Post-Mastectomy Pain Syndrome

RESULTS OF SCOPING REVIEW AND DEVELOPMENT OF STANDARDIZED ASSESSMENT TOOL

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The aim of this project was to create an evidence-based physiotherapy assessment tool for the diagnosis of Post-Mastectomy Pain Syndrome which could be accessed by clinicians working anywhere.
Where did the idea start?

I’ve treated hundreds of women for breast cancer related complications—a majority with trunk and upper limb impairments or lymphedema.

Participated in webinars, several post-graduate education courses, and projects regarding physiotherapy for breast cancer patients.

I realized that I still understood very little about what I was doing right or wrong for this subset of patients with neuropathic pain post breast cancer treatment.
Background
Clinical Presentation

- Patient has undergone any type of breast surgery or radiation therapy and are presenting with pain in the surgical area lasting more than 3 months.

- Pain may be mild, moderate, or severe

- Pain may radiate to the shoulder, scapula, axilla, or upper arm.

- Can present with or without problems related to shoulder function

- Pain associated with other neurological symptoms (sensory deficits)
Prevalence

- Article published in JAMA 2014: Prospective study of persistent pain after breast surgery: 88% had pain, 15% had moderate to severe pain\(^1\)

- 2014 mail out survey in Norway to patients previously receiving surgery for breast cancer (n=1332, response rate=832, 63%) – 49% of respondents had moderate or severe pain. 115 had symptoms consistent with neuropathic pain (8.6% of total n=1332 or 13.8% of respondents n=832). \(^2\)

- Retrospective chart review: 470 patients receiving breast surgery at single centre in Cincinnati, OH, 2013. The incidence of neuropathic pain was 14.7%\(^3\)
Predictive Factors

Based on Meta-Analysis by Leyson et al. 2017\textsuperscript{4} (over 70 factors were examined)

7 factors were significantly correlated to a high risk of developing chronic pain in breast cancer:

1) BMI > 30
2) Education <12–13 years
3) Lymphedema
4) no- or ex-smoker
5) axillary lymph node dissection
6) chemotherapy
7) radiotherapy

Lymphedema was the strongest risk factor for the development of chronic pain
Causes of PMPS

It was demonstrated and commonly referred to that persistent or neuropathic pain secondary to breast surgery was a consequence of injury to the ICBn. 5
Causes of PMPS

- Longitudinal study including subjective and objective assessment measures and follow-up at 3, 6, and 12 months post-op. Excluded patients with known depression, anxiety, or other chronic pain, including pain in the cancer site prior to surgery. 6
53% had intercostalbrachial neuropathy at 3 month follow-up, 15% were confirmed to have neuropathic pain. Most with painless neuropathy recovered mechanical detection over time but those with pain did not have much improvement in pain or thermal sensation.

People undergoing RT after surgery had less recovery.

These observations are consistent with the established notion that neuropathic pain does not merely arise from nerve section, and even minor nerve damage can be associated with nociceptive nerve dysfunction causing neuropathic pain.
Persistent (chronic); Moderate to severe pain affects 13-15% of patients after breast surgery.

Lymphedema, radiation therapy, younger patients, anxiety or depression, pre-op pain, and acute post-op pain are strong predictors of chronic pain at 3, 6, and 12 months and beyond.

This pain is most likely neuropathic as a result of peripheral nerve injury during surgery. ICBn is implicated but smaller unmyelinated fibers are probably also a culprit for moderate to severe pain.
The aim of this project was to create an evidence-based physiotherapy assessment tool for the diagnosis of Post-Mastectomy Pain Syndrome which could be accessed by clinicians working anywhere.
Scoping Review

RESEARCH ASSISTANTS:
PAULA OSPINA-LOPEZ
MONA AL-ONAZI
Purpose

1. Explore screening methods used to identify patients with PMPS.

2. Explore outcome measures used for the assessment of PMPS.
Inclusion Criteria

- Post-mastectomy pain (neuropathic, chronic, persistent)
- Participants should have pain >=3 months
- Used both objective and subjective outcome measures to assess pain and/or other functional outcomes (i.e. shoulder ROM)
- Types of studies: clinical prospective studies/ Cross sectional studies
- Studies in English, Spanish, Portuguese, and French language only
Exclusion Criteria

- Review articles, commentaries, case reports, and case series
- Wide spread pain chronic pain
- Studies that only reported acute post-surgical pain (<3 months of the surgery)
- Studies that include breast reconstruction pain
- Studies that did not report the pain assessment tool or the assessment was not clear
- If less than 30% of the study population had mastectomy (compared to breast conserving surgery or other Sx)
Records identified through database searching (n = 720)

Total of duplicates removed (n = 329)

Records screened (n = 391)

Records excluded (n = 255)

Full-text articles assessed for eligibility (n = 136)

Full-text articles excluded (n = 117)

Studies included in qualitative synthesis (n = 19)
Included articles were categorized according to study type and reviewed to extract the following information:

1) sample size
2) age,
3) study objectives
4) pain definition
5) PMPS screening
6) Inclusion/exclusion criteria
7) Pain duration
8) Follow-up
9) Pain objective outcomes
10) Pain self-reported outcomes
11) Other objective measures
12) Other self-reported measures
13) validation of outcome measures.

