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# FSI Focal Spasticity Index

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## Focal Spasticity Index

Goal analysis from four large international studies has identified six common categories for treatment goals [1], which are listed in Table 1. More recently a structured framework has been developed for use in spasticity management – the Focal Spasticity Index.

## Table 1: Treatment goals

Principal ICF	Key goal areas (ICF codes)
domains	
Domain 1:	1. Pain/discomfort/stiffness (b280, b780, b134)
Symptoms and	2. Involuntary movements (b760, b765)
impairment	3. Impairment (prevention of contractures) (b710, b735)
Domain 2:	4. Passive function (caring for the affected limb), (d520)
Activities	5. Active function (using the affected limb in some motor task) (d430, d440, d445)
(Active and	6. Mobility (d415, d450)
Passive function)	
Other	<ul> <li>Cosmesis (improving body image)</li> </ul>
	Facilitation of therapy

Key: ICF= International Classification of Functioning, Disability and Health

The **Focal Spasticity Index (FSI)** includes both patient-reported and clinician-rated elements. Developed originally in the context of upper limb intervention [2], the approach as now been adapted to encompass outcome evaluation in both upper and lower limb spasticity.

- The FSI comprises a structured approach to GAS together with severity indicators and confounders to recovery, and a limited set of standardised measures determined by the selected goal areas of treatment for any given patient.
- The key components of the FSI are listed in Table 2, and further detail regarding the incorporated tools is included in Appendix 1.

## Table 2: Components of the Focal Spasticity Index

FSI	Measurement tools				
A. Severity and confounders to recovery (History and examination)	<ul> <li>Duration of spasticity (months)</li> <li>Distribution and severity of spasticity (<i>Modified Ashworth Scale</i>)*</li> <li>Soft tissue contractures (<i>Loss of range</i>)*</li> <li>Severity of underlying impairment (<i>Neurological Impairment Set</i>)*</li> </ul>				

B. Goals for treatment	<ul> <li>Individual goal attainment scaling using GAS light</li> <li>Goals negotiated between patient and team, categorised within one or more of the six main goal areas:         <ul> <li>Domain 1</li> <li>Pain</li> <li>Involuntary movements</li> <li>Impairment (prevention of contractures)</li> <li>Domain 2</li> <li>Passive function</li> <li>Active function</li> <li>Mobility</li> </ul> </li> </ul>				
	<ul> <li>Recommended measures used to define goal parameters, selected according to the chosen goal area(s) eg         <ul> <li>Pain: Rating out of 10 (Verbal rating, NGRS or SPIN)</li> <li>Ease of care: Rating out of 10 (Verbal rating, NGRS)</li> <li>Involuntary movement – Carry angle, spasm frequency or Upper limb Associated Reaction Rating Scale [3]</li> <li>Mobility: 10m walking speed</li> </ul> </li> </ul>				
C. Standardised measures	<ul> <li>recommended for all patients where relevant / possible</li> </ul>				
	<ul> <li>Function – passive and active</li> <li>Upper limb: Arm Activity Measure (ArmA)</li> <li>Lower limb: Leg Activity Measure (LegA)</li> </ul>				
	<ul> <li>Global benefits</li> <li>Patient reported: <i>Global benefit scale (-2 to +2)</i></li> <li>Clinician reported: Global benefit scale (-2 to +2)</li> <li>Quality of life: <i>The Spasticity-related Quality of Life tool (SQoI-6D)</i></li> </ul>				

MAS = Modified Ashworth Scale; NIS = Neurological Impairment Scale; NGRS = Numbered Graphic Rating Scale; SPIN = Scale of Pain Intensity (See Appendix 3)

\* See website or more details

## Severity indicators and confounders to recovery

These data are collected by clinicians. The section includes:

- Basic demographic characteristics to define the population (eg age, gender, aetiology).
- **Distribution and severity of the spasticity**. Spasticity is a focal condition which may affect the whole upper limb or just the proximal or distal part of it. Its severity and distribution will affect the types of goals for treatment. Despite its acknowledged limitations [4], the Modified Ashworth Scale (MAS) [5] is included as the most widely used measure of spasticity in clinical practice.
- Factors that may confound outcome include neurological impairments within the affected limb(s) (eg motor control, sensory loss, neglect) and general impairments (eg deficits in cognition, behaviour, communication, and mood) which may limit the individual's ability to engage successfully in rehabilitation and achievement of their set goals. These are captured using the Neurological Impairment Set adapted for spasticity [2].

