Physiotherapy for functional motor disorders: a consensus recommendation (Long Version)

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ABSTRACT

Background: Patients with functional motor disorder (FMD) including weakness and paralysis are commonly referred to physiotherapists. There is growing evidence that physiotherapy is an effective treatment but the existing literature has limited explanations of what physiotherapy should consist of and there is insufficient data to produce evidence- based guidelines. Here we aim to address this issue by presenting recommendations for physiotherapy treatment.

Methods: A meeting was held between physiotherapists, neurologists and neuropsychiatrists, all with extensive experience in treating FMD. A set of consensus recommendations were produced based on existing evidence and experience.

Results: We recommend that physiotherapy treatment is based on a biopsychosocial aetiological framework. Treatment should address illness beliefs, self directed attention and abnormal habitual movement patterns through a process of education, movement retraining and self management strategies within a positive and non-judgemental context. We provide specific examples of these strategies for different symptoms.

Conclusions: Physiotherapy has a key role in the multidisciplinary management of patients with FMD. There appear to be specific physiotherapy techniques which are useful in FMD and which are amenable to and require prospective evaluation. The processes involved in referral, treatment and discharge from physiotherapy should be considered carefully as a part of a treatment package.

INTRODUCTION

Many regard physiotherapy for functional motor disorder (FMD) as a useful part of treatment and there is increasing evidence for its use including a randomized controlled trial.[1–3] There is, however, very little description, even in these studies, of what physiotherapy should actually consist of. A common view of physiotherapy for FMD is that when it helps, it does so only by providing a 'face saving way-out' for patients (another way of saying that the precise elements of treatment are unimportant as recovery is entirely under the control of the patient). On the contrary, evidence is emerging that the composition of physiotherapy does matter and that targeted physiotherapy based on an underpinning scientific rationale and embedded in transparent communication can address mechanisms that produce and maintain FMD. We therefore met as a group of geographically diverse and multidisciplinary health professionals to create recommendations for the content of physiotherapy for FMD to act as a guide for others and to form the basis of further treatment studies.

We use the term FMD, to denote symptoms such as weakness, paralysis, tremor and dystonia that are not caused by a standard neurological disease. FMDs are among the commonest reasons for people to seek neurological advice.[4] They are associated with high levels of disability and distress, prognosis is considered poor and the financial burden is high.[5–7]

In a recent survey of UK neurophysiotherapists,[8] it was found that most (77%) saw patients with FMD and had good levels of interest in treating patients with FMD. A lack of support from non-physiotherapy colleagues and inadequate service structures were commonly identified barriers to treatment. In addition they rated their knowledge as low compared to other commonly seen conditions. This is not surprising given the lack of evidence and descriptions of treatment techniques. In a recent systematic review of physiotherapy for FMD,[3] only 29 studies were identified with a combined total of 373 patients (only 7 studies had more than 10 subjects). Despite their limitations, these studies show promising results for physiotherapy (and physical rehabilitation), with improvement in 60% to 70% of patients. In addition a recently published randomised trial of 60 patients showed highly encouraging results from a 3 week inpatient physical rehabilitation intervention in patients with functional gait disorder (7 point improvement on a 15 point scale).[1] However, the literature contains little practical advice about how best to carry out physiotherapy in an individual with FMD. There are no existing published recommendations. Here we attempt to address this issue by providing recommendations for physiotherapy practice. We introduce a pathophysiological model for FMD, on which we base our treatment strategies and provide practical suggestions for the patient journey from referral to treatment and discharge.

DEVELOPMENT OF RECOMMENDATIONS

In 2013 physiotherapists, an occupational therapist, neurologists and neuropsychiatrists, all with extensive experience in treating patients with FMD met in Edinburgh, UK to produce a set of recommendations for physiotherapy treatment. This is explicitly not a guideline because of the lack of evidence available. Instead the recommendations seek to combine the existing evidence in the literature[1 3] with experience from health professionals into a document that can form the basis of further studies and can be developed further as new evidence emerges.

SYMPTOM MODEL AND RATIONALE FOR PHYSIOTHERAPY

Our *aetiological* framework is a biopsychosocial framework in which a heterogeneous mixture of predisposing, precipitating and perpetuating factors need to be considered and formulated with the acceptance that relevant factors differ between different patients (Table 1).

More specifically for FMD we base some of our recommendations on a model for the *mechanism* of symptoms which may be more homogeneous between patients. In this model FMD is conceived as an involuntary but learned habitual movement pattern driven by abnormal self directed attention. We emphasise that this is commonly triggered by physical or psychophysiological events such as injury, illness, pain and dissociation with panic and is mediated by illness beliefs and expectation.[9–11] Life events, emotional disorder and personality traits are relevant in understanding and treating some patients with FMD, especially in cases where a clear link exists between mood/anxiety and symptom exacerbation. However our recommendations, in keeping with revised criteria in DSM-5,[12] move away from an assumption that "recent stress" and a purely psychological model is essential to understand and treat patients with FMD.

PHYSIOTHERAPY WITHIN A MULTIDISCIPLINARY APPROACH TO FMD

Physiotherapy is one of many interventions that may help FMD. Others may include simple education, psychological treatment, occupational therapy, speech and language therapy, hypnosis, medication and vocational rehabilitation. We recommend however that for patients with physical disability, that physiotherapy informed by awareness of the complexities of FMD should take a primary role in treatment in many patients. We also suggest that when psychological treatment is indicated, in some cases it may be more effectively delivered after or alongside successful physiotherapy.

We propose that physiotherapy has an important role in normalising illness beliefs, reducing abnormal self directed attention and breaking down learned patterns of abnormal movement through:

1. Education
2. Demonstration that normal movement can occur
3. Retraining movement with diverted attention
4. Changing maladaptive behaviours related to symptoms

DIAGNOSIS, PHYSICIAN EXPLANATION AND REFERRAL TO PHYSIOTHERAPY

Recommendations for assessment and correct diagnosis of FMD are available elsewhere.[14 15] There is a consensus among health professionals regarding the importance of a clear physician explanation to the patient and their carers regarding the diagnosis[16 17] (detailed further below). The critical outcomes of the explanation which appear to facilitate physiotherapy are:

1. An understanding by the patient that their treating health professionals accept that they have a genuine problem (i.e. not “imagined” or “made up”).
2. An understanding by the patient that they have a problem which has the potential for reversibility (ie a problem with function of the nervous system not damage to the nervous system) and thus is amenable to physiotherapy.

A physician referral to physiotherapy for FMD should ideally contain a description of what the patient has been told and should be shared with the patient. Awareness of other relevant symptoms that may be present such as pain, fatigue, memory and concentration problems, anxiety and depression is important.

Not all patients with FMD are suitable for physiotherapy. We recommend that the following criteria should usually be met:

1. Patients should have received an unambiguous diagnosis of FMD by a physician, preferably using the recommendations above.
2. The patient should have some confidence in or openness to the diagnosis of FMD. Physiotherapy is unlikely to be helpful to someone who believes the diagnosis is wrong.
3. The patient desires improvement and can identify treatment goals.

Patients who do not fulfil all of these criteria may still benefit from physiotherapy. For example to aid the diagnostic and explanatory process or for disability management where rehabilitation has explicitly failed. Not all patients with an acute onset of FMD will require additional specific treatment. A proportion will experience spontaneous remission without specific treatment, but follow up studies have shown that the majority of patients remain symptomatic in the long term.[6 18] As chronicity of symptoms is associated with poor outcome, we would still

Table 1. A range of potential mechanisms and aetiological factors in patients with functional motor disorder (Adapted from Stone et al 2012[13])

Factors	Biological	Psychological	Social
Factors acting at all stages	▶ "Organic" Disease ▶ History of previous functional symptoms	▶ Emotional disorder ▶ sPersonality disorder	▶ Socio-economic/ deprivation ▶ Life events and difficulties
Predisposing Vulnerabilities	▶ Genetic factors affecting personality ▶ Biological vulnerabilities in nervous system	▶ Perception of childhood experience as adverse ▶ Personality traits ▶ Poor attachment/coping style	▶ Childhood neglect / abuse ▶ Poor family functioning ▶ Symptom modeling of others
Precipitating Mechanisms	▶ Abnormal physiological event or state (e.g. drug side effect hyperventilation, sleep deprivation, sleep paralysis) ▶ Physical injury/pain	▶ Perception of life event as negative, unexpected ▶ Acute dissociative episode/panic attack.	
Perpetuating Factors	▶ Plasticity in CNS motor and sensory (including pain) pathways leading to habitual abnormal movement ▶ Deconditioning ▶ Neuroendocrine and immunological abnormalities similar to those seen in depression and anxiety	▶ Illness beliefs (patient and family) ▶ Perception of symptoms as being irreversible ▶ Not feeling believed ▶ Perception that movement causes damage ▶ Avoidance of symptom provocation ▶ Fear of falling	▶ Social benefits of being ill ▶ Availability of legal compensation ▶ Ongoing medical investigations and uncertainty ▶ Excessive reliance on sources of information or group affiliations which reinforce beliefs that symptoms are irreversible and purely physical in nature

recommend early referral of appropriate patients to physiotherapy. The question of how much spontaneous improvement might account for the benefit seen from physiotherapy (or indeed any other treatment) is one that needs answering via randomised clinical trials.

