Welcome to our survey of clinicians in Ontario. Please note that your participation in this survey does not require any prior knowledge of or experience with targeted muscle reinnervation.

Participant Information and Informed Consent Form Title: Targeted Muscle Reinnervation (TMR) in the Management of Symptomatic Neuroma Pain and Phantom Limb Pain: A Province-Wide Survey of Clinicians in Ontario

Investigator: Dr. Michael Hendry, MD
Co-investigator: Sasha Létourneau

Introduction
As a specialist in Ontario who may be involved in the care of patients undergoing amputation or experiencing amputation-related pain, you are invited to participate in this brief survey. This study may help advance the use of targeted muscle reinnervation in routine clinical practice for the treatment of pain or improvement of advanced prosthetic use after amputation in Canada.

This study has been reviewed for ethical compliance by the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board.

Purpose of the Study:
Targeted muscle reinnervation (TMR) is a surgical technique originally developed to improve the control of bioprostheses. TMR has also been shown to improve post-amputation pain, including neuroma pain and phantom limb pain when used both at the time of primary amputation and as secondary management of these post-amputation pain conditions. Therefore, the aim of this survey study is threefold: 1. To characterize the clinical population experiencing post-amputation neuroma pain and phantom limb pain; 2. To survey the current management of neuroma pain and phantom limb pain by orthopedic surgeons, plastic and reconstructive surgeons as well as physical medicine and rehabilitation specialists in Ontario; 3. To evaluate current awareness of and attitudes toward the routine use of TMR in the treatment of post-amputation neuroma pain and phantom limb pain.

Voluntary Participation and Withdrawal:
The survey should take about 7-10 minutes to complete. After starting the survey, you can withdraw your consent to participate at any time by closing the browser window before submitting your responses. If you withdraw before submitting, your responses will be deleted and will not be included in analysis. However, because all submissions are anonymized and de-identified, once you submit your responses, you will no longer be able to withdraw. Submission of the survey will be considered your implied consent for the use of your responses.
If you do not finish the survey in one sitting, you may continue the survey where you left
off by reopening the link on the same internet browser on the same device.

Confidentiality:
Your responses will be anonymous and the study survey will not ask for any identifying information. Note that Queen’s University and Affiliated Teaching Hospitals Research Ethics Board (HSREB) representatives may require access to study records for quality assurance purposes.

Incentive:
Upon completion of the study survey, you will be eligible for entry into a draw for an iPad Mini. When you submit the study survey, you will be redirected to a second optional survey which will ask for your name and an email where you would like to be notified if your name is drawn. The information collected in the incentive survey will be kept confidential, will not be linked to your responses in the TMR survey study and will be destroyed after the winner is drawn.

This study provides no direct benefit to participants. There are also no foreseeable risks to participating.

Further information:
If you have any questions or concerns regarding this study, please contact the principal investigator: Dr. Michael Hendry at Michael.Hendry@kingstonhsc.ca or (613) 544-3400 x. 2117.

For ethics concerns, please contact the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board. Call 1-844-535-2988 (toll free in North America) or email the HSREB Chair at clarkaf@queensu.ca.

Please note that your responses will be only be recorded if you click the "submit" button at the end of this survey.

End of Block: Introduction & Welcome
Start of Block: Part 1: Demographics
What specialty are you currently practicing in Ontario?
- Orthopedic Surgery (1)
- Plastic and Reconstructive Surgery (2)
- Physical Medicine and Rehabilitation (3)
- Not currently practicing one of the above specialties in Ontario (4)

Skip To: End of Survey If What specialty are you currently practicing in Ontario? = Not currently practicing one of the above specialties in Ontario

Display This Question:
If What specialty are you currently practicing in Ontario? = Orthopedic Surgery
What subspecialty or subspecialties do you practice? (Please choose all that apply.)
- General Orthopedics (1)
- Orthopedic Trauma (2)
- Orthopedic Spine (3)
- Orthopedic Sports Medicine (4)
- Orthopedic Oncology (5)
- Orthopedic Pediatrics (6)
- Hip and Knee Reconstruction (7)
- Foot & Ankle Surgery (8)
- Hand & Wrist Surgery (9)
- Shoulder & Elbow Surgery (10)

