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Common goal areas in the treatment of upper limb spasticity: a multicentre analysis

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Abstract

Objective: We aimed to develop a goal classification of Individualised goals for spasticity treatment incorporating botulinum toxin intervention for upper limb spasticity to under-pin a more structured approach to future goal setting.

Design: Individualised goals for spasticity treatment incorporating botulinum toxin intervention for upper limb spasticity (n=696) were analysed initially from four studies published in 2008-2012), spanning a total of 18 centres (12 in the UK and 6 in Australia). Goals were categorised and mapped onto the closest matching domains of the WHO International Classification of Functioning. Confirmatory analysis included a further 927 goals from a large international cohort study spanning 22 countries published in 2013.

Results: Goal categories could be assigned into two domains, each subdivided into three key goal areas:

Domain 1: Symptoms/impairment n=322 (46%): a. pain/discomfort n=78 (11%), b. involuntary movements n=75 (11%), c. range of movement/contracture prevention n=162 (23%).

Domain 2: Activities/function n=374 (54%): a. passive function (ease of caring for the affected limb) n=242 (35%), b active function (using the affected limb in active tasks) n=84 (12%), c. mobility n=11 (2%).

Over 99% of the goals from the large international cohort fell into the same six areas, confirming the international applicability of the classification.

Conclusions: Goals for management of upper limb spasticity, in worldwide clinical practice, fall into six main goal areas.

Word count: 217

Keywords: Goal-setting, Activities, Arm, Muscle Spasticity, Botulinum toxin

Introduction

Spasticity is a common and distressing sequela of stroke, which interferes with upper limb movement and limits use of the limb for active functional tasks, as well as impacting on mobility and increasing the burden on caregivers¹. Goals for treatment of upper limb spasticity are diverse, depending on the individual aspirations and priorities of the patient and/or their family. This diversity presents a challenge for outcome measurement in this context, due to the potential variety of outcome evaluation methods required to capture change in different domains.

Goal attainment scaling is increasingly used as an outcome measure in clinical studies of spasticity intervention²⁻⁶, but concerns have been raised about lack of standardisation in individual goal setting, which limits its comparability across different populations and settings^{7,8}. The development of a simple goal classification for use in this context, may assist clinicians to use goal attainment scaling in a more timely and structured manner. The identification of a subset of standardised measures to be used alongside goal setting may also help to make outcome measurement more comparable.

This short paper reports a secondary analysis of goal statements, rates of achievement and the measurement parameters that were used alongside them from five published studies that used goal attainment scaling as an outcome measure for treatment of upper limb spasticity using botulinum toxin^{2,4,9,10,6}.

Methods

Our initial analysis included goal statements from four studies published between 2008 and 2012:

1. Ashford and Turner-Stokes 2006: a small single centre, open label study from the UK recording the first published application of goal attainment scaling this context, (n=18, of which 9 had upper limb spasticity) ².
2. Ashford and Turner-Stokes 2008: a further small single centre, UK open label study, focussed on the use of botulinum toxin for management of shoulder girdle and proximal upper limb spasticity (n=16) ¹⁰.
3. Turner-Stokes et al 2010: a secondary analysis of a multi-centre randomised controlled trial from Australia (n=90 patients from six centres)^{3,4}.
4. Turner-Stokes et al 2013: the UK pilot for a large international prospective cohort - the Upper Limb International Spasticity (ULIS) series ⁶- incorporating n=151 patients from 12 centres ⁹.

In all four studies, goals were set and systematically recorded using goal attainment scaling as described by Turner-Stokes 2009 ¹¹, based on the original method of Kiresuk and Sherman ¹². These studies were selected based on the consistency of the goal setting process applied and the required recording of what goals were set.

Goal statements were extracted from the datasets of all the four studies, and classified and mapped onto the WHO International Classification of Functioning (ICF) ¹³ with a view to reducing the number of goal categories to a smaller number of 'key goal areas'.

