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Physical and pharmacological intervention for spasticity and contracture management: A multi-causative and multi-management picture

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Overview

- Current guideline recommendations
 - Contracture management
 - Spasticity management
- Practice implementation
- Evidence update
- Current practice advice

Splinting for the prevention and correction of contractures in adults with neurological dysfunction.

Evidence, process, outcomes & translation into practice

- Guideline Development Group:
 - C Kilbride (editor); S Ashford; J Ashworth-Beaumont; T Baird; K Hoffman; J Tuckey; F Malaprade; A Mohagheghi; and L DeSouza.

Available at: <http://www.acpin.net/>



Splinting for the prevention and correction of contractures in adults with neurological dysfunction

Practice guideline for occupational therapists and physiotherapists

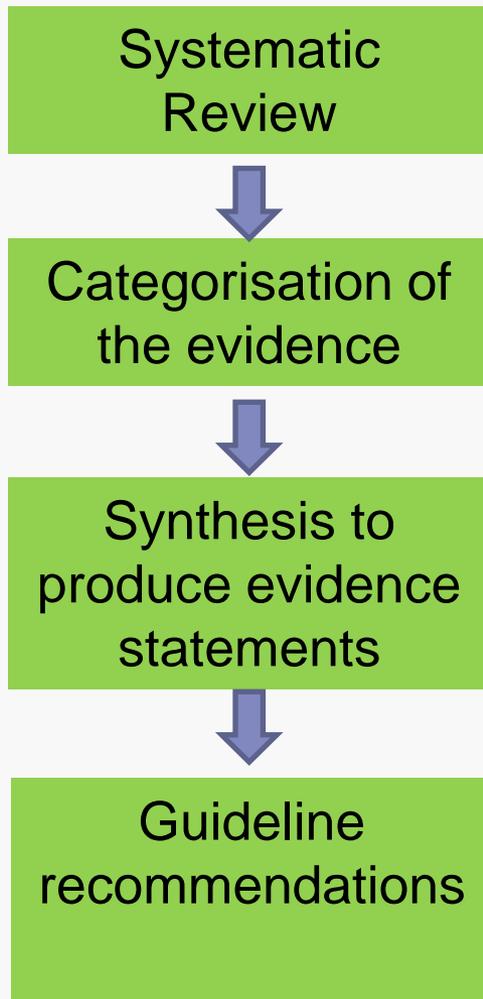
College of Occupational Therapists and
Association of Chartered Physiotherapists in Neurology



Clarification of Terminology

- ***Splinting*** = ***the process*** of applying a prolonged stretch through the application of a range of devices i.e. a ***splint*** or ***cast***

Recommendation development



Pre-defined search methodology

Development of methodology by GDG with agreed analysis plan

Guideline recommendations

- Selected statements
 - From current evidence
 - To illustrate practice implications

Lower limb - Ankle

Ankle: Contracture correction

1. It is suggested that **ankle casts are used at end range** (for people with ABI and stroke) for **improving range of movement at the ankle joint.** 2C

(Booth et al 1983 [D] ABI; Carda et al 2011 [B] stroke; Lehmkuhl et al 1990 [D] ABI; Moseley 1993 [C] ABI; Moseley et al 1997 [B] ABI; Pohl et al 2002 [C] ABI and stroke; Singer et al 2003a [B] stroke and ABI; Singer et al 2003b [C] stroke and ABI; Verplancke et al 2005 [B] ABI; Yasar et al 2010 [D] stroke)

2. It is suggested that ankle casts are applied at **end range** to improve joint range of movement in conjunction **with botulinum toxin A** (in people with stroke and ABI) when presenting with clinically significant spasticity (see also RCP 2009). 2B

(Carda et al 2011 [B] stroke; Farina et al 2008 [B] stroke; Verplancke et al 2005 [B] ABI; Yasar et al 2010 [D] stroke)

**End of range
ankle cast
application**

Lower limb - Knee

Knee: Contracture correction

8. It is suggested that casts may be used for the correction of contracture (in people with ABI stroke) with the knee joint positioned at **end range of movement**. 2D

(Booth et al 1983 [D] ABI; Lehmkuhl et al 1990 [D] ABI; Pohl et al 2002 [C] ABI and stroke)

9. It is suggested that **short-duration** cast application (1–4 days) may produce a lower complication rate than longer-duration cast application (4–7 days). 2C

(Pohl et al 2002 [C] ABI and stroke)

**End of range
knee cast
application**

**Lower
complication
rate – short
duration cast**

Upper limb – Wrist and Hand

Hand and wrist: Contracture correction

12. It is suggested that splints should **not be used** 2B
routinely for the correction of range of movement but may be beneficial in selected cases (in people with stroke and ABI).