Display This Question:
If What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery
What subspecialty or subspecialties do you practice? (Please choose all that apply.)
- General Plastic Surgery (1)
- Pediatric Plastic Surgery (2)
- Hand & Upper Extremity (3)
- Reconstructive Microsurgery (4)
- Craniofacial Surgery (5)
- Pediatric Craniofacial Surgery (6)
- Aesthetic Surgery (7)
- Burn Care (8)
What subspecialty or subspecialties do you practice? *(Please choose all that apply.)*

- Amputee Rehabilitation (1)
- Brain Injury Rehabilitation (2)
- Cancer Rehabilitation (3)
- Cardiovascular Prevention and Rehabilitation (4)
- Chronic Pain Medicine/Rehabilitation or Interventional Medicine (5)
- Musculoskeletal/Trauma Rehabilitation (6)
- Neurological Rehabilitation (7)
- Neuromuscular Rehabilitation (8)
- Pain Medicine and Management (9)
- Pediatric Rehabilitation (10)
- Spinal Cord Injury Rehabilitation (11)
- Stroke Rehabilitation (12)
- Sports Medicine/Rehabilitation (13)

What is your age?

- 21-30 (1)
- 31-40 (2)
- 41-50 (3)
- 51-60 (4)
- 61-70 (5)
- 71-80 (6)
- >80 (7)
How many years have you been in practice? *(Please type a number, i.e. if you have been in practice for five (5) years, please only type "5" in the box.)*

________________________________________________________________

What city do you practice in? *(If you practice in more than one city, please indicate the city in which you have the majority of your practice.)*

________________________________________________________________

What kind of center do you practice in? *(Please choose all that apply.)*

- Community Health Center (1)
- Office-Based Practice (2)
- Outpatient Hospital (Ambulatory Care) (3)
- Community Hospital with Inpatient Beds (Less than Level I Trauma Center) (4)
- Community Hospital with Level I Trauma Center (5)
- Academic Hospital (Less than Level I Trauma Center) (6)
- Academic Hospital with Level I Trauma Center (7)

Which of the following best describes your type of practice?

- Non-academic community clinician or surgeon (1)
- Academic clinician/surgeon – academic focus on research (2)
- Academic clinician/surgeon – academic focus on education (3)
- Academic clinician/surgeon – academic focus on administration (4)
- Academic work only (5)

End of Block: Part 1: Demographics

Start of Block: Part 2: Experience with Amputation and/or Painful Neuroma and Phantom Limb Pain
Approximately how many patients with extremity amputation do you manage/follow in your practice annually?

Please note:

**Upper extremity amputation** includes amputation at any level from the *scapulothoracic joint* to the *digits*.

**Lower extremity amputation** includes amputation at any level from the *hip joint* to the *digits*.

- 0 (1)
- 1-10 (2)
- 11-20 (3)
- 21-30 (4)
- 31-40 (5)
- 41-50 (6)
- >50 (7)

---

Display This Question:

- If What specialty are you currently practicing in Ontario? = Orthopedic Surgery
- Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery
Approximately how many primary extremity amputations do you perform on average annually?

Please note:

**Upper extremity amputation** includes amputation at any level from the *scapulothoracic joint* to the *digits*.

**Lower extremity amputation** includes amputation at any level from the *hip joint* to the *digits*.

O 0 (1)
O ≤5 (2)
O 5-10 (3)
O 11-15 (4)
O 15-25 (5)
O >25 (6)

Display This Question:

*If What specialty are you currently practicing in Ontario? = Orthopedic Surgery*

*Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery*
Approximately how many revision extremity amputations do you perform annually (including early revisions for poor wound healing, infection…etc. as well as late revisions for prosthesis fitting, residual limb reshaping…etc.)?