PHYSIOTHERAPY ASSESSMENT

The key elements are: to gain a detailed understanding of the range of symptoms experienced; the effect on day to day function; the patient's understanding of and level of confidence in the diagnosis already given; setting goals for physiotherapy treatment and gaining rapport. If it is clear at this stage that the patient has very fixed views about an alternative diagnosis or has no wish to have physiotherapy then it may not be appropriate to proceed. The use of a treatment contract, as in other disorders, may have benefits in providing impetus for change and assisting discharge of patients not benefitting from treatment.

The initial assessment can be time consuming but we believe it is important to get a thorough history from the patient. A good assessment will help build rapport and is likely to be therapeutic in itself. The following is useful information to ascertain during the initial assessment.

1. Details of symptom onset and progression

The circumstances of how and when symptoms started may reveal triggering physical events such as injury, pain, viral illness, migraine, fatigue or somatic symptoms of panic. This can be followed by charting the progression of symptoms, medical investigations and previous treatment. Asking the patient about what was going on in their life at the time of symptom onset may reveal relevant physical or social stressors.

2. Comprehensive list of symptoms

Create a list of symptoms in the order of relative importance/concern to the patient. For each symptom it can be helpful to make notes on –

- Variability – does the symptoms change in severity or nature? Overall is it stable, getting better or worse?
- Severity – using visual analogue scale, word descriptors, level of resulting disability etc.
- Frequency – is it constant or intermittent? How many hours in a day or days in a week do they experience the symptom?
- Exacerbating and easing factors
- Prompt for information about pain and fatigue if this has not already been discussed. When the patient has significant pain, gauging irritability will help guide decisions on appropriate treatment.

3. Social History

4. Twenty-four hour routine

Exploring the patients 24 hour routine provides an insight into disability, the amount of support they require and symptom-relevant behaviours, such as boom bust activity patterns, poor sleep hygiene and excessive support from carers.

5. Use of adaptive aids, equipment and home modifications

6. Activity limitations and participation restrictions

7. Explore the patients understanding of the diagnosis

Ask the patient what they have been told about their diagnosis and what their understanding is. Explore beliefs about the presence of other disease processes, the need for additional tests and prognosis. It may be helpful to ask the patient if they feel that psychological factors are relevant to their symptoms.

8. Goals for physiotherapy

9. Physical assessment

The physical assessment should have greater emphasis on activity performance and functional ability (e.g. posture, transfers, mobility, gait pattern and upper limb function) than on assessment of impairment (e.g. muscle strength and coordination), as performance on impairment assessment is unlikely to correlate with disability. Exploring habitual

movement patterns and postures often reveals problematic behaviours (e.g. sitting with fore-foot only contact with the floor in lower limb tremor or prolonged sitting with limbs in the "dystonic position" in fixed dystonia).

The information gained from the initial assessment can be formulated into a multi-factorial symptom explanation to assist the patient and physiotherapist to understand the diagnosis. This can include physical triggering factors, which may have been influenced by social events or psychological processes and symptom maintaining behaviours.

THE TREATMENT CONTRACT / AGREEMENT

Following the initial assessment and prior to commencement of treatment it can be helpful to negotiate the terms of a treatment contract. The treatment contract outlines the plan for physiotherapy including the number, length and frequency of treatment sessions. The patient should be made aware of local policies about non-attendance and early discharge. Time limited treatment blocks will assist discharge in difficult cases where symptoms have not improved. Time limited treatment blocks may help promote self management, provide an impetus for change and increase the patients' perception of the value of sessions, potentially reducing non-attendance.

COMPONENTS OF PHYSIOTHERAPY

Broad principles which apply to treatment of most patients with FMD are shown in Table 2.

Table 2. General treatment principles of physiotherapy for FMD

- Build trust before challenging/pushing the patient
- Project confidence making it clear that the physiotherapist knows about FMD
- Create an expectation of improvement
- Open and consistent communication between the multidisciplinary team and patient
- Involve family and carers in treatment
- Limited "hands-on" treatment. When handling the patient, facilitate rather than support
- Encourage early weight bearing. "On the bed strength" will not usually correlate with ability to stand in functional weakness
- Foster independence and self management
- Goal directed rehabilitation focusing on function and automatic movement (e.g. walking) rather than the impairment (e.g. weakness) and controlled ("attention-full") movement (e.g. strengthening exercises)
- Minimise reinforcement of maladaptive movement patterns and postures
- Avoid use of adaptive equipment and mobility aids (though these are not always contra-indicated)
- Avoid use of splints and devices that immobilise joints
- Recognise and challenge unhelpful thoughts and behaviours
- Develop a self management and relapse prevention plan

Education

The physiotherapist, like the physician, is in an excellent position to improve the patient's understanding of their disorder throughout treatment. The explanation given should build on a thorough explanation from the referring physician.[15] Useful ingredients include:

1. Use of the term *functional* movement disorder/limb weakness/paralysis/ tremor/dystonia/myoclonus to describe the disorder. The rationale for this in preference to 'psychogenic' or conversion disorder or other terms is explained elsewhere.[19]
2. Acknowledgement that such symptoms are real, and are not imagined or "put on" (i.e. you believe them).
3. Acknowledgement that such symptoms are common and that they are commonly seen by the treating physiotherapist.
4. Explanation that symptoms can get better, that the problem is to do with nervous system functioning, not irreversible damage to the nervous system.
5. Explanation of how FMD is diagnosed using demonstration of positive clinical signs which demonstrate normal movement (see below).
6. Explanation that a wide variety of factors may be involved in triggering symptoms, including physical illness and injury and that psychological factors such as anxiety, depression or trauma may also be important.
7. Introducing the role of physiotherapy in "retraining" the nervous system to help regain control over movement.
8. It may be important to discuss other terms used for FMD and the fact that many health professionals have ambivalent or negative attitudes to FMD.

This information should be backed up with written or online information (e.g. www.neurosymptoms.org). In patients where doubts about the diagnosis remain, these often improve if therapy progresses successfully. See Table 3 below for some examples of ways to communicate with patients (available in online version only).

Table 3. Examples of ways of speaking to patients

INGREDIENT	EXAMPLE
Explanation of the diagnosis	
Explain what they do have….	"You have functional weakness" "You have functional tremor"
Emphasize the mechanism of the symptoms rather than the cause	Weakness – "Your nervous system is not functioning properly but it is not damaged. There is a problem with the way your brain is sending messages to your arm/leg." Tremor – "You have lost control over the arm/leg. This is why it is moving by itself."
Explain how the diagnosis is made	Weakness – Hoover's sign "I can see that when you try to push that leg down on the floor it's weak, In fact the harder you try the weaker it becomes. But when you are lifting up your other leg, can you feel that the movement comes back to normal? Your affected leg is working much better when you move your good leg. What this tells me is that your brain is having difficulty sending messages to the leg but that problem improves when you are distracted and trying to move your other leg. This also shows us that the weakness can't be due to damage." Tremor – Alteration in tremor using contralateral movement "When you are trying to copy the movement in your good hand, can you see that the tremor in your affected hand improves? That is typical of functional tremor." Or "Can you see how difficult it is for you to copy that movement with your good hand? That is typical of functional tremor."
Explain what they don't have and why	"You do not have multiple sclerosis, epilepsy etc."
Indicate that you believe them	"I believe you. I do not think you are imagining / making up your symptoms / mad."
Emphasize that it is common	"I see lots of patients with similar symptoms."
Emphasize reversibility	"Because there is no damage you have the potential to get better. Your physical signs show me that."
Emphasize that self-help is a key part of getting better	"This is not your fault but there are things you can do to help it get better."
Metaphors may be useful	"The hardware is alright but there's a (reversible) software problem."
Introducing the role of depression/anxiety	"If you have been feeling low/worried, that will tend to make the symptoms even worse" (often easier to achieve on a second visit).
Involve the family / friends`	Explain it all to them as well
During the physiotherapy session	
Asking the very immobile patient to stand up	"I know this seems odd because you can't move your legs but we think it's worth trying to stand. We want to encourage the automatic movements that we know are there but you can't access. Look ahead and at me…"
Asking the patient with impaired gait to walk faster or backward	"I know this sounds strange but one way of encouraging automatic movement is to try to move at different speeds. Walking faster or backwards involves different 'programs' in the brain that may not be so affected by your condition."
Discharging the patient	
The patient who is angry or doesn't believe the diagnosis	"From experience we know that the treatments we are using aren't effective in a situation where the patient feels they have no idea what is wrong with them. Having some confidence in the diagnosis doesn't make the movement return to normal, but physiotherapy won't work without at least some confidence to begin with." "The problem here is that I believe you, but I'm afraid you don't really believe me."
The patient who does have some confidence in the diagnosis, has been a good attender but is making no progress because of insurmountable perpetuating factors	"You have worked really hard on these sessions and hopefully you agree that I have too. I'm sorry that I have not been able to help. I don't think further treatment from me will be helpful at the moment. Remember that with your diagnosis there is always the potential to improve at a later stage."

