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Developing Manual Therapy Frameworks for Dedicated Pain Mechanisms

component of multimodal musculoskeletal pain management and may include procedures such as light touch, pressure, thrust joint manipulation, and nonthrust mobilization.^{13,35} Across numerous forms of musculoskeletal disorders, manual therapy interventions have consistently demonstrated similar or superior clinical outcomes^{2,4-6,10,14,16,18,31,37-39,43,45-47,53} and cost-effectiveness^{1,15,26,28,40,51,52,54} versus a variety of comparators. The evidence is conflicting about whether subclassifying individuals into groups most likely to benefit from manual therapy may improve outcomes versus a “one size fits all” treatment approach.^{8,11,20}

The International Association for the Study of Pain (IASP) describes 3 major mechanisms-based pain classifications: nociceptive, nociplastic, and neuropathic pain.²⁴ Different pain phenotypes have been explored within each pain mechanism, in conditions such as post-COVID,¹⁹ cancer,³⁶ multiple sclerosis,²⁷ and osteoarthritis.²¹ A prevailing hypothesis is that categorizing pain into underlying subclassifications such as mechanisms or phenotypes should advance clinical decision making¹⁷ and prognosis,³² and ultimately, may improve patient

- **OBJECTIVE:** To create a consensus-based framework of manual therapy treatment approaches for the major mechanisms-based pain classifications established by the International Association for the Study of Pain (IASP) nociceptive, nociplastic, and neuropathic pain.
- **DESIGN:** The hybridized consensus survey included experts who participated in working groups and a survey of external stakeholders.
- **METHODS:** Eighteen working group members created theoretical treatment frameworks for nociceptive, nociplastic, and neuropathic pain mechanisms. The treatment frameworks were then sent to manual therapists and/or pain experts (stakeholders), who rank ordered the frameworks for each mechanism. The mean/median/mode of the rank ordered results was tabulated, and a single framework was identified for each pain mechanism.
- **RESULTS:** Fifteen theoretical frameworks were created for nociceptive (3), nociplastic (6), and neuropathic (6) pain mechanisms. Ninety-six stakeholders rank ordered the framework options, and 1 framework was identified for each pain mechanism. Four of the 10 framework constructs were consistent across each mechanism, whereas notable differences in recommendations were promoted in the other six.
- **CONCLUSION:** There were notable differences across the recommended frameworks, suggesting endorsement modification of manual therapy approaches based on the individual’s dominant pain mechanism. Understanding dominant pain mechanisms may help clinicians tailor care for precision musculoskeletal medicine. *JOSPT Open* 2023;1(1):48-62. Epub 10 July 2023. doi:10.2519/josptopen.2023.0002
- **KEY WORDS:** manual therapy, neuropathic, nociceptive, nociplastic, pain mechanism, phenotype

Manual therapy interventions (also described as force-based manipulations) refer to the passive application of mechanical force to the outside of the body with therapeutic intent.³⁵ Manual therapy is commonly used in conjunction with other interventions as a

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outcomes.³² There is some evidence to support these assumptions,³ yet overall, the clinical implications of mechanisms-based classifications have not been well studied.

Whereas dominant pain mechanisms have been identified,⁴⁹ manual therapy approaches that are matched to mechanisms-based pain classifications have yet to be constructed or studied. Manual therapy techniques are notably heterogeneous, are used for a range of hypothesized purposes (eg, increase range of motion, improve muscle function, reduce pain, reduce inflammation, increase nerve conduction, reduce central sensitization, etc), and are applied differently across and within professions.^{9,12,29,41} Because of notable variability in manual therapy techniques, one could theoretically tailor treatment options to match the dominant pain mechanism. The objective of this study was to create consensus-based treatment framework recommendations for manual therapy that were unique to each IASP pain mechanism and rank order the candidate recommendations with knowledgeable stakeholders. For each IASP pain mechanism, a final treatment framework was identified based on consensus. Ultimately, once the final treatment frameworks are identified, comparative testing can explore the value of focusing on the recommended treatment for each pain mechanism.

METHODS

Study Design

The study was a hybrid consensus-based survey design that included experts who participated in working groups and a survey of external stakeholders. The study time frame from initiation to completion was September 2022 through March 2023. The Duke University Institutional Review Board approved the study as “empt” (#Pro00111790-INIT-1.0).

Participants

There were 2 levels of participants in the study, *working group members* and *stake-*

holders. Working group members included an international, multidisciplinary group of expert clinician researchers, who specialized in manual therapy, pain management/research, or both. Each working group member worked in 1 of 3 working groups (nociceptive pain, nociplastic pain, or neuropathic pain) tasked with creating several defined treatment frameworks based on their interpretation of optimal manual therapy practice for their dedicated pain mechanism.

Stakeholders were defined as expert clinicians who exhibited high levels of training and experience using manual therapy interventions in clinical practice and/or who are skilled at pain management application or research. Stakeholders were identified by the working group members and were targeted specifically based on their extensive experience in the aforementioned skill sets.

Definitions

The IASP pain mechanisms served as the foundation for this study.

- Nociceptive pain was defined as pain that arises from actual or threatened damage to nonneural tissue and is due to the activation of nociceptors.²¹
- Nociplastic pain was defined as pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain.²⁴
- Neuropathic pain was defined as pain that is caused by a lesion or disease of the somatosensory nervous system.²⁴ Working group members were instructed that many heterogeneous forms and conditions are associated with neuropathic pain, such as painful diabetic polyneuropathies, mononeuropathy and polyneuropathy, painful radiculopathy, and various other conditions including multiple sclerosis.²⁴

Our working definition of manual therapy treatments was characterized as “hands-on” interventions that are theoretically grounded in physiological, biomechanical, or contextual-based mechanisms research, have been shown to influence clinical outcomes through isolated or multimodal methods, and are learned through formalized, advanced training.¹³ The manual therapy techniques could include thrust and non-thrust joint manipulations, nerve-based interventions, and soft tissue mobilizations (eg, massage).^{13,35} We included these procedures due to their stronger representation in mechanisms-based research, which has demonstrated a physiological effect in animal or human models.^{7,8,25,44}

We asked working group members and stakeholders to exclude techniques that address fascia, craniosacral rhythm, or reflexogenic theories. These techniques were excluded because they have poor representation in mechanisms-based research or have a questionable scientific foundation.^{22,23,50}

The manual therapy framework (TABLE 1) was defined as a theoretical framework that outlines distinguishable treatment applications that are used to reduce pain, restore movement and function, and can be modified based on a patients’ signs and symptoms.¹³ Descriptions such as force (eg, heavy, medium, light), speed of application, frequency of application, direction of application, targeted structures (eg, joint, soft-tissue, nerves), type of passive or active-assisted movement (eg, thrust, nonthrust), the intent of the technique (eg, compressing or decompressing the structure), the responsible individual performing the technique (eg, therapist applied or self-applied), or expected patient response (eg, pain reduction, pain increase), were identified as key features of the theoretical treatment framework by consensus. The manual therapy framework was created

TABLE 1
Treatment Framework Components

Label (Domain)	Description
Type of technique	Joint thrust, joint nonthrust, nerve mobilization, soft-tissue mobilization, active-assistive movements, palpation/sensory discrimination
Targeted tissue	The contact area for the hands of the clinician and whether it is at the site of pain or at a regional location
Magnitude of force	Typically described in the literature by newton meters, but for this, we will consider heavy, moderate, or light
Velocity of application	Rapid thrust, light touch, versus dedicated cycles per second
Duration of loading	Single thrust, versus repeated oscillations, versus a static hold, no loading
Frequency of application (repetitions)	Dedicated time of administration of the technique (may be in seconds or minutes, or by repetitions)
Expected dosage (sets)	One-time application, self-administered throughout the day
Direction of application (direction of force)	Into the restriction, at the area of symptoms, at the opposite area of symptoms, etc
Intent of technique	Decrease pain versus improve mobility, compression or decompression, reproduction of symptoms versus symptom-free
Expected patient response	Pain relief, improved range of motion, pain and improved range of motion, improve muscle response (muscle activation)
Applicator of the technique	Clinician administered, self-administered, machine administered
Adjunctive care	Specific exercises, medications, other
Communication with patient	What the patients are told about the technique and why it is being performed
Follow-up techniques	Home exercise program, augmented exercises, education

by selected working group members and cross-checked for face and content validity by 5 clinicians experienced in manual therapy who were not part of the study.

Procedures

Working group members were divided equally into 1 of 3 IASP pain mechanism-working groups: (1) nociceptive, (2) nociplastic, and (3) neuropathic. Working group members self-selected group inclusion based on preference and/or experience; however, there were 2 cases in which group members were asked to populate a different group to have balanced participants. A chair was assigned to each working group and the 3 chairs communicated regularly to homogenize the methods and final framework choices. Working group members were shown an example of a manual therapy framework (TABLE 1) that was used to guide the development of the manual therapy treatment frameworks for each of the dedicated pain mechanism categories.

Working group members were instructed to create the framework based on their beliefs of “best practice” combined with available evidence associated with manual therapy and their respective pain mechanism group. Working group members were told that some overlap of content was expected and that the framework choices could end up having only subtle differences across examples. Each working group was instructed to create up to 6 unique and comprehensive manual therapy treatment frameworks. Further, members were authorized to suggest edits and improvements for each iteration as a component of the methodology. A majority consensus from each working group was required prior to proceeding to the external stakeholder stage of the study.

Working group members provided the names of approximately 5 (or more) identified specialists (stakeholders) who were experts in manual therapy and/or pain research. Stakeholders were targeted for

their expertise; therefore, the research team was less concerned about sample size, as the priority was inclusion of individuals who were “hand-picked” by our working group members for their known expertise in manual therapy and/or pain management.

Stakeholders were e-mailed to solicit their participation in the study. Individual stakeholders read an information statement describing the survey, provided consent to participate, answered a series of demographic questions, and rank ordered the individual frameworks created by the working groups. Each framework was presented in Qualtrics (Qualtrics, Provo, UT), which allowed survey participants to manually rank order each framework option from first to last, representing individual stakeholder preferences for the management of each IASP pain mechanism. Stakeholders had the opportunity to comment in an open text space after each of the 3 pain mechanisms.

Analyses

Working group and stakeholder demographic information were tabulated. Individual treatment frameworks were analyzed for the number of first-place votes and were subsequently assigned a mean rank order value, with lower values reflecting higher percentages of preferred ranks. Median and mode were also reported. Thematic coding of text comments was performed to identify commonly occurring themes in the stakeholders’ comments section. Ten measurable, descriptive aspects of key framework concepts (eg, technique is selected based on unique patient presentations, treatment is modified based on patient response), which were derived by consensus, were evaluated for each selected theoretical framework, and scored as (1) not advocated, (2) advocated, or (3) strongly advocated.

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RESULTS

Working Group Members

The eighteen working group members who created the original treatment frameworks represented 4 different clinical professions (physical therapy, chiropractic, massage therapy, and osteopathy), and were from 9 different countries (Australia, Canada, England, Ireland, Italy, Portugal, Spain, Switzerland, and the United States). The working group members were majority male (N = 11; 61%), had a mean of 25.27 years of patient care or clinical experience (SD = 9.88; median = 26 years), had 15.22 years of research experience (SD = 6.89; median = 15), and had a mean of 78.38 publications dedicated to manual therapy and/or pain (SD = 79.81; median = 65). The nociceptive working group created 3 unique initial frameworks, whereas the nociplastic and neuropathic groups each created 6 unique initial frameworks (APPENDICES A through C).

Stakeholders

One hundred twenty-six e-mails were sent to potential stakeholders. One hundred eight (108) stakeholders agreed to participate in the survey. Of the 108, there were 96 (76.1% of e-mails sent) fully completed surveys by the external stakeholders (TABLE 2). The median amount of time to complete the survey was 29 minutes and 36 seconds. Stakeholders were predominantly physical therapists (76%), mostly male (74%), but also included chiropractors (10.4%), massage therapists (4.2%), osteopaths (3.1%), and “other”—not defined (2.1%). Twenty-six percent of stakeholders reported more than 30 years of clinical experience. Internet protocol (IP) address markers indicated surveys originated from all continents except Antarctica, with the majority completed in North America and Europe. Primary work loca-

TABLE 2
Stakeholders Background (N = 96)

Variable	Mean/Median (SD)/ Frequency/Percentage
Gender	Female = 20 (20.8%) male = 71 (74.0%) nonbinary = 1 (1.0%) missing = 4 (4.2%)
Clinical profession	Physical therapy = 73 (76.0%) Chiropractic = 10 (10.4%) Massage therapy = 4 (4.2%) Osteopathy = 3 (3.1%) Other = 2 (2.1%) Missing = 4 (4.2%)
Years of clinical experience	0 to 5 years = 6 (6.3%) 6 to 10 years = 19 (19.8%) 11 to 20 years = 24 (25.0%) 21 to 30 years = 18 (18.8%) >30 years = 25 (26.0%) Missing = 4 (4.2%)
Primary work setting	Academic = 31 (32.3%) Orthopaedic, clinical setting = 44 (45.8%) Primary research setting = 6 (6.3%) Other = 11 (11.5%) Missing = 4 (4.2%)

tion was split between academic (32.3%) and clinical (45.8%), with several indicating “primarily research” (6.3%) and “other” (11.5%).

Rank Ordering of Frameworks

Three manual therapy treatment frameworks were *ranked ordered* as the top selections, one from each pain mechanism-working group (TABLE 3). For the nociceptive mechanism’s framework, the highest-ranked selection received 46.9% of the first-place votes and an average ranking of 1.6/3 (median 2.0; mode 1.0). There were 37 unique open-text responses to the nociceptive pain mechanism ranking choices. A predominant theme was the reported difficulty in identifying the nuanced differences between the 3 framework choices.

For the nociplastic mechanisms framework, the highest-ranked selection received 36.5% of the first-place votes and

an average ranking of 2.4/6 (median 2.0; mode 1.0). There were 31 unique open-text responses associated with nociplastic pain, with the majority reporting their appreciation of the recommendations of shared decision-making, building a relationship with the patient, and helping them understand their current condition. As with the nociceptive pain mechanism choices, the stakeholders expressed their difficulty in navigating the nuanced differences between the frameworks.

For the neuropathic mechanisms, the highest-ranked selection received 25.0% of the first-place votes and an average ranking of 2.6/6 (median 2.0; mode 2.0). The neuropathic pain mechanism frameworks had 28 unique comments, with a predominant amount reporting the lengthy nature of each of the choices. Several comments highlighted preference for a mechanisms-based description of neuropathic pain versus the diagnostic classification options that were presented.

Three of the 10 framework construct recommendations were consistent across each mechanism (TABLE 4). These included the following: “treatment is modified based on patient response”; “MT is incorporated as part of a biopsychosocial, multimodal approach”; and “MT is promoted as a unique, patient-centered approach to management.” Notable differences in recommendations were promoted in the other 7 framework descriptions. In particular, the support for “Primary goal of treatment is to reduce pain and improve mobility,” “Care is provided concurrently with pain neuroscience education,” and “Techniques are selected based on concepts of space, movement, and blood flow” were different in all 3 pain mechanisms. “Success of application depends on assessment at within- and between-session follow-up” was only advocated for nociceptive pain.

DISCUSSION

This study aimed to identify recommended manual therapy treatment frameworks for the IASP mechanism-based pain classifications: (1) nociceptive, (2) nociplastic, and (3) neuropathic. In our hybrid consensus survey design, a team of 16 international, interdisciplinary experts created unique treatment frameworks for each of the 3 pain mechanisms and external stakeholders rank ordered the frameworks that they believed were most appropriate and representative of each of the 3 IASP mechanism-based pain classifications. The suggested treatment frameworks include some overlapping areas as well as differences in characteristics, which warrant further discussion here and within the community.

Similarities Among Frameworks

All 3 mechanisms frameworks advocate for the importance of selecting a therapeutic manual therapy approach including interventions that are based on each patient's unique presentation, although the nociceptive framework's selection emphasized both patient and clinician preferences. All 3 frameworks recommended modifications based on patient response to treatment and pain levels, including any active progression such as exercise and modifications of manual therapy techniques. Of the three, the nociplastic framework suggested use of pain interference (ie, the extent to which pain leads to participation restrictions) more so than pain intensity when implementing manual therapy techniques. Each framework contends that manual therapy is a recognized feature within a biopsychosocial, multimodal approach and should not be used as a unimodal treatment option.³⁰ Each framework also described the importance of manual therapy as a person-centered approach, tailored to each individual's needs. There is a growing trend toward patient-centered practice in health care internationally,^{33,34} especially

TABLE 3
Highest-Ranked MT Frameworks for Each Pain Mechanism

Pain Mechanism and MT Framework Description
<p>Nociceptive Framework</p> <p>Choice 2 (Mean = 1.68, Median = 2, Mode = 1):</p> <ul style="list-style-type: none"> Nociceptive pain arises from actual or threatened damage to nonneural tissue and is due to the activation of nociceptors. Management of nociceptive dominant pain phenotypes may include the use of MT techniques performed with varying magnitudes of force, intensity, speed, and rates (eg, <i>frequency of oscillation if a mobilization</i>), and with varying doses (repetitions, sets, frequencies) based on a patient's clinical presentation. Dosing adjustments can be made based on the patient's specific clinical presentation, including the patient's severity, irritability, nature, stage, and stability. Manual therapy techniques performed by a licensed practitioner may include passive or active-assisted joint range of motion, soft-tissue mobilization, nerve mobilization, and thrust and nonthrust manipulation techniques. Manual therapy techniques are generally targeted toward specific impairments and known or hypothesized peripheral somatic sources of pain in an attempt to modulate nociceptive input and processing within the peripheral and central nervous systems. The goal of the MT techniques is to reduce pain perception, thus improving patient mobility and function. Further, MT techniques may target locations other than the primary source of pain when, for example, the primary site is too painful, or when impairment at another site is hypothesized to contribute to the primary pain. Treatment is deemed successful if the patient perceives or reports a decrease in pain and/or improvement in function. Patients' tolerance for MT techniques is actively monitored through subjective and objective information gathered within session and at follow-up sessions. Manual therapy should not be performed as a stand-alone intervention but rather as a component of a comprehensive, multimodal, evidence-based physical therapy approach, including personalized education and exercise therapy; tailored toward the patient's needs within the context of a broader patient-centered, biopsychosocial treatment approach. <p>Nociplastic Framework</p> <p>Choice 5 (Mean = 2.4, Median = 2, Mode = 1):</p> <ul style="list-style-type: none"> Agreement between the patient and provider on goals of treatment, choice of interventions, and a strong therapeutic relationship should be emphasized. The specific parameters in terms of targeted tissue (ie, joint biased, soft tissue biased, and nerve biased) and type of technique (ie, thrust vs nonthrust, superficial versus deep, and "sliding" vs "tensioning") are less important and dependent on patient preferences (if present), provider preferences, and patient response. Treatment may be provided at the primary site of pain for which the individual is seeking care, or remotely. Outcome domains targeted by MT include pain, interference with activity, negative mood, fear avoidance, unpleasantness, suffering, and fatigue. The patient should be educated to prioritize improvement in outcome domains other than pain with the explanation that pain is unlikely to improve without notable improvements in the other domains first occurring. The intent of MT and expected patient responses should initially be improvements in outcome domains other than pain. Furthermore, while decreasing pain should not be the initial primary focus, by definition, individuals with a nociplastic pain presentation may experience an increase in pain in response to MT interventions more easily than patients with pain conditions characterized by other primary mechanisms (ie, nociceptive, neuropathic) so treatment response must be monitored and the responses carefully framed to lessen fear and negative emotional responses. Communication with the patient should include education on the definition of nociplastic pain as a maladaptive nervous system response occurring in the absence of tissue damage, to help reconceptualize their experience of pain. The use of MT should be justified as an approach to "desensitizing" the nervous system and not primarily as a means to correct a peripheral impairment, ie, "putting a joint back into place" or "restoring motion." Manual therapy should be combined with exercise, and the dosage for exercise may need to be at a lower intensity than may typically be prescribed for individuals with primarily nociceptive or neuropathic pain phenotypes. Exercise interventions may be directed toward the primary region for which the patient is seeking care, or remotely. <p>Neuropathic Framework</p> <p>Choice 5 (Mean = 2.6, Median = 2, Mode = 2):</p> <ul style="list-style-type: none"> From a neurophysiological perspective, the nervous system, in its response to treatment, requires space, movement and adequate blood flow. Space: For optimal functioning, the nervous system requires adequate space as it encounters various containers, ie, muscles, canals, fascia, etc. It is well established that decreased space around nerves is associated with onset and development of neuropathic pain, ie, foraminal stenosis, carpal tunnel syndrome, etc. Treatment aimed at improving space around the nervous system is a well-established strategy, be it surgical (decompression) or therapeutic. Manual

(Table continues on next page.)

TABLE 3
Highest-Ranked MT Frameworks for Each Pain Mechanism (continued)

Pain Mechanism and MT Framework Description

and exercise strategies aimed at the containers have