9
Cognitive/behavioural disturbance	50
Psychiatric support	20
Need for specialist facilities – seating, FES, ECS, communication aids	63
Specialist interventions	32
Specialist vocational rehabilitation	37

The limited number of level 1 beds along with the lack of level 2 beds results in long waiting times for both physical and psychiatric services and great distances for patients in the far south and west of the region to travel, again highlighting a gap in service provision (**Recommendation 6**).

A twenty six year old man with severe traumatic brain injury requiring emergency neurosurgery and a prolonged ITU stay was in a minimally-conscious state and was transferred to another unit whilst awaiting an available bed in a Level 1 rehabilitation unit. During this delay he developed limb contractures due to spasticity which would have been proactively treated had he been in the specialist service earlier. Permanent loss of joint range has occurred in his upper limbs which has limited his

ability to do independent self-care and affects his balance putting him at risk of falls. Despite making a good neurological recovery this problem has profoundly limited his social life and prospects of return to employment.

Feedback from Rehabilitation Consultant

Community Services

Dedicated specialist brain injury rehabilitation teams within the community are only currently commissioned in Gateshead, Cumbria and Northumberland. There are different models of care at each locality. All these teams work across health and social care, with Northumberland alone having all therapies represented in the one team. The importance of a specialised community team has been highlighted in previous reports (BSRM 2009).

Region	Specialist Community Brain Injury Team	Rehab Consultant in Team	Outpatient Therapy Services	Community Teams
Northumberland	OT, PT, Neuropsychologist, SALT, Care Managers, CRM and RA	Yes	Neuro PT	Area specific generic teams, Central, North, West and Berwick. PT, OT and RA
Newcastle	No	Yes-RDT	RDT:Neuro specific PT, OT, RA, Orthotics and RCM	
			Neuro PT: RVI	Area specific generic teams. PT, OT, RA
Gateshead	Psych, OT, PT and SW	No	Neuro PT	Generic PT Team
North Tyneside	No	N/A	Neuro Rehab Services: PT, OT, RA	
South Tyneside	No	N/A	Neuro PT	Generic Intermediate care Team
Sunderland	No	N/A	Neuro PT: CRM Clinic	Generic PT and Intermediate Care Team 6/52 involvement. PT, OT, RA, SW
Easington	No	N/A	East React Team Neuro: PT, OT, Nurse, Support worker, Care manager.	
North Durham	No	N/A	North React Team Neuro: PT, OT, Nurse, Support worker, Care manager.	
Darlington	No	N/A	Darlington React Team Neuro: PT, OT, Nurse, Support worker, Care manager.	
Durham Dales	No	N/A	South React Team Neuro: PT, OT, Nurse, Support worker, Care manager.	

Darlington	No	N/A	React Team Neuro: PT, OT, Nurse, Support worker, Care manager.	
Sedgefield	No	N/A	South React Team Neuro: PT, OT, Nurse, Support worker, Care manager.	
North Tees	No	N/A	Neuro PT, OT Pilot CRM Clinic	
South Tees	No	N/A	Neuro PT, OT, SALT CRM Clinic	
Cumbria	Neuropsychologist, OT, RA, Nurse, SW	No	Neuro PT CRM Clinic	Generic Rehab Teams

Key: PT – Physiotherapist; OT - Occupational Therapist; RA – Rehabilitation Assistant; SW – Social Worker; CRM – Consultant in Rehabilitation Medicine;

SALT – Speech & language Specialist

Colours: Specific Brain Injury Teams

Neuro - Neurology specific therapy's

Generic – Non neurology specific teams

One approach is to consider the needs of neurotrauma survivors in the context of services supporting those with Acquired brain injury from any cause. Recent work on an overarching rehabilitation strategy for South of Tyne is exploring potential models which fit with this approach but maintain the specialist skills needed for this group of patients (Barr 2011).

To give an example of the scope of a dedicated traumatic brain injury team, the Northumberland Brain Injuries Service covers a large geographical area with population of approximately 312,000 people (ONS 2010), serving both rural and urban communities. It consists of:

Whole Time Equivalent	Profession
1 Team Lead across 3 teams	
4	Level 1 & 3 Care Managers
0.2	Consultant in Rehabilitation Medicine
1	Band 8a Neuropsychologist
1.1	Band 6 & 7 Occupational Therapists
0.2	Speech & Language Therapist
1.2	Band 6 & 7 Physiotherapists
1	Rehabilitation Assistant
Administration support	

In the year January 2012-January 2013 the team saw 36 new referrals. The team operates an open referral system. Prior to treating patients in their own home, the team may also work alongside inpatient therapists in the trauma units or Walkergate Park Centre for Neuro Rehabilitation and Neuropsychiatry (level 1 rehabilitation), to ensure a smooth transition on discharge into the community. Due to a lack of coordinated care for neurotrauma patients in the local TUs it has not been possible to apply this model for all patients using the service.

There is a large gap in the delivery of coordinated services to traumatic brain injured patients across other local areas, lacking a specialist community team, varying from individual neuro therapy services to non neuro specific therapy teams of varying size and professions (**Recommendation 7**).

23year old mother suffered a TBI requiring neurosurgery. Following initial recovery she was transferred for level 1 rehabilitation. Following this she was discharged to a nursing home with specialised community brain injury service support. She required assistance with all personal care and was wheelchair dependant. Two years later with on-going care management and intermittent therapy as required she is about to move back into her own flat, with a small care package, independently mobile and in all personal care and enabling her to enjoy quality time with her 6 year old son. Without the help of a combined health and social care specialised team this patient would have remained totally dependent with a markedly reduced quality of life, for her and her family, not to mention the financial implications on the state.

Feedback from Therapist

Vocational rehabilitation

Vocational Rehabilitation enables people who have sustained neurotrauma to overcome barriers in order to be able to return to work. It encompasses job retention (maintaining the person in the work place), as well as preparing the individual to return to work and every effort should be made to facilitate people in returning to work where ever possible (RCP, 2010).

Currently the majority of comprehensive coordinated vocational rehabilitation for those with neurotrauma is provided as part of their specialist rehabilitation programme delivered by the specialist community teams or during a Level 1 inpatient stay. For example, the cognitive rehabilitation service at Walkergate Park is an inpatient short-stay service specifically addressing work and community re-integration with specialist multi-disciplinary involvement. In Teesside vocational rehabilitation is provided by the Occupational therapists within the community.

56yr old lady fell from a horse suffering a TBI admitted to acute neurology services then transferred to level 1 rehabilitation but due to an inability to cope in an inpatient setting took her own discharge. She was supported at home by a specialist brain injury community service. This lady spent most of her time outdoors and managed a horse riding stables. Following coordinated intervention, which she engaged in fully as it was in her environment and meaningful to her. She is now, with strategies, running her business again. The appropriate support and vocational rehabilitation has improved her quality of life and has reduced any financial impact on the state from her not working again.

Feedback from Therapist

Elsewhere patients only have access to statutory services. Throughout the region, non-specialised vocational assistance (but not rehabilitation or work support) is available through local “Job Centre Plus” via Disabled Enablement Advisors (DEA).

This service is not appropriate for those with significant cognitive or emotional impairment.

A farmer suffered a TBI, requiring transfer to acute neurosurgery for a craniotomy. Following initial recovery he was transferred to level 1 rehabilitation and discharged back to his farm independently mobile and in all activities of daily living but unable to participate effectively in any farming activities. Support was provided by a specialised community brain injury team. The coordinated interdisciplinary working within the patient's home environment, over a 2 year period resulted in him becoming a valued member of the team on the farm, giving him a feeling of self-worth and he and his family an improved quality of life. If he had not returned to work this would have also impacted on the state financially.

Feedback from Therapist

For more specialised vocational rehabilitation and training including interview advice and support, job coaching, physical environmental workplace assessment and job-buddying, there is currently only one specialised provider - "Momentum" a charitable organisation who has limited places and whose offices are based in north of the region in Newcastle.

There are other charitable organizations assisting in vocational rehabilitation but not specifically for neurological disorders. Again evidence indicates the cost effectiveness of specialist vocational or supported employment and the gain for the tax payer (RCP, 2010) (**Recommendation 10**).