Positive signs of FMD which demonstrate the potential for normal movement

Demonstration that normal movement can occur (or that abnormal movement can stop) alters expectations about movement abnormalities, and can be a powerful way of convincing a sceptical patient (and their family) that their diagnosis of FMD is correct and the problem is potentially reversible.[20] Several clinical signs to elicit normal movement and differentiate functional symptoms from neurological disease have been described. These are used as part of diagnosis to positively identify FMD, rather than it being just a diagnosis of exclusion. Some of these signs are listed in Table 4.

Retraining movement with diverted attention

The challenge for the physiotherapist is to demonstrate normal movement in the context of meaningful activity such as walking. The key is to minimise self focused attention via distraction or preventing the patient from cognitively controlling movement and to stimulate automatically generated movement. This can be achieved by altering the focus of motor attention, such as thinking about a different part of the movement or trying fast, rhythmical, unfamiliar or unpredictable movement.

Distraction can occur on a cognitive level for example engaging attention away from the affected limb(s) with conversation, music or mental tasks such as arithmetic. However, task orientated exercises (Table 5) are preferred as they are often more effective, translate directly into improved function and encourage implicit motor control. Meaningful automatic movement and muscle activity can be generated by weight bearing or automatic postural responses such as when sitting on an unstable surface (e.g. a therapy ball). Table 5 includes further suggestions of how to demonstrate normal movement in different situations and other specific techniques for individual symptoms.

Other Physiotherapy Treatment Strategies

Use of Language

Using the right language may matter. Explanations that correctly remove blame, fault or implications of voluntariness are useful. For example: "your brain is attending to your body in an abnormal way", or "tests have shown that your muscles are capable of movement", as opposed to "…you can move your muscles."

The words used when asking the patient to move may also be important. Language may help trigger automatic movement, for example "allow your leg to come forward" may produce movement in a better way to "step/move your leg forward". During physiotherapy sessions you may pick up on cues or prompts that are more useful for individual patients.

Exercise – Nonspecific and graded

Nonspecific graded exercise should be considered as part of all general rehabilitation programmes to address reduced exercise tolerance and symptoms of chronic pain and fatigue. There is some evidence for this in FMD.[21] Success here is dependent on getting the intensity right to prevent exacerbation of symptoms and promote adherence/compliance with the programme. Graded exercise has been shown in large randomised trials to moderately improve outcomes in patients with chronic fatigue syndrome[22] a common accompaniment to FMD (see below) and is likely to be beneficial to many patients.

Visualisation

Some patients may find visualisation techniques helpful during movement. This may work as a form of distraction whereby the patient imagines a more fluid motor task or pleasant scenario while engaged in tasks. Visualisation may be unhelpful if it encourages self focus during movement.

Mirrors and Video

Mirrors and the use of video can be helpful in providing feedback to patients about their movements, posture or gait pattern which are often significantly different to how they imagine them to be.[23] Moving in front of a mirror may also help distract attention from monitoring body sensations.

Hypersensitivity/Allodynia

Interventions aimed at desensitisation may be appropriate where hypersensitivity and allodynia are present. This can include graded sensory stimulation, graded return to normal activity, exercise and transcutaneous electrical nerve stimulation (TENS).

Rehabilitation Diary or Workbook

Completion of a rehabilitation diary or workbook with support from the physiotherapist may be a useful technique to help the patient reflect, remember and reinforce the

information provided during physiotherapy. The patient can use the diary to keep track of goals, outcome measures and achievements, treatment strategies, activity plans etc. A diary may improve compliance with treatment, and encourage self management.

Table 4. Clinical Signs which can be shown to a patient with FMD to demonstrate the diagnosis and potential for reversibility and examples of how to discuss it with patients.

Hoover's sign Weakness of hip extension which returns to normal with contralateral hip flexion against resistance.	'I can see that when you try to push that leg down on the floor its weak, In fact the harder you try the weaker it becomes. But when you are lifting up your other leg, can you feel that the movement in your bad leg comes back to normal? Your affected leg is working much better when you move your good leg. What this tells me is that your brain is having difficulty sending messages to the leg but that problem improves when you are distracted and trying to move your other leg. This also shows us that the weakness must be reversible / cannot be due to damage".
Hip Abductor Sign Weakness of hip abduction which returns to normal with contralateral hip abduction against resistance.	Similar to Hoover's sign.
Distraction or entrainment of a tremor Abolishing tremor by asking the patient to copy rhythmical movements or generate ballistic movements with the contralateral limb (i.e. index to thumb tapping at different speeds).	'When you are trying to copy the movement in your good hand can you see that the tremor in your affected hand improves? That is typical of functional tremor'.

Table 5. Examples of techniques for specific symptoms to normalise movement.

Symptom	Movement Strategy
Leg weakness	Early weight bearing with progressively less upper limb support, e.g. 'finger-tip' support, preventing the patient from taking weight through walking aids/supporting surfaces. Standing in a safe environment with side to side weight shift. Crawling in 4 point then 2 point kneeling Increase walking speed Treadmill walking (with or without a body weight support harness and feedback from a mirror).
Ankle weakness	Elicit ankle dorsiflexion activity by asking patient to walk backwards, with anterior/posterior weight shift while standing or by walking sliding feet along the floor. Use of electrical muscle stimulation
Upper limb weakness	Weight bear through the upper limbs, weight bearing with weight shift or crawling. Minimise habitual non-use by using the weak upper limb functionally to stabilise objects during tasks, for example stabilise paper when writing, a plate when eating. Practice tasks that are very familiar or important to the individual, that may not be associated with symptoms e.g. use of mobile phone, computer, tablet. Stimulate automatic upper limb postural response by sitting on an unstable surface such as a therapy ball, resting upper limbs on a supporting surface.
Gait disturbance	Speed up walking (in some cases this may worsen walking pattern). Slow down walking speed. Walk by sliding feet forward, keeping plantar surface of foot in contact with the ground. (i.e. like wearing skis) Progress towards normal walking in graded steps. Build up a normal gait pattern from simple achievable components that progressively approximate normal walking. For example – side to side weight shift, continue weight shift allowing feet to "automatically" advance forward small amounts, progressively increase this step length with the focus on maintaining rhythmical weight shift rather than the action of stepping. Walk carrying small weights / dumbbells in each hand. Walking backwards or sideways. Walk to a set rhythm (e.g. in time to music, counting: 1,2,1,2…). Exaggerated movement (e.g. walking with high steps). Walking up or down stairs (this is often easier that walking on flat ground).
Upper limb tremor	Make the movement "voluntary" by actively doing the tremor, change the movement to a larger amplitude and slower frequency then slow the movement to stillness. Teach the patient how to relax their muscles by actively contracting their muscles for a few seconds then relaxing. Changing habitual postures and movement relevant to symptom production. Perform a competing movement For example clapping to a rhythm or a large flowing movement of the symptomatic arm as if conducting an orchestra. Focus on another body part, for example tapping the other hand or a foot. Muscle relaxation exercises. For example progressive muscle relaxation techniques, EMG biofeedback from upper trapezius muscle or using mirror feedback.
Lower limb tremor	Side to side or anterior-posterior weight shift. When the tremor has reduced slow weight shift to stillness. Competing movements such as toe tapping. Ensure even weight distribution when standing. This can be helped by using weighing scales and or a mirror for feedback. Changing habitual postures relevant to symptom production. For example reduce forefoot weight bearing.
Fixed dystonia	Change habitual sitting and standing postures to prevent prolonged periods in end of range joint positions and promote postures with good alignment. Normalise movement patterns (e.g. sit to stand, transfers, walking) with an external or altered focus of attention (i.e. not the dystonic limb). Discourage unhelpful protective avoidance behaviours and encourage normal sensory experiences (e.g. wearing shoes and socks, weight bearing as tolerated, not having the arm in a "protected" posture. Prevent or address hypersensitivity and hypervigilance. Teach strategies to turn overactive muscles off in sitting and lying (e.g. by allowing the supporting surface to take the weight of a limb. Cushions or folded towels may be needed to bring the supporting surface up to the limb where contractures are present). The patient may need to be taught to be aware of maladaptive postures and overactive muscles in order to use strategies. Consider examination under sedation, especially if completely fixed or concerned about contractures. Consider a trial of electrical muscle stimulation or functional electrical stimulation to normalise limb posture and movement.
Functional Jerks/ Myoclonus	Movement retraining may be less useful for intermittent sudden jerky movements. Instead look for self focused attention or premonitory symptoms prior to a jerk that can be addressed with distraction or redirected attention. When present, address pain, muscle over-activity or altered patterns of movement that may precede a jerk.