#### Individual goal attainment scaling

The FSI incorporates a structured approach to goal attainment scaling using the GAS-light. Goals are categorised within one of the six main goal areas (see Table 4). 'SMART' (ie specific, measurable, achievable, realistic and timed) goal statements are drawn up with reference to recommended measures (or 'goal parameters') wherever possible. This supports the collection of standardised measures alongside GAS, but the burden of data collected is reduced as only the measures relevant to the chosen goal categories are recorded for each patient.

For example, if pain reduction is a goal for treatment, the SMART goal statement may refer to a pain rating out of 10 - eg '*To reduce spasticity-related pain from 8/10 to 4/10 within 6 weeks*'

Clinicians should be aware however, that patients with cognitive/communication deficits may have difficulty reporting their symptoms. A number of tools have been developed to facilitate pain reporting, such as the numbered graphic rating scale or the Scale of Pain Intensity (SPIN) [6] (See Appendix 3 for more details).

#### Standardised measures

The Arm Activity measure (ArmA) and Leg Activity measure (LegA) are patient-reported tools that are recommended as standardised measures to capture changes in passive and active function in the upper and lower limb respectively.

The clinician and patient rating of global benefit of the intervention are recommended to reflect overall change following intervention.

Increasingly, quality of life measures are required by commissioners to capture health utility and cost-effectiveness. General health utility and quality of life measures are shown to be insensitive to change following focal interventions for spasticity. A specific health utility tool to capture spasticity-related quality of life (the SQoL6D) is currently undergoing evaluation, but there is insufficient evidence as yet to recommend its general use.

# Appendix 1: Tools to assess outcome

## Structured approach to goal attainment scaling

Principal GAS domains within focal spasticity intervention, sub-categories and goal parameters are set out below.

Domain 1: Impairment/symptoms		
Goal Area	Sub-categories	Goal parameter (suggestions provided)
Pain/discomfort (b280, b780, b134) Including stiffness	<ul> <li>Pain (b280)</li> <li>Stiffness (b780)</li> <li>Sleep disturbance (b134)</li> </ul>	Level of pain / stiffness / sleep disturbance eg rated /10 or on graphic rating scale* Score 0–10 in whole numbers (see Appendix 1)
Involuntary movements (b760, b765) eg spasms or flexed posturing of arm when walking)	<ul> <li>Associated reactions</li> <li>Spasms</li> <li>Posturing/dystonia</li> </ul>	Carry angle of elbow/height of hand up torso Spasm frequency (no. per day or night) Resting angle – degrees or % joint range
Range of movement/prevention of contractures (b710, b735)	<ul> <li>Contracture prevention</li> <li>Passive ROM</li> <li>Active ROM</li> <li>Splint tolerance</li> </ul>	Joint angles or anatomical distances eg - goniometry - % normal joint range (25, 50, 75%) - fingertips to palm Splint tolerance – time per day
Cosmesis Perception of body image Facilitation of therapy	<ul> <li>Aesthetic appearance</li> <li>Body image</li> <li>Facilitating therapy</li> </ul>	Satisfaction with appearance / body image, eg rated /10 or on graphic rating scale Interference with therapy (team rating/10)
Domain 2: Activities / Function		T
Goal area	Sub-categories	Goal parameter (suggestions provided)
Passive function (d520) <u>Caring for the affected limb</u> whether care is done by someone else or by the person him/herself.	<ul> <li>Hygiene – hand</li> <li>Hygiene – axilla / elbow</li> <li>Nail cutting</li> <li>Dressing the limb</li> </ul>	Ease of care - egg rated /10 or on NGRS Time taken to achieve functional task

him/herself.	Dressing the limb	
	Positioning the limb	
	Splint application/removal	
Active function	Reaching (d445)	Able to manage motor task, eg
(d430, d440, d445)	• Grasp/release/grip (d445)	<ul> <li>holding and using the object</li> </ul>
Using the affected limb in some active task	Holding/bimanual function (d445)	<ul> <li>lifting cup to mouth etc</li> </ul>
involving motor movement /dexterity		Improved control / dexterity eg