Classification of goals for studies 1 and 2 was undertaken by both authors (LTS and SA) independently and then compared, with any disagreements discussed and rectified.

Classification of goals for studies 3 and 4 was taken from the existing datasets. In addition to the goal classification which was the primary aim of this work, we also interrogated the datasets for rates of goal achievement and also any parameters or standardised measures that had been used to provide quantification in goal evaluation (e.g. visual analogue scales, numerical rating scales etc.) within the different goal areas. This information was not always

recorded and was not available for all data sets and is therefore preliminary evaluation at this stage.

Confirmatory analysis of a further 927 goal statements from a large international cohort involving 84 centres in 22 countries (the ULIS-II study) published in 2013 ⁶, was undertaken to confirm or refute the goal classification.

Results

A total of 696 individualised primary and secondary goals for treatment of upper limb spasticity using botulinum toxin injection were analysed from the first four studies. Goal classification is summarised in Table 1 with a list of measured goal parameters / standardised measures that were identified in each goal area. Overall 322 (46%) of goals were set in the domain of symptoms and impairment, whilst 374 (54%) goals were related to activities.

Insert table 1 about here

Key goal areas in the domain of 'Symptoms and impairment' were:

- Reduction of spasticity-related pain (11%)
- Prevention of contractures and deformity, by improving passive range of movement (23%).
- Control of unwanted involuntary movements, such as associated reactions whilst walking or spasms (11%).

Key goal areas in the domain of 'Activities' were:

- Making it easier to care for the affected limb ('passive function' ¹⁴) e.g. maintaining palmar/axillary hygiene, skin integrity, dressing the limb including splint application etc. (35%)
- Using the affected limb for some purpose ('active function' ¹⁴) defined either by the motor task for function (e.g. grasping/holding/releasing objects, lifting and carrying or fine finger dexterity) (12%) – or by a functional task e.g. eating/drinking, household tasks, or activities related to work or hobbies (5%), or both.
- Improved mobility - such as safer transfers, standing balance, improved walking (gait pattern, speed or endurance), confidence or reduction of falling/tripping (2%).

Other goal areas that were used only occasionally related to improving body image (cosmesis) (1%) and facilitating therapy (0.01%)

The analysis of goal areas reported in the fifth study ⁶ confirmed that that 99% of the goals fell into the same six areas. This supports the conclusion that our findings have saturated. Table 2 compares the distribution of goals set and achieved within each goal area and demonstrates the same goal categories in these two different data sets. Rates of achievement were generally higher in the fifth study, which may reflect the concerted approach to training in the use of goal attainment scaling that was taken in this study ⁶

Discussion

In this study, analysis of a total 1623 goals from five published studies led to the identification of 6 key goal areas in two principal domains, which were mapped on to the WHO ICF. Our analysis confirms that, despite their diversity, goals for management of upper limb spasticity fall broadly into six main goal areas.

The large number of goals analysed across 18 centres spanning two continents in our first analysis provided a firm basis for selection of the six key goal areas. The subsequent confirmatory goals analysis from the large international cohort involving 22 countries across four continents (the ULIS-II study) ⁶ supports the conclusion that our findings have saturated and have world-wide applicability.

The findings have been used to inform the development of a structured approach to goal setting - the Goal Attainment Scaling – Evaluation of Outcome for Upper-limb Spasticity (GAS-eous) method, which is a structured process for applying goal attainment scaling alongside recording of standardised measures. This method and its development are described in an article in the International Journal of Therapy and Rehabilitation ¹⁵.

The approach of identifying the common goal areas and associated subsets of standardised measures is by no means confined to the management of spasticity, but has the potential for wider application both in rehabilitation and in other areas of health and social care. In time this may lead to the establishment of ‘goal banks’ as recommended by Tennant 2007 ⁸ within the specific field of interest, that will further improve the utility and comparability of goal attainment scaling as a person-centred outcome measure for complex interventions.