(Abdolvahab et al 2010 [D] stroke; Amini et al 2009 [D] stroke; Beaty and Murphy 2013 [C] stroke; Bürge et al 2008 [A] stroke; Charait 1968 [D] stroke; Doucet and Mettler 2013 [C] stroke; Fayez and Sayed; 2013 [C] stroke; Lannin et al 2007a [A] stroke; Lannin et al 2003 [B] stroke and ABI; Leung et al 2012 [A] stroke and ABI; Shamila et al 2011 [D] stroke)

Hand and wrist splints not for routine use

Why correct in PDOC

- Is it appropriate and justified
 - What is the benefit to the person
 - Pain?
 - Prognosis improving presentation?
 - Does it impact significantly on ease of care

Upper limb – Wrist and Hand

Hand and wrist: Contracture prevention

13. It is suggested that splints should **not be used routinely** to prevent loss in range of movement at the wrist and hand (people with stroke and ABI) but may be beneficial in selected cases. 2B

(Basaran et al 2012 [B] stroke; Bürge et al 2008 [A] stroke; Harvey et al 2006 [A] stroke and ABI; Lannin et al 2007a [A] stroke; Lannin et al 2003 [B] stroke and ABI; Shamila et al 2011 [D] stroke)

14. It is suggested that splints in conjunction with botulinum toxin A (in people with stroke and ABI) may reduce spasticity as a component in preventing loss of range of movement in selected cases. 2C

(Carda and Molteni 2005 [C] stroke and ABI)

Hand and wrist splints not for routine use

Hand and wrist splints with BoNT in selected cases

Why prevent in PDOC

Again:

- Is it appropriate and justified
 - What is the benefit to the person
 - Pain
 - Prognosis improving presentation
 - Does it impact significantly on ease of care
- Is this different to any other patient?
- Overall aims:
 - Minimise intervention and improve care

Practice application

- Practice based implementation

Stage 1: Before considering splinting	<ul style="list-style-type: none"> • Splinting should be regarded not in isolation but as one part of a comprehensive goal-directed rehabilitation or management programme (RCP 2009). • If relevant, remediable provocative factors for spasticity should be addressed first (e.g. pain, infection) (RCP 2009).
Stage 2: Patient selection	<ul style="list-style-type: none"> • Patients suitable for splinting are those who may have, or may be at risk of, contractures and other treatment strategies are not maintaining joint range of movement. • Goals of intervention should be identified (e.g. improving range of ankle dorsiflexion or knee extension to enable standing or range of elbow extension to improve ease of dressing). • Splinting should not be considered in certain circumstances (Delphi Consultation 2013, ACPIN 1998, GDG Consensus), and caution is advised in others (see Boxes 8.1 and 8.2).
Stage 3: Agree action plan with team	<ul style="list-style-type: none"> • Identify the specific splinting intervention to be applied e.g. <ul style="list-style-type: none"> – cast or splint – bespoke or 'off the shelf' – design (e.g. consider pressure areas, lever lengths, materials used etc) – patient position to optimise application – wearing regime. • Identify the appropriately skilled person(s) responsible for making/provision of the splint or cast (ISWP 2012, NICE 2013). • Agree monitoring regime. • Identify outcome evaluation, including timeframes.
Stage 4: Before splinting	<ul style="list-style-type: none"> • Provide appropriate information to patients and carers (see example forms). • Obtain informed consent. In cases where an adult is unable to consent, a consultee process may be applied with the next of kin following discussion with the team, including medical colleagues, and a best interests decision made (COT 2010, CSP 2012). • Record baseline measures.
Stage 5: Splinting procedure	<ul style="list-style-type: none"> • Make or provide splint or cast.
Stage 6: Documentation	<ul style="list-style-type: none"> • Document consent or consultation process (COT 2010, CSP 2012). • Document splint or cast application details (see example in Appendix 6). • Document splint or cast monitoring regime (see example in Appendix 6). • Provide personalised application and monitoring information to patient and carers (see example in Appendix 6).
Stage 7: Review	<ul style="list-style-type: none"> • Plan review dates and outcome evaluation (NICE 2013).