Pain and Fatigue Management

Persistent or chronic pain and fatigue are common in patients with FMD and often have a role in precipitating and maintaining symptoms. Preferably, the patient should have an understanding that these symptoms are all linked together as one problem (with many symptoms) rather than multiple separate illnesses. The core of evidence based treatments for pain and fatigue involve, as suggested for FMD, 1) a change in illness beliefs from perceiving symptoms as due to damage as potentially reversible; 2) recognising that chronic pain is not correlated with harm and 3) changing maladaptive behaviours, such as breaking cycles of over-activity and under-activity with graded exercise. It may be helpful to re- formulate pain as another example of the nervous system sending out incorrect signals which like FMD can be helped by 're-training' (i.e. establishing more normal motor-sensory feedback). A number of good quality evidence based guides to pain management education and helpful patient resources exist.[24 25]

Provision of Equipment, Adaptive Aids, Splints and Plaster Casts

We recommend avoiding adaptive aids where possible, especially in acute presentations. Provision of equipment and adaptive aids can lead to adaptive ways of functioning (such as weight bearing excessively through crutches) and behaviours that prevent return

of normal movement and result in secondary changes such as weakness and pain.

In some cases use of equipment may be necessary for pragmatic reasons (for example to ensure safety after proven injuries) in which case it should be considered as temporary and provided with a plan to wean its use. We recommend ensuring the patient understands the potential harmful effects of equipment and a plan should be in place to minimise this (for example ensuring the patient with a wheelchair has opportunity to stand and mobilise as much as is safe and possible). For patients with FMD who have not responded to treatment, adaptive equipment may improve independence and quality of life and should be considered.

We strongly advise against immobilising a patient in splints, plaster casts or similar devices. In one study of fixed (functional) dystonia (n=103), 15% developed their problem or deteriorated markedly during or after immobilisation in a plaster cast. In no case did immobilisation in a plaster cast result in lasting improvement.[26]

Electrotherapies – Functional Electrical Stimulation, EMG feedback, TMS and TENS

The use of electricity has a long history in the treatment of FMD and can be traced back to the 19th century.[27 28] We would not recommend any of these electrotherapies as isolated treatments. Functional electrical stimulation (FES) may be a useful adjunct to treatment, particularly in patients with a functional gait disturbance.[29] Ideally FES should be used as a therapeutic modality and not a permanent mobility aid. Electrical muscle stimulation (not necessarily FES) can be used to demonstrate normal movement and help change illness beliefs. It may also work at the level of motor relearning.

EMG biofeedback can be used to address illness beliefs and may be useful to retrain movement in functional weakness[30] or muscle relaxation for tremor and fixed postures.

Recent studies of transcranial magnetic stimulation (TMS) also offer some promise.[31] None of the published studies were controlled and none involved exposure to protocols of TMS that could be considered neuromodulatory. It is likely that placebo and suggestion play a large role in patients where this is successful although TMS may have a specific role, like hypnosis or therapeutic sedation,[32 33] in being able to demonstrate movement in limbs that can't be seen to move any other way.[34] TMS, like FES may therefore be a useful additional tool for some patients, and one that specialised physiotherapists could incorporate into their practice.

TENS that produces a tingling sensation without pain or muscle twitch has been described as a treatment for patients with FMD.[35] For patients with functional anaesthesia or marked sensory loss, we have used a TENS machine with the stimulus setting increased to a high level to improve sensory awareness.

Falls and Self Harming Behaviour

Falls in patients with FMD are often considered to have a low risk of injury, in particular the common pattern of "controlled descents". Where this is the case, staff should be made

aware of this possibility and it may be appropriate for the patient to take greater (apparent) risk. The situation is more complex where there is a history of self harm which may sometimes manifest as a fall. The risk of injury during therapy sessions is likely to be higher. In this case clinical decisions should be made with support from a multidisciplinary team (MDT). The physiotherapist can help manage this situation by being upfront about falls injury risk, document discussions and clinical decisions in the medical notes and encourage the patient to be involved in decision making.

SYMPTOM SPECIFIC INFORMATION

Functional Gait Disturbance

In table 5 we have listed some strategies that can be useful to help retrain gait. In addition, careful assessment may identify contributing factors amenable to a physiotherapy approach that includes education and movement retraining. Some examples include antalgic movement patterns, fatigue and myalgia, fear of falling associated with somatic symptoms of panic and excessive upper limb weight bearing through walking aids.

Gait retraining can be approached in a number of ways, for example Facilitated (hands on) support in replacement of walking aids. Hands on support is gradually reduced as confidence improves, preferably with limited awareness of the patient. Encouraging use of light touch support from the surrounding environment can be used as an alternative to walking aids. Gait retraining can be practiced in progressively more challenging environments such as outdoors, on uneven surfaces and crowded environments. This may be particularly important where a fear of falling is significant.

Changing walking speed can help normalise movement. A gait pattern characterised by excessive slowness and attention to movement, may improve if encouraged to speed up. Conversely some patients (e.g. those with tremulous movement or muscle over-activity) will respond better to slowing down movement and speed is worked on later as a rehabilitation goal.

An approach to gait retraining has been described in the literature where the patient is required to master a series of prescribed manoeuvres. Each stage in the series progressively approximates normal walking and the patient is not allowed to progress to the next stage until the current stage was mastered and previous stages remain effectively executed.[36–39] This approach may be helpful in some patients, such as those whose symptoms are very resistant to change. However we generally would not recommend such a rigid approach to physiotherapy. This rehabilitation approach also involved confining a patient to a wheelchair to prevent unhelpful reinforcement of symptomatic movement. This is something we do not advocate.

Weakness

There is limited or no value in strengthening exercises for functional weakness as the problem is fundamentally not one of muscle weakness but movement control. Specific muscle strengthening exercises are likely to encourage self focus and explicitly controlled movement and therefore exacerbate the functional symptom. Tasks should be goal oriented, such as walking, transferring and drinking from a cup.

Whole body movement in a safe environment that include upper limb and lower limb weight bearing may be helpful, such as moving from supine to sitting to 4-point-kneeling to two-point-kneeling to standing. Weight bearing through a limb will automatically activate proximal stabilising muscles around the hip and shoulder girdles that the patient may not be able to access when tested in isolation.

The patient who has been using a wheelchair or weight bearing through crutches should be encouraged to stand even if they believe this will not be possible. They can be reminded that the aim is to encourage automatic movements. They can be told that initially their gait may be worse than it is with crutches. Clearly this should be performed in a safe and protected

environment and performance will be adversely affected if the patient feels unsafe.

Walking with facilitated support, preventing the patient from taking excessive weight through the support may be helpful to build confidence. "Finger-tip" support at the patients upper limbs or at their knees with the therapist standing close may instil a sense of confidence and psychological support. The patient should be encouraged to look ahead and definitely not at the affected limb(s). Maintaining eye contact with the patient may help prevent them from watching their body. Managing falls risk is a complex issue and we discuss this separately below.

Functional Tremor

Functional tremor is usually generated by muscle co-contraction or in a similar manner to voluntary shaking with alternate activation of agonists and antagonists around a joint.

Patients often perceive that their tremor is continuous, however this is rarely the case. A novel experiment demonstrated that patients dramatically over estimate the presence of a functional tremor when compared to measurements from a tremor watch.[40] It was hypothesised that when the patient was not attending to their tremor, the tremor ceased. Any interventions that reduce the presence of the tremor will help by limiting reinforcement of the movement pattern or behaviour, essential breaking the habit.

A starting point for physiotherapy may be to help the patient to explore and develop strategies that control or stop the tremor, some specific ideas are given in table 5. These strategies aim to interfere with the tremor by distraction and or a competing movement. Strategies such as these may help patients develop a sense of control or agency over the movement, without which they may adopt unhelpful passive coping strategies. Using strategies to control a functional tremor usually requires practice and may not be successful on the initial attempts. Visual feedback from a mirror is often helpful to establish control.

Physiotherapy should also consider and discourage habitual postures and movement patterns that may exacerbate the tremor. A common presentation in functional tremor occurs when the patient sits with forefoot contact with the floor, triggering a lower limb tremor via a clonus mechanism. In this case changing lower limb posture so the heel and forefoot have floor contact can stop the movement. Commonly patients attempt to control a tremor by increasing the tension in their muscles (e.g. clenching a fist). This tends not to be a helpful solution as functional tremor is primarily a problem of muscle over-activity and the inability to relax muscles at will. There may be value in developing treatments using EMG biofeedback to teach the patient how to relax their muscles. Targeting muscles proximal to the tremor may help to reduce unhelpful attention to the tremulous limb.

Functional (Fixed) Dystonia

Functional dystonia is often associated with high levels of pain and commonly overlaps with the diagnosis of complex regional pain syndrome type 1.[26] Patients typically present with fixed posturing of limbs, and joint contractures may become a major source of disability. If the limb position is fixed then an evaluation under anaesthetic is useful to determine the available range which may influence immediate physiotherapy goals. If examination under anaesthesia is carried out then it should be used as an opportunity to demonstrate the reversibility of the position to the patient (by video recording or by carrying out the procedure under light anaesthesia).[23, 33] Many patients with fixed dystonia report a different position (usually more normal) of the affected limb (or an absence of the limb) with their eyes closed. This observation can be shared with the patient to emphasise that there is a problem in the map of the limb in the brain, not a problem in the limb itself.

Treatments that involve immobilisation of the joint in casts and splints are likely to be harmful.[26] Similarly passive stretches and explicitly controlled movement and exercises are likely to increase unhelpful self focused attention and exacerbate the problem. Treatment should focus on retraining the maladaptive postures, movement patterns and muscle over-activity that contribute to the fixed posture during the patient's 24 hour routine. A common issue that should be addressed is a habitual sitting posture in the dystonic position, for example prolonged sitting with lower limb joints in end range positions (e.g. ankle plantarflexion and inversion). These are often positions of comfort or feel 'normal' for the patient and the therapist must convince the patient that they are problematic and the cause of contracture.