	Manipulating objects (d445)	- rating/10, or NGRS etc.
	• Dexterity/fine motor (d440)	Improved speed
	Lifting/carrying (d430)	
Ideally, goals should also have a clear functional	• Eating /drinking (d550, d560)	Achievement of functional task
purpose	• Personal ADL (d510, d520, d540)	
	• Extended ADL (d630, d640)	
	• Typing/writing (d345, d360)	
	Hobbies/recreation (d920)	
	• Work (d850)	
Mobility	• Ease of transfers (d420)	Gait parameters – speed, distance
(d415, d450)	Balance (d415)	Ability to climb stairs
Improved mobility – transfers/standing/walking	• Gait quality (b770)	Falling/tripping frequency
	Speed/efficiency	Video rating of gait quality
	Type of walking aid used	

## The Numeric Graphic Rating Scale (NGRS)

The NGRS can be used for patients to 'score' a number of different symptoms, but is commonly used for pain, which is given as the example below.

### 1. The scale below is a measure of pain

The top LEVEL (marked 10) indicates pain as bad as it could be The bottom LEVEL (marked 0) indicates no pain at all

## Which number best describes the pain that you feel?



	•	Yes
2. To the administrator:	•	No
In your opinion, does the patient understand this scale?	•	Not sure
Comments:		

3. Which scale would they prefer to use to assess their pain next time?

- The SPIN
- The NGRS
- Either

## The SPIN Screen

The SPIN is a visual scale that can be used instead of a numbered graphic rating scale and may be helpful in individuals who have communication impairment associated with language.

#### 1. Do you have pain anywhere?



If yes, where?..... NB if >1 site, complete separate sheet for both

#### 2. The scale below is a measure of pain

The top red circle indicates pain as bad as it could be

The bottom clear circle indicates no pain at all

Which circle best describes the pain that you feel?



#### 3. To the administrator:

In your opinion, does the patient understand this scale?

#### Comments:

## Associated Reaction Rating Scale (ARRS)

Α	Excursion and duration of associated reaction
0	No involuntary movement/excursion of the limb
1	Excursion of the limb occurs on effort and disappears when effort ceases
2	Excursion of the limb occurs on effort
	May be variable through the task and remains present for some time after the task has been completed
	Residual posturing may be evident
3	Static 'stereotypical posturing'
	Limb reaction remains essentially present and unchanging throughout task
В	Number of joints in the affected upper limb involved in associated reaction
0	No involuntary movement of joints during task
1	Limb reaction confined to 1–2 joints
2	Limb reaction involves 3–4 joints
3	All joints of the limb involved and/or trunk
С	Release of associated reaction
0	No limb reaction. Release not required
1	Initial position is regained through the subject's conscious control or with the assistance of gravity alone
2	Subject needs to use unaffected hand in order to return affected limb towards starting position
3	Subject needs to use unaffected hand in order to return affected limb towards starting position, but limb
	immediately returns to stereotypical posture when handling ceases
	Or limb is unable to be released
D	Effect of upper limb associated reaction on functional task (sit-to-stand, stand to sit).
0	No limb reaction. Task unaffected
1	Limb reaction present but does not interfere with task
2	Obvious interference with task, but able to complete task
3	Significantly affects ability to complete task or task not completed

## MODAL SCORE = ....... 0 = None, 1 = Mild, 2 = Moderate, 3 = Severe

Most frequently occurring.

If scores are equally distributed between 2 levels, score the higher (more severe).

## TOTAL SCORE = .....

(sum of all sections above) Note whether the subject uses arm support during sit-to-stand: Yes/No (circle)

## ARRS – scoring guidelines

1) Score each section A–D.

2) Chose one rating only from 0 to 3.

3) If you cannot decide between two levels, score the higher (more severe).

4) If the performance of the patient varies between tasks or during a single task score the worst performance.

5) If severity varies between joints of the upper limb, score the worst, most affected joint.

6) If using their unaffected limb to return the affected limb to its starting position provokes further associated reaction, score the worst situation observed during the test.

