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Mirror visual feedback therapy for treatment of phantom limb pain: a clinical practice guideline

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Clinical Practice Guidelines

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Mirror Visual Feedback Therapy for Phantom Limb Pain

*An Evidence Based Approach to the Conservative
Treatment of Phantom Limb Pain using Mirror Therapy*

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Introduction

The sensation of a “phantom limb” is experienced by a majority of individuals who have undergone the loss of a limb.¹ Many of those experiencing this phenomenon have a multitude of sensations ranging from the feeling of something “bothersome” to experiencing chronic pain.^{2,3} It was found that as many as 85-90% of individuals with phantom limb sensations experience chronic pain that may lead to emotional distress, physical limitations, and disability.^{3, 4, 5, 6} The prevalence of amputation varies by region, sex, and in how the individual acquired the loss of limb. However, it is known that the incidence of amputation is increasing, which may be attributed to ongoing military conflicts and the increasing prevalence of diabetes.⁷

The first reported use of a mirror box for the treatment of phantom limb pain was described in “synesthesia in phantom limbs induced with mirrors” by Ramachandran in 1996.⁸ Their findings from this study suggested that the use of a mirror box was an effective treatment for the reduction in pain symptoms associated with phantom limb pain. Since the introduction of Ramachandran’s use of a mirror box for the treatment of phantom limb pain, there has been considerable literature on the topic, leading to many different treatment methods and reports of favorable outcomes. However, the majority of the literature to date has been low level case reports that don’t have agreement in their treatment protocols.^{9, 10, 11, 12, 13, 14, 15, 16, 17, 18} The few studies that have incorporated random controls or meta-analysis agree that the use of mirror box therapy is effective for alleviating phantom limb pain but again, there has been no consensus on the most effective way to carry out individuals with phantom limb pain treatment.^{19, 20, 21, 22}

A review of the literature for phantom limb pain treatments describes how sensory experiences can be evoked using visual information alone.^{8, 10, 11, 12, 13, 14, 15, 16, 19, 23, 24} Supplemental visual feedback, in conjunction with mirror visual feedback, may be beneficial as well.^{9, 17, 18, 22} Supplemental treatments to visual feedback that were found to be beneficial in the literature include motor imagery and laterality training. Motor imagery is essentially thinking about the movement; visualizing the action without actually moving the limb. A benefit of motor imagery is that it can be practiced nearly anywhere at any time and is intended to supplement mirror visual feedback. However, the sole use of motor imagery is not as effective of a treatment for reducing phantom limb pain symptoms when compared to mirror visual feedback used alone.²⁵ Laterality training, or left/right discrimination, is the ability to identify the orientation of a limb in space in multiple positions. Additionally, there were a few studies that provided positive results from the inclusion of non-visual sensory input to reduce phantom limb symptoms used in conjunction with mirror visual feedback.^{9, 17, 18, 22}

The mechanisms behind mirror visual feedback therapy are not clear.¹² It is believed that at the time of amputation, the brain undergoes a pathological reorganization of the somatosensory and motor cortex regions of the brain.²⁶ This cognitive process leads an individual to experience the

sensation of a phantom limb due to the same process that led to its creation of an existing limb's sensation, remaining present following an amputation.¹⁹ The use of mirror visual feedback to alleviate phantom limb sensations is thought to aid in cortical reorganization mainly through the activation of mirror neurons.²⁷ A mirror neuron is a neuron that fires both when an individual acts and when the individual observes the same action performed. Thus, the neuron "mirrors" the behavior of the other, as though the visual observer were itself acting.²⁷

Aims of this Clinical Practice Guidelines

The purpose of this clinical practice guideline, using mirror visual feedback for phantom limb pain, is to describe the peer-reviewed evidence and to make recommendations related to (1) the evidence-based physical therapy practice, including diagnosis, prognosis, intervention, and assessment of outcome, for the conservative treatment of phantom limb pain using mirror visual feedback, (2) classify and define phantom limb pain using the World Health Organization (WHO) terminology relating to impairments of body function and body structure, activity limitations, and participation restriction; (3) identify interventions supported by current best evidence to address impairments of body function and structure, activity limitations, and participation restrictions associated with phantom limb pain; (4) identify appropriate outcome measures to assess changes resulting from physical therapy interventions in body function and structure as well as in activity and participation of the individual; and (5) create a reference publication for physical therapy clinicians, academic instructors, clinical instructors, and students regarding the best current practice for the use of mirror visual feedback for phantom limb pain.