Normalising movement will stretch muscles without undue attention and will limit unhelpful muscle co-contraction via reciprocal inhibition. Muscle over-activity may occur as a pain protective response or as learnt behaviour in the absence of pain. Over time prolonged muscle over-activity will accelerate muscle shortening and lead to joint contractures. Treatment involves patient education and replacing maladaptive movements and postures with practical therapeutic alternatives that allow over-active muscles to relax. In most cases addressing pain with the principles of chronic pain management will be important. Areas of hypersensitivity should be desensitised through graded exposure to normal sensation and movement. For example the wearing of socks and shoes, symmetrical weight bearing and normalising sitting and standing postures.

Functional Jerks / Myoclonus

Treatment of intermittent symptoms can be challenging. Exploration of symptom onset may reveal a history of pain or injury. Treatment may include recognising and addressing the precipitating factors such as increased self focused attention prior to a jerk, pain, muscle over-activity, altered patterns of movement and altered posture. If no precipitating factors that are amenable to physiotherapy can be identified, the patient may be more suited to a cognitive behavioural therapy approach which can focus on premonitory symptoms or approaching the problem as a 'habit' which needs to be unlearnt. In those patients who do have premonitory symptoms, the jerk, although unwelcome may also produce a temporary sense of relief from these symptoms or give a feeling of "release of tension". Understanding this can be helpful in explaining to the patient why they have developed the 'habit' in the first place and to find other ways of dealing with premonitory symptoms.

TECHNIQUES WE DO NOT RECOMMEND

There are a number of rehabilitation approaches described in the literature that we advise against using as first line treatment. These are:

1. Deception of the patient through any form. For example telling the patient that lack of recovery means the symptoms are all in the mind,[41] and the use of deceptive placebo treatments.
2. Confining the patient to a wheelchair outside of therapy sessions while their gait pattern remains affected by functional symptoms.[39]
3. Managing functional symptoms with surgery. Surgical procedures are a commonly

reported precipitant of FMDs.[10 26] Some patients with fixed functional dystonia seek amputations which usually result in worsening of symptoms.[42] There may be a role for tendon lengthening surgeries in cases with fixed contractures confirmed by evaluation under anaesthetic, however this comes with a risk of exacerbating functional symptoms and chronic pain.

TREATMENT PARAMETERS

The optimum treatment setting, duration and intensity are unknown and are likely to vary with symptom severity, chronicity and possibly presentation/phenotype. Inpatient settings allow for the reduction of social and environmental factors that may be working to trigger or maintain symptoms and for higher intensity of treatment. Domiciliary treatment can target real world problems that the patient will face on discharge which may result in symptom relapse. Outpatient settings have the advantage of service provision over a longer period of time. A "stepped care" approach to treatment is the ideal situation, where treatment complexity can be escalated according to patient need.[43]

In the absence of evidence for specified treatment parameters for FMD, it would be reasonable to take into consideration rehabilitation guidelines for similar conditions. The National Institute for Health and Care Excellence (NICE) in the United Kingdom recommend offering patients with low back pain up to 8 sessions of a tailored structured exercise programme over 12 weeks. They recommend that treatment can be escalated to a combined physical and psychological treatment programme comprising around 100 hours over a maximum of 8 weeks.[44]

GROUP THERAPY

There was little experience of group therapy among the health professionals involved in this document and there is no published evidence. Group therapy may have benefits for selected patients in sharing unusual experiences involved in having FMD. We would suggest that if groups are used that they are carefully moderated by someone with experience of group treatments. For most patients individualised treatment is preferable because of the heterogeneous nature of FMD.

OUTCOME MEASURES

This is an unresolved issue in studies of FMD. Changes in disability (for example using the Functional Independence Measure),[37 38 45 46] quality of life (for example the SF-36), clinical global impression (5 point scale)[2 47] and cost benefit have been used. Objective research measures for FMD, such as the Psychogenic Movement Disorders Rating Scale[48] have questionable value in clinical practice and also for research because FMD symptoms are so variable. Table 6 lists some commonly used and potentially useful outcome measures.

DISCHARGE AND FOLLOW UP / CONCLUDING TREATMENT

A set discharge process agreed at the start of treatment (Treatment Contract/Agreement) is beneficial as it helps both parties plan for the conclusion of treatment and limit potential associated problems. A self management plan should be in place that may include strategies and exercises that have been helpful, future goals with realistic time frames and strategies

to prevent a return to unhelpful behaviours (for example pacing, graded activity and exercise plans to prevent boom-bust activity cycles). Setbacks and symptom relapses following treatment are common and it is important for the patient to be prepared to manage this. A follow up appointment several months after discharge can be helpful to review and reset goals and to "troubleshoot" issues that may have arisen.

A discharge summary letter to the patient, GP and relevant clinicians can have therapeutic value if it is used as an opportunity to reinforce information given to the patient and to educate others about the diagnosis and treatment.

Table 6. Useful outcome measures

Physical Outcome Measures

- Functional Mobility Scale[1]
- Berg Balance Scale
- 10 metre Timed Walk
- Functional Independence Measure[37 38 45 46]
- The Modified Rankin Scale[49]

Patient Reported Outcome Measures

- Clinical Global Impression Scale[47 49]
- Short Form 36 / Short Form 12[47]
- Illness Perception Questionnaire (IPQ) / Brief-IPQ[47]
- Hospital Anxiety and Depression Scale[5]
- Work and Social Adjustment Scale

Outcome Measured Used in Research

- Psychogenic Movement Disorders Rating Scale[21 48]
- Video Rating Scale for Motor Conversion Symptoms[36]

FMD & PSYCHIATRIC COMORBIDITY

Patients with psychiatric comorbidity are generally more highly represented in a group of patients with FMD compared to the general population. For some patients psychiatric comorbidity may be present, relevant to the onset of FMD and require specialist psychiatric treatment. This may need to be before (e.g. where an individual is at risk of self harm or reluctant to engage in physical rehabilitation), during or after physiotherapy. Our experience is that psychotherapy (in particular treatment for anxiety and depression) is often more successful after some improvement has occurred during physiotherapy.

LIMITATIONS

This document aims to address the problem of a lack of information and evidence for physiotherapists treating patients FMD. We recognise that there are a number of limitations to our recommendations. Most significant is that they are based on limited evidence. Our aim is only to provide advice for physiotherapists. We recognise that physiotherapy is only one part of the MDT, and other disciplines such as occupational therapy and psychological therapies may have an equal or greater role in particular patients. Patients with FMD are a heterogeneous group and each patient will have unique factors contributing to their symptoms.

CONCLUSIONS / SUMMARY

FMD are complex and the aetiology is multi-factorial. Patients with this diagnosis are therefore heterogeneous. Treatment needs to reflect this. Physiotherapy aimed at restoring movement and function has face validity, is becoming evidence based and is acceptable to patients. Physiotherapy resources are currently employed for patients with FMD but the supporting structures do not exist and there is a lack of information for physiotherapists to help plan their treatment. The biopsychosocial model and recommendations that we present are aimed at helping physiotherapists to plan individualised treatments that target the problems that contribute to a patient's symptoms. A stepped care approach is important to escalate treatment when necessary.

FREQUENTLY ASKED QUESTIONS

The patient still appears really angry or unclear about their diagnosis. I can't seem to change their mind. What should I do?

It is reasonable to try on a couple of occasions to persuade the patient of their diagnosis using the steps above including written information. If however the patient remains of the view that the diagnosis is wrong after that then it may be most appropriate to suspend treatment (see Table 3. Example of things to say). It is important for everyone to understand that having confidence in the diagnosis will not *in itself* lead to improvement. But the techniques that a physiotherapist will want to try will be hampered in a patient who is concerned that a diagnosis has been missed. For example if a particular exercise leads to pain or relies on risking the possibility of falling. The physiotherapist should communicate the problem back to the referring physician to see if further consultations with a doctor can help to alter things.

Do patients with FMD fall during therapy and if they fall do they injure themselves? What about self harm?

Falls in patients with FMD are often considered to have a low risk of injury, in particular the common pattern of "controlled descents". Where this is the case, staff should be made aware of this possibility and it may be appropriate for the patient to take greater (apparent) risk. The situation is more complex where there is a history of falls with injury, self harm or other psychiatric problems. In this case the risk of injury during therapy sessions is likely to be higher and clinical decisions should be made with support from a MDT. The physiotherapist can help manage this situation by being upfront about falls injury risk, document discussions and clinical decisions in the medical notes and encourage the patient to share responsibility for decision making.

How do you strike a balance between progressing mobility and managing falls risk?

We suggest being explicit with the patient that some risks need to be taken in order to progress and proceed when they are willing.

How do you manage patients with intermittent symptoms? (i.e. symptoms that may not be present during the physiotherapy session).