Please note:

**Upper extremity amputation** includes amputation at any level from the **scapulothoracic joint** to the **digits**.

**Lower extremity amputation** includes amputation at any level from the **hip joint** to the **digits**.

- 0 (1)
- ≤5 (2)
- 5-10 (3)
- 11-15 (4)
- 15-25 (5)
- >25 (6)

Display This Question:

If What specialty are you currently practicing in Ontario? = Orthopedic Surgery
Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery

And If

Approximately how many primary extremity amputations do you perform on average annually? Please... != 0

Or Approximately how many revision extremity amputations do you perform annually (including early re... != 0

Of the primary or revision amputations you perform in your practice annually, please indicate approximately what proportion are upper extremity amputations versus lower extremity amputations (expressed as a percentage).  Example: If you perform 10 extremity amputations annually, of which 6 are upper extremity amputations and 4 are lower extremity amputations, please answer 60% upper extremity and 40% lower extremity. If you only perform upper or lower extremity amputation, please put 100% and 0% in the appropriate boxes. Only enter numbers in the boxes.

Upper extremity amputation : _______ (1)
Lower extremity amputation : _______ (2)
Total : _______
Display This Question:

If What specialty are you currently practicing in Ontario? = Physical Medicine and Rehabilitation
And Approximately how many patients with extremity amputation do you manage/follow in your practice a... != 0

What proportion of patients with upper and lower extremity amputations do you manage/follow in your practice (expressed as a percentage). Example: If there are 10 patients in your practice with extremity amputations, of which 4 have upper extremity amputations, 4 have lower extremity amputations and 2 have both an upper and a lower extremity amputation, please answer 40% upper extremity, 40% lower extremity and 20% both. If one type of amputation does not apply, please put 0 in the corresponding box. Only enter numbers in the boxes.

Patients with Upper Extremity Amputation : _______ (1)
Patients with Lower Extremity Amputation : _______ (2)
Patients with Both 1 (or more) Upper Extremity and 1 (or more) Lower Extremity Amputation : _______ (3)
Total : _______

Display This Question:

If What specialty are you currently practicing in Ontario? = Orthopedic Surgery
Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery

Please indicate if you perform amputations for the following clinical indications and also how often you amputate for these indications?

|                  | Never | Very Rarely | Occasionally (1-5/year) | Often (>5/year) |
|------------------|-------|-------------|-------------------------|-----------------|
| Diabetes (1)     | ○     | ○           | ○                       | ○               |
| Infection (2)    | ○     | ○           | ○                       | ○               |
| Peripheral Vascular Disease (3) | ○     | ○           | ○                       | ○               |
| Malignancy (4)   | ○     | ○           | ○                       | ○               |
| Trauma (5)       | ○     | ○           | ○                       | ○               |
If applicable, please include any other indications you consider for limb amputation.
________________________________________________________________

Considering all the patients in your practice who have undergone extremity amputation, have you EVER encountered a patient with a painful neuroma?

**Definitions:**  
**Neuroma:** Dilated formation of disordered neural tissue and scar that forms at the end of severed nerves. Neuromas will necessarily form in every severed proximal nerve stump (Golan et al 2004, Campbell 2013, Bowen et al. 2017).  
**Painful neuroma:** A neuroma that elicits symptoms of pain, often in a discrete territory and neuropathic in quality, in addition to focal tenderness on exam with direct palpation and/or Tinel’s sign (Golan et al 2004, Campbell 2013, Bowen et al. 2017, Dumanian et al. 2018).

- Yes (1)
- No (2)

---

**Display This Question:**
If Considering all the patients in your practice who have undergone extremity amputation, have you EVER encountered a patient with a painful neuroma?  

* = Yes

**Approximately** what proportion of your patients with extremity amputation have developed **painful neuroma**?  
*(Please express this as a percentage of the total number of patients with extremity amputation.)*

________________________________________________________________
Considering all the patients in your practice who have undergone extremity amputation, have you EVER encountered a patient with phantom limb pain?

**Definition: Phantom limb pain:** Sensation of pain in the region represented by the amputated limb that is no longer present (Vaso et al 2014, Flor 2006).

- Yes (1)
- No (2)

Display This Question:

If Considering all the patients in your practice who have undergone extremity amputation, have you E... = Yes

Approximately what proportion of your patients with extremity amputation have developed **phantom limb pain**? *(Please express this as a percentage of the total number of patients with extremity amputation.)*

________________________________________________________________

Display This Question:

If What specialty are you currently practicing in Ontario? = Orthopedic Surgery

Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery

And If

Approximately how many primary extremity amputations do you perform on average annually?  Please... != 0

Or Approximately how many revision extremity amputations do you perform annually (including early re... != 0

How long do you routinely follow patients post-operatively following extremity amputation?