It is not the intent of these guidelines to be the standard level of medical care; they should be regarded as a guide only. Though some evidence is suggestive of successful outcomes, adherence to the outlined practices are not a guarantee to success for every patient. Best clinical judgment should be shown when developing a treatment plan of care to include the diagnosis and treatment options available to the clinician and their patient, as well as the patient's expectations for treatment, their values, and their preferences.

Physical Therapist Considerations

Classification²⁸: Perception of painful and non-painful phantom sensations that occur following the complete or partial loss of a limb can be classified into one of the following three categories: (1) The extremity was previously paralyzed as a result of a peripheral nerve lesion prior to amputation, which causes the phantom limb to be perceived as paralyzed in the same manner the

limb had been prior to amputation, (2) A non-traumatic amputation that results in patients having the ability to usually generate voluntary movements in the phantom limb; however, this voluntary movement may diminish over time, (3) Pain that is perceived to originate from the phantom limb, whether at a specific point or in its entirety, this pain can have multiple sensations and at varying intensities.

The following International Statistical Classification of Disease and Related Health Problems (ICD-10) categories:

- (G54.6) Phantom limb syndrome with pain
- (G54.7) Phantom limb syndrome without pain

Risk factors: Several risk factors were identified in the literature that may lead to a higher incidence of experiencing phantom limb pain. Risk factors include but are not limited to: amputation of an extremity, presence of pain pre-amputation, gender (females experience more pain compared to males), and time after amputation (patients tend to experience higher pain levels around two peak time intervals at 1 month post-amputation and/or around 1 year post-amputation).

Signs/Symptoms: Patients may report a multitude of phantom sensations which can be broken down into two broad categories: superficial pain or deep pain. The following list compiles those sensations found throughout the literature: searing, aching, cramping or cramp-like, clenching of fist, spasm, paralyzed, “frozen” in a certain position, clenching sensation, deep pain in phantom limb, vivid movement, sharp pain, shooting pain, unpleasant itching, freezing or burning, twisting pain, crushing, throbbing, dull, taut, clenching, tearing, crossing of toes or fingers, pins and needles, vibration sense, and/or electric-like pain.

Other Treatments: (1) Pharmacotherapy: opioids, Tramadol, tricyclic antidepressants, anticonvulsants, sodium channel blockers, NMDA receptor antagonist, Ketamine, and/or marijuana. (2) Surgical intervention: stump revision, nerve block, neurectomy, rhizotomy, cordotomy, lobectomy, sympathectomy, and/or CNS stimulation. (3) Conservative intervention: transcutaneous nerve stimulations (TENS), mirror therapy, biofeedback, massage, ultrasound, sensory discrimination training, prosthesis training, cognitive behavioral pain management, and/or electroconvulsive therapy.

Mirror Therapy Considerations

Contraindications:^{11, 26, 30} Mirror therapy is not appropriate if the patient has bilateral lower extremity or upper extremity amputations, severe cognitive/communicative deficits and/or visual disturbances.

Precautions:²⁶ Proceed with caution if the patient exhibits one or more of the following:

- Poor cognition
- Inability to discern left from right
- Anxiety or depression
- Malpositioned phantom limb.

Patient Positioning:¹⁹ Position the patient comfortably with the mirror placed vertically and perpendicular to the patient’s body midline, in the sagittal plane. However, if the phantom limb is malpositioned and unable to be viewed with the mirror orientation above, adjusting the mirror to accommodate the position is warranted. The mirror should be of sufficient size as to be able to view the whole superimposed limb throughout any movements and to obscure the view of the residual limb behind it. The reflection of the intact limb should be reflected in such a way as to allow the patient to view the intact limbs reflection. Ask the patient to close their eyes and to describe how they currently perceive their phantom limb’s position. The residual limb should be orientated in such a way as to mimic the phantom limb’s perceived position.