A thorough assessment may identify symptom exacerbating behaviours, movement patterns or postures or other relevant issues such as chronic pain with hypervigilance. Treatment can involve education and development of symptom management plan that addresses these issues. If assessment has not identified any problems that you feel are amenable to physiotherapy, then the patient may be more suited to other treatments (such as occupational therapy, cognitive behavioural therapy or other psychological therapies). If appropriate, it may be possible to provoke symptoms (e.g. with movements or busy environments) and techniques can then be practised.

What should I do if I think my patient is feigning

This is an age-old concern for patients and doctors dealing with FMD. It is not surprising given that the symptoms arise from the voluntary nervous system and are diagnosed using tests that are equally positive in patients feigning motor symptoms. Clear evidence of feigning can only be obtained if there is a marked difference between what the patient says they can do, and what they are seen to do. Discrepancies in movement are NOT evidence of feigning - this is how the diagnosis of a FMD is made. If a patient appears better when unobserved then it may just be that the symptoms are experienced mostly when they think about them, but are less pronounced when they don't.

Follow up studies, consistent clusters of symptoms and syndromes, patient descriptions of dissociative aspects of their symptoms and wear marks on shoes and equipment all provide evidence of the genuine nature of FMD in the vast majority of patients.

Are patients with FMD eligible for benefits? What if I am asked to do a report for benefits/work insurance?

Access to disability benefits should rely fundamentally on the symptoms a patient has and their resultant disability, and not on the diagnosis the patient has. Insurance companies may ask for additional information, but a report of the symptoms a patient has and the diagnosis should still be made in the manner it would be made for any other cause of neurological symptoms.

How should I manage relapse?

Relapse of symptoms is more common than a straightforward recovery. For most patients it is helpful to anticipate that at some stage symptoms will relapse. They can be told that recovery from FMD typically involves a series of relapses, but with underlying progressive improvement. It is worth going through how the patient will feel and respond when they do relapse, anticipating a different response to the one they had before they knew what the diagnosis was. A relapse is an opportunity to re-evaluate possible physical and psychological triggers and obstacles to improvement. It is useful to plan in advance what an appropriate response would be for carers and health professionals dealing with a relapse. For example, being taken as an emergency to hospital can sometimes lead to a longer relapse than if the patient can manage it quietly at home. In some cases a relapse of symptoms may indicate the need for escalating treatment, for example to more formal MDT rehabilitation.

What should I do if I think my patient has a FMD but they have not been given a diagnosis?

Physiotherapists have reported that they are often referred patients with FMD but the diagnosis was not discussed with the patient, either because the clinician did not know this was the diagnosis or because they failed to communicate it.[8] This is a difficult situation for both the therapist and the patient. In this case we suggest the physiotherapist should write to the responsible clinician, asking if they can clarify the diagnosis, explaining that this will change the treatment approach and effectiveness of treatment. If this is unsuccessful we suggest persevering with a trial of treatment, the literature suggest that rehabilitation can sometimes be successful without a clear diagnosis.[3] Treatment can still address symptom precipitating and maintaining factors.

Physiotherapy is no longer helping but I can't find a way to discharge the patient

We discussed setting goals and a treatment contract earlier in this article. In some cases a physiotherapist may find that the patient is very keen to continue treatment even though they appear to be making little progress. In this situation we suggest transparency with the patient about their lack of progress and the fact that physiotherapy is not helping. This does not exclude treatment helping at some point in the future. If you are working with a lot of patients with FMD it is essential to focus

your efforts where they are likely to have some impact. Teams that don't do this may become quickly demoralised. An example of phrasing in this situation which does not blame the patient is given in Table 3. "*You have worked really hard on these sessions and hopefully you agree that I have too. I'm sorry that I have not been able to help. I don't think further treatment from me will be helpful at the moment. Remember that with your diagnosis there is always the potential to improve at a later stage.*"

How should I manage the situation when there is a lot of pressure on me to facilitate the patient's discharge from hospital but they have not improved and do not feel able to go home.

We commonly hear from therapists working in acute hospital settings who feel unsupported in arranging a difficult discharge from hospital. In complex situations, decision making and discharge planning should involve the multidisciplinary team. No one individual should feel responsible for decisions made. It may be appropriate to hold a meeting with the team, patient and their family prior to discharge. The responsible medical team in particular may need education on functional disorders and the value of rehabilitation.

My patient wants to talk to me about traumatic events. What should I do?

It's not unusual for patients to confide new information regarding psychological symptoms or undisclosed traumatic events to their physiotherapist. We would suggest acknowledging information but making it clear that this is not the purpose of physiotherapy. This may be an opportunity to show the patient how psychological therapy, where appropriate, may complement physiotherapy in the treatment of their condition. Ensure this information is passed back to the referring clinician for further assessment including risk assessment.

I suspect my patient is anxious or depressed but they deny this and do not feel psychological treatment is relevant to them. How can I help this situation?

If the patient does not think psychological treatment is relevant to their problem, referring them regardless is unlikely to be helpful and will damage the therapeutic relationship. After developing some trust the patient may acknowledge psychological symptoms. For other patients, the process of physiotherapy may help them make links between the impact of stress and other psychological factors on symptoms.

I am worried about making my patient worse by "feeding in" or "medicalising" their beliefs or behaviours.

Many health professionals worry that providing rehabilitation is somehow medicalising a problem and thus "feeding in to it". We would suggest that it is no less appropriate to "medicalise" functional disorders than it is to medicalise migraine or depression. We have discussed the importance of the patient approaching treatment with the right illness beliefs. Discussing symptoms or taking a patient's concerns seriously is an essential step in treatment. It would be unhelpful to reinforce beliefs that FMD is irreversible, progressive, dangerous, due to a sinister disease process or to in anyway increase health anxiety.

CASE STUDIES

The following 4 case studies have been put together to demonstrate how the above treatment recommendations can be put into practice. The patients described in each case are fictional but based on scenarios we commonly encounter and our experience of patients that have had a good outcome following treatment. We acknowledge there are important roles for other health professional in these case examples, but for clarity we have only discussed physiotherapy treatment.

Tremor

Miss A had a 12 month history of a right upper limb tremor which started following an adverse reaction to a trial of migraine relieving medication. At the time she was told the tremor was nothing to worry about and should resolve in a few days. However it persisted and was a source of great embarrassment. To suppress the tremor she would clench her fist and when in public she hid her hand in her pocket or behind her back. Her hand had become very painful and she felt her tremor was progressively getting worse. Miss A saw a neurologist who made a diagnosis of functional tremor based on clinical features. A small number of investigations were completed which were negative. She was referred to physiotherapy for management of a functional tremor.

Physiotherapy Assessment

After a comprehensive subjective history and physical assessment, the physiotherapist noted the following problems –

1. A persistent right upper limb tremor that was variable in frequency and amplitude.
2. Miss A reported that she accepted the diagnosis, but found it difficult to understand why this happened to her.
3. Habitual disuse. Miss A hid her right hand when in public. She had adapted to only using her left hand for activities, including writing with her non-dominant left hand.
4. Hypersensitivity and pain affecting the right hand and forearm.
5. Tight finger and wrist flexor muscles due to constant fist clenching. Pain prevented assessment of range of motion but it appeared there may have been some muscle contracture.
6. Fatigue with boom bust activity patterns.
7. Miss A reported her mood had become low, but this had only been a problem since the tremor started. She worried that she would lose her job and was very concerned that the tremor may be a progressive neurological disease.

Miss A's goal was to be able to write with her right hand again and return to normal duties at work.

Physiotherapy Treatment

Physiotherapy started by addressing Miss A's understanding of the diagnosis, describing the tremor as a learnt movement pattern. It was discussed that the reaction to medication was clearly important in triggering the tremor, but the investigations have shown that this event did not seem to cause structural damage. The tremor has more in common with a learnt movement pattern than a tremor due to neurological disease. A characteristic of this type of tremor is that it requires some attention in order to manifest. This explains why the tremor changes when attention is directed elsewhere and this is how the neurologist diagnosed the tremor. The physiotherapist then demonstrated to Miss A how her tremor entrained and she was able to observe in a mirror short periods when her tremor paused during distraction and certain movements. It was explained that distraction of attention can be used to help retrain the brain and the muscles of the arm to stop the tremor. That this is a difficult thing to do and it takes time and practice. The aim initially should be to try to develop some

control over the tremor and slowly reduce the impact it has on everyday life over time.

The physiotherapist guided Miss A through an exploration of how she could influence the tremor, using a mirror as feedback. Miss A could see how certain postures appeared to exacerbate her tremor, in particular over activity of upper trapezius muscles with elevated shoulders. She also learnt how to entrain her tremor with large flowing movements of her arm as if conducting an orchestra and clapping at the same frequency of the tremor and then slowing down.

In physiotherapy sessions, Miss A created a management plan that included the following –

1. Practicing strategies to control her tremor 2 or 3 times each day.
2. Trying to stop hand clenching to suppress the tremor. They acknowledged that it did make the tremor less noticeable but in the long run it was counterproductive as it had resulted in muscle tightness, pain and exacerbation of the tremor.
3. Desensitising the right hand by generally increasing the use of the hand, drying her hand thoroughly with a rough towel, using moisturizing cream and allowing others to touch her hand gently.
4. Addressing the habitual nonuse of the right hand by incorporating the hand into some specific activities as a starting point. There were washing her hair, cleaning and to try to brush her teeth right hand. It was acknowledged that initially this may be less efficient than not using the hand at all, but it should get easier with practice.
5. Addressing fatigue by reducing boom and bust activity patterns and starting a gentle graded exercise and activity programme.