## Clarifications

1) Arm swing of the affected limb during tasks such as sit-to-stand is not considered to be an involuntary movement or a limb reaction.

2) Number of joints.

Joints in this instance are said to be hand, wrist, elbow and shoulder. Each is taken to represent one joint.

3) Section D: Score 3 'Task not completed'.

This refers to a subject who can attempt a task independently, but does not complete it. For example, in sit-to-stand they initiate the task but fail to achieve full standing.

## Arm Activity measure (ArmA)

#### Guidance for completion of the ArmA:

**Section A** asks about 'caring' for your affected arm either yourself with your unaffected arm or by a carer or a combination of both of these. This section <u>does not</u> ask about using your affected arm to complete any of the tasks.

Section B asks what you can do with your affected arm or using both arms.

For each of the activities listed, please indicate (circle):

- 1. The amount of <u>difficulty</u> that you or your carer experience in doing the task, based on your activity over the <u>last 7 days</u>. Please estimate if you do the task but have not done so in the last 7 days (eg for cutting finger nails).
- 2. If the task is never done, but this has nothing to do with your arm or is never done with your affected arm, score 0 = no difficulty.

If you are unable to complete the questionnaire independently, you may:

- receive assistance from a carer or professional to act as scribe
- receive assistance from a carer or professional to facilitate understanding and completion question by question
- a carer may complete the questionnaire on your behalf based on difficulty in performance of the tasks.

In <u>each column</u>, please <u>CIRCLE</u> the amount of <u>difficulty</u> that you or your carer have experienced in doing the activity, over the <u>last 7 days</u>.

Activities (affected arm)		Difficulty 0 = no difficulty 1 = mild 2 = moderate 3 = severe difficulty 4 = unable to do activity				ivity
Sec	tion A: Caring for your affected arm (not using it in tasks or activities)					
1.	Cleaning the palm of the hand	0	1	2	3	4
2.	Cutting finger nails	0	1	2	3	4
3.	Cleaning the armpit	0	1	2	3	4
4.	Cleaning the elbow crease	0	1	2	3	4
5.	Positioning arm on a cushion or support in sitting (If never done, circle 0)	0	1	2	3	4
6.	Putting arm through a garment sleeve	0	1	2	3	4
7.	Putting on a glove (If never done, circle 0)	0	1	2	3	4
8.	Putting on a splint (If never done, circle 0)	0	1	2	3	4
Sec	tion B: Independently completing tasks or activities using your affected arm					
1.	Difficulty with balance when walking <u>due to your arm</u>	0	1	2	3	4
2.	Hold an object still while using unaffected hand	0	1	2	3	4
3.	Open (affected hand) a previously opened jar	0	1	2	3	4
4.	Pick up a glass, bottle or can	0	1	2	3	4
5.	Drink from a cup or mug	0	1	2	3	4
6.	Brush your teeth	0	1	2	3	4
7.	Tuck in your shirt	0	1	2	3	4
8.	Write on paper	0	1	2	3	4
9.	Eat with a knife and fork	0	1	2	3	4
10.	Dial a number on home phone	0	1	2	3	4
11.	Do up buttons on clothing	0	1	2	3	4
12.	Comb or brush your hair	0	1	2	3	4
13.	Use a key to unlock the door	0	1	2	3	4

Total score	Section A
	Section B

## Leg Activity measure (LegA)

#### Guidance for completion of the LegA:

**Section A** asks about 'caring' for your affected leg either yourself or by a carer or a combination of both of these.

Section B asks what activities you can do with your affected leg.

For each of the activities listed, please indicate (circle):

- 3. The amount of <u>difficulty</u> that you (or your carer) experience in doing the task, based on your activity over the <u>last 7 days</u>. Please estimate if you do the task but have not done so in the last 7 days.
- 4. If the task is never done, but this has nothing to do with your leg or is never done with your affected leg, score 0 = no difficulty.

**Section C** asks what general symptoms and difficulties you are having related to your leg which impact on your life.

For these questions you will need to score the extent to which each item impacts on you in your life based on the <u>last 7 days</u>.