Prosthetics are typically removed; however, they can be donned so that the patient can “approximate” the position of their residual limb.

Condition of Intact Limb: Tattoos, piercings, scars, and anything that can distinguish the memory of the phantom limb from the intact limb (thereby weakening the illusion), should be covered using sleeves, gloves, make-up, etc. ^{19, 26, 27}

Unique Phantom sensations: Stump mapping, positioning, dimensions, ROM, allodynia, telescoping, other pain characteristics (severity, duration, frequency, alleviating, exacerbating factors). ^{19, 26, 27}

Graded Motor Imagery (GMI): Evidence supports GMI and its ability to reduce PLP/disability when used as a prerequisite before mirror therapy.²⁵ Access more information on GMI and how to implement it with mirror therapy at: <http://www.gradedmotorimagery.com/>

- Limb laterality training
- Imagined movements
- Mirror movements

Pre-amputation: The use of mirror therapy may be of benefit to the patient prior to amputation if applicable.³¹

Intervention Recommendations

Recommendation for motor exercises: The current literature does not support the use of any single exercise protocol over the use of another. Generally, the use of single planar exercise as well as tri-planer exercises were both utilized and showed success in their implementation in

mirror visual feedback therapy. For motor exercise examples, refer to the appendix tables for a complete list of exercises used throughout the literature.^{14, 19, 25, 26}

General motor exercise suggestions

- Start with simple single plane movements.
- Adjust the ROM and the abilities of the intact limb to match that of the phantom limb.
- Perform a high number of quality repetitions maintaining patient focus throughout.
- Monitor patient gaze and give feedback about performance.
- Incorporate sufficient breaks to maintain quality.
- Stay below the pain threshold.

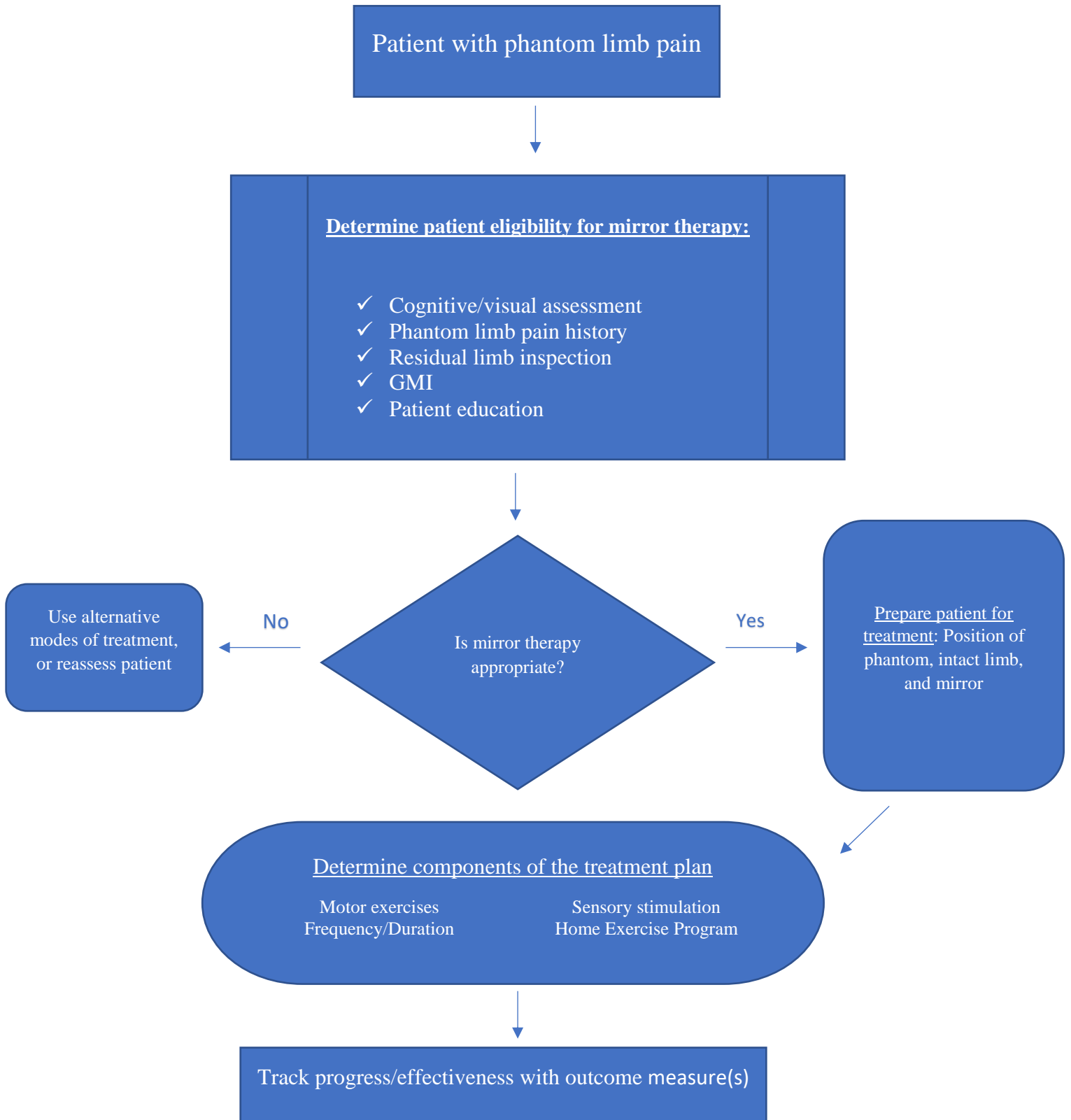
Recommendation for sensory stimulation: The use of sensory aids and stimulation was supported by the literature. Examples include: the use of transcutaneous electrical nerve stimulation in conjunction with motor exercise; the use of a magnifying glass to attenuate patient's perception of pain by "shrinking the limb"; auditory feedback as part of their motor exercises; and desensitization therapy.^{17, 18, 22, 24, 29}