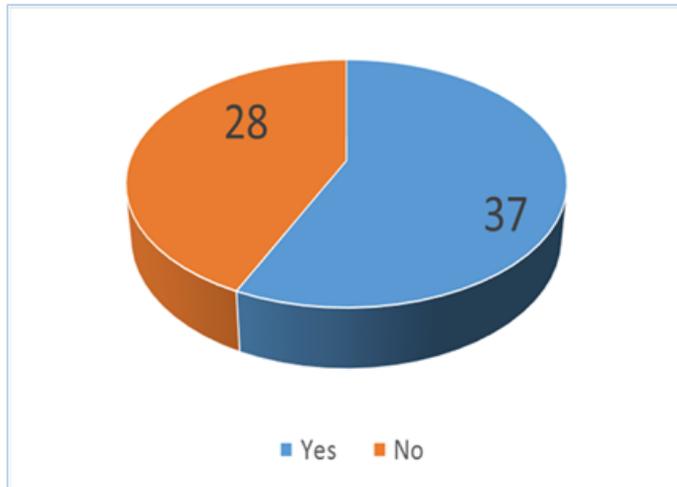
Audit of practice

- Specialised Hyper-acute service (1a)
- Cohort of patients including PDOC
- Service evaluation against
 - Guideline recommendations

Method

- All patients receiving splinting and/or casting
 - Including those in PDOC
- Comparison with standards in the:
 - Practice Guidelines - Clinical Audit Tool

Results – Pre intervention

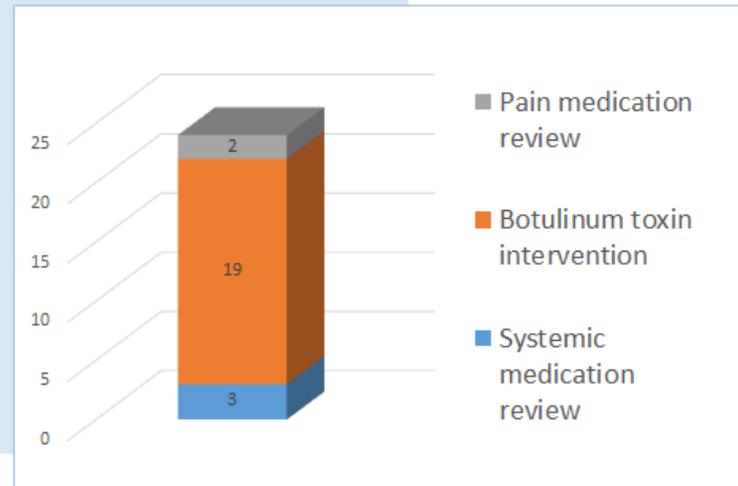


GOALS WITHIN THE OVERALL CONTEXT OF REHABILITATION

Consideration of goals within the overall context of rehabilitation evident in 57%.

REMEDIAL MANAGEMENT OF PROVOCATIVE FACTORS

67% presented with spasticity. Remedial management evident in 55%.



Results – Intervention

- 65 splinting interventions identified, of which
 - 54 were upper limb
 - 11 lower limb
- Type of device:
 - 39 custom-made
 - 56 were removable and 9 were non-removable (casts)
 - 26 prefabricated

Audit conclusions

- Areas of importance for practice:
 - Integration of splinting intervention
 - Management of spasticity (when appropriate)
 - Consistency of application
 - Dosage
 - Practicality for long term application
 - Preparation for discharge

Specific implications for PDOC

- Practicality of long term application!
- Withdrawal of intervention
 - Ineffective
 - Move from sub-acute to community
 - Need to review and re-assess
 - Impractical
 - Does it give sufficient benefit for incorporation in the care plan

Spasticity in adults: management using botulinum toxin

- Guideline Development Group:
 - L Turner-Stokes (editor); S Ashford; B Bhakta; K Heward; P Moore; A Robertson; A Ward
- Available at:
<http://shop.rcplondon.ac.uk/>

Spasticity in adults: management using botulinum toxin

National guidelines

January 2009



Spasticity

- Muscle over-activity
 - Upper Motor Neurone syndrome (UMN)
 - Positive feature
- Contributes to unwanted effects
 - Pain
 - Contracture
 - Increased contribution to disability