Consultants in Rehabilitation Medicine

The core role of a Consultant in Rehabilitation Medicine is to manage medical conditions and prevent complications in those conditions causing complex disability. Vital contributions to care are made through anticipation and prevention of physical, psychological and social complications based on a knowledge of the conditions' complications and prognosis. Nationally Rehabilitation Medicine is a small specialty with most Consultants specialising in neurorehabilitation (RCP 2010).

In Northern Region the Consultant Provision is below national standards for the population base.

National standards recommend a minimum of 6 WTE Consultant Specialists in RM per million of population including 3.6 WTE for district (level 2 specialist inpatient rehabilitation services). and 2.4 WTE for specialist community rehabilitation services. There should be no single-handed consultants. Complex (Level 1) services – require higher staffing levels reflecting patient complexity.

<u>Current Provision of Consultants in RM in Northern Region 2013;-</u>

Level 1 Services (including specialist community) – 3.8 WTE

Level 2 Services (including specialist community) – 3WTE all single-handed

The shortfall is therefore currently two-thirds of the national standard recommendations. The Trauma standards also introduce the new concept of “Hyper acute” rehabilitation. Currently there are no designated beds in the region. To allow such new developments, in addition to input and leadership for the rehabilitation prescription process, will require extra CRM specialist staffing

The Trauma standards and major trauma CAG document recommend Consultants in RM should be an integral part of the Major Trauma Centre’s Team. For patients with on-going needs the RMC or an appointed deputy, including Consultant AHP, are required to complete the “Specialist Rehabilitation Prescription” (i.e. patients requiring level 1 or 2 rehabilitation). Also each trauma unit should have expertise in rehabilitation medicine available. This is currently not the case in the Northern Region. (**Recommendation 1**).

Conclusions

The biggest gaps highlighted throughout the region using the grids and trauma standards are: _

Lack of robust data about numbers requiring specialist rehabilitation and generic rehabilitation services (RR&R pathway). No adequate system of identifying and addressing rehabilitation needs for all neurotrauma patients currently exists. (**recommendation 3**)

Lack of coordination of patient’s pathways (**recommendations 1 & 2**).

Lack of specialist inpatient neurorehabilitation facilities (**recommendation 6**).

Lack of CRM (**recommendation 1**).

Lack of specialised community teams (**recommendation 7**).

Lack of Specialised vocational rehabilitation (**recommendation 10**)

Appendices

1. Neurotrauma Work Stream
2. Interim Report and commissioning template
3. List of Trauma Rehab Steering group
4. Rehabilitation prescription
5. Categorisation of the rehabilitation prescription
6. Stakeholder events attendance list
7. Outcome measures
8. MSK Methods and Outputs from aims & objectives
9. Stakeholder event results MSK
10. Step down inpatient beds for general rehabilitation
11. Visits to other centres - MSK
12. Paediatric (Neurotrauma)
13. Geographical TBI maps – CDD, Tees, Newcastle
14. Regional Stakeholders list

Appendix 1 – Neurotrauma Work stream

Neurotrauma Group

Chair: Richard Jones, Consultant Neurologist, Newcastle Upon Tyne Hospitals NHS Foundation Trust.

Elizabeth Morris, Service Improvement Lead, North East Neurosciences Network.
Helen Hastie, Head Injuries Nurse Specialist, Newcastle Upon Tyne Hospitals NHS Foundation Trust.
Dr Laura Graham, Consultant in Rehabilitation Medicine, Walkergate Park Centre for Neuro-rehabilitation and Neuropsychiatry.
Rebekah Mercer, Directorate Manager for Neurosciences, Newcastle Upon Tyne Hospitals NHS Foundation Trust
Paula Dimarco, Acute Neurosciences Physiotherapist, Newcastle Upon Tyne Hospitals NHS Foundation Trust
Sharon Smith, Brain Injury Community Therapist, Northumberland, Tyne and Wear NHS Foundation Trust

Additional support:

Dawn Temple-Scott, Service Improvement Manager, North East Neurosciences Network

Appendix 2 Interim Report and commissioning template

CLINICAL NETWORKS NORTHERN ENGLAND

Template for identifying commissioning priorities for 2013/14

Network:	Northern Trauma System Executive Group	CCG:	All CCGs in NHS North East

1. Saving Lives

Network wide priorities

- Development of an integrated pathway of care for Major Trauma patients via the Trauma Network in line with the Outcome Framework/Quality Dashboard (Domain 3).
- Promote the use of the rehabilitation prescription to facilitate rehabilitation throughout the patient pathway (currently only completed in the MTC's).
- Develop rehabilitation services to meet the needs of survivors of major trauma.
- Maximise rehabilitation, recovery and re-ablement in order to reduce disability for patients who have suffered major trauma.
- Develop appropriate outcome measures to evaluate patient and service interventions including development and support of UKROC as outcome framework to support specialist commissioning for rehabilitation

CCG specific priorities

- Investment in rehabilitation services to meet the needs of major trauma patients
- Gaps in rehabilitation services identified and therefore potential solutions include development of specialist rehabilitation facilities and staff.
- Support the work of the regional trauma network.

2. Contribution to QIPP

Network wide priorities

- Develop an efficient, effective and integrated pathway for major trauma patients to ensure resources are targeted appropriately.
- Ensuring through effective rehabilitation that major trauma patients reach their full potential in a timely manner and reduce dependency on NHS services e.g. return to work and leisure.

CCG Specific priorities

- Investment in specialist rehabilitation for major trauma patients in order to save in the long term.

3. Compliant/quality assured services (e.g. Cancer Peer Review/NICE guidance)

Network wide priorities

- Complete pathway gap analysis and recommend best practice pathway.
- Audit pathway against major trauma rehabilitation standards – BSRM and Major trauma CAG recommendations
- Develop appropriate outcome measures to evaluate patient and service interventions (UKROC).
- Develop a robust IT infrastructure that will facilitate the identification and monitoring of major trauma patients.
- Develop and maintain a directory of rehabilitation services.

CCG specific priorities

- Use best practice pathway as a basis for commissioning rehabilitation services.
- Commissioning of services compliant with major trauma rehabilitation standards.
- Investment to ensure there is sufficient capacity to be compliant with major trauma rehabilitation standards.
- Support the work of the regional trauma network to develop outcome measures.
- Support and invest in the development of a robust IT infrastructure.

Supporting Information for template for identifying commissioning priorities for 2013/14 (Major Trauma)

Introduction

Major Trauma describes serious and often multiple injuries where there is a strong possibility of death or disability. It is estimated that there are 20,000 cases of major trauma in England each year with a further 28,000 not classified as major trauma that would follow the same pathway. This project has therefore been undertaken in order to look at the rehabilitation of patients following Major Trauma across the North East region and develop a best practice pathway in line with the NHS Outcomes Framework indicator 3.3 ‘Effective recovery following injury or trauma’. This report will provide information and recommendations to support the identified priorities on the commissioning template for Major Trauma.

Background

Deficiencies were highlighted in the treatment and care of major trauma patients including below optimum rehabilitation (Darzi 2007). A Clinical Advisory Group (CAG) for major trauma was established with Keith Willett as chair which led to the development of Regional Trauma Networks. The aim of the networks was to improve the management and flow of major trauma patients through the system. The CAG also identified that rehabilitation provision was suboptimal and uncoordinated. Keith Willett stated that rehabilitation should be a priority area for improvement. Complex musculoskeletal injuries account for over half of hospital admissions following major trauma (Urquhart 2006). Neurological injury is the commonest cause of mortality and disability after major trauma and requires specialist rehabilitation to address complex physical, cognitive, emotional and socio-psychological problems. There is evidence that early coordinated rehabilitation results in better outcomes and reduces use of NHS resources across the patient pathway including decreased length of stay and readmission rates (National Audit Office 2010).

Since April 2012 there have been two new initiatives implemented for Major Trauma patients, with the introduction of Major Trauma Centres and Rehabilitation prescriptions. James Cook University Hospital (JCUH) and the Royal Victoria Infirmary (RVI) were designated as Major Trauma Centres (MTCs) for the North East region as part of the Regional Trauma Network (RTN). The impact of MTCs on rehabilitation services in the North East is unclear and the ability of existing services to meet the demands of major/serious trauma patients is unknown (Wilson 2011).

Rehabilitation prescriptions were introduced to document the rehabilitation needs of the patients and identify how they will be addressed. The prescription is completed for major trauma patients (injury severity score >15) and for serious trauma patients (injury severity score 9-15) who follow a similar pathway. The rehabilitation prescription has also identified needs which are not being met by current rehabilitation services. Currently a case for change is being developed for the National Commissioning Board which is hoped will stimulate a national piece of work. The rehabilitation pathway is not complete until the patient has re-joined society having reached optimum functional potential e.g. employment and leisure. Therefore future work will need to have a much stronger focus on rehabilitation and re-ablement.

North East Major Trauma Rehabilitation Project

A regional Steering Group has been formed by the SHA to lead and deliver on this piece of work. They have therefore invested in a two stage project, stage one includes mapping the current pathway and gap analysis with initial priorities highlighted, see template for commissioning priorities. Stage two will involve further consultation and gap analysis resulting in the production of a best practice pathway and recommendations.

Initial mapping and gap analysis has shown:

- Disjointed pathways for major/serious trauma patients resulting in poor communication
- No specialist rehabilitation staff for MSK major/serious trauma patients that can deliver a high quality, co-ordinated seamless pathway of care. Services for those with neurological trauma are severely limited with significant deficiencies in specialised staff. There are limited statutory specialist services for reablement/specialist vocational rehabilitation and patients are dependent on charitable organisations and independent providers for input in the later stages of their rehabilitation pathway.
- No specialist rehabilitation facilities for MSK major/serious trauma patients. For those with complex neurological trauma, appropriate provision is limited to the level one unit at Walkergate Park in Newcastle with a bed capacity approximately one quarter of that predicted according to population base. (BRSM). Elsewhere, patients may be treated in units which lack the resources and funding required to provide rehabilitation to those with more complex needs after brain injury (Category A needs SSNDS 2007)
- Insufficient capacity in services to deliver intensive rehabilitation and reablement. The next part of this project will design a best-practice rehabilitation pathway and identify the most appropriate competency-based workforce to deliver a good, cohesive service along the whole pathway.
- Inconsistent use of valid and reliable outcomes throughout the pathway. An opportunity is being missed to evidence the effectiveness of interventions, to compare outcomes and costings and therefore to make financial savings which could be re-invested into providing a more comprehensive rehabilitation pathway. Recommendations in relation to outcome measures will be provided in the final report.

Data collection and analysis

As part of the project all available sources of data were analysed to establish the potential impact of Regional Networks for Major Trauma on rehabilitation. Historical data is incomplete and does not therefore indicate the number of major trauma patients requiring rehabilitation. Since April 2012, however, data collection systems are being developed to give a more accurate picture. Current TARN data indicates that the number of major trauma patients with an ISS > 15 are 105 per annum for James Cook University Hospital and 156 per annum for the Royal Victoria Infirmary (TARN data Apr – July 2012 extrapolated to estimate annual figure). TARN data is calculated retrospectively therefore these figures may be under estimated.

Summary

The main problem for major/serious trauma patients both locally and nationally is rapid access to specialist rehabilitation (Keith Willett 2012). Phase one of this project has identified some significant gaps in the pathway and reflects the national findings that lack of specialist rehabilitation, poor communication and insufficient capacity for rehabilitation are the main problems.

The key recommendations for commissioning at this stage are:

- Continuing collaboration with the Major Trauma Steering Group to ensure commissioning decisions are well informed.
- Commission to ensure service re-design and improvement of rehabilitation and re-ablement services in the community including provision of specialist traumatic brain injury and musculoskeletal rehabilitation teams.
- Commission to ensure quality through an appropriately skilled specialised workforce, identified through the competencies required to deliver the best-practice pathway.
- Commission to ensure a robust co-ordinated pathway for recovery, rehabilitation and reablement.
- Commission to ensure achievement of quality indicators as evidenced by consistent use of appropriate valid and reliable outcomes at key points in the pathway.

Phase one of the project is summarised in this paper and priorities identified in the commissioning template. Phase two will result in a more substantial report that will include an evidenced based pathway with recommendations for commissioning.

Appendix 3 List of Trauma Rehab Steering Group

Name	Title
Steve Aldridge	Consultant Orthopaedic Surgeon, RVI
Tony Baldasera	Clinical Programme Lead NE SHA
Lynne Barr	Freelance Commissioner, Advancing Potential
Pauline Birchall	Clinical Specialist Occupational Therapist / Head Injury Project Coordinator for South of Tyne & Wear
Alison Carter	/Senior Physiotherapist, Trauma & Orthopaedics JCUH
Paula Di Marco	Neurotrauma Work Stream/Clinical Lead Physiotherapy Neurotrauma
Jonathan Forty	Clinical Director, Northumberland Tyne and Wear Trauma Network
Sue Gavaghan	Co-Director Physiotherapy South Tees
Laura Graham	Consultant in Rehabilitation Medicine Walkergate Park
Professor Charles Greenough	Consultant Orthopaedic Surgeon JCUH
Mike Guy	Medical Director, Durham, Darlington and Tees Area Team
Liz Holey	Professor Liz Holey - Co-AHP Lead North East SHA
Julie Irwin	MSK Work Stream Lead/ Clinical Lead Outpatient MSK Physio, South Tees
Andrea Jones	Chair, Darlington Clinical Commissioning Group
Lisa Jordan	Senior Commissioning Manager, North of England SCG
Elizabeth Morris	Service Improvement Manager, NECVN
Mike Prentice	Chair – Medical Director, Cumbria, Northumberland, Tyne and Wear Area Team
Dr. Helen Smith	Co-AHP Lead North East SHA
Sharon Smith	Neurotrauma Work Stream/Advanced Physiotherapy Practitioner, Northumberland Head Injuries Service.
Corrine Wilson	Service Improvement Lead, NECVN

Appendix 4 Rehabilitation prescription

Prescription for Rehabilitation Date completed / /

Patient name: Date of Birth: Address: NHS No: GP: Current Location:	Date of Injury: Injury Type: (tick all that apply) □ Musculoskeletal □ Burns □ Neurological □ Vascular □ Abdominal □ Thoracic □ Amputation □ Other
Name and contact details of key worker:	
YOUR REHABILITATION PRESCRIPTION: Services referred to: (including contact details and anticipated waiting time)	
Other key information: (e.g. patient/family wishes/potential barriers to discharge)	

Names and disciplines of those involved in MDT:
Summary of injuries/main problem: (in plain language)
Pre-injury/illness information: (including social situation, housing, vocation/roles, leisure)

The TARN minimum dataset (this section MUST be completed)

(a) Rehabilitation prescription (completed or not required) No □ Yes □ Not Required □

(b) Presence of physical factors affecting activities or participation No □ Yes □ Not Required □

(c) Presence of cognitive/mood factors affecting activities or participation No □ Yes □ Not Required □

(d) Presence of psychological factors affecting activities or participation No □ Yes □ Not Required □

Current functional status: (complete all details for each domain or mark N/A if not assessed)

Neurological

GCS _____ Motor loss No □ Yes □ Sensory loss No □ Yes □

Vision: Intact □ impaired □ unable to assess □

Hearing: Intact □ impaired □ unable to assess □

Respiratory

Assisted ventilation No □ Yes □ Type _____

If yes, is there a management plan? No □ Yes □

Other respiratory support required on discharge _____

Sitting ability

Unable to sit □ Can sit out □ (uses) Standard chair □ Special seating □

Transfers with: hoist/standard □ assistant of _____ nurse (s) □

Independently with/without aid (e.g. banana board) □

Walking: Unable to walk □ walks with _____ nurse (s) □

Walking independently with/without aids □

Washing and dressing

Independent □ Needs assistant of _____ nurse (s) □

Urinary continence

Uses toilet/commode/urinal independently □

Uses toilet/commode/but needs assistant of _____ nurse(s) □

Incontinent uses catheter/convene/pads □

Faecal continence

Uses toilet/commode/urinal independently □

Uses toilet/commode/but needs assistant of _____ nurse(s) □

Incontinent uses catheter/convene/pads □

Skin

Pressure sore risk score Braden/Waterlow (please circle which) _____

Pressure sores No □ Yes □ Grade & location _____

Nutrition

MUST score _____ (please indicate if other screening tool used)

Swallowing: normal □ Impaired □

Food consistency: Normal oral fluids and diet □ Pureed or soft diet □ Fed via Ng/PEG □
Feeding: Independent (with/without aids) □ Needs assistant of _____ nurse (s) □
Communication: Independent □ Impaired □ ——————————————————

Cognition/Perception
No significant impairment □ Impaired □
Behaviour: No significant impairment □ Impaired □
Mood: No significant impairment □ Impaired □
Anxiety: No significant impairment □ Impaired □
Other Comments:

Equipment Required

□ Orthotics/Prosthetics
□ Mobility Aids/Transfer Equipment
□ Specialist Seating
□ Bed/Posture Management
□ Activities of Daily Living Equipment
□ Other (e.g. Environmental controls)

Therapies and Interventions Required **Date / /**

Yes	**No**	**Not Assessed**	**Rehabilitation Needs** (tick yes/no/not assessed and add details for each)
			Mobility
			Independence in activities of daily living
			Communication/swallowing
			Nutrition
			Spasticity
			Wound management
			Urinary continence
			Faecal incontinence/constipation
			Pain
			Pulmonary rehabilitation/ventilator weaning
			Sensory loss (eg vision/hearing)

			Cognitive
			Behavioural management
			Mood
			Psychological support
			Environmental assessment
			Vocational/educational
			Other

Rehabilitation services required (see definitions in standards)

Level 1 □ Level 2a □ Level 2b □ Level 3 □

Date of Prescription: / / Date next Multidisciplinary Team review due: / /

Completed by (name): _____ **Role:** _____

Signed: _____ **NB TARN minimum dataset must be completed**

Appendix 5 Categorisation of the rehabilitation prescription

Rehabilitation Prescription Criteria for Categorisation

Musculoskeletal: Soft tissue injury and fractures including spinal, if there is no neurological impairment. Rib fractures are included if there is no pneumothorax/ haemopneumothorax

Neurological: Any injury that results in neurological impairment. Includes skull fractures.

Other: For the purposes of this report other includes the following:

Facial fractures

Lacerations

Amputations

Abdominal injury

Thoracic injuries

Vascular injuries

Plastics/burns

Some patients have a combination of injuries and where this was the case patients were categorised according to their most significant injury.

Appendix 6 Stakeholder events attendance list

Major Trauma Rehabilitation Workshop
9am – 12 noon, 21st November, Trinity Centre North Ormesby

Name	Job Title	
Birleson, Angela	Principle Clinician - Occupational Therapy	JCUH South Tees
Cale, Kim	Occupational Therapist	Friarage Northallerton
Clark Monica	Osteoporosis Nurse	Falls & osteoporosis Service South Tees
Cole, Ben	Senior Physio – MSK Outpatients	JCUH South Tees
Gavaghan, Sue	Co-Director of Physiotherapy	JCUH South Tees
Green, Louise	Senior Occupational Therapist	Friary Community Hospital Richmond
Greenough, Prof Charles	Consultant Orthopaedic Surgeon	JCUH South Tees
Heathcote, Sarah	OT Intermediate Care	Middlesbrough Intermediate Care Centre
Hill, Nicola	Clinical Specialist Physio	Elderly Care Wards Redcar Primary Care Hospital
Holey, Liz	Joint Strategic AHP Lead	North East Strategic Health Authority
Iveson, Lynn	Senior Physio – Fast Response/Intermediate Care	Old Rutson, Northallerton
Kelly, Johnathan	Acquired Brain Injury Coordinator	JCUH South Tees
Langford, Katy	Occupational Therapist	Friarage Hospital
Lipscombe, Nicola	Major Trauma Co-ordinator	JCUH South Tees
Matthews, Diane	Ortho Team	Sunderland
Moreley Sarah	Physiotherapist	Cumbria (Neuro)
Elizabeth Morris	Service Improvement Lead	North of England Cardiovascular Network and North East Neurosciences
Nicholson, Sheila	MSK outreach physio	JCUH South Tees

Rosser, Crystal	Physio Outpatient MSK	Community Outpatients South Tees
Rowell, Sue	Sport & Health Co-ordinator	Sports Development Redcar & Cleveland Borough council
Skinner, Nicki	CS Physio Outpatients	Friarage Northallerton
Smith, Kathryn	Ortho Team	Sunderland
Smith, Sally	Senior Physio Prosthetic rehab	JCUH South Tees
Smith, Sharon	Advanced Physio Practitioner /Neurotrauma Work Stream	Northumberland Head Injuries Service
St John, Michelle	SALT	Carters/JCUH South Tees
Sturdey, Kate	Senior Physio	Friary Community Hospital
Tate, Kathryn	Clinical Lead Falls	Falls Service South Tees
Thomson, Linda	Senior Physiotherapist – Orthopaedics	Friarage Northallerton
Thornton, Michael	Physiotherapist	Intermediate Care Multilink Team Hartlepool
Warnett, Rosie	Senior Physio – Neuro	JCUH south Tees
Weatherley, Paula	OT Hand Therapist	University Hospital of North Tees
Wilkin, Ange	Operational Lead – MSK Physio	JCUH South Tees
Wilmore, Kelly	Band 6 Physio	JCUH South Tees

Major Trauma Rehabilitation Workshop
12.30pm – 4.00pm, 28th November, Infinity Room North East SHA Waterfront 4 Newcastle

Name	Job Title	Area of Work
Aldridge Steve	Consultant Orthopaedic Surgeon	RVI Newcastle
Anderson, Karen	Senior Sister Trauma	RVI Newcastle
Barker, Kate	B6 MSK Physio	South Tyneside District Hospital
Barr, Lynne	QIPP reform team ,	NHS South of Tyne and Wear
Bell Frazer	Physio Short Term Support Service West	Dean Park House Hexham
Binningsley, Joanne	Ortho Team	Sunderland
Birchall, Pauline	ABI Coordinator/Clinical Specialist Occupational Therapist	Bensham Hospital South of Tyne & Wear
Colllett, Sarah	Physiotherapist	Farmborough Court Intermediate Care Sunderland
Courtney, Lindsay	Head of Occupational Therapy Services	Bensham Hospital South of Tyne & Wear
Fearon, Paul	Consultant – Ortho Trauma	RVI Newcastle
Fox, Louise	Supt Radiographer	RVI Newcastle
Garner , Claire	CS Physio neuro	Cumberland Royal Infirmary Carlisle
Goddard, Christopher	Ortho Team	Sunderland
Graham, Laura	Consultant Rehabilitation Medicine	Walkergate Park Newcastle
Green, Barbara	Occupational Therapist	Rapid Response and Discharge Team Molineux Street NHS Centre, Newcastle
Hewitson,	Orthopaedic Team Leader	University Hospital of North

Janette	Physio	Durham (covers Darlington)
Kelly, Johnathan	ABI Coordinator	JCUH South Tees
Marley, Karen	Senior Sister Major trauma	RVI Newcastle
May, Helen	CS Physio neuro	Cumberland Royal Infirmary Carlisle
McConnell, Huw	Consultant Intensive Care	RVI Newcastle
McCreadie, Jennifer	Physio Short Term Support Service West	Dene Park House,Hexham
McPartlin, Tony	Ortho Team	Sunderland
Merriweather, David	Clinical Specialist – Occupational Therapist	Queen Elizabeth Hospital Gateshead
Nicholson, Sue	Physio Team Lead inpatient critical care	Cumberland Royal Infirmary Carlisle
Nyman Elaine	Community Physiotherapist	Newcastle
Rigg, Jessica	Occupational Therapist	Cumberland Royal Infirmary Carlisle
Smith, Dr Helen	Joint Strategic Lead for AHP's	North East Strategic Health Authority
Smith, Sharon	Advanced Physio Practitioner /Neuro Work stream–	Northumberland Head Injuries Service
Temple-Scott, Dawn	Service Improvement Manager	North of England Cardiovascular Network and North East Neurosciences
Tweedy, Dawn	Occupational Therapist	RVI Newcastle
Westgate, Hazel	Occupational Therapist	Cumberland Royal Infirmary
Wilkinson, Lynne	Trauma Lead – Physio	RVI Newcastle
Williams, Diane	CS Physio Ortho	Wansbeck Hospital Ashington
Woods, Angela	Senior Physio Ortho	JCUH South Tees

Appendix 7 Outcome measures

Outcome measures

Measurement of outcomes should be an integral part of the major trauma rehabilitation pathway. It is important to measure change in order to evaluate the effectiveness of rehabilitation and prove the cost benefits. Department of health guidance (2012) suggests the following measures which incorporate requirements for patient assessment and that of data collection

- The 20 point Barthel Index
- The Rehabilitation Complexity Scale
- Anxiety and Depression scores
- Orientation and awareness of personal safety.
- Ability to communicate own needs
- Ability to take medication

Whilst an in depth review and recommendations for the use of outcome measures was outside the scope of this project information was gathered about their current use of and ideas for a best practice pathway. Stakeholder events were held and the current use of outcome measures was explored, issues discussed and suggestions made for use in the ideal pathway:

- Current use:
    - No consistency
    - No one outcome measure fits all
    - Patient orientated goals
    - Outcomes in relation to pre injury status
    - Patient satisfaction
- Suggested use of MSK outcome measures
    - Acute – Hospital anxiety and depression (HAD), EQ 5D 5L, goal attainment
    - Community – Tinetti, Bartel
    - Need a range of outcome measures/menu based approach
    - Outcome star – well being

- Function – return to work, social interaction, dependence on social services
- Mobility, pain, ADL e.g. Driving

Validated outcome measures

Suggested use of Neurological Outcome measures

Length of Stay

The Coma/Near Coma Scale } Measure small changes in patients with

The Wessex Head Injury Matrix } low arousal

Disability Rating Scale - can measure recovery from coma to community

The Neurological Outcome Scale - Measures level of impairment

FIM/FAM - measures disability

Bartel Index - measures function

Goal Attainment Scale - patient lead outcome measure

EQ5D - self assessment scale of health

Profession Specific measures

Patient/staff statements

Northwick park nursing dependency scale (NPDS)

The Rehabilitation Complexity Extended Trauma version (RCS-ET)-monitors delayed in transfers

UKROC

Outcome measures may also have to link with a piece of future work highlighted in the new Trauma standards (2012) which begins development in 2013. This is a 5 year programme linking data between TARN and UKROC. It will provide data from acute services through specialist rehab (levels 1 & 2) to the community, stating who actually received the service they required and evaluate specific outcomes.

Appendix 8 MSK Method and Outputs from aims and objectives

Aim	Objective	Method	Output
1 & 2	1 & 2	Information gathering and analysis following meetings with key people and workshops.	Flow diagram showing typical NE pathway
1	3	Visit areas of best practice to collate and explore other models.	Summary of main findings
1 & 2	4	Compare the NE pathway with best practice pathway	Flow diagram of best practice pathway alongside NE current pathway
1	5	Collate and analyse data and information gathered for the report.	Interim and final reports including recommendations for commissioning
3	6	Consult with stakeholders on Trauma Rehabilitation Community of Interest	Workshop attendance list Trauma Rehabilitation Steering Group members Names of key stakeholders Planned launch event

Appendix 9 Stakeholder event results MSK

Middlesbrough -Summary of Workshops main Themes

Workshop 1: review of the current pathway

Capacity in Rehab services

- Lack of capacity to provide intensive rehabilitation e.g. Outpatient and Domiciliary Physio/OT
- No 7 day service availability in Outpatient physio and limited in Domiciliary rehab services
- Limited therapy and time in residential rehab/PCHs
- Lack of capacity to provide long term rehabilitation where needed
- Delays to discharge from MTC
- Access to Intermediate Care/Primary Care Hospital beds
- Non weight bearing patients not offered rehabilitation until allowed to weight bear
- Exercise on prescription limited resources
- Lack of vocational rehabilitation
- Physio/OT focus in MTC is on discharge facilitation not rehab
- Geography can affect service provision

Communication

- Weight bearing status not communicated sufficiently across pathway
- Fracture clinic follow up appointments missed
- Poor communication between fracture clinic and therapy services
- No integrated IT system currently
- Repetition of documentation/assessment across interfaces
- Duplication of referrals
- Insufficient clinical information/rehab plan when patients are transferred from one service to another
- Lack of clarity on who to refer to once the patient has left hospital

Coordination

- Lack of coordination and leadership throughout the pathway
- Delay in setting up care packages
- Delays in referrals to social workers
- Delayed response by social services to referrals
- Lack of responsibility for reintegration e.g. return to work and leisure.
- Access to rehabilitation facilities e.g. transport, location, facilities
- Patients not always discharged with equipment required

Gap analysis

- Poor communication and coordination across the pathway
- No facility or staffing geared towards rehab younger age
- Residential rehabilitation services/specialist centre for people under 65 years
- Non weight bearing patients not offered rehabilitation until allowed to weight bear

- No provision of specialist wheelchairs if required for less than 6 months
- Cognitive and mood issues are not usually assessed
- Psychology and counselling services
- Lack of chronic pain management
- No specialist rehabilitation team for trauma patients
- No specialist rehabilitation facility for trauma patients (in-patient/outpatient)
- Lack of specialist rehabilitation equipment outside the MTC
- Lack of specialist skills in rehabilitation and reablement which limits access
- No specialist vocational rehabilitation

Workshop 2 - Best Practice Pathway

Acute Care

- Multidisciplinary team including psychological support
- A clearly defined MDT pathway that starts in acute care
- Key person to coordinate the pathway and improve communication
- Electronic rehabilitation prescription to ensure live up to date information is communicated across each interface

Step Down Acute

- Access to wider MDT e.g. SALT, psychologist, counsellor, social workers, pain management, specialist wheelchair assessment
- Specialist MDT assessment to determine next step in pathway jointly with patient and family e.g. home, inpatient rehab.
- In depth assessment and joint planning with patient and family to give ownership and realistic expectations/rehab plan
- Appropriate level of therapy for trauma patients e.g. capacity to deliver sufficient intensity
- Appropriate equipment is in place at the right time
- Communication

Specialist In-patient Rehabilitation

- Dedicated rehabilitation beds/facility for trauma patients
- Non-medical environment for young people's rehabilitation to promote independence
- Access to appropriate rehabilitation facilities e.g. Gym, Hydro Pool.
- MDT specialist team
- Intensive therapy provision, time table of rehabilitation

Supported Discharge

- Coordinator responsible for care including actioning appropriate referrals
- Community rehabilitation immediately following discharge e.g. orthopaedic discharge team
- Generic support staff
- Review of equipment needs and access to immediate supplies

Specialist Community Rehabilitation

- MDT rehabilitation with appropriate level of staffing and skill mix
- Rehabilitation coordinator to follow the patient along the pathway and advise as appropriate
- Access to appropriate rehabilitation facilities e.g. Gym, Hydro Pool.
- Access to vocational rehabilitation
- Advice on progression of activity e.g. weight bearing status, driving, leisure and work.

Community reintegration

- Input from rehabilitation coordinator
- Assessment of work role – pre injury role or new
- Exercise on prescription
- Facilitate return to previous leisure activities

Integrated care Planning

- Point of contact through Rehabilitation Coordinator for advice and support
- Links with social care
- Links with voluntary sector

Key Points for the best practice pathway:

- Patient held notes to improve communication
- Rehab prescription to be reviewed and updated regularly along the pathway (patient held or electronic)
- Coordination crucial at all stages of the pathway e.g. Rehabilitation Coordinator
- Communication across each interface
- Equipment appropriate and timely provision including specialist wheelchairs

Workshop 3 – Outcomes

- No one outcome measure suitable for all stages of the pathway
- Outcomes need to be patient centred and realistic
- Use a menu based approach to outcomes
- Individualised goal related outcomes , short term and long term
- EQ 5D 5L quality of life indicator useful but has limitations as a stand-alone measure
- Rehabilitation prescription should follow the patient and contain all up to date information including pre trauma level of function, outcomes and goals
- Pre-defined criteria that need to be met for each stage of the pathway
- Apps on smart phones for communication

Newcastle, Summary of Workshops – Main Themes

Workshop 1: review of current pathway

Communication

- Lack of information when patients are discharged from the MTC
- Patients referred for outpatient therapy are given no priority in Trauma Units over any other outpatients
- Referrals to PT/OT sometimes not done when patient discharged from MTC
- Duplication of referrals from different sources
- No seamless pathway
- Repeated assessments from different specialities
- Lack of information from fracture clinic to therapists and back
- Community teams cannot access computer systems that record changes post clinic review, rely on handovers from patients

Specialist staff/centre

- Lack of specialism when referred on e.g. referred to generalists wastes time
- Lack of specialism in rehab both in the MTC wards and the community
- Lack of MDT with specialist skills across the pathway
- No specialist centre
- Lack of psychiatric/psychology/counselling input including outreach
- Acute wards are the worst place to rehabilitate major trauma patients

Access

- Geography can dictate services received and facilities vary

Equipment

- Unable to access specialist wheelchairs for short term use
- Provision of equipment is difficult if patient lives outside the catchment area of the MTC/TU

Gaps

- No coordination of care across the pathway
- Non weight bearing patients often don't meet the criteria for rehabilitation but don't require an acute bed e.g. Intermediate care
- Not all areas have step down units
- No 7 day service in most rehab teams
- Poorly defined pathway beyond MTC/TUs
- Unable to access specialist wheelchairs for short term use
- Lack of MDT with specialist skills across the pathway

- No specialist centre
- Lack of capacity for some therapies e.g. waiting list community physio, no 7 day service for social worker

Workshop 2 – Best Practice Pathway

Acute Care

- MDT including social worker and psychologist
- Early rehabilitation prescription identifying patient needs
- Robust repatriation policy
- Coordinator role to link to services in the community

Step Down acute

- Review of rehabilitation prescription at each stage of pathway
- Liaise with families through prescription

Specialist In-Patient Rehabilitation

- Provide intensity and frequency of rehabilitation required
- Specialist extended MDT
- Input from acute care settings to e.g. surgeons
- Appropriate rehabilitation facilities e.g. Hydro Pool, Gym

Supported Discharge

- Functional goals

Specialist Community Rehabilitation

- Coordinator role to link into acute and follow patient across the pathway
- Provision of a 7 day service for rehabilitation
- Right level of skill mix including rehab/carers
- Experienced specialist staff
- Provide intensity and frequency of rehabilitation required
- Appropriate rehabilitation facilities e.g. Hydro Pool, Gym

Community reintegration

- Access to vocational rehabilitation
- Social integration

Integrated care planning

- Coordination to the end of the pathway
- Healthy lifestyle choices

Key Points for Best Practice Pathway

- Need comparable services in all areas
- Coordinator role to provide links from the acute to the community
- Community coordinators to link into the acute
- Once stabilised transfer to MDT led rehabilitation facility
- Directory of rehabilitation services
- 7 day service
- Appropriate and timely provision of equipment including specialist wheelchairs

Workshop 3 – Outcomes

- No consistency
- No one outcome measure fits all
- Need a range of outcome measures
- Don't always fit
- Patient orientated goals
- Outcomes in relation to pre injury status
- Function – return to work, social interaction, dependence on social services
- Mobility, pain, ADL e.g. Driving
- Validated outcome measures
- Patient satisfaction
- Outcome star – well being
- Suggested outcomes:
    - Acute – Hospital anxiety and depression (HAD), EQ 5D 5L, goal attainment
    - Community – Tinetti, Bartel

Appendix 10 Step down inpatient beds for general rehabilitation

Newcastle	South of Tyne & Wear	County Durham & Darlington
Harehills	Houghton le Spring Primary Care Centre. Farmborough Court Intermediate Care Centre.	Grampian house Sedgefield Community Hospital Bishop Auckland Hospital Shotley Bridge Hospital Additional intermediate care beds located in residential homes
North & South Tees (inc North Yorkshire)	**Northumberland & North Tyneside**	**North Cumbria**
Rosedale Intermediate Care Centre, Stockton Hartlepool General Hospital Additional Intermediate Care beds located in Residential homes (Hartlepool) Carter Bequest Hospital Redcar Primary Care Hospital Guisborough General	Hexham Hospital Berwick Infirmary Rothbury Community Hospital Alnwick infirmary Morpeth cottage Hospital Blyth Community Hospital The Cedars, North shields Tom Haddaway Unit –	West Cumberland Hospital (including Copeland Unit) Penrith Hospital Keswick Community Hospital Maryport Community Hospital Ruth Lancaster James Hospital, Alston Wigton hospital

Hospital East Cleveland Hospital Middlesbrough Intermediate Care Centre (incorporating Redcar Intermediate care beds) Friarage Hospital Lambert hospital Friary Hospital	Intermediate Care North Tyneside	Brampton Hospitsl Reiver House Workington Community Hospital

Appendix 11 Visits to other centres (MSK)

Unit Visited	Speciality/Model of Care	Learning Points
Manchester Royal Infirmary	MTC, Adult Major Trauma	• Process of identification • Electronic rehab prescription • Role of the Rehabilitation Coordinator
Salford Royal Infirmary	MTC, Head Injuries	• Clearly defined pathway • Locally adapted rehab prescription (electronic) • Rehabilitation Coordinators
Wythenshawe Hospital	MTC, Burns	• Staged implementation • Rehabilitation Coordinators
Hedley Court	National Centre for Military Rehabilitation	• Military model of rehabilitation • Specialist inpatient rehabilitation • Facilities and staffing for Intensive rehabilitation • Coordinated MDT approach • Importance of hydrotherapy • Vocational rehabilitation • Psychological rehabilitation
Hull Royal Infirmary	MTC Adult Major Trauma	• Directory of rehabilitation • Electronic rehab prescription
Walkergate Park	Centre for Neuro-rehabilitation and Neuropsychiatry	• Specialist inpatient rehabilitation (neuro only) • Facilities and staffing for Intensive rehabilitation • Coordinated MDT approach • Vocational rehabilitation • Psychological rehabilitation
Spinal Injuries Unit JCUH	Regional Spinal Injuries Centre	• Specialist inpatient rehabilitation • Coordinated MDT approach • Use of outcome measures • Liaison therapists for discharge • Psychological rehabilitation

Stroke Unit JCUH	Stroke Pathway	• Specialist inpatient rehabilitation • Defined pathway of care • Coordinated MDT approach • Coordinator role • Use of outcome measures

The Trauma Rehabilitation conference at St Bartholomew's and rehabilitation prescription workshop in London were attended. This facilitated networking and information gathering for this piece of work.

Military model for rehabilitation

Following trauma the military model has a three tier system which offers graduated levels of rehabilitation dependent upon patient need. The levels are described as follows:

- Primary Casualty Receiving Facilities - 70 Units which manage simple injuries by provision of physiotherapy assessment and treatment.
- Regional Rehabilitation Units (RRUs) - 15 Units which manage more complex trauma with a specialist MDT approach and offer intensive rehabilitation and access to investigations.
- The Defence Medical Rehabilitation Centre (DMRC) at Headley Court - 1 Unit that provides a full range of MDT specialist inpatient rehabilitation services for very complex trauma.

Appendix 12 Paediatric (Neurotrauma)

Intensive Paediatric Rehabilitation Services in North East England

Paediatric acquired brain injury (ABI) has been regarded historically as a low incidence problem. With improved PICU survival however this is no longer the case. Precise epidemiology is still somewhat lacking, however even the most conservative estimates of numbers of children acquiring neurological morbidity sufficient to require a period of rehabilitation are comparable to the all-severity incidence of cerebral palsy in children at around 1000 new cases annually in the UK.

Not surprisingly paediatric rehabilitation services have grown in a rather ad hoc fashion nationally, with services centred on regional paediatric neuroscience units adjacent to PICUs. The North East service historically based at Newcastle General Hospital has been based on ward 1b at the Great North Children's Hospital (RVI) for the last two years. Services are provided by a team of inpatient physical, occupational and speech therapists; play specialists; clinical and neuro-psychologists; a dedicated team social worker; paediatric nurse specialist; and a paediatric neurologist with training in paediatric rehabilitation services (Dr Forsyth). Many but not all children are under Dr Forsyth as named consultant during their hospital admission.

This team has provided acute and post-acute intensive rehabilitation for children with a wide variety of acquired neurological insults including traumatic brain injury, and various forms of non-traumatic brain injury (stroke, anoxic brain injury, post-metabolic encephalopathy, encephalitis and meningitis etc). We also treat a small number of children with acquired spinal injuries as the regional spinal injuries unit based at James Cook University Hospital does not admit children. A significant proportion of the children are still receiving active medical treatment (such as intravenous antibiotics for intracerebral sepsis or neurosurgical procedures) at least in the early phases of their rehabilitation. However in later stages of recovery their inpatient status is often determined by the need to access on-going intensive (daily) therapy, and/or home adaptations to permit discharge. We have on occasions arranged early implantation of intrathecal baclofen pumps for severe, total body involvement, spasticity.

Some children sustaining significant ABI as a result of brain tumours receive therapy input under the auspices of the paediatric neuro-oncology service, in another part of GNCH. Additionally ABI due to complications of cardiac surgery and/or use of LVAD devices account for a significant proportion of new cases. Rehabilitation for less severe cardiac cases takes place on the cardiac wards at Freeman Hospital without involvement of the GNCH team; more severely impaired children have been transferred for intensive rehabilitation to GNCH.

Random fluctuations affect numbers but during 2010/11 a total of 24 children required inpatient stays >1 month as a result of their rehabilitation needs. Two were

cardiac children; two were severe Guillain Barre cases. One was an acute onset thoracic-level total paraplegia. This period was unusual for a relative lack of traumatic brain injury children, usually the largest group.

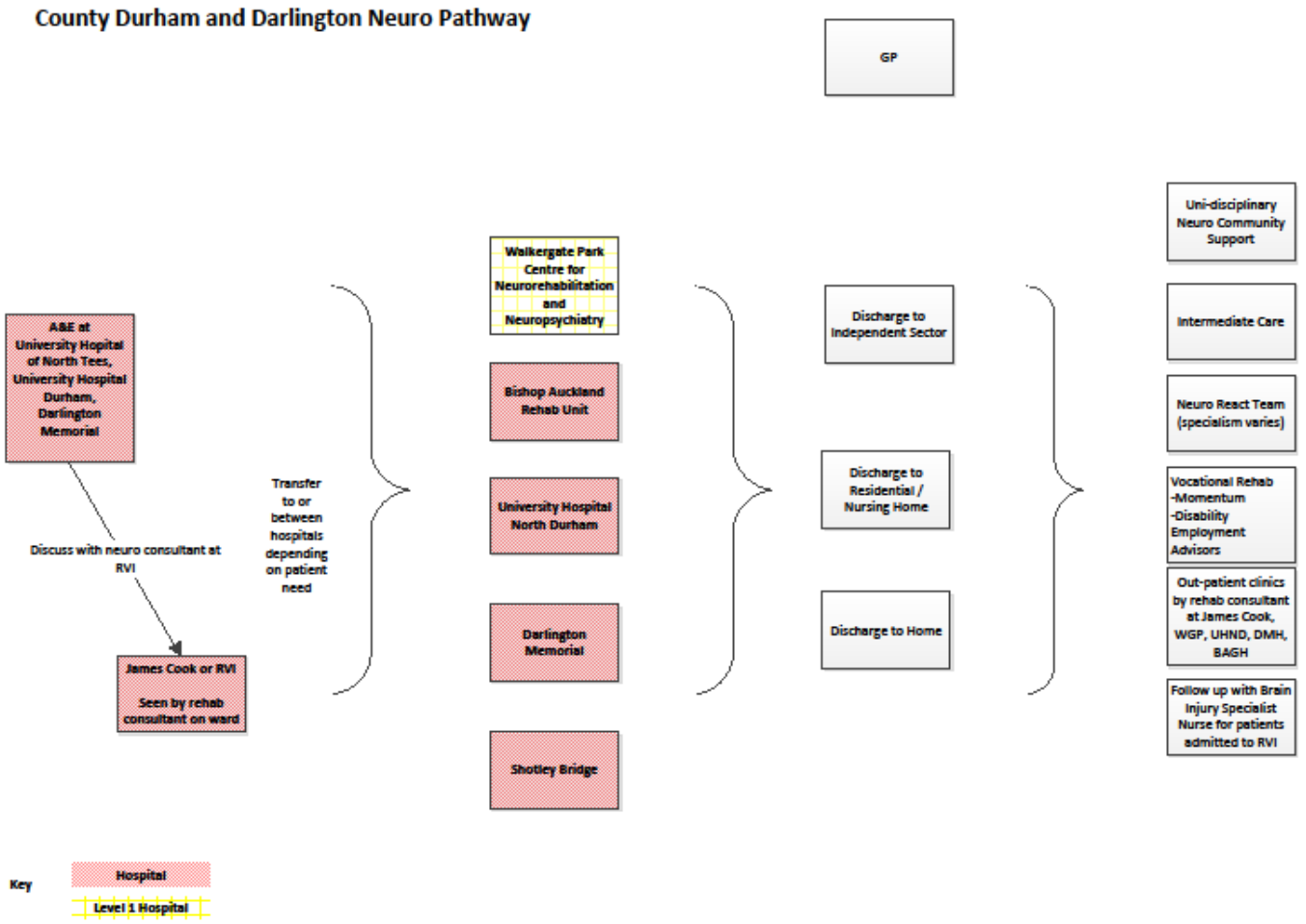
Due to the very limited availability of inpatient therapy services in DGH paediatric units across the region we generally adopt a pattern of centralised rehabilitation in Newcastle until a child's needs can be met by community services rather than any form of step down model involving DGHs. The Newcastle team provides services across the former northern region with the exception of Middlesbrough who are largely self-sufficient in providing inpatient rehabilitation for all but the most complex cases.

As a specialty paediatric neuro-rehabilitation has a particular emphasis on the late cognitive and educational complications of ABI. Thus with my colleague, Dr Tom Kelly, Consultant Clinical Neuropsychologist we provide a period of extended outpatient follow up monitoring the cognitive consequences of any acquired insult and advocating for children's additional educational needs with school authorities.

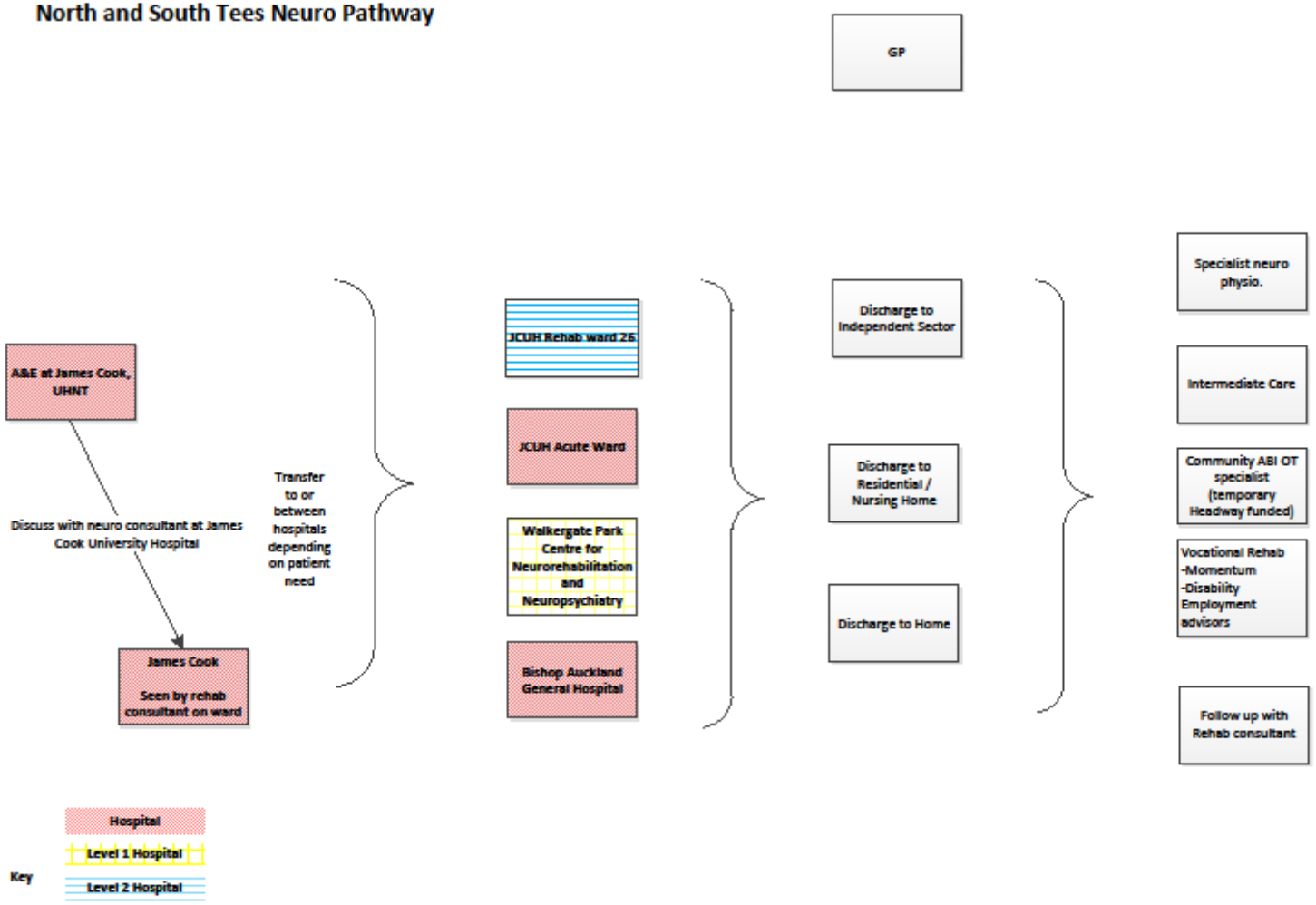
The Newcastle team has been recognised informally as one of the premier paediatric rehabilitation providers nationally. We liaise closely with the voluntary sector organisations in the field and were the first UK centre to be allocated a Family Support worker by the Child Brain Injury Trust. Team members have national and international profiles lecturing, publishing and researching in the field.

The rehabilitation prescription process introduced with the Trauma Networks has formalised a process that was to a large extent in place in the paediatric service, in that extensive *ad hominem* discussions have tended to occur with the handover of each child to district services (of course it should be remembered that traumatic brain injury only represents ~50% of the case load). There has been no formal commissioning of paediatric neurorehabilitation services in the north east to date: this is typical of the national picture although there are exceptions (e.g. South West region have an explicitly commissioned hub and outreach rehabilitation service). All members of the Newcastle team have other commitments outside their rehabilitation work. Some sessions for team members have been purchased on the back of other developments over the years.

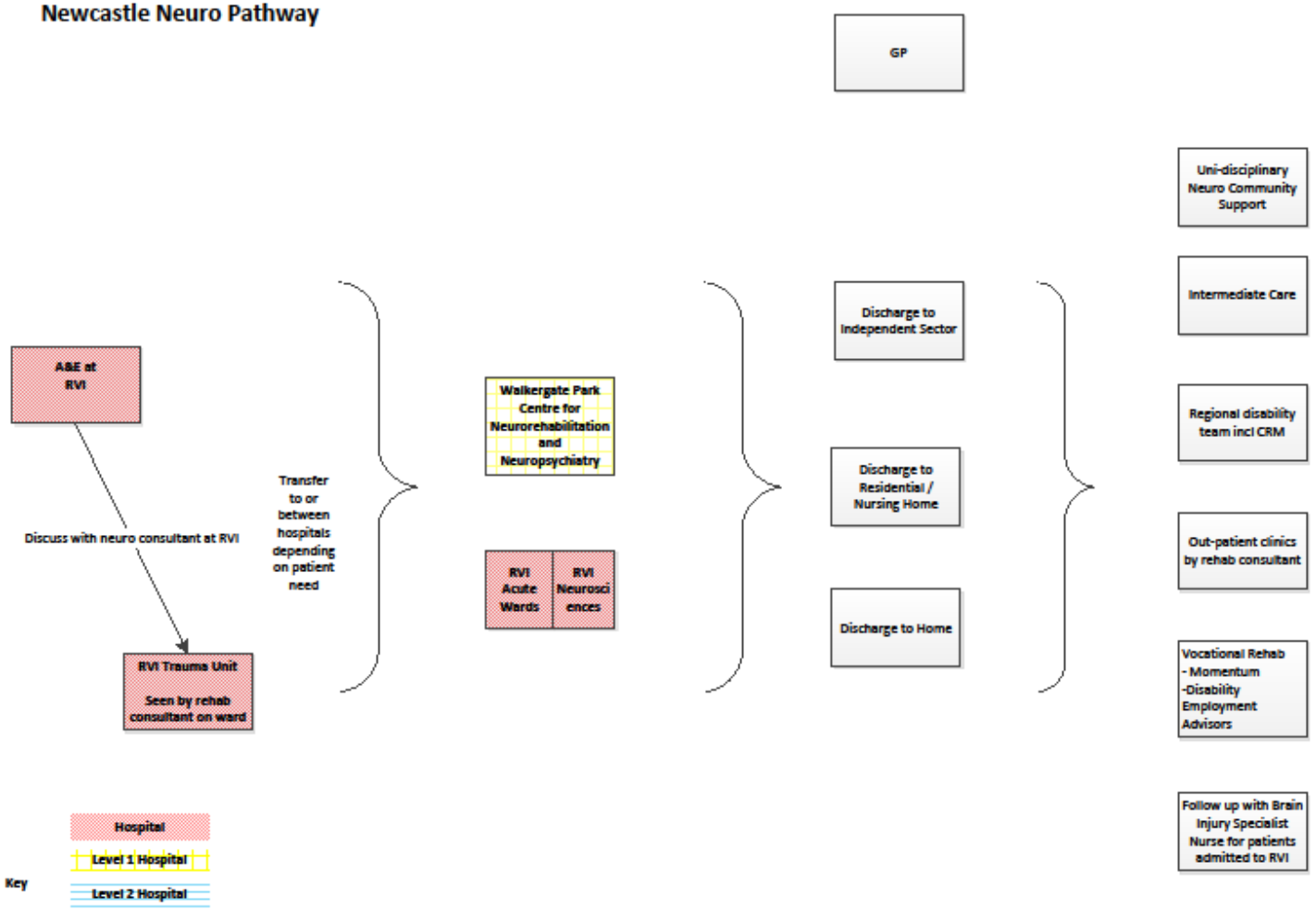
Appendix 13 Geographical TBI maps – CDD, Tees, Newcastle



North and South Tees Neuro Pathway



Newcastle Neuro Pathway



Appendix 14 Regional Stakeholders involved in validation of maps and gap analysis for Neurotrauma work stream

Newcastle:

Richard Jones, Consultant Neurologist, Newcastle Upon Tyne Hospitals NHS Foundation Trust.

Mr Jonathan Forty, Consultant Cardiothoracic Surgeon/Deputy Medical Director, Newcastle Upon Tyne Hospitals NHS Foundation Trust.

Rebekah Mercer, Directorate Manager for Neurosciences, Newcastle Upon Tyne Hospitals NHS Foundation Trust.

Julie Green, Divisional manager neuro services, WalkergatePark Centre for Neurorehabilitation and Neuropsychiatry, NTW Foundation Trust.

Sandra Stark, Consultant Physiotherapist, WalkergatePark Centre for Neurorehabilitation and Neuropsychiatry, NTW Foundation Trust.

Northumberland & North Tyneside:

Neil Brownlee Manager for Long Term Conditions and Team Lead for Northumberland Head Injuries Service, NTW Foundation Trust.

Mr Murty, Trauma and Orthopaedic Consultant, Northumbria Healthcare NHS Foundation Trust.

South of Tyne and Wear:

Duncan Mitchell, Consultant in Rehabilitation Medicine, City Hospitals Sunderland, NHS Foundation Trust.

Dave Bramley, Consultant in Emergency Medicine, City Hospitals Sunderland, NHS Foundation Trust.

Pauline Birchall, Occupational Therapist In Gateshead ABI Team. Project leader for South of Tyne Brain Injury Project.

North & South Tees:

Christine Woodgate, Divisional Manager – Neurosciences, South Tees Hospitals NHS Foundation Trust.

Lucy Tulloch, Deputy Divisional Manager – Neurosciences, South Tees Hospitals NHS Foundation Trust.

Dr Anwar Khalid, Consultant in Rehabilitation Medicine, South Tees Hospitals NHS Foundation Trust.

Cumbria:

Vicky Reay, Cumbria Community Aquired Brain Injury Rehabilitation team, (CCABIRT), Case Manager, Cumbria Partnership NHS Foundation Trust.

Dr Yogan Jagatsinh, Consultant in rehabilitation Medicine, North Cumbria University Hospitals, NHS Trust.

Durham & Darlington:

Darren Archer was Head of Joint Planning, NHS County Durham and Darlington – Commissioning Support.

List coordinated by Elizabeth Morris NENN on behalf of the Neurotrauma Workstream

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