Word count 1086

Clinical Messages

- Two domains for goal setting could be consistently identified of ‘symptoms and impairment’ and ‘Activities’.
- Six goal areas were identified, under the two domains; 1: Symptoms/impairment: pain, involuntary movements and range of movement. 2: Activities/function: passive function (ease of caring), active function (using the affected limb) and mobility.

Declarations of interest

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References

1. Royal College of Physicians, British Society of Rehabilitation Medicine, Chartered Society of Physiotherapy and Association of Chartered Physiotherapist Interested in Neurology. Spasticity in adults: management using botulinum toxin - National Guidelines. London: Royal College of Physicians, Clinical Effectiveness and Evaluation Unit, 2009.
2. Ashford S and Turner-Stokes L. Goal attainment for spasticity management using botulinum toxin. *Physiotherapy Research International*. 2006; 11: 24-34.
3. McCrory P, Turner-Stokes L, Baguley I, et al. Botulinum toxin A for treatment of upper limb spasticity following stroke: A multi-centre randomized placebo-controlled study of the effects on quality of life and other person-centered outcomes. *Journal of Rehabilitation Medicine*. 2009; 41: 536-44.
4. Turner-Stokes L, Baguley I, De Graaff S, et al. Goal attainment scaling in the evaluation of treatment of upper limb spasticity with botulinum toxin: A secondary analysis from a double-blind placebo-controlled randomised clinical trial. *Journal of Rehabilitation Medicine*. 2010; 42: 81-9.
5. Borg J, Ward A, Wissel J, et al. Rationale and design of a multicentre, double-blind, prospective, randomized, European and Canadian study: Evaluating patient outcomes and costs of managing adults with post-stroke focal spasticity. *Journal of Rehabilitation Medicine*. 2011; 43: 15-22.
6. Turner-Stokes L, Fheodoroff K, Jacinto J and Maisonobe P. Results from the Upper Limb International Spasticity Study-II (ULIS-II): a large, international, prospective cohort study investigating practice and goal attainment following treatment with botulinum toxin A in real-life clinical management *BMJ Open*. 2013; doi:10.1136/bmjopen-2013-002771
7. Turner-Stokes L, Fheodoroff K, Jacinto J, Maisonobe P and Zakine B. Upper limb international spasticity study: rationale and protocol for a large, international, multicentre prospective cohort study investigating management and goal attainment following treatment with botulinum toxin A in real-life clinical practice. *BMJ Open*. 2013; 3: e002230.
8. Tennant A. Goal attainment scaling: Current methodological challenges. *Disability and Rehabilitation*. 2007; 29: 1583-8.
9. Turner-Stokes L, Williams H and Ashford S. A UK pilot for a large international prospective cohort analysis of the use of Botulinum Toxin A (BoNT-A) in upper limb spasticity. *Physical Medicine & Rehabilitation* 2012; 2: S190-S19.
10. Ashford S and Turner-Stokes L. Management of shoulder and proximal upper limb spasticity using botulinum toxin and concurrent therapy interventions: A preliminary analysis of goals and outcomes. *Disability and Rehabilitation*. 2009; 31: 220-6.
11. Turner-Stokes L. Goal attainment scaling (GAS) a practical guide. *Clinical Rehabilitation*. 2009; 23: 362-70.
12. Kiresuk T and Sherman R. Goal attainment scaling: a general method of evaluating comprehensive mental health programmes. *Community Mental Health Journal*. 1968; 4: 443-53.
13. WHO. *International Classification of Functioning, Disability and Health*. Geneva: World Health Organisation, 2002.