Coordinated focal management

Recommendation	Grade of evidence*
1 Principles of coordinated spasticity management	
1.1 The management of spasticity should be undertaken by a coordinated multidisciplinary team (MDT), rather than by clinicians working in isolation.	C
1.2 Before using botulinum toxin (BT), the team must ensure that: <ul style="list-style-type: none">• an appropriate physical management programme is in place• all remediable aggravating factors have been addressed• a suitable programme of on-going coordinated management is planned.	C
1.3 BT must only be injected by clinicians who have: <ul style="list-style-type: none">• appropriate understanding of functional anatomy• experience in the assessment and management of spasticity, and the use of BT in this context• knowledge of appropriate clinical dosing regimes and the ability to manage any potential complications.	C
1.4 BT injection must be part of a rehabilitation programme involving post-injection exercise, muscle stretch and/or splinting to achieve an optimal clinical effect.	A

Ensure intervention is integrated with overall management plan

Injection administration

2 Botulinum toxin injection

2.1	Patients should be selected for BT on the basis of: <ul style="list-style-type: none">• focal or multifocal problems due to spasticity• a dynamic spastic component as opposed to contracture• clearly identified goals for treatment and anticipated functional gains.	C
2.2	Patients and their families/carers should: <ul style="list-style-type: none">• be given appropriate information• have an understanding of the realistic goals and expected treatment outcomes• agree treatment goals before BT is given.	C
2.3	Informed consent should be obtained from patients prior to injection. If the patient does not have the mental capacity to consent, current local (eg trust) policies for obtaining consent should be followed, with reference to the Mental Capacity Act 2005.	C
2.4	Clinicians must be aware that different BT products have different dosage schedules. The current recommended maximum doses used in a single treatment session are: <ul style="list-style-type: none">• 1,000 units Dysport® or• 360 units Botox® Clinicians should refer to Appendix 2 for the recommended doses for individual muscles.	A

Consider the need:

- Focal
- Regional
- Generalised

Prescribing, supply & administration

3 Prescribing, supply and administration of botulinum toxin by non-medical practitioners

- 3.1** Processes for the administration and/or prescription of BT by non-medical practitioners (eg nurses, physiotherapists and other allied health professionals) are currently under exploration and development. **C**
- As for all spasticity interventions, the administration of BT by medical and non-medical practitioners should be in the context of a MDT decision.
 - Support and supervision should be available from a medical clinician who has the appropriate expertise and knowledge of BT injections, and will provide medical back-up in the event of any complications.
 - A formal system (such as a Patient Group Directions) should be produced to enable the administration of BT under sound clinical governance principles.
 - Careful attention should be given to the additional training needs of staff involved eg sterile intramuscular injection techniques, anatomical assessment etc.

Medical and Non-medical practitioners able to both: A. Administer and B. Prescribe

Outcome evaluation

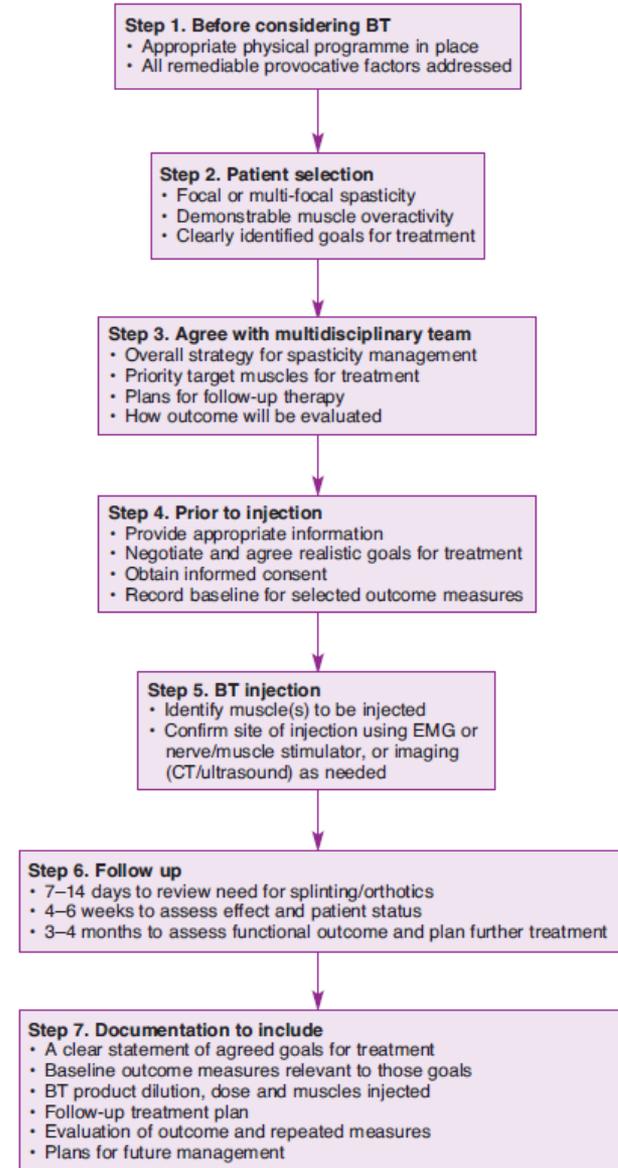
4 Follow up, documentation and outcome evaluation