After several sessions of physiotherapy and implementing the management plan, Miss A reported feeling as if she had greater control of the tremor. The tremor continued but she felt it was less severe and she had noticed there were times during the day when her tremor was less prominent and sometimes absent. The hypersensitivity and pain had improved on a visual analogue scale and it had become easier to use the right hand. On good days she was able to sign her name with her right hand. Miss A was discharged from current treatment after 8 sessions and was booked into a 6 month follow up appointment. At follow up things had progressed but fatigue persisted and mood remained low. The physiotherapist suggested Miss A could discuss further management of low mood and fatigue with her doctor. Miss A's management plan was updated to ensure changes were maintained. A discharge report was sent to the patient, general practitioner and referring neurologist which invited a re-referral should there be any deterioration in Miss A's symptoms.

Comment: This case study illustrates the key principles in our published guidance. It also shows that a thorough assessment can reveal problems associated with the tremor that can be amenable to physiotherapy. It is common for patients to have residual symptoms after some improvement and this should not be interpreted as a poor response to treatment. There is also a role for other health care professionals that we have not discussed including occupational therapy and psychological therapy.

Fixed Dystonia

Ms B, a 36 year old woman, presented with a fixed plantarflexed and inverted ankle. Eighteen months ago she fell unexpectedly and sustained an ankle injury. Unable to weight bear, she presented to the accident and emergency department of her local hospital. There she was assessed, had an X-ray that did not reveal a fracture and was sent home with crutches and pain killers. Over the following months the pain seemed to get worse, she remained unable to take her full weight through the foot and was dependent on crutches to walk. Several months after the initial injury, Ms B noticed her foot had started to turn inwards. She was sent to a physiotherapist who suggested passive stretches, after which Ms B would have significantly increased pain for the next 48 hours. The inversion posturing progressed and her ankle became completely "locked". She had further investigations and an evaluation under anaesthetic which demonstrated fair range of motion. While sedated her ankle was placed in a plaster cast in a neutral position. This was very painful and resulted in skin breakdown. When removed 6 weeks later, the foot immediately returned to a plantarflexed and inverted position and had become very sensitive to touch. Ms B was referred again to physiotherapy, this time with a diagnosis of fixed dystonia. She was reluctant to attend as her previous experience of physiotherapy was very painful and did not help.

Physiotherapy Assessment

The following problems were noted on assessment –

- Severe pain affecting the left foot and ankle, exacerbated by weight bearing and passive movement. Ms B was dependent on high doses of analgesics which only helped a little.
- Altered sensation to the foot and ankle. In addition, Ms B reported her foot felt as if it was straight when it was in an inverted position.
- Habitual sitting postures where the foot and ankle joints were in the "dystonic position" at the end of joint range (plantarflexion and inversion).
- Dependence on crutches to walk, weight bearing heavily through her upper limbs. She swung her left and right leg through together, taking little or no weight through the left side. When standing still the lateral and dorsal surface of her left foot would rest on the ground.
- Shoulder pain had developed secondary to heavy use of crutches and subsequently Ms B had become more dependent on a wheelchair.
- Altered patterns of movement moving from sit to stand and uncontrolled stand to sit, with minimal weight through the left leg.

Physiotherapy Treatment

The physiotherapist reassured Ms B that they had seen fixed dystonia before and that that while it is not common, it is not a rare or unusual diagnosis. Physiotherapy commenced by helping her understand the problem of fixed dystonia. It was explained that the original injury was important for triggering the problem. The injury together with persistent pain changed the way the movement is controlled and that it is possible to regain some control over the foot. They discussed that it was difficult to explain why this had happened to her, however for a number of reasons, the posturing had been learnt involuntarily by the brain and was outside Ms B's control. It was described that the ankle draws Ms B's attention, possibly due to pain and then the attention would drive or exacerbate the ankle posturing. The experience Ms B had described, that when she closes her eyes, her foot feels straight when it is actually inverted is commonly reported in fixed dystonia. This helps to explain that much of the problem is to do with the way the brain is processing information (including pain) producing a 'distorted map' in the brain but that it is possible to retrain this. It was explained to Ms B that manual therapy and passive treatments such as stretches

and splinting were usually counterproductive as they increased attention to the area, which exacerbates posturing. In addition they do not help to retrain the muscles. The physiotherapist explained that a better approach to rehabilitation is to address the pain with a management approach and to change habitual movement patterns, postures and behaviours that reinforce the posturing.

Movement retraining progressed through the following goals –

- Retraining sit to stand to sit. This goal helped redirect Ms B's focus away from her foot. She was encouraged to start to take more weight through the left. Within a few sessions of physiotherapy the movement pattern improved resulting in activation of the left ankle dorsiflexor muscles, which in turn reduced the plantarflexion and inversion muscle torques, this in turn improved the foot position on standing and sitting.
- To stand with an improved foot position. By standing up with the improved movement pattern the left foot was in a better position to accept weight. Adding rhythmical anterior-posterior weight shift helped to improve alignment further by activating and relaxing the ankle plantarflexion and dorsiflexion muscles.
- To stand with weight distributed evenly through both feet. Rhythmical lateral weight shift helped to introduce weight through the left foot and build confidence to take the weight without fear of the ankle giving way or significant increased pain. Feedback from a mirror helped.
- Slowly over the following sessions the focus became gait retraining by introducing stepping to her improved standing alignment. Ms B was gradually encouraged to decrease the amount of weight placed through her crutches and increasing the weight through her leg. Functional electrical stimulation and treadmill training with mirror feedback were helpful additions to physiotherapy sessions.

In addition to the movement retraining, Ms B wrote out a personal management plan in her physiotherapy workbook and updated it after each session. It included the following plans and goals –

- To reduce the time she spent in the unhelpful "dystonic position" (end of range joint positions) when sitting. She understood that while these positions seemed to relieve discomfort, they were damaging to the ankle joint, exacerbating pain when she tried to straighten her ankle and probably contributed to her altered sense of joint position.
- To stand up and sit down using her new improved pattern of movement at every opportunity, with the aim that this would become automatic.
- To change her walking pattern with crutches so that she phased out the habit of swinging both legs through together. A graded approach was taken for this goal as Ms B felt that it would be unfeasible to make sudden changes due to the increased effort, increased pain and decreased speed of reciprocal stepping.
- To plan her week to avoid boom and bust activity patterns, and schedule in short rests into activities to stop pain from escalating to unmanageable levels.

At times, physiotherapy progress was very slow and the interval between some sessions was extended to accommodate this. Ms B experienced a number of exacerbations of pain and posturing during her rehabilitation but with rest and some support was able to get back on track. Twelve months on, things had improved significantly. She required a single crutch to walk, but was putting most of her weight through the left foot. She didn't feel ready to stop using the crutch. Ms B reported feeling a little disappointed that things were not completely better, but she was relieved that they were no longer getting worse. She understood that time was a limiting factor in her recovery and by continuing to follow her management plan things should continue to improve. She continued to experience the occasional set back, and was frustrated with the slowness of her recovery but she was optimistic that things would continue to improve.

Functional Gait

Mr C had a 2 year history of gait disturbance following a fall down stairs. At the time he was admitted to hospital with a suspected spinal injury but a comprehensive set of investigations were normal. Despite this Mr C had high level pain, reduced power in both legs and when assisted to stand his legs would shake. He spent 5 days in hospital receiving physiotherapy and occupational therapy and was discharged home on high levels of analgesics with a walking-frame and some adaptive equipment. Over the following months there was some improvement in Mr C's mobility and he no longer required walking aids but his gait pattern had not returned to normal. He remained confused about his persistent symptoms and felt his injury had not been taken seriously. When things hadn't improved after 18 months he was re-referred for a neurology assessment. A diagnosis of functional neurological symptoms was made based on positive clinical signs and some repeat investigations. Mr C was helped to understand how his back injury and subsequent pain were important triggers for developing his walking problems but that there was no underlying structural deficit. Mr C was referred to physiotherapy for assessment and treatment of functional gait disturbance.

Physiotherapy Assessment

The following problems were noted on assessment –

- Continuous low back pain. The pain varied in intensity from 4 to 10 out of 10 and was exacerbated by walking for more than a few minutes.
- Dependence on 2 crutches to walk.
- Walking pattern was characterised by tremulous movement during stance phase of gait. Swing phase was effortful and he had a forefoot initial contact. He had intermittent episodes of freezing, where he was unable to initiate swing.
- Mr C reported falling at least 5 times a week. He rarely injured himself during a fall, but sometimes sustained cuts and bruises.
- He was usually independent with all his personal care needs. On good days he would do all the housework and meal preparation but on bad days he was unable to get out of bed.
- He had great difficulty sleeping at night due to pain and would often sleep during the afternoon.