14. Sheehan GL. Botulinum treatment of spasticity: Why is it difficult to show a functional benefit? *Trauma and Rehabilitation*. 2001; 771-6.
15. Turner-Stokes L and Ashford S. Goal Attainment Scaling – Evaluation of Outcome for Upper-limb Spasticity - The GAS-eous method. *International Journal of Therapy and Rehabilitation*. in press.
16. Jackson D, Horn S, Kersten P and Turner-Stokes L. Development of a pictorial scale of pain intensity for patients with communication impairments: initial validation in a general population *Clinical Medicine*. 2006; 6: 580-5.
17. MacFarlane A, Turner-Stokes L and De Souza L. The associated reaction rating scale: a clinical tool to measure associated reactions in the hemiplegic upper limb. *Clinical Rehabilitation*. 2002; 16: 726-35.
18. Ashford S, Slade M, Nair A and Turner-Stokes L. Arm Activity measure (ArmA) application for recording functional gain following focal spasticity treatment. *International Journal of Therapy and Rehabilitation*. 2014; 21: 10-7.
19. Ashford S, Slade M and Turner-Stokes L. Conceptualisation and development of the Arm Activity measure (ArmA) for assessment of activity in the hemiparetic arm. *Disability and Rehabilitation*. 2013; 18 1513-8.
20. Ashford S, Slade M and Turner-Stokes L. Initial psychometric evaluation of the Arm Activity Measure (ArmA): a measure of activity in the hemiparetic arm. *Clinical Rehabilitation*. 2013; 27: 728-40.

Table 1: Breakdown of goals set (n=696) and standard measures in each goal area

Goal Domain	Goal area	No. of goals set	% of goals set	Goal parameters / standard measures used*
Symptoms and impairment N=322 goals (46%)	Spasticity-related pain or discomfort	78	11%	Visual analogues scales (VAS), numerical rating scales, Scale of Pain Intensity (SPIN) ¹⁶
	Involuntary movements during use of other limbs (associated reactions) or spasms	75	11%	Carry angle, spasm frequency, Associated Reaction Rating Scale (ARRS) ¹⁷
	Range of movement, prevention of contractures/ deformity, splint tolerance,	162	23%	Goniometry, anatomical distances (e.g. finger-palm), splint tolerance times
Activities N=374 goals (54%)	Passive function - Ease of caring for the affected limb (e.g. maintaining hygiene, skin integrity, dressing the limb)	242	35%	Ease of care ratings (VAS or numerical rating), carer burden, time to complete task Arm Activity measure (ArmA) – passive function ¹⁸⁻²⁰
	Active function - Domestic and community tasks (e.g. meal preparation, household duties, work-related tasks, recreation/leisure activities) Using the limb in an active function task (e.g. incorporating reaching, holding, grasping/releasing objects, lifting and carrying, or fine dexterity)	120	17%	Ability to complete the defined task, Time taken, control/quality of movement Arm Activity measure (ArmA) – active function ¹⁸⁻²⁰
	Improved mobility ** (e.g. transfers, standing, walking, balance, confidence, avoiding falls)	11	2%	Gait speed (e.g. 10 metre walk), endurance (e.g. 6 minute walk), video, falls frequency, confidence rating
	Therapy facilitation and cosmesis - perception of body image	8	1%	

*All standardised measures or ordinal scales used to quantify goal attainment are indicated. These measures were inconsistently applied in the four primary studies analysed in the goals analysis and in many cases were not used. Data for goal parameter use were not available for all studies.

**Goals for upper limb intervention related to improved mobility reflect the impact of the spastic upper limb on mobility

Table 2. Proportion of goals set and achieved in the different goal areas

Goal Domain	Goal area	Combined analysis of 696 goals		Analysis of the 927 goals from ULIS-II	
		No. of goals set	No goals achieved	No. of goals set	No goals achieved
Symptoms and impairment	Pain	78	66 (85%)	145	121 (83%)
	Involuntary movements	75	51 (65%)	97	77 (79%)
	Impairment	162	95 (59%)	222	173 (78%)
Activities	Passive function	242	151 (62%)	241	197 (82%)
	Active function	120	32 (27%)	182	122 (67%)
	Mobility	11	6 (54%)	29	21 (72%)
	Other	8	7 (87%)	8	6 (75%)

