Neurobehavioural Rehabilitation: as it is now

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Brain Injury Rehabilitation Trust

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Overview

What is neurobehavioural rehabilitation?
Is it clinically effective?
Is it cost-effective?
What is neurobehavioural rehabilitation?

Supporting principles

• Post acute rehabilitation for those with an acquired brain
Neurobehavioural Rehabilitation

- Informed by an understanding of the cognitive, emotional and behavioural effects of acquired brain injury
- Especially the effects of brain injury on memory and learning, motivation, emotional regulation and social behaviour - these affect the ability to participate in and profit from rehabilitation
Neurobehavioural Rehabilitation
Evidence concerning the learning abilities of those with acquired brain injuries

- Implicit learning
- Procedural learning — skills or routines
- Errorless learning and vanishing cues
- Classical and operant conditioning
- Evidence for lack of generalisation of learning eg learned to use a washing machine but unable to use a new one
Neurobehavioural Rehabilitation

• Effects of brain injury on motivation
  – Idea generation,
  – goal selection,
  – goal formulation (planning),
  – initiation,
  – monitoring behaviour,
  – review and reinforcement

(Oddy, Worthington and Frances 2009)
Neurobehavioural Rehabilitation

• Emotional regulation
• Impulsivity
• Disinhibited behaviour
• Social perception and behaviour
Neurobehavioural Rehabilitation

- Vast area dating back to Pavlov and Skinner – includes comparative psychology, evidence from a wide range of clinical populations including LD, MH, child health – includes operant and classical conditioning and it includes learning and training protocols.
Neurobehavioural Rehabilitation

- Behaviour and skills are learned
- Behaviour has a function or purpose
- Behaviours may have an observable antecedent
- The likelihood of the behaviour recurring is determined by its consequences
- Behaviour is described and recorded objectively: what you see, not what you infer – observed behaviour can be measured
Neurobehavioural Rehabilitation

• Shaping
• Skills training
• Breaking down into the elements
• Chaining elements together
• Short bursts
How to do neurobehavioural rehabilitation

• Set a small number of core goals
• Focus on increasing positive behaviours rather than reducing behaviours seen as negative
• Ensure the team’s and family’s goals are aligned with those of the individual
How to do neurobehavioural rehabilitation - continued

• Try to understand the context of behaviour
• Try to understand the person
• Understand frustration
• Avoid confrontation
• Build relationships
Neurobehavioural Rehabilitation

- Holistic approach including psychological adjustment
- Interdisciplinary team approach
- Functional approach
- Community based
- Compensatory Strategies
- SMART goal setting — specific, measurable, achievable, relevant (rather than realistic) and time-bound
- Goal Attainment Scaling
- Working with the family
- Prosthetic environment (structure etc) including assistive technology for cognitive deficits
- Systematic reviews by: Cicerone et al. 2000, Cicerone et al., 2005 Carney et al. 1999; Chesnut et al. 1999
Neurobehavioural Rehabilitation

• The neurobehavioural approach is not just about challenging behaviour but informs the way all aspects of rehabilitation are delivered i.e. physical and sensory, functional ADLs, cognitive deficits and challenging behaviour

• It addresses how those with a brain injury best learn and can benefit most from their rehabilitation

• Cognitive deficits and challenging behaviour can stand in the way of learning after acquired brain injury and need to be addressed before other rehabilitation can be effective
The people we serve (I)

Gender
72% Male
28% Female

Diagnosis
55% TBI
21% CVA
11% Hypoxia
6% Encephalitis
2% Neoplasm
5% Other
The people we serve (II)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Range</th>
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<tbody>
<tr>
<td>Age at injury</td>
<td>40.9</td>
<td>3-76</td>
</tr>
<tr>
<td>Injury severity (GCS)</td>
<td>6.7</td>
<td>3-15</td>
</tr>
<tr>
<td>Time since injury (weeks)</td>
<td>102.6</td>
<td>1-2325</td>
</tr>
<tr>
<td>Length of stay (weeks)</td>
<td>25.6</td>
<td>0-223</td>
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</table>

Glasgow Coma Scale (GCS)

**Severe TBI**
GCS ≤ 8

**Moderate TBI**
GCS 9 -12

**Mild TBI**
GCS 13 -15
What we achieve (I)

Reduction in levels of supervision

Bars represent percent (%) Service Users (SRS Scores)
What we achieve (IV)

Reduction in number of hours of care

Bars represent hours of care

- Admission
- Discharge
- Follow-up
What we achieve (V)

Reduction in cost of care

Bars represent hundreds of pounds

Hours of care x £ per hour
Savings today

B = Daily care costs \textbf{before} rehabilitation
A = Daily care costs \textbf{after} rehabilitation
R = Total cost of rehabilitation

Cost savings = (B-A)-R
Cost savings per year

0-12 months

B = £ 165.95
   (£ 60,571.75 per year)
A = £ 51.67
   (£ 18,859.55 per year)
R = £ 54,080.56

1st year Cost savings = (B-A)-R =
   -£ 12,368.36

BUT

An annual cost saving of £ 41,712.20

> 1 year

B = £ 135.84
   (£ 49,581.60 per year)
A = £ 85.60
   (£ 31,244.00 per year)
R = £ 85,810.71

1st year Cost savings = (B-A)-R =
   -£ 67,473.11

BUT

An annual cost saving of £ 18,337.60

0-12 months > 1 year
Individual cost savings in a lifetime...

Cost of rehabilitation recovered in 1 to 5 years, depending on Time Since Injury

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<tr>
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<th>Lifetime savings</th>
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<tbody>
<tr>
<td></td>
<td>0 – 12 months</td>
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<tr>
<td>Discounted at 1.5%</td>
<td>£1,134,799.42</td>
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<tr>
<td>Discounted at 3%</td>
<td>£891,682.70</td>
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<tr>
<td>Discounted at 5%</td>
<td>£671,217.01</td>
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Given a mean cohort age of 43.4 at discharge, and a mean lifespan of 79.6.
Individual cost savings in a lifetime...

Lifetime savings corrected for injury specific lifespan

- 25 years
- 38 years

0-12 months

- 1.5%
- 3%
- 5%

> 1 year
Concluding messages

• Neurobehavioural rehabilitation contributes to achieving greater independence and more participation in society

• Neurobehavioural rehabilitation contributes to significantly reducing the costs of long-term care
There was always a "good" atmosphere in the unit - everyone seemed valued.
— Family of Graham Anderson House Service User

Each client and family treated with a very warm and personal approach. Opportunity for pre-referral discussion.
— Referrer to York House

The staff - their obvious caring natures - it is not just a job to them. (I hope they are paid well!)
— Family of York House Service House
Thank you