- 1-3 months (1)
- 3-6 months (2)
- 6 – 12 month (3)
- greater than 12 months (4)
Display This Question:

If What specialty are you currently practicing in Ontario? = Physical Medicine and Rehabilitation
And Approximately how many patients with extremity amputation do you manage/follow in your practice a... != 0

How frequently do your patients with amputation **experiencing painful neuroma or phantom limb pain** come back for follow-up?

- O every 1-3 months (1)
- O every 3-6 months (2)
- O every 6-12 months (3)
- O greater than 12 months (4)
Approximately how many referrals do you receive per year on average to manage:

(Please enter "0" if you do not receive any referrals to manage a condition.)

☐ Painful neuroma (1)

☐ Phantom Limb Pain (2)

In your opinion, do painful neuromas and/or phantom limb pain have a negative impact on patients’ quality of life after extremity amputation?

☐ Yes (1)
☐ No (2)
☐ Unsure (3)
Thinking about your patients with painful neuroma and/or phantom limb pain in their amputated extremity, to what degree are the following domains of quality of life affected specifically by painful neuromas and/or phantom limb pain?

| Domain                                                                 | Not affected (1) | Barely Affected (2) | Moderately Affected (3) | Severely Affected (4) |
|------------------------------------------------------------------------|------------------|----------------------|-------------------------|-----------------------|
| Overall Health (1)                                                     |                  |                      |                         |                       |
| Participation in normal daily activities (2)                           |                  |                      |                         |                       |
| Ability to cope with amputation (3)                                    |                  |                      |                         |                       |
| Prosthetic use (4)                                                     |                  |                      |                         |                       |
| Bed or chair positioning (5)                                           |                  |                      |                         |                       |
| Mobility/Ambulation (6)                                                |                  |                      |                         |                       |
| Transferring (7)                                                       |                  |                      |                         |                       |
| Narcotic misuse (8)                                                    |                  |                      |                         |                       |
| Hygiene/self care (9)                                                  |                  |                      |                         |                       |
| Sleep quality (10)                                                     |                  |                      |                         |                       |
| Social life/relationships with friends/family (11)                     |                  |                      |                         |                       |
| Return to work/school (12)                                             |                  |                      |                         |                       |
| Leisure activities (13)                                                |                  |                      |                         |                       |
| Mental health & stress (14)                                            |                  |                      |                         |                       |
| Sexual Function (15)                                                   |                  |                      |                         |                       |
Please enter any other quality of life domains you believe may be affected by painful neuroma:

__________________________________________________________________________

Display This Question:
If What specialty are you currently practicing in Ontario? = Orthopedic Surgery
Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery

Have you ever used surgical management to treat a patient with either of the following conditions?

| Yes, I have used surgical management. (1) | No, I have NOT used surgical management. (2) |
|----------------------------------------|---------------------------------------------|
| Painful neuroma (2)                     |                                             |
| Phantom limb pain (4)                  |                                             |

Display This Question:
If What specialty are you currently practicing in Ontario? = Orthopedic Surgery
Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery

At what point would you consider operative management for the following conditions?

| 1st- or 2nd-line treatment option. (1) | Reserved for 3rd line or last resort treatment (i.e. only once all other options have been exhausted). (2) | I would NOT consider surgical management for this condition. (4) | I do not manage patients with extremity amputations. (5) |
|----------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------|
| Painful Neuroma (1)                    |                                                                                                   |                                                                                     |                                                          |
| Phantom limb pain (2)                  |                                                                                                   |                                                                                     |                                                          |
What are or what would be your indications for surgical management of painful neuroma?

________________________________________________________________

What are or what would be your indications for surgical management of phantom limb pain?