Recommendation for treatment frequency and time: Clinicians should consider that the evidence supports a considerable time investment in the use of mirror visual feedback for phantom limb pain. The literature shows that patients should actively engage in regular mirror box therapy sessions 5-7 days per week, with more days showing greater likelihood of success compared to fewer days.^{10, 11} It is unclear at this time whether there is a clinical significance in patient's participation frequency; however, the majority of studies had participants actively engage in the clinic or home settings on the majority of days in the week. Treatment times ranged from 15 minutes to 1 hour in length, with no evidence supporting one time over another. Again, the majority of studies favored 30-minute treatment times, with multiple studies having participants coming in twice per day for mirror visual feedback therapy.^{10, 14, 15, 16, 18, 23} Further details concerning treatment intervention frequency and times can be referred to in the study characteristics tables located in accompanied appendices.

Recommendation for home exercise program: Clinicians should utilize effective patient education on mirror visual feedback therapy exercises in order for patients to properly carry out their therapy sessions at home unsupervised. The evidence suggests that daily therapy sessions may be beneficial; however, the frequency required may not be possible due to patient and hospital time/financial constraints.

Recommendation for the use of outcome measures: Visual analog scales (VAS), McGill Pain Questionnaire, and the Total Pain Ranking Index.

Figure 1. Flowchart for phantom limb pain treatment



Darnall BD ¹⁰	IX - Poor	n: 1 age: 35 years sex: male time since amputation: 3 years onset of PLP: Immediately post-surgery	Unknown	Exercises designed by patient and carried out alone at home	F: 3 times/week S: unknown R: unknown B: unknown T: 20-30 min./day for 3 months	PLP resolved
MacLachlan M, et al. ¹⁴	IX - Poor	n: 1 age: 32 years sex: male time since amputation: unknown onset of PLP: 2 days post-consciousness	Unknown	Exercise given by therapist initially then patient carried out therapy alone	F: 2 x /day (daily) S: 10 R: 1 rep (10 exercises) B: pause T: 3 weeks	Reduction of PLP with increased sense of motor control of PL
Seidel S, et al. ¹⁶	IV - Fair	n: 8 age: 50 years (31-78) sex: m time since amputation: 13.5 years (2-52) onset of PLP: unknown	Yes	Exercises designed by therapist and carried out with therapist supervision	F: 2 times/day with 2 sessions/week (12 sessions total) S: 2 R: 6 exercises/1 min. each B: 1 min between exercises and 3 minutes between sets T: unknown	Decreased PLP

Note: *Participant characteristics:* n (study participant size), age of participant in years unless otherwise noted (age range), sex; m-male f-female, time since amputation in years unless otherwise noted, onset of PLP in years unless otherwise noted. *Intervention:* F – Frequency indicating the number of times per day, if indicated and days

per week; S – Sets of exercises performed, R – Repetitions of exercise performed in each set; B – Rest Break taken between sets, T – total therapy time performed each session and/or the span of entire therapy treatment.

Table 2. Summary of appraised articles for mixed upper and lower extremity phantom limb pain using mirror visual feedback therapy.

Authors	Level/Strength of Evidence	Participants	Voluntary movement of PL	Treatment setting	Intervention	Conclusion
Darnall BD ¹¹	VIII - Poor	n: 40 age: 32-74 sex: m and f time since amputation: 0.2-59 onset of PLP: unknown	Unknown	Exercises designed by patient and carried out alone at home	F: daily S: unknown R: unknown B: unknown T: 25 min/session	Decreased mean PLP intensity at end of month 1 and 2
Moseley GL ²⁵	III - Good	n: 51 (PLP and CRPS) age: unknown sex: m and f time since amputation: unknown onset of PLP: unknown	Yes – received training	Exercises designed by researcher and carried out with supervision	F: daily S: unknown R: 10 each exercise B: unknown T: once per waking hour	Decreased PLP post-treatment, decreased PLP maintained at 6-month follow-up
Tilak M, et al. ²²	III - Good	n: 26 age: 42.62 (+/- 10.69) sex: m and f time since amputation: unknown onset of PLP: 13 days (+/- 1.4)	Unknown	Unknown exercises carried out with supervision	F: once per day for 4 days S: unknown R: unknown B: unknown T: 20 min/session	Reduction in PLP using mirrors and TENS with no difference between the groups

Note: *Participant characteristics:* n (study participant size), age of participant in years unless otherwise noted (age range), sex; m-male f-female, time since amputation in years unless otherwise noted, onset of PLP in years unless otherwise noted. *Intervention:* F – Frequency indicating the number of times per day, if indicated and days per week; S – Sets of exercise performed, R – Repetitions of exercise performed in each set; B – Rest Break taken between sets, T – total therapy time performed each session and/or the span of entire therapy treatment.

Table 3. Summary of appraised articles for upper extremity phantom limb pain using mirror visual feedback therapy.

Authors	Level/Strength of Evidence	Participants	Voluntary movement of PL	Treatment setting	Intervention	Conclusion
Foell J, et al. ¹²	VI - Fair	n: 13 age: 50.6 (26 – 74) sex: m and f time since amputation: 21.3 (6-49)	Unknown	Exercises provided by researcher and	F: daily S: 1 R: 1 per exercise (5 exercises total)	Reduction in PLP

		onset of PLP: at least 2 years post amputation		carried out without supervision at home	B: unknown T: 15 min (3 min per exercise)	
Kim SY & Kim YY. ¹³	IX - Poor	n: 1 age: 30 sex: m time since amputation: 8 months onset of PLP: unknown	Yes	Exercises carried out with supervision Exercises performed at home without supervision after first month	F: 4 x / week (first month) 3-4 x / week (after first month) S: unknown R: unknown B: unknown T: 15 min/session	Decreased PLP
Mercier C & Sirigu A. ²³	IV - Good	n: 8 age: 19-54 sex: m time since amputation: 1-16 onset of PLP: unknown	unknown	Exercises provided by researcher and carried out with supervision	F: 2 sessions/week for 8 weeks S: 10 R: 10 B: unspecified time between sets T: 30-60 min/session	Reduction in PLP, maintained at 4 weeks post-intervention
Ramachandran VS & Rogers-Ramachandran D ⁸	IV - Good	n: 10 age: 23-73 sex: unknown time since amputation: 19 days-9 years onset of PLP: unknown	No	Exercises provided by researcher and carried out with supervision	Movements were participant dependent. No specifics of exercises provided.	In some participants relieved PL spasms 1 participant had PLP resolved Most participants had kinesthetic awareness of PL
Ramachandran VS, et al. ¹⁵	IX - Poor	n: 1 age: 42 sex: m time since amputation: 23 onset of PLP: unknown	No	Exercises provided by researcher and carried out with supervision	F: 2 sessions in same day w/ 2 hr. break S: 1 R: 18 B: 30 sec T: 6 min (20 sec each repetition)	Reduced or temporary cessation of PLP

Thomas S ¹⁷	IX - Poor	n: 1 age: 48 sex: m time since amputation: 1 onset of PLP: unknown	unknown	Exercises provided by therapist and carried out at home and in clinic	F: 8 weeks S: 2 R: 40 B: unknown T: unknown	Decreased PLP (Mirror therapy was a small part of overall plan of care).
Wilcher DG, et al. ¹⁸	IX - Poor	n: 1 age: 24 sex: m time since amputation: unknown onset of PLP: unknown	unknown	Exercises provided by therapist and carried out in clinic	F: 2 x /day S: unknown R: unknown B: unknown T: 15 min./session	Some decrease in intensity of PLP after 1.5 weeks of treatment.

Note: *Participant characteristics:* n (study participant size), age of participant in years unless otherwise noted (age range), sex; m-male f-female, time since amputation in years unless otherwise noted, onset of PLP in years unless otherwise noted. *Intervention:* F – Frequency indicating the number of times per day, if indicated and days per week; S – Sets of exercises performed, R – Repetitions of exercise performed in each set; B – Rest Break taken between sets, T – total therapy time performed each session and/or the span of entire therapy treatment.

Table 4. Lower extremity exercise routines using mirror visual feedback for phantom limb pain as described in the methods sections of their respective publications.

Brodie EE, et al. (2007)	<ol style="list-style-type: none"> 1. Slowly straighten and then bend your legs at the knee at the same time 2. Slowly straighten and then bend your legs at the knee alternately as if walking 3. Point your feet upwards, and then point your feet downwards at the same time 4. Turn your soles in towards each other and then away from each other 5. Move your feet around in a circle, to the left and to the right 6. Lift your feet off the ground in a walking movement 7. Point your toes upwards, and then downwards whilst trying to keep your ankle and foot still. 8. Clench and unclench your toes 9. Spread out your toes and then relax them 10. Point up your big toe and point down the other toes, then reverse it so that your big toe is pointing down and your other toes are pointing up
Chan, et al. (2007)	No specific exercises listed by the author
Clerici, et al. (2012)	<ol style="list-style-type: none"> 1. Looking at reflected limb 2. Touching the reflected limb 3. Scratching the reflected limb 4. Moving the limb
Darnall, BD (2009)	<ol style="list-style-type: none"> 1. Diaphragmatic breathing 2. Flexing the foot up and down at the ankle 3. Rotating the ankle in circles 4. Touching the big toe in the mirror 5. Raising and lowering the leg at the hip 6. Bending the leg at the knee
MacLachlan M, et al. (2004)	<ol style="list-style-type: none"> 1. Slowly straighten and then bend your legs at the knee at the same time 2. Slowly straighten and then bend your legs at the knee alternately as if walking 3. Point your feet upwards, and then point your feet downwards at the same time 4. Turn your soles in towards each other and then away from each other 5. Move your feet around in a circle, to the left and to the right 6. Lift your feet off the ground in a walking movement 7. Point your toes upwards, and then downwards whilst trying to keep your ankle and foot still. 8. Clench and unclench your toes 9. Spread out your toes and then relax them 10. Point up your big toe and point down the other toes, then reverse it so that your big toe is pointing down and your other toes are pointing up
Seidel S, et al (2011)	<ol style="list-style-type: none"> 1. Hip abduction and adduction 2. Hip external rotation and internal rotation

	<ol style="list-style-type: none"> 3. Hip and knee flexion and extension 4. Foot dorsiflexion/supination – plantarflexion/pronation 5. Foot dorsiflexion/pronation – plantarflexion/supination 6. Toe flexion and extension
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Table 5. Mixed upper and lower extremity exercise routines using mirror visual feedback for phantom limb pain as described in the methods sections of their respective publications.

Darnall BD (2012)	No specific exercises listed by the author
Moseley GL (2006)	No specific exercises listed by the author
Tilak M, et al (2016)	No specific exercises listed by the author

Table 6. Upper extremity exercise routines using mirror visual feedback for phantom limb pain as described in the methods sections of their respective publications.

Foell J, et al. (2014)	<ol style="list-style-type: none"> 1. Opening and closing of fingers: repeated converging of the fingertips, starting with a loosely opened hand, palm towards the mirror, but without any tactile contact among the fingers or between fingertips and palm 2. Stretching of fingers, with palm towards the mirror 3. Turning the hand, so the palm alternately faced upwards and downwards 4. Sequential converging of fingertips and thumb, palm towards the mirror, without actual contact between the fingertips 5. Tracing figures with the index finger in the manner of a concert conductor
Kim, S. Y., & Kim, Y. Y. (2012)	No specific exercises listed by the author
Mercier, C., & Sirigu, A. (2009)	<ol style="list-style-type: none"> 1. Flexion and extension of the elbow 2. Pronation and supination of the forearm 3. Flexion and extension of the wrist 4. Opening and closing the hand 5. Adduction and abduction of the fingers 6. Thumb-to-fingers opposition 7. Flexion and extension of the thumb 8. Grabbing an object (such as a glass) 9. Precision grip with small objects 10. Dialing a phone number
Ramachandran, V. S., & Rogers-Ramachandran, D. (1996)	“Pretend you are conducting an orchestra” but no specific exercises listed by the author
Ramachandran, V. S. et al. (2009)	<ol style="list-style-type: none"> 1. Clenching of fist 2. Unclenching clapping 3. Conducting an orchestra

	4. * not all specific exercises were described by the author
Thomas, S. (2015)	<ol style="list-style-type: none"> 1. Wrist extension 2. Wrist flexion 3. Elbow flexion 4. Elbow extension
Wilcher, D. G., et al. (2011)	<ol style="list-style-type: none"> 1. Bicep curls 2. Opening and closing the fist 3. Pronating and supinating the outstretched arms

Methods

Studies included in the creation of this clinical practice guideline were all articles published before January 2017 and available in English. Articles considered for inclusion evaluated the clinical aspects of mirror visual feedback (MVF) from all meta-analysis of randomized controlled trials, randomized controlled trials (RCT's), nonrandomized controlled prospective trials, case series, and case reports.

Articles were categorized per their study design as described by Jovell and Navarro-Rubio. This classification was used to assess the methodological quality of the included papers. The content of the papers was scanned for: subjects (n, age, and sex), time since injury, design classification, intervention, outcome measurements, and conclusions by two separate reviewers.

Table 1. Criteria for grading the strength of evidence for individual research articles appraised.

Level	Strength of Evidence	Type of study design
I	Good	Meta-analysis of randomized controlled trials
II	Good	Large-sample randomized controlled trials
III	Good to fair	Small-sample randomized controlled trials
IV	Good to fair	Non-randomized controlled prospective trials
V	Good to fair	Non-randomized controlled retrospective trials
VI	Fair	Cohort studies
VII	Fair	Case-control studies
VIII	Poor	Non-controlled clinical series; descriptive studies
IX	Poor	Anecdotes or case reports

Literature Search Strategy

An electronic search was conducted from August 2016 to February 2017 for relevant data to be used in this clinical practice guide on MVF for phantom limb pain. A systematic review on the clinical aspects of MVF incorporated the following databases: Cochrane Library, CINAHL, PsycInfo, MEDLINE, PubMed, and Google Scholar. The following keywords were used in our searches: phantom limb, mirror visual feedback, phantom pain, mirror therapy, phantom limb pain, virtual limbs, mirror imagery, physical therapy, and amputation. In addition, reference lists

from relevant publications were screened for their reference lists to identify additional articles for retrieval.

Additional methods used included inquiry electronic communication with the authors of appraised articles to ascertain further methods in their respective studies that may not have been included in their published articles. Specific questions to the authors were dependent upon provided information in the publication. Specific questions included but were not limited to; exercises performed by the study participants, number of sets and repetitions performed by study participants, rest time taken between each exercise and each therapy session, the use of laterality training prior to the use of mirror visual feedback, and if the author had any additional information gathered from the study they felt would be clinically significant.

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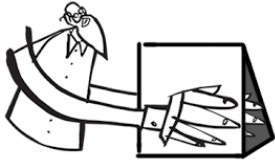
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Patient Take-Home Instructions

Therapist: _____

Patient: _____



Mirror Visual Feedback

- Perform exercises in a quiet area free of distractions to allow full concentration on the illusion of the reflected limb
- The reflected limb should be as realistic as possible. Cover up scars or tattoos and remove jewelry to make the illusion believable
- The residual limb should be completely hidden by the mirror while performing exercises
- Avoid looking at your intact limb during exercise sessions
- Concentrate on the limb in the mirror during the entire exercise session. Try to imagine that the reflected image in the mirror is your affected limb
- Exercises will be more beneficial if you practice consistently. Try to practice at least once daily for 30 minutes each session for best results
- Perform each exercise slowly while concentrating on the reflected image
- Record your exercise sessions in a daily log to track your progress
- When unsure about unusual or excessive emotional responses, increased pain that does not go away shortly after stopping exercises session, consult your therapist or doctor.

Short-form McGill Pain Questionnaire Instructions and scoring³²

The short-form McGill Pain Questionnaire (SF-MPQ) is a shorter version of the original MPQ, and was developed later in 1987.

The pain rating index has 2 subscales:

1. Sensory subscale with 11 words, and
2. Affective subscale with 4 words from the original MPQ.

These words or items are rated on an intensity scale as 0 = none, 1 = mild, 2 = moderate and 3 = severe. There's also one item for present pain intensity and one item for a 10 cm visual analogue scale (VAS) for average pain.

Scoring

The Pain Rating Index can be scored in several ways:

- "Pain Rating Index - rank value": The adjectives are ranked according increasing intensity, so each descriptor can be assigned a higher score.
 - 0 = no pain
 - 1 = mild
 - 2 = discomforting
 - 3 = distressing
 - 4 = horrible
 - 5 = excruciating
- "Pain Rating Index - scale value (VAS)": The pain intensity of each pain descriptor can be assessed on a numeric scale. The assigned rating can also be accepted as the score for the pain descriptor.
- "Number of words chosen (NWC)": The number of words chosen by the patient. The higher the total score on the MPQ, the more pain is being experienced by the patient.

Short-Form McGill Pain Questionnaire

PATIENT'S NAME: _____ DATE: _____

	NONE	MILD	MODERATE	SEVERE
THROBBING	0) _____	1) _____	2) _____	3) _____
SHOOTING	0) _____	1) _____	2) _____	3) _____
STABBING	0) _____	1) _____	2) _____	3) _____
SHARP	0) _____	1) _____	2) _____	3) _____
CRAMPING	0) _____	1) _____	2) _____	3) _____
GNAWING	0) _____	1) _____	2) _____	3) _____
HOT/BURNING	0) _____	1) _____	2) _____	3) _____
ACHING	0) _____	1) _____	2) _____	3) _____
HEAVY	0) _____	1) _____	2) _____	3) _____
TENDER	0) _____	1) _____	2) _____	3) _____
SPLITTING	0) _____	1) _____	2) _____	3) _____
TIRING/EXHAUSTING	0) _____	1) _____	2) _____	3) _____
SICKENING	0) _____	1) _____	2) _____	3) _____
FEARFUL	0) _____	1) _____	2) _____	3) _____
PUNISHING/CRUEL	0) _____	1) _____	2) _____	3) _____

VAS NO PAIN WORST POSSIBLE PAIN

|-----|

PPI

0	NO PAIN	_____
1	MILD	_____
2	DISCOMFORTING	_____
3	DISTRESSING	_____
4	HORRIBLE	_____
5	EXCRUCIATING	_____

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