Physiotherapy Treatment

The physiotherapy service was only able to offer blocks of 8 treatment sessions and this was explained to Mr C prior to commencing treatment. The 8 sessions of physiotherapy included education and movement retraining while building on a personal management plan.

The physiotherapist explored Mr C's beliefs about his symptoms and diagnosis making it clear that he should feel free to be honest about his thoughts. The physiotherapist addressed Mr C's concerns, first by acknowledging the severity of the symptoms and the resulting disability. They discussed objectively the results of investigations which show his spinal cord was intact and then explained that it is very possible to have neurological symptoms such as weakness, or poor coordination and balance with an intact neurological system. The physiotherapist

described the initial injury to Mr C as having triggered a cascade of events which have changed the way the brain processes motor and sensory signals and led to the functional gait disorder. It was discussed that shock or a fight or flight response at the time of injury can be important. This information was reinforced by demonstrating how the positive clinical signs of his functional symptoms supported the diagnosis, for example Hoover's sign or that walking backwards is easier than walking forwards.

Mr C interpreted his persistent pain as a sign of persistent injury. Treatment involved helping him to understand the concept of central sensitisation and that the experience of pain does not in his case necessarily mean harm. He was given the simple idea that chronic pain is like a "volume knob" turned up too high in the pain pathways of the nervous system. Pain was addressed as a part of physiotherapy management with education, identifying maladaptive behaviours (such as Mr C's boom-bust activity cycle), identifying maladaptive postures and movement patterns and he starting a graded activity and exercise plan. The plan was reviewed and updated at follow up physiotherapy sessions.

The movement retraining components of treatment aimed to progress Mr C through a progression of purposeful movement starting from sit to stand. This was progressed to standing with smooth rhythmical weight shift. The weight shift was used to entrain and supress his lower limb tremor. Mr C's steps had become very effortful, so the aim was to initiate some relaxed "automatic" steps. This was achieved by allowing his feet to advance forward very small amounts during weight shift. It was initially difficult to suppress Mr C's very active and stiff steps but with perseverance he was able to allow his foot to slide forward. By keeping his focus directed towards the rhythmical weight shift, over time he was able to progress the length of his steps and his movement pattern was progressed towards normal walking. This was practiced between parallel bars for support and reassurance, though Mr C was discouraged from taking weight through his hands. By the fifth physiotherapy session, Mr C was able to use this technique, with less emphasis on weight shift, to take several smooth steps, supporting himself very lightly on furniture or a wall. At this point physiotherapy focussed more specifically on gait retraining exercises. Walking by sliding his feet along the floor prevented the excessive plantarflexion and forefoot initial contact. Within a single session this was progressed to walking by sliding heels along the ground and then to walking by "gently touching heels down" (heel strike). These exercises provided an altered focus of attention, which seemed to help dampen his effortful gait. This progression of movement was practiced in subsequent sessions and Mr C was encouraged to try to subtly use this progression over several steps to normalise his walking at home. By the 7th physiotherapy session Mr C had developed a number of different strategies he could use improve his walking pattern. He felt that he had to concentrate in order to walk with this improved pattern and that he would easily slip back into his effortful gait when distracted. The final sessions of physiotherapy aimed to help his walking become more automatic and to increase speed. They used a treadmill in front of a mirror and practiced walking outdoors and in challenging environments, where Mr C was encouraged to utilise different strategies to control his walking and take a number of short breaks as his movement became worse.

Mr C had stopped using his crutches at home and in physiotherapy sessions but did not feel confident to leave home without them. When pushed to walk in challenging environments without crutches, his gait pattern was much worse. They discussed that it would probably be counterproductive to rush relinquishing the crutches. That he can minimise the problems they cause by not weight bearing heavily through his hands. They practiced walking with a single crutch and made a plan to slowly reduce their use starting in more familiar environments and shorter outings such as the local shop.

The final physiotherapy session reviewed all the information that Mr C had been given, which had been summarised in a physiotherapy workbook. A management plan was finalised and included lists of helpful movement strategies that normalised Mr C's gait, a pacing and exercise plan and suggestion of what he can do on those inevitable bad days. Mr C was discharged from physiotherapy with a comprehensive report that was also sent to his general practitioner and referring neurologist. It was agreed that Mr C could be referred back to the service in the future and he could contact the physiotherapist by phone if there were any questions.

Weakness

Mrs D was admitted to an acute neurology ward via the accident and emergency department with left sided weakness. She had a number of investigations including brain and spinal cord MRI, nerve condition studies and blood tests. All of which were normal. Mrs D was referred to the ward physiotherapists for rehabilitation and to facilitate discharge from hospital.

Physiotherapy Assessment

The following problems were noted on assessment –

- Reduced power in left upper and lower limb. On assessment her power was approximately 2-3/5, with some give-way weakness.
- Reduced sensation to light touch on the left side.
- Mrs D was able to move from lying to sitting independently with effort by using her right arm to lift her left leg over the edge of the bed. She had independent sitting balance but felt unable to stand and was afraid of falling. She was independent with pivot transfers.
- Mrs D stated that nobody had told her what was wrong with her, however it was documented in the notes that the diagnosis of functional weakness had been given to the patient.
- Mrs D was concerned that she was going to be discharged from hospital without a "proper diagnosis" and be unable to look after herself. She described feeling very isolated and missed her friends and family.

Physiotherapy Treatment

The physiotherapist felt that treatment could not progress usefully until Mrs D had a better understanding of the diagnosis. After further discussion Mrs D acknowledged that someone had told her she had functional weakness but she described feeling confused about what had happened to her and why. A family meeting was arranged with Mrs D, her husband, the neurologist, the ward nurse and the therapy team. At the meeting the neurologist explained that the diagnosis of functional weakness was based on Mrs D's presenting symptoms. The positive Hoover's sign was demonstrated and it was explained how it showed that it was possible to get the muscles in the left leg to turn on by moving the right leg. This demonstrates that "the wiring" from the left leg to the brain is intact but the problem lies with the brain having difficulty sending the message. For this reason it is possible to retrain these messages with rehabilitation involving physiotherapy and occupational therapy. The neurologist also explained how the test that had been performed

had ruled out some other common causes of weakness such as stroke. It was discussed that the question "why functional symptoms occur" is more difficult to answer, in the same way that we do not completely understand why other neurological conditions occur, such as multiple sclerosis. The answer is likely to be multifactorial, it often occurs following injury or illness and it is different in every case. It was discussed how psychological factors can sometimes be important and that multidisciplinary rehabilitation often involves psychological therapy. Mrs D agreed to meet with the psychologist for an assessment.

At the next physiotherapy session, Mrs D demonstrated a good understanding of her condition, stating she was aware that there was nothing structurally wrong. She expressed an interest in knowing what she should be doing to help herself. Together with a colleague, the physiotherapist assisted Mrs D to a standing position from sitting over the edge of the bed. One therapist provided hand held assistance at the left upper limb and the other therapist was sitting in front of Mrs D, providing reassurance and minimal facilitation only at the knees. Following 3 repetitions of sit to stand, further time was spent discussing the diagnosis and answering Mrs D's questions. It was explained how they were using automatic muscle activity, which allowed Mrs D to stand and will allow her to walk in time. Mrs D was given a list of things she could do to help her rehabilitation. This included changing the way she transferred, reducing the weight through the arms and allowing more automatic activity in the legs. It also included sitting out in the chair as tolerated and trying to use both hands when taking a drink, washing and eating. The occupational therapist provided additional support for this. They discussed that exercises in the bed were less useful than automatic, purposeful movement (such as standing and transferring from bed to chair).

The next day, Mrs D managed to move from sit to stand with less support. Treatment included 3 stands for 1 minute and lateral weight transference in standing. Mrs D managed to mobilise 2 metres with hand held assistance of 1 and minimal facilitation at her knees. Treatment was repeated in the afternoon when Mrs D managed to walk 2 laps of 3 metres with assistance. Mrs D received lots of encouragement and positive feedback throughout the session.

On day 3, the focus of treatment was walking. Assistance was given using a "fingertips hold" where the therapist stands in front of the patient and provides minimal support through the fingertips. This ensured Mrs D was not able to lean heavily through her upper limbs and all the weight is taken through her lower limbs. This position also allowed good eye contact between the physiotherapist and Mrs D to allow prompting and encouragement and to prevent her from looking down. Mrs D managed 7 metres with one rest. Over the next few days gait re-education was continued with Mrs D using fingertip support from walls and furniture or within parallel bars. The reasoning behind avoiding walking aids was discussed. It was explained that a walking aid would encourage more weight to be taken through the upper limbs and this would hinder her progress. That to ensure optimal muscle activity, it was important for all body weight to be taken through the lower limbs. Mrs D was satisfied with the explanation. By day 6 she was walking with supervision only and was managing to walk to the toilet with the nursing staff. On day 8 Mrs D managed a flight of stairs and was able to go home on weekend pass, which was a success. Her gait pattern was still abnormal with quite a marked hesitation prior to stepping with the right leg. To address this a treadmill was used and her gait pattern normalised after 2 sessions, with only some minor hesitation. Mrs D was discharged home with referrals made to a gym exercise scheme and a community rehabilitation team.

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