Each article was reviewed by 2 of the reviewers and the data extracted, it was then checked by a 3 reviewed to ensure the data extracted was correct.
How we Define PMPS

- 19 studies analyzed in this review, 15 clearly identified their PMPS screening methods.

- 10 confirmed that pain was neuropathic in origin and 5 articles included patients with any type of persistent pain and did not confirm whether or not pain was neuropathic or otherwise.

- We define PMPS as a neuropathic pain syndrome and the assessment tool is designed to help differentiate this from other types of somatic pain in the area of surgery.

- Defining PMPS as a peripheral nerve syndrome allows us to easily differentiate from other types of MSK pain such as scar tissue adhesions.
### Self-reported outcome measures

<table>
<thead>
<tr>
<th>Test name</th>
<th>Outcomes</th>
<th>Number of studies</th>
<th>Number of items</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief Pain Inventory - Short Form (BPI-sf)</td>
<td>Pain characterizing (Pain intensity, severity and the impact on function)</td>
<td>7</td>
<td>9-item</td>
<td>BPI-sf quantifies the intensity of pain using four 11-point NRS scores that defined current, worst, least, and average pain scores over the preceding 24 h. The BPI also assessed the degree to which pain interferes with 7 daily activities using 11-point NRS scores anchored at 0 “does not interfere” and 10 “interferes completely.”</td>
<td>La Cesa, S., Sommariva, P., Molica, C., Cocchi, G., Crucchi, G., Trunf, A., &amp; Frontino-dei-Maestatto, M. (2002). A longitudinal study of pain intensity and pain interference in fibromyalgia and chronic tension headache. <em>Neuropathology and Applied Neurobiology</em>, 28(1), 1-10.</td>
</tr>
<tr>
<td>Brief Pain Inventory - Long Form (BPI-lf)</td>
<td>Pain characterizing (Pain intensity, severity and the impact on function)</td>
<td>1</td>
<td>17-item</td>
<td>BPI-lf long form includes additional questions on demographics, pain history, aggravating and easing factors, treatment and medication, pain quality, and response to treatment.</td>
<td></td>
</tr>
<tr>
<td>McGill Pain Questionnaire LONG form (MPQ-lf)</td>
<td>Different qualities of the subjective pain experience (measures several dimensions of the patient's pain experience)</td>
<td>1</td>
<td>20 subclasses, each containing 2–6 words, and 1 pain intensity scale consisting of 1 item</td>
<td>The MPQ is composed of 78 words, of which respondents choose those that best describe their experience of pain. Seven words are selected from the following categories: dimension 1 to 10 (pain descriptors), three words, dimensions 11 to 15 (effective components of pain), dimension 16 (evaluation of pain) one word, and dimension 17 to 20 (miscellaneous) one word. Scores are calculated by summing values associated with each word; scores range from 0 (no pain) to 78 (severe pain). Qualitative differences in pain may be reflected in respondent’s word choice.</td>
<td>Melzack, R. “The McGill Pain Questionnaire: major properties and scoring methods.” <em>Pain</em> 1975 (15), 277-299</td>
</tr>
</tbody>
</table>

Tools used for pain:
- BPI-sf = 7
- PCS = 3
- DN4 = 2
- NPSI = 2
- MPQ-sf = 1
- MPQ-lf = 1
- PGIC = 1
Self-reported outcome measures

Other self-reported tools used for Quality of Life and Mental Health Outcomes;

Patient Global Impression of Change (1)
QLQ-C30 (2)
QLQ-BR23 (1)
SF-36 (1)
SF-12 (1)
KPS Scale (1)
Lee Fatigue Scale (1)
Hospital Anxiety and Depression Scale–Anxiety (HADS-A) (4)
State-Trait Anxiety Inventory (STAI) (2)
The Beck Depression Inventory (BDI) (1)
Pitsburg Sleep Quality Index (PSQI) (1)
The Montreal Cognitive Assessment (MoCA) Test (1)
Objective outcomes used

Number of Studies using each method of objective nerve/sensation measurement tool:

Pressure threshold testing = 11
Thermal sensation testing = 7
Pinprick sensation testing = 5
Noxious electrical stimulus threshold = 2
Nerve conduction testing = 1
Other objective outcomes used