4.1	All injections should be followed by: <ul style="list-style-type: none">• therapy review in 7–14 days for assessment and if necessary orthotics/splinting• MDT review at 4–6 weeks to assess effect and patient status• MDT review at 3–4 months to plan future management.	C
4.2	Injections should be followed by a formal assessment of outcome. Appropriate measures should be identified as part of the goal-setting process.	C
4.3	Formal evaluation of outcome should include: <ul style="list-style-type: none">• achievement of intended goals for treatment• evaluation of gains at the levels of:<ul style="list-style-type: none">– impairment eg clinical spasticity, range of movement etc– function ie whether 'active' eg motor use, or 'passive' eg ease of care• for details of tools to assess outcome see Appendix 3.	B
4.4	Documentation for all injections should include: <ul style="list-style-type: none">• patient and carer expectations for outcome• a clear statement of agreed treatment goals• baseline outcome measures appropriate to those goals• BT product, dose, dilution and muscles injected• follow-up treatment plan• evaluation of outcome and repeat measures• plans for future management.	C

We must be clear about what the meaningful benefit is.

Practice application

Practice based
implementation



**What categories of goal outcome
do we know improve?**

Goal Analysis

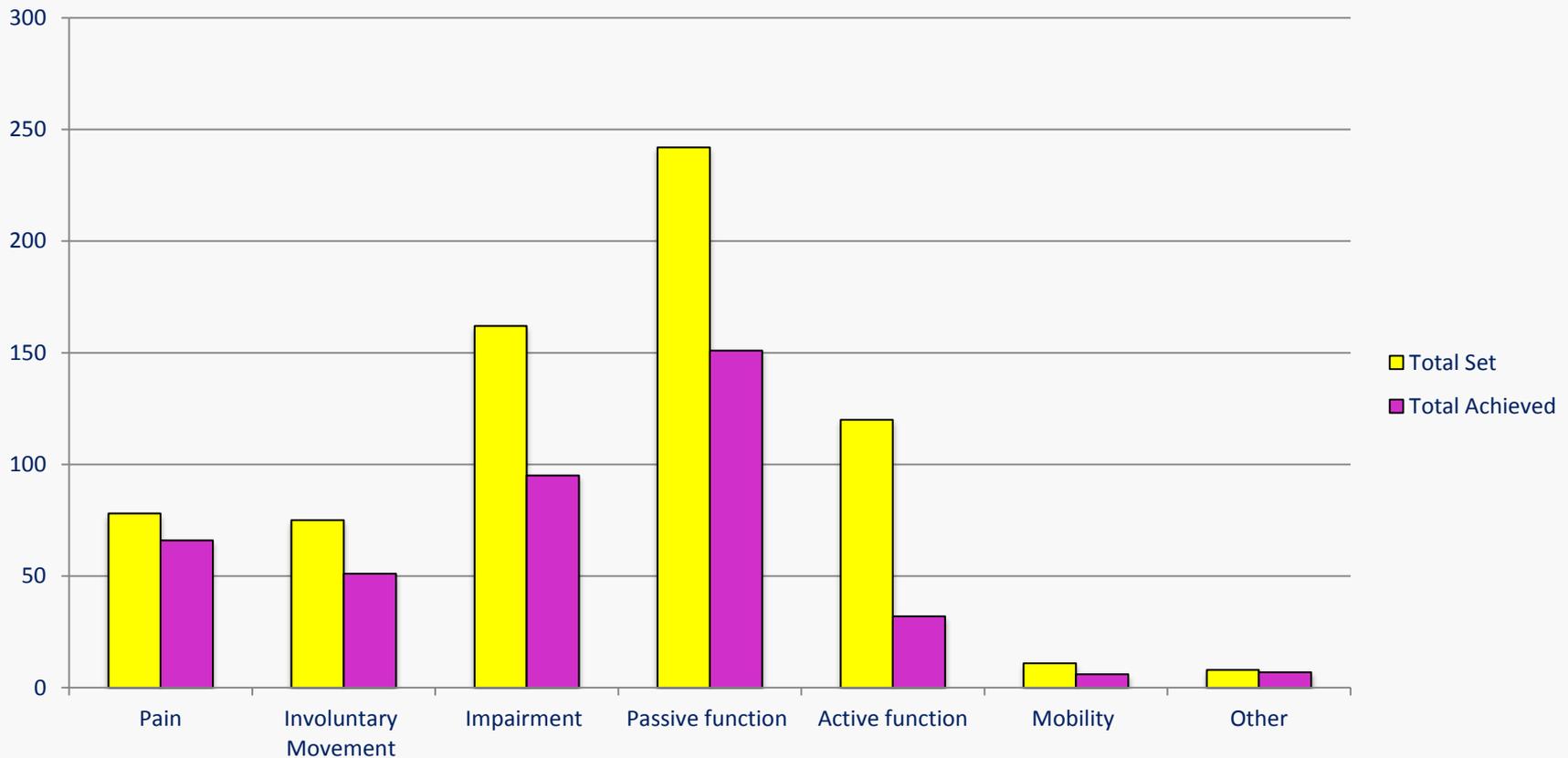
- Goal-setting from
 - five published studies of botulinum toxin treatment for upper limb spasticity
 - 1.Ashford and Turner-Stokes 2006: a small single centre, open label study from the UK recording the first published application of GAS in this context, (n=18, of which 9 had upper limb spasticity) .
 - 2.Ashford and Turner-Stokes 2008: a further small single centre, UK open label study, focussed on the use of BoNT for management of shoulder girdle and proximal upper limb spasticity (n=16) .
 - 3.Turner-Stokes et al 2010: a secondary analysis of a multi-centre randomised controlled trial from Australia (n=90 patients from six centres) .
 - 4.Turner-Stokes et al 2013: the UK pilot for a large international prospective cohort - the Upper Limb International Spasticity (ULIS) series incorporating n=151 patients from 12 centres .
 - 5.Turner-Stokes 2013 ULIS II results BMJ Open
- To develop a goal classification for
 - Development of a structured approach to goal setting

Ashford S. Jacinto J. Fheodoroff K. Turner-Stokes L. (2015) Common goal areas in the treatment of upper limb spasticity: a multicentre analysis, *Clinical Rehabilitation*. DOI: 10.1177/0269215515593391.