If you are unable to complete the questionnaire independently, you may:

- receive assistance from a carer or professional to act as scribe
- receive assistance from a carer or professional to help you understand and complete questions
- for the passive function sub-scale, a carer may complete the questionnaire on your behalf based on difficulty in carrying out the tasks.

In <u>each column</u>, please <u>CIRCLE</u> the amount of <u>difficulty</u> that you or your carer have experienced in doing the activity, over the <u>last 7 days</u>.

If the activity is never done, but this has nothing to do with your leg or is never done with your affected leg, Score 0 = No difficulty

#### Section A: Caring for the affected leg (not using it in tasks or activities)

		No difficulty	Mild difficulty	Moderate difficulty	Severe difficulty	Unable to do activity
1.	Cleaning and washing the area between your legs	0	1	2	3	4
2.	Putting on a splint (If never done, circle 0)	0	1	2	3	4
3.	Positioning legs in a wheelchair (If never done, circle 0)	0	1	2	3	4
4.	Putting your leg(s) through a trouser leg(s) (If never done, circle 0)	0	1	2	3	4
5.	Transfer using a hoist, including positioning sling (If never done, circle 0)	0	1	2	3	4
6.	Putting on underwear or continence pads	0	1	2	3	4
7.	Positioning your leg(s) in bed using a positioning aid or pillow (If never done, circle 0)	0	1	2	3	4
8.	Cleaning behind your knee (knees)	0	1	2	3	4
9.	Putting on your footwear	0	1	2	3	4

Section B: Independently completing activities using your affected leg

		No difficulty	Mild difficulty	Moderate difficulty	Severe difficulty	Unable to do activity
1.	Turning in bed	0	1	2	3	4
2.	Moving from lying to sitting	0	1	2	3	4
3.	Being able to sit (including balance)	0	1	2	3	4
4.	Transferring from bed to chair or wheelchair	0	1	2	3	4
5.	Transferring from wheelchair to car	0	1	2	3	4
6.	Moving from sitting to standing (including balance)	0	1	2	3	4
7.	Standing (including balance)	0	1	2	3	4
8.	Walking indoors (including balance)	0	1	2	3	4
9.	Turning around (including balance)	0	1	2	3	4
10.	Walking up stairs	0	1	2	3	4
11.	Walking around obstacles or objects (including balance)	0	1	2	3	4
12.	Walking over carpet	0	1	2	3	4
13.	Walking outdoors	0	1	2	3	4
14.	Walking over rough or uneven ground outdoors	0	1	2	3	4
15.	Walking for half a mile or more	0	1	2	3	4

## Section C: Symptoms (impairments) and impact on your life (participation)

## In each column, please CIRCLE how severe the symptom was over the last 7 days.

		Not at all	A little	Moderately	Severely	Extreme
1.	To what extent have you experienced pain or discomfort in your affected leg(s) or foot?	0	1	2	3	4
2.	To what extent have you experienced involuntary movements or leg spasms in your affected leg(s) (ie movements or abnormal limb postures that you can't control)?	0	1	2	3	4
3.	To what extent have you experienced involuntary movements or leg spasms impacting on your comfort or sleep?	0	1	2	3	4
4.	To what extent have you experienced restricted range of movement (due to shortening of muscles or stiffness in joints) in your affected leg(s)?	0	1	2	3	4
5.	To what extent is it difficult for you (or your carer) to care for your affected leg(s) (eg positioning your leg, putting on underwear or pads, or washing between your legs)?	0	1	2	3	4
6.	To what extent has your affected leg(s) limited your daily activities (eg sitting, transferring, walking or doing stairs)?	0	1	2	3	4
7.	To what extent have involuntary movements or tightness of your leg(s) or foot interfered with your mobility or balance?	0	1	2	3	4
8.	To what extent has your affected leg(s) limited your normal activities with family, friends, neighbours or groups (eg social activities)?	0	1	2	3	4
9.	To what extent has your affected leg limited your work or other regular activities (eg hobbies)?	0	1	2	3	4

#### **Total scores**

Totaling section A, B and C separately produces a total score for
each sub-scale of the measure. The sub-scales should not be
combined.