- Shoulder or Scapula Range of Motion=5
- Hand Grip Strength=3
- Muscle Trigger Point Evaluation=1*
- Limb Volume=1

*Only PT intervention study included in the scoping review.
Assessment Tool for PTs

SELECTING OUTCOME MEASURES AND PHYSICAL EXAM ELEMENTS
Breast Cancer EDGE Task Force Outcomes: Clinical Measures of Pain

Shana Harrington, PT, PhD, SCS, MTC, Laura Gilchrist, PT, PhD, and Antoinette Sander, PT, DPT, MS
Cancer EDGE Taskforce Outcome Measure Rating Form: Oncology Section – American Physical Therapy Association

- Multi-domain assessment of outcome measures

| ICF Domain | Type of Measure | Languages available | Reliability (test-retest, intra-rater, inter-rater) | Validity (concurrent, criterion-related, predictive) | Reference Values for Interpretation | How is instrument scored | Level of client participation required | Availability and Cost, | Population developed in Validated Population | Instrument properties | Ceiling/floor effects | Sensitivity to change (responsiveness, MCID, MDC) | Equipment required | Time to complete | Effect of training (if applicable) | Computer or Web Based |
|------------|----------------|---------------------|---------------------------------------------------|---------------------------------------------------|----------------------------------|-------------------------|-------------------------------|-------------------|------------------------------------------|-------------------|--------------------------|---------------------------------|-------------------|-----------------------------|-----------------------------|-------------------|--------------------------------|-----------------|
Breast Cancer EDGE Rating Scale

<table>
<thead>
<tr>
<th>Level</th>
<th>Recommendation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Highly Recommend</td>
<td>Highly recommended; the outcome has excellent psychometric properties and clinical utility; the measure has been used in research on individuals with or post breast cancer.</td>
</tr>
<tr>
<td>3</td>
<td>Recommend</td>
<td>Recommended; the outcome measure has good psychometric properties and good clinical utility; no published evidence that the measure has been applied to research on individuals with or post breast cancer.</td>
</tr>
<tr>
<td>2A</td>
<td>Unable to Recommend at this time</td>
<td>Unable to recommend at this time; there is insufficient information to support a recommendation of this outcome measure; the measure has been used in research on individuals with or post breast cancer.</td>
</tr>
<tr>
<td>2B</td>
<td>Unable to Recommend at this time</td>
<td>Unable to recommend at this time; there is insufficient information to support a recommendation of this outcome measure; no published evidence that the measure has been applied to research on individuals with or post breast cancer.</td>
</tr>
<tr>
<td>1</td>
<td>Do not Recommend</td>
<td>Poor psychometrics &amp;/or poor clinical utility (time, equipment, cost, etc.)</td>
</tr>
</tbody>
</table>

Also Considered the practicality and clinical application of the outcome measures.
Selected Outcome Measures

- Brief Pain Inventory (BPI): Initially intended for use in epidemiological studies and clinical trials involving patients with cancer-related pain.

- DN4: Patients with chronic pain associated to a lesion in the nervous system (either peripheral or central)

- Pain Catastrophization Scale: For adolescents and adults dealing with pain as the result of various pathology/disease. The individual does not need to be in pain while completing it.
Quantitative Sensory Testing including stimulus thresholds for thermal, electrical, or pressure are probably not practical in physiotherapy clinical practice. Comparison to opposite side for hypoesthesia to temperature, pressure, or pinprick could be used.

- Based on information from Periera et al. 2017 (Neuropathic Pain After Breast Cancer Treatment: Characterization and Risk Factors)\textsuperscript{7}
  6.4% alldynia to cold, 3.3% alldynia to heat
  97.4% hypoesthesia to touch, 96.4% hypoesthesia to pinprick

- It would make the most sense to include touch and pinprick sensation (which are both included as part of the DN4 exam).
Selected Physical Exam Items

- Range of motion and/or pain with movement.
- Presence of lymphedema
- Scar Tissue adhesions

Physiotherapists will do this anyways to assess for the presence of other differential diagnoses and findings related to PMPS.
Presence of trigger points: based on 1 study, one of the few by PT investigators that met the inc/exl criteria.

After TrP palpation on each muscle, participants were asked: “When I pressed this muscle, did you feel any pain locally and in other distant area (referred pain). Please tell me whether the pain that you felt during digital compression reproduced any clinical pain symptom that you suffered from.” (Fernandez-Lao C. C.-V., et al. (2010))
PMPS Assessment Tool

BETA VERSION CREATED SPRING OF 2020
Focus Group (Summer 2020)

- Testing by AHS Cancer Rehab sites in Spring and Summer 2020 (testing limited due to covid-19 pandemic). Analyzed data and feedback to focus questions.

- Focus group included several professionals of different disciplines in clinical practice and research and a patient representative.

- Collated feedback and made improvements to the assessment tool
Assessment Tool

► For use by PTs within and outside of AHS

► Recommended that clinicians review the user guide prior to using.

► Recommend patients complete Breif Pain Inventory short form and Pain Catastrophization Scale prior to starting this assessment.
Limitations

NOT intended to:

- Provide treatment recommendations. The recommendations we make are based on expert opinion only, as such we have not specifically supported one treatment regimen over another but provide a range of options for the clinician to consider.

- Diagnose shoulder pathologies. This tool only assists clinicians with the assessment of PMPS, by ruling out certain conditions that should be further examined by the clinician.

- Be used for follow-up assessments. This tool was designed to assist the clinician with the screening of PMPS. However, it can be used for follow-up assessments if considered appropriate.
Using the Assessment Tool

- https://survey.albertahealthservices.ca/PMPS

- Paper (hardcopy) version does not exist – in practice consider a substitute to be using DN4 to differentiate neuropathic pain and PCS to determine need for multi-disciplinary pain management team. BPI to assess for follow-up to measure treatment effect.
SUMMARY, ANALYSIS, RECOMMENDATIONS

SUMMARY OF PATIENT HISTORY:
Has pain has persisted for 3 months or more post-surgery: Yes
Was the onset of pain within 1-3 weeks post surgery or radiation therapy: Yes
Type of breast surgery: Breast Conserving Surgery
Breast Surgery details: ALND-axillary lymph node dissection
Has the patient received radiation therapy for breast cancer: Yes
Does the patient have a history of anxiety or depression: 
Is pain located in LCBn distribution on the BPI diagram: Yes
Does the patient have lymphedema in the affected upper quadrant: Unsure
Patient has the following symptoms: Feeling of heaviness in the affected arm, Feeling of firmness/tightness in the affected arm
SUMMARY OF MSK ASSESSMENT
Shoulder ROM: Restricted and/or painful on affected side. Cording is present and restricting movement.
Treat with axillary web syndrome (cording) specific stretching protocol.
Thoracic AROM/ROM: Restricted and/or painful in one or more directions.
Mobilization of scar tissue: Yes
Presence of scar tissue adhesion: No, consider scar massage and scar desensitization.

SUMMARY OF POST-MASTECTOMY PAIN SYNDROME ASSESSMENT
DN4 Score = 5
Trigger point pressure test: Clinically significant difference from contralateral side. Consider treatment of affected muscles using trigger point release techniques: Manual therapy, massage therapy, dry needling or acupuncture, stretching.
Central sensitization: PCS<30. Monitor for symptoms of central sensitization and fear avoidance.
Analysis and Recommendations

ANALYSIS
Based on assessment consider PMPS diagnosis - a peripheral nerve dysfunction.

RECOMMENDATIONS
Physiotherapy treatment for peripheral n. dysfunction. Accupuncture, TENS, Low level laser therapy (uncertain safety), Treat potential areas of entrapment (i.e. upper thoracic spine), stretching, swimming, and relaxation therapies.

Consider notifying the referring physician to discuss neuropathic medications (both oral and topical). If pain along the intercostal brachial nerve (IBCn) distribution then can also consider an IBCn block through anesthesiology or radiology.

Neuropathic pain is often accompanied by other contributing impairments including but not limited to lymphedema, axillary web syndrome (cording), scar tissue adhesion, and other mechanical dysfunctions. These should be addressed by the physiotherapist as indicated to optimize the response to PMPS treatment. For more information about assessing and treating lymphedema and cording please see the user manual for this assessment tool.

Please consider printing this page from your browser as these results will not be available after you continue to the next page.
Survey Completed

That concludes the assessment.

If you have decided that pain management is the primary goal of therapy then you may find the BPI-Sf as a useful tool for checking treatment response after completing a course of therapy.

The BPI-sf does not have an overall score. It can be used to look for changes in each individual question or can be divided into 2 domains.

1) "Worst pain" or the average of the four severity items can be used as measures of pain severity
2) The average of the seven interference items can be used as a measure of pain interference.

A change of 2 or more points is thought to be clinically significant.

If shoulder function or other goals are identified as being the primary concern then other tools (such as DASH) may be better indicators for response to therapy.
Next Steps

- Further refine the assessment tool based on feedback from users and non-identifying data (how many times a question was skipped).

- Assess validity and reliability

- Selected clinics storing assessment data from routine use and follow-ups. Providing us a considerable amount of data to aid in designing controlled trials on PT interventions for PMPS.
Important Resources

- User Guide for electronic tool:

- Alberta referral directory: Search “Rehabilitation Oncology” for Cancer Care Alberta Rehab programs
  https://albertareferraldirectory.ca/PublicSearchController?direct=displaySpecialistSearch#top
Thank You!

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