Goal categories

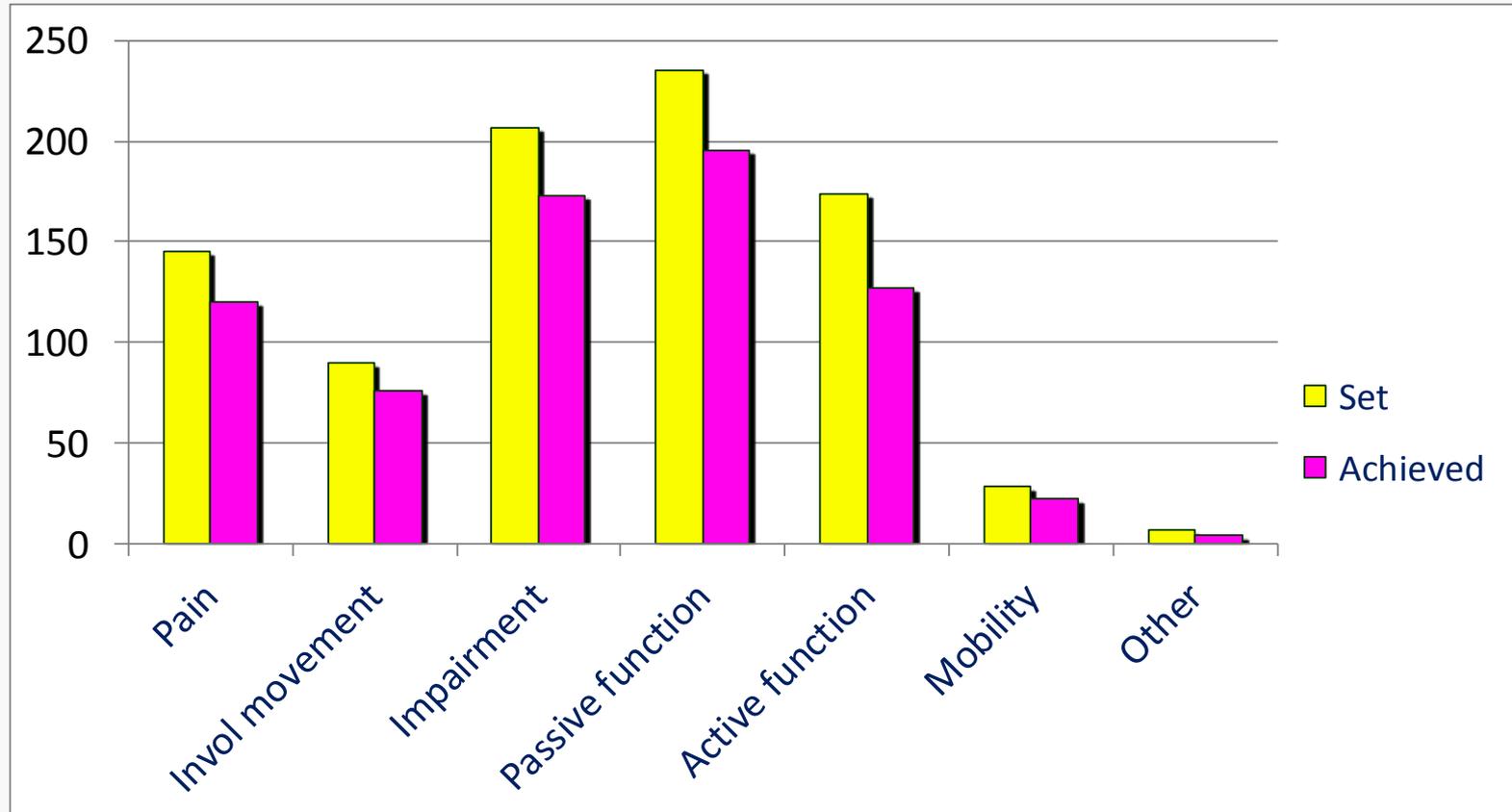
Based on first 4 published studies

Total number of goals set and achieved



Goal categories

Confirmation from ULIS II

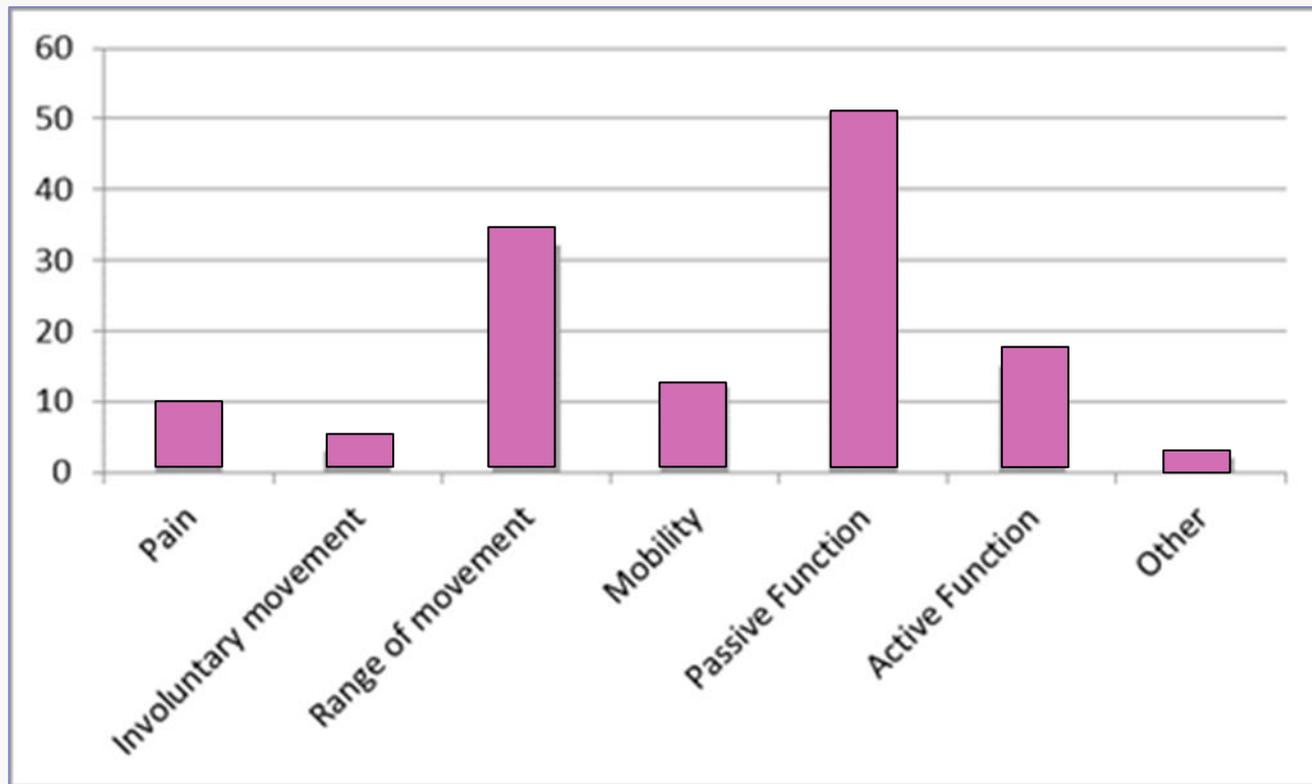


GAS- evaluation in upper limb spasticity

Domain 1	Symptoms / impairment
Pain / discomfort (b280)	Spasticity-related pain or discomfort - including painful spasms or stiffness
Involuntary movements (b755, b760, b765)	Unwanted involuntary movements during use of other limbs - eg spasms or flexed posturing of arm when walking
Range of movement / contracture prevention (b710, b735)	Range of active / passive movement, - including prevention of contractures
Domain 2	Activities / function
Passive function (Care Tasks) (d520)	Ease of caring for the affected limb - whether care is done by someone else or by the person him/herself.
Active function (d430, d440, d445)	Using the affected limb in some active task - involving motor control for a clear functional purpose
Mobility (d415, d450)	Improved mobility – transfers / standing / walking - due to better balance, gait quality, speed, efficiency
Other. Eg:	
Cosmesis / body image (b180) Therapy facilitation	Patient's perception of body image, aesthetic appearance Team's perception of interference with therapy

Goal analysis – Lower limb

Goals set



GAS- Legs

Domain 1	Symptoms / impairment
Pain / discomfort (b280)	Spasticity-related pain or discomfort - including painful spasms or stiffness
Involuntary movements (b760, b765)	Unwanted involuntary movements
Range of movement / contracture prevention (b710, b735)	Range of active / passive movement, - including prevention of contractures
Domain 2	Activities / function
Passive function (Care Tasks) (d520)	Ease of caring for the affected limb - whether care is done by someone else or by the person him/herself.
Active function	Transfers (d420, d415) - involving motor control for a clear functional purpose
	Locomotion walking (d415, d450, b770) - due to better balance, gait quality, speed, efficiency
Other. Eg:	
Cosmesis / body image (b180) Therapy facilitation	Patient's perception of body image, aesthetic appearance Team's perception of interference with therapy

PDOC priorities

- Positioning and stretch
 - Dose and consistency important
- Spasticity
 - What's the benefit to the person?
- Passive function goals
 - Understandably relevant in PDOC
 - Usually identified by carers (family / professional)

Conclusion

- Physical management in general important
 - Particularly for people in PDOC
- Some combinations of intervention
 - Appear more effective
- However many questions remain
 - Accurate recording of intervention needed
 - Be clear about the 'treatment' to demonstrate effectiveness
 - Combination and need for intervention



Acknowledgements

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<http://www.kcl.ac.uk/lsm/research/divisions/cicelysaunders>