Section A Section B Section C

## The Spasticity-related Quality of Life tool (SQoL-6D)

#### Background

Spasticity is a condition in which certain muscles are continuously contracted. The resulting stiffness and tightness of muscles may affect your ability to move one or more of your limbs. Sometimes spasticity is so severe that it gets in the way of daily activities, sleep patterns, and caregiving.

Common unwanted effects of spasticity are:

- pain
- spasms or involuntary movements
- contracture and deformity
- decreased functional abilities
- difficulties with care, hygiene, dressing etc
- reduced mobility.

The SQoL-6D is a brief questionnaire in six domains, designed to assess quality of life in relation to spasticity.

#### 1. Spasticity-related pain/discomfort:

Spasticity may cause pain arising from stiffness or a cramp-like sensation in the muscles, the joints being pulled into uncomfortable positions, or the fingernails digging into the palm. When severe, pain may interfere with activities or cause sleep disturbance at night.

I have no pain or discomfort
I have mild pain or stiffness only
I have moderate pain, which does not interfere with my activities or sleep
I have severe pain, which sometimes interferes with activities or disturbs my sleep
I have extremely severe pain, which frequently limits my activities and/or disturbs my sleep

#### 2. Involuntary movements

Spasticity may result in spasms or involuntary movements. For example when walking or moving, the spastic arm may pull into a tight fist or bend at the elbow. When severe, these involuntary movements or spasms can effectively limit normal activities.

I have no problem with involuntary movements or spasms
I have mild involuntary movements or spasms, but they do not interfere with any activities
I have moderate involuntary movements or spasms which interfere with high-level activities
I have severe involuntary movements or spasms which significantly limit my normal activities
I have extremely severe involuntary movements or spasms which severely limit my activities

#### **3.** Restriction of movement:

Spasticity may restrict the range of movement in joints causing abnormal posture in the affected limb(s). When severe, it can lead to contractures (permanent shortening of the muscles and tendons) and deformity of the bones and joints.

-	
	I have no restriction of movement in any of my joints
	I have mild restriction of movement, but I am able to stretch my joints out fully with assistance
	I have moderate restriction of movement, or restriction affecting just a few joints
	I have severe restriction of movement, or restriction affecting many of my joints
	I have extremely severe restriction of movement, so that I can barely move my affected limb at all

#### 4. Caring for the affected limb

Spasticity may result in difficulty caring for the affected limb. For example, keeping the palm or armpit clean, cutting the finger-nails or dressing the limb (eg getting the arm through a sleeve or the hand in a glove). When severe, it may prevent the limb from being properly cleaned and/or dressed.

I have no difficulty caring for my affected limb		
I have mild difficulty caring for my limb – for example it takes some extra time or effort to care for my limb		
I have moderate difficulty caring for my limb – for example it takes me a long time or I need help from		
someone else to care for the limb		
I have severe difficulty, for example despite assistance my limb is sometimes smelly or left undressed		
I have extremely severe difficulty caring for my limb, and am unable to keep my limb clean and dressed		

#### 5. Using the affected limb in functional tasks

*Spasticity may affect the ability to use the limb. For example, it may affect fine movement and dexterity to manipulate objects. When severe, it may limit ability to reach out for, grasp, hold and release objects.* 

I am able to use my affected limb entirely normally
I have slightly problems using my limb, but only with high level dexterity / coordination
I have moderate problems using my limb, which affect my ability to reach; or to grasp and release objects
I have severe problems using my limb, but am still able to use my limb as a 'prop' to steady an object
I am unable to use my affected limb for any purpose

#### 6. Mobility

Spasticity (even in the upper limb) may limit mobility, affecting ability walk at normal speed or for long distances; or interfering with balance producing a tendency to fall. When severe, it may prevent the person from moving around independently.

I have no problems with mobility
I have mild problems with mobility, but they do not restrict my ability to get around
I have moderate problems with mobility, which limit my ability to walk independently outdoors
I have severe problems with mobility, which limit my ability to walk independently indoors
I have extremely severe problems with mobility, requiring assistance from another person even to move
around indoors

# Global assessment of benefit

Patient	Global assessment of benefit following the BoNT-A	Clinicians
rating	treatment cycle	rating
+2	Much better	+2
+1	A bit better	+1
0	The same	0
-1	Worse	-1
-2	Much worse	-2

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