________________________________________________________________

Have you ever referred a patient for surgical management to treat either of the following conditions?

|                      | Yes, I have referred a patient for surgical management. (1) | No, I have NOT referred a patient for surgical management. (2) |
|----------------------|----------------------------------------------------------|-----------------------------------------------------------|
| Painful neuroma (1)  | ○                                                        | ○                                                         |
| Phantom limb pain (2)| ○                                                        | ○                                                         |

Display This Question:
If What specialty are you currently practicing in Ontario? = Physical Medicine and Rehabilitation
At what point would you consider referral for surgical management for the following conditions?

| Condition               | 1st- or 2nd-line treatment option. (1) | Reserved for 3rd line or last resort treatment (i.e. only once all other options have been exhausted). (2) | I would NOT consider referring for surgical management. (7) | I do not manage patients with extremity amputations. (8) |
|-------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------|
| Painful neuroma (1)     |                                        |                                                                                                               |                                                             |                                                          |
| Phantom limb pain (2)   |                                        |                                                                                                               |                                                             |                                                          |

Display This Question:
If What specialty are you currently practicing in Ontario? = Physical Medicine and Rehabilitation

What are or what would be your indications for referral for surgical management of painful neuroma?

Display This Question:
If What specialty are you currently practicing in Ontario? = Physical Medicine and Rehabilitation

What are or what would be your indications for referral for surgical management of phantom limb pain?
How do you **typically** manage patients with extremity amputation **specifically** with regard to their **painful neuromas** and/or their phantom limb pain? *(Please check all that apply.)*

| Treatment                                      | Painful Neuroma (1) | Phantom Limb Pain (2) |
|------------------------------------------------|---------------------|-----------------------|
| NSAIDs (oral or topical)                       | □                   | □                     |
| **Topical compounded agents** (e.g. lidocaine, TCAs, NSAIDs, etc.) | □                   | □                     |
| Local injection therapy with local anaesthetic | □                   | □                     |
| Local injection therapy with corticosteroids   | □                   | □                     |
| Local injection therapy with botulinum toxin   | □                   | □                     |
| N-methyl-D-aspartate (NMDA) receptor antagonists| □                   | □                     |
| Anticonvulsants (e.g. gabapentin, pregabalin)  | □                   | □                     |
| Tricyclic antidepressants                      | □                   | □                     |
| Chemical ablation (e.g. with alcohol or phenol)| □                   | □                     |
| Opioids                                        | □                   | □                     |
| Referral for hypnosis                         | □                   | □                     |
| Referral for guided imagery, visual-kinetic feedback therapy or mirror therapy | □                   | □                     |
| Referral for cognitive behavioural therapy or mindfulness | □                   | □                     |
| Cryotherapy/referral for cryotherapy           | □                   | □                     |
Referral for rehabilitation therapy or exercise (19)
Referral to pain clinic to assume primary management (16)
Referral for surgical management (17)

What specialty are you currently practicing in Ontario? = Orthopedic Surgery
Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery

Perform surgery as the primary surgeon (18)

Display This Question:
If What specialty are you currently practicing in Ontario? = Orthopedic Surgery
Or What specialty are you currently practicing in Ontario? = Plastic and Reconstructive Surgery
Please choose the statement that best reflects your familiarity and/or experience with the following techniques used to manage **painful neuroma** and/or **phantom limb pain**: (Please choose all statements that apply.)

| Technique Description                                                                 | Not aware of this technique (1) | Aware of this technique but have never performed it. (2) | Have used this technique in the past to treat symptomatic neuroma. (3) | Would currently use this technique for the treatment of painful neuroma/phantom limb pain. (4) |
|---------------------------------------------------------------------------------------|---------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Spinal Cord Stimulation (1)                                                          | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Ligation of Nerve endings (2)                                                          | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Neuroma stump resection (9)                                                            | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Neuroma excision & burial of nerve ending in **muscle** (3)                            | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Neuroma excision & burial of nerve ending in **bone** (4)                              | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Neuroma excision & burial nerve ending in **fat** (5)                                  | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Neuroma excision & nerve transfer into an adjacent nerve of any type (7)              | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Capping the nerve ending with nerve, vein, epineurium or synthetic materials (6)       | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
| Coverage of neuroma with a local skin/tissue flap (8)                                  | ☐                               | ☐                                                        | ☐                                                                       | ☐                                                                                           |
## Display This Question:

If *What specialty are you currently practicing in Ontario? = Physical Medicine and Rehabilitation*
Please choose the statement that best reflects your familiarity and/or experience with referral for the following techniques used to manage painful neuroma and/or phantom limb pain:

(Please choose all statements that apply.)

| Technique                                                   | Not aware of this technique. (1) | Aware of this technique but have never referred a patient for it. (2) | Have referred a patient in the past technique in the past to refer this technique. (3) | Would currently refer my patients for this technique. (4) |
|-------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Spinal Cord Stimulation (1)                                 | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Ligation of Nerve endings (2)                               | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Neuroma stump resection (9)                                 | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Neuroma excision & burial of nerve ending in muscle (3)     | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Neuroma excision & burial of nerve ending in bone (4)       | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Neuroma excision & burial nerve ending in fat (5)           | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Neuroma excision & nerve transfer into an adjacent nerve of any type (7) | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Capping the nerve ending with nerve, vein, epineurium or synthetic materials (6) | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
| Coverage of neuroma with a local skin/tissue flap (8)       | [ ]                              | [ ]                                                                 | [ ]                                                                                       | [ ]                                                      |
End of Block: Part 2: Experience with Amputation and/or Painful Neuroma and Phantom Limb Pain

Start of Block: Part 3: Attitudes Toward Targeted Muscle Reinnervation (TMR)

YOU ARE ON THE LAST PAGE!

What is Targetted Muscle Reinnervation?

Targeted muscle reinnervation (TMR) is a surgical technique that involves coapting the distal transected end of a nerve in an amputated residual limb to a redundant motor nerve after extremity amputation. This technique can be performed either at the time of initial amputation or in a delayed fashion (Pet et al. 2014). The technique was originally developed to improve the control of bioprostheses (Hijjawi et al. 2006, Kuiken et al. 2009; Dumanian et al. 2009) but recent data has shown efficacy in managing painful, symptomatic neuromas and phantom limb pain in transected nerve stumps (Pet et al. 2014, Souza et al. 2014, Cheesborough et al. 2014, Kuiken et al. 2017, Dumanian et al. 2018). As we study the usefulness of TMR for the management of symptomatic neuroma and phantom limb pain, it is important to consider barriers to its introduction into surgical practice.

Would you consider incorporating TMR or referral for TMR into your practice for the purpose of managing painful neuroma and/or phantom limb pain?

☐ Yes (1)

☐ No (2)
Please indicate under which conditions you would consider allowing/performing TMR during the same procedure as the amputation for the purpose of managing painful neuroma and/or phantom limb pain:
(Please check all that apply.)

- If it required an additional surgeon (6)
- If it added 30 minutes to the case (whether or not you were the surgeon performing the TMR) (1)
- If it added 1 hour to the case (whether or not you were the surgeon performing the TMR) (2)
- If it added 1.5 hours to the case (whether or not you were the surgeon performing the TMR) (3)

☑️ I would consider allowing TMR in the same procedure as the amputation under any conditions (4)

☒ I would only allow TMR to be performed in a delayed fashion (i.e. not at the time of the amputation surgery). (5)

☒ I would NOT consider allowing TMR in the same procedure as the amputation under any conditions. (8)
What are the barriers you perceive to incorporating TMR into your practice for the purpose of managing painful neuroma and/or phantom limb pain?  
(Please check all that apply.)

- TMR is outside of my scope of practice or clinical skill set (1)
- I do not have a sufficient comfort level with microsurgery (2)
- I do not have enough general knowledge about TMR (3)
- I do not have the support of a plastic surgeon or neurosurgeon to perform the technique (4)
- I feel that there is a lack of evidence that it is effective (5)
- I am concerned TMR would require too much extra time in the operating room (6)
- I am concerned TMR would utilize too many extra resources (including cost, personnel, surgical facilities) (7)
- I do not feel knowledgeable enough about painful neuroma or phantom limb pain to select patients who would benefit from TMR (8)
- I do not feel there is a need for TMR – my current techniques for dealing with painful neuroma are effective (9)
- I do not feel that the demand for TMR is significant enough (10)
- No barriers (11)
- Other (12)

If you indicated "Other," please specify any other barrier you perceive to incorporating TMR into your practice for the purpose of managing symptomatic neuroma/phantom limb pain:

Display This Question:

If What specialty are you currently practicing in Ontario? = Physical Medicine and Rehabilitation
What are the barriers you perceive to incorporating referral for TMR into your practice for the purpose of managing painful neuroma and/or phantom limb pain?
(Please check all that apply.)

- TMR is outside of my institution’s scope of practice. (1)
- I do not feel I have enough general knowledge about TMR. (2)
- I feel that there is a lack of evidence that TMR is effective. (3)
- I am concerned TMR would utilize too many extra resources (including cost, personnel, surgical facilities). (4)
- I do not feel knowledgeable enough about painful neuroma or phantom limb pain to select patients who would benefit from TMR. (8)
- I do not feel there is a need for TMR – my current techniques for dealing with painful neuroma are effective. (5)
- I do not feel that the demand for TMR is significant enough. (9)

☒ No barriers (6)
Other (7)

Display This Question:
If What are the barriers you perceive to incorporating referral for TMR into your practice for the purpose of managing symptomatic neuroma/phantom limb pain? = Other

If you indicated "Other," please specify any other barrier you perceive to incorporating referral for TMR into your practice for the purpose of managing symptomatic neuroma/phantom limb pain:

________________________________________________________________

Please SUBMIT your survey below.

Survey References

Bowen, J. B., Wee, C. E., Kalik, J. & Valerio, I. L. Targeted Muscle Reinnervation to Improve Pain, Prosthetic Tolerance, and Bioprosthesis Outcomes in the Amputee. Adv. Wound Care (2017). doi:10.1089/wound.2016.0717

Campbell, J. N. Neuroma Pain. in Encyclopedia of Pain (eds. Gebhart, G. F. & R.F. Schmidt) (Springer, 2013). doi:10.1007/978-3-642-28753-4_2661

Cheesborough, J. E., Souza, J. M., Dumanian, G. A. & Bueno, R. A. Targeted muscle
reinnervation in the initial management of traumatic upper extremity amputation injury. Hand (2014). doi:10.1007/s11552-014-9602-5

Dumanian, G. A. et al. Targeted Muscle Reinnervation Treats Neuroma and Phantom Pain in Major Limb Amputees. Ann. Surg. (2018). doi:10.1097/SLA.0000000000003088

Dumanian, G. A. et al. Targeted reinnervation for transhumeral amputees: Current surgical technique and update on results. Plast. Reconstr. Surg. (2009). doi:10.1097/PRS.0b013e3181b038c9

Flor, H., Nikolajsen, L. & Jensen, T. S. Phantom limb pain: A case of maladaptive CNS plasticity? Nature Reviews Neuroscience (2006). doi:10.1038/nrn1991

Golan, J. D. & Jacques, L. Nonneoplastic peripheral nerve tumors. Neurosurgery Clinics of North America (2004). doi:10.1016/j.nec.2004.02.001

Hijjawi, J. B. et al. Improved myoelectric prosthesis control accomplished using multiple nerve transfers. Plast. Reconstr. Surg. (2006). doi:10.1097/01.prs.0000242487.62487.fb

Kuiken, T. A., Barlow, A. K., Hargrove, L. J. & Dumanian, G. A. Targeted muscle reinnervation for the upper and lower extremity. Tech. Orthop. (2017). doi:10.1097/BTO.0000000000000194

Kuiken, T. A. et al. Targeted muscle reinnervation for real-time myoelectric control of multifunction artificial arms. JAMA - J. Am. Med. Assoc. (2009). doi:10.1001/jama.2009.116

Souza, J. M. et al. Targeted Muscle Reinnervation: A Novel Approach to Postamputation Neuroma Pain. Clin. Orthop. Relat. Res. (2014). doi:10.1007/s11999-014-3528-7

Vaso, A. et al. Peripheral nervous system origin of phantom limb pain. Pain (2014). doi:10.1016/j.pain.2014.04.018

End of Block: Part 3: Attitudes Toward Targeted Muscle Reinnervation (TMR)