

Management of traumatic brain injury: practical development of a recent proposal

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ABSTRACT

A recent article identified weaknesses in the management of patients with traumatic brain injury (TBI). The authors suggested some reasons but overlooked two of the reasons for the low quality of services: a lack of resources and a systemic failure to organise rehabilitation services. They suggested early involvement of a condition-specific service with a new ‘neuroscience clinician’ and additional neuro-navigators, but the evidence shows this approach does not work. Their proposal failed to acknowledge the neuroscience skills of existing rehabilitation medicine consultants and teams, and ignored the many non-TBI problems patients will have and the consequent need for expert rehabilitation input. We revise and develop their proposal, suggesting an alternative way to improve services. Rehabilitation teams should work in parallel with acute services and remain responsible for the rehabilitation of patients as they move through different settings. This suggested development of rehabilitation mirrors the development followed by geriatric medicine from 40 years ago.

KEYWORDS: traumatic brain injury, service design, rehabilitation

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Introduction

Recently, Li and colleagues suggested that the NHS should develop ‘a clinical neuroscience-led pathway’ for patients after a traumatic brain injury (TBI).¹ We welcome their recognition that patients with a TBI need expert rehabilitation, that services are insufficient and that rehabilitation can be cost effective. We are concerned that:

- > their perception of existing services, provided by teams that include consultants in rehabilitation medicine, does not recognise current practise
- > their solution, the development of a specialist service for a single condition, will fragment care pathways so that patients may not receive input.

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Herein, we consider the weaknesses and strengths of the proposal to suggest a better solution to the undoubted problems.

Overview of original article

We agree with their summary of the nature and scale of the problem. They detail the clinical pathways followed by hospitalised patients not requiring critical care or neurosurgical expertise, showing that acute (first week) care is, for patients with an isolated moderate head injury, delivered by non-specialist clinical teams without expertise in TBI and that subsequent management is ‘haphazard’, breaking down due to insufficient expertise in recognising sequelae and causes of disability.

They then segue into a discussion of pathways, leading to their proposal. Four assumptions underlie this transition.

- > Cognitive and other non-motor problems (so-called hidden disabilities) are not recognised.
- > Hidden disabilities are sufficiently common, persistent and disruptive to cause difficulties for the patient and economic losses to society.
- > Follow-up will identify patients with these losses.
- > Interventions will reverse losses or lessen the consequences of the losses.

They propose a solution: a dedicated TBI service for all patients with TBI, whatever their severity or problems. We think some of their assumptions are incorrect and that a better solution exists.

Relevant evidence

There is evidence of benefit from multidisciplinary team-based rehabilitation for patients with a moderate or severe TBI.² Rehabilitation targeted at cognitive and behavioural problems is beneficial and can be delivered in hospital or at home.^{3–5}

Routine follow-up of patients admitted to hospital or who are not admitted but have post-traumatic amnesia of over 1 hour is effective.⁶ Regular follow-up of patients attending emergency departments with less severe head injuries is not effective.^{7–9} Engagement with follow-up after a moderate or mild injury is low, many patients do not attend, even when a flexible outreach service is offered.^{8–10}

Major trauma centres already have rehabilitation coordinators who manage all major trauma cases, including patients with TBI; some centres have dedicated neurological specialist case managers. The need for a second case manager, termed a ‘neuro-navigator’, is unclear. The only trial of case management

after TBI, based on 126 patients, showed no benefit.¹¹ The authors conclude that, 'Widespread introduction of early case management after severe head injury is not supported, and early case management is not a substitute for improvement in provision of skilled and specialist rehabilitation for patients.' We agree.

The absence of simple definition or criterion for TBI makes it difficult to estimate numbers. The coding of patients is unreliable, with many patients with significant TBI being missed.^{12,13} The total number of patients experiencing a TBI of any severity may be 5–9 per 1,000 per year in the adult population.¹⁴ Many patients with minor or very minor head injury may only need advice and no more.¹⁰

Rehabilitation services have no overall coherent organisation at present. This problem was recognised in 2010 when considering trauma.¹⁵ The National Audit Office, in their review of long-term conditions, said, 'Ongoing care is fragmented and poorly coordinated. Our focus groups mentioned having no personal care plan or single person coordination.'¹⁶

There are recommended standards for some rehabilitation service, such as the national service specifications for England and Wales.^{17,18} The British Society of Rehabilitation Medicine (BSRM) has core standards for rehabilitation after major trauma, including TBI, and the standards specify rehabilitation medicine consultants as part of the service.¹⁹ The standards also recommend the use of rehabilitation prescriptions, specialist outpatient clinics and links to other specialist services. An audit showed that none of the standards are met. One reason was a lack of commissioned beds; only 40% of patients needing specialist inpatient rehabilitation could access a service, often after a delay.²⁰

A recent study on vocational rehabilitation for people after TBI vividly showed the lack of coherent services.²¹ The occurrence of longer-term problems needing rehabilitation after COVID-19 has exposed a lack of any coherent organising principle for services.²² Fig 1 illustrates the considerable range of isolated, separate services available in a district.

Even if condition-specific services benefit the group of patients seen, they do not lead to a coherent, seamless service for all patients. A few simple thought experiments, presented as clinical questions, illustrate this.

- > Should a patient with a moderate TBI and a complete C4 spinal cord injury be kept under the aegis of this team or transferred to a spinal cord injury service?
- > Should this team manage a 65-year-old patient with advanced dementia, living at home supported by social services, after a fall and a minor subdural haemorrhage?
- > Should a patient with a non-traumatic acquired brain injury (ABI), leaving them with all the losses described by Li *et al*, be denied access to this team or should there be separate condition-specific services for each of the many causes of ABI?¹

Condition-specific services are contrary to the current drive to ensure coordinated, holistic delivery of health services. The increasing specialisation of health services resulted in patients receiving patchy and piecemeal services. The Shape of Training report in November 2013 was a direct response to the fragmentation of healthcare: 'Patients and the public need more doctors who are capable of providing general care in broad specialties across a range of different settings.'²³ The report stressed two significant points:



Fig 1. Disparate rehabilitation services often available in a district without coherent organisation. MSK = musculoskeletal.

- > many patients have multiple conditions
- > specialised services could only manage the condition concerned, requiring the involvement of or transfer of patient care to one or more other specialties.

Although the Shape of Training report applied to services managing disease, the same argument applies to services managing disability. The example of specialist stroke rehabilitation given by Li *et al* arises from the need for hyper-acute stroke treatment in a stroke-specific unit and the large numbers involved.¹ Even so, stroke services do not cover vocational rehabilitation, most community rehabilitation or the needs of a significant minority of patients with unusually complex needs.

The underlying problems

One problem highlighted by Li *et al* is universal: how do patients admitted to acute hospital wards or presenting with a new issue in the community gain access to rehabilitation expertise without too much delay?¹ This matter is a significant problem for people with TBI. Still, it is equally a problem for patients on cardiology wards with hypoxic brain damage, for people with long-standing disabling conditions (such as multiple sclerosis or spinal cord injury) admitted with a separate acute illness and for people presenting to a general practitioner with reduced mobility secondary to known osteoarthritis of the knee.

They suggest that services lack neuroscience expertise, leading to an under-recognition of cognitive, emotional and behavioural problems, and a failure to develop ‘individualised, impairment-based diagnostics and therapeutics.’¹

They ignored two other essential needs. Many non-neurological factors contribute to the genesis and extent of a patient’s problems, including social factors and environmental factors. A ‘neuroscience clinician’ may not have training in identifying these factors. Moreover, the patient will need much more than impairment-based therapeutics, and a neuroscience clinician is unlikely to have the relevant expertise to identify and enact these interventions.

Rehabilitation medicine consultants, in contrast, are trained both in neuroscience analysis and treatment and in a much broader rehabilitation approach, so that one person can identify all a patient’s needs and meet them. Moreover, rehabilitation consultants work within multi-professional teams that often include other neuroscience trained professionals.

The third major underlying problem, not mentioned, is the lack of sufficient resources, clearly identified in the national clinical audit.²⁰ Li *et al* attribute the patient’s lack of service to a failure in ‘diagnosis’ rather than to a commissioning failure. Commissioning, at present, fails to provide appropriate and adequate resources.

For example, they say that, ‘the rehabilitation prescription is poorly implemented post-discharge and there is often no TBI-specific outpatient follow-up.’¹ The rehabilitation prescription is ‘poorly implemented’ precisely because no services are available to meet the identified need. Many of their statements imply that the poor access by patients to expert services arises from a failure to identify need; in reality, need is identified, but, for most patients, no services are available.

The TBI service proposed

The central strategy of the proposed service is stated thus: ‘The clinical management of all patients who present after TBI of any severity, to any healthcare facility (hospital or community), is formulated early after injury by a neuroscience-trained clinician using individualised, impairment-based diagnostics and therapeutics.’¹

They illustrate the variety of pathways responding to the various ways a patient may present. It is notable that the five bullet points and the associated illustration of the path:

- > does not show a pathway, as it has no exit; they show a map of resources that might be available
- > does not specify what the specialist ‘TBI’ team will do, other than assessing and referring
- > gives no recognition of the current lack of adequate rehabilitation resources.

They have a restricted view of what factors are relevant when formulating a case, overlooking the many non-neurological influences upon the patient’s functioning. This is surprising, given their emphasis on the biopsychosocial model of illness.

The proposal undervalues rehabilitation expertise. A neuroscience clinician is unlikely to identify the many non-neurological factors contributing to disabilities, and is unlikely to identify and implement the wide range of interventions needed. In contrast, a rehabilitation consultant can determine what interventions are available across the whole range of a patient’s

problems and, most importantly, implement the rehabilitation interventions needed. A rehabilitation expert will not only identify what interventions are possible, but will also prioritise them, set goals, evaluate the response and modify the rehabilitation programme over time.

The 2021 Rehabilitation Medicine Training Curriculum requires trainees to gain experience in neurological and trauma rehabilitation, including hyperacute management of TBI.²⁴ The accompanying syllabus lists hyperacute TBI management competencies, which cover the expertise listed in the proposal.²⁵ Trainees are also required to acquire experience in relevant specialties (eg neuropsychiatry).

Lastly, polytrauma is common in patients with TBI.²⁶ Rehabilitation medicine consultants train to manage all injuries (for example, spinal cord injury or complex orthopaedic and musculoskeletal injuries) and any co-existing conditions. Early rehabilitation input is associated with reduced length of stay and other benefits and later the same expert can, for example, support return to work.²⁷

An alternative proposal

We agree that clinical teams should have sufficient expertise to manage most of the patients and most of the problems seen by the team. We disagree that the best or only solution is to develop a condition-specific service centred on TBI.

Their proposal is not compatible with current or optimal organisation and, if it were implemented fully, it would further fragment services and significantly disadvantage other patient groups. Secondly, both rehabilitation after trauma and rehabilitation after COVID-19 have demonstrated that isolated, condition-specific, treatment-specific or location-specific services are often not able to provide a patient with the range of expertise and flexibility in service delivery needed.^{15,22}

Rehabilitation is, at present, undervalued and under-resourced. It is rarely available as an expert service in an acute hospital setting and, when it is, resources are limited. This situation is reminiscent of the status of geriatric medicine in the 1970s.²⁸ Geriatrics grew by becoming integrated into acute services. Initially, each medical and surgical team had an ‘attached’ geriatrician who gave advice and took on responsibility for appropriate patients. Now acute care and geriatric services run in parallel, and often the same doctor and team covers both aspects of a patient’s care.

Similarly, mental health input is now becoming available to patients in acute hospitals through liaison psychiatry input. Palliative medicine’s role in acute care has been recognised as vital during the previous 2 years for COVID-19 patients; the training programme for palliative medicine has also recognised the importance acute input.

One feature needs emphasis. Rehabilitation services work within the biopsychosocial model of illness: the basis for the International Classification of Functioning (ICF) and for multi-professional rehabilitation teamwork.²⁹ Consequently, a rehabilitation service needs to:

- > provide a range of interventions spanning all domains of the biopsychosocial model of illness
- > work collaboratively with different services and agencies, especially other specialist hospital services, general practice and social services

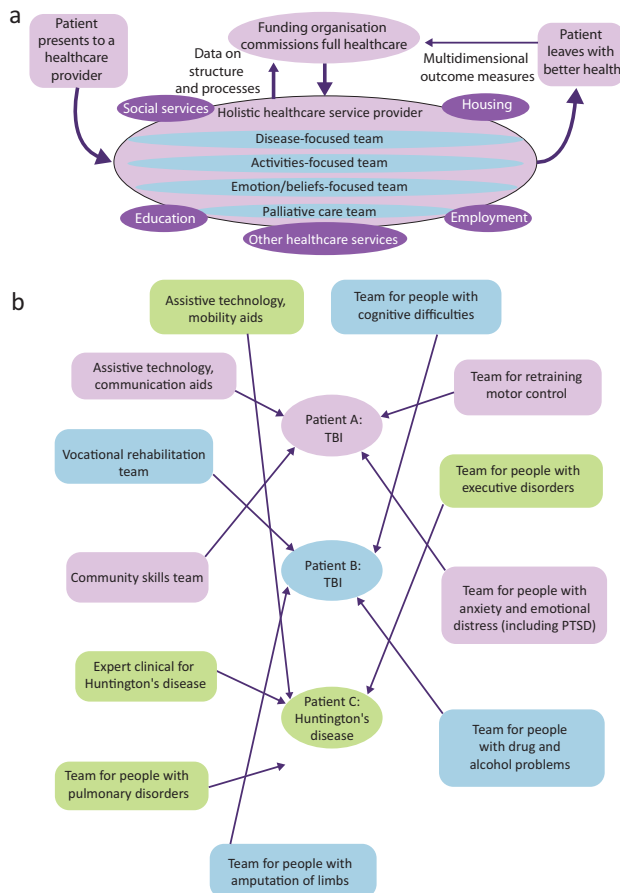


Fig 2. a) Rehabilitation in healthcare: organisation and relationships in the system. b) An integrated, holistic rehabilitation service: individualised teams for different patients. PTSD = post-traumatic stress disorder; TBI = traumatic brain injury.

- > remain involved with a patient as they move through different settings (intensive care to a ward, to a nursing home or to home)
- > remain available to patients over time, sometimes over a lifetime.

This situation is similar to the needs of people with learning disability. The solution for this relatively small group of patients is a single integrated service available wherever and whenever needed. As illustrated in Fig 2, our proposed solution is for a single rehabilitation service integrated into all other healthcare services.

Conclusion

Li *et al* identified one of many areas within the NHS where improvement in rehabilitation services is needed.¹ We suggest that their solution is misguided in three ways: it does not acknowledge the expertise of existing services; it does not recognise the importance of rehabilitation expertise within the proposed service and it does not consider how the service will fit into existing NHS organisations and structures.

We suggest an alternative solution. Rehabilitation services need to be integrated into all (acute) healthcare services to ensure the early identification of patients who need or will need further

rehabilitation input. Rehabilitation services should be organised so that patients can receive a 'holistic and seamless' service. This change depends upon all services within a single organisation (budgetary and management unit) to manage a patient's problems without further transfers of care. Rehabilitation medicine consultants already possess all expertise needed for such a service.

Two obstacles prevent our suggestion from being taken forward. One is resources, with insufficient resources being devoted to rehabilitation to meet patient needs. The other, which is probably more critical and challenging to resolve, is political and organisational resistance to reconfiguring existing resources. Such a reconfiguration would increase efficiency and effectiveness.

COVID-19 resulted in rapid, successful organisational changes, showing what can be achieved in acute care and rehabilitation services. We hope this article will stimulate improvements in rehabilitation services for patients with TBI and any other disabling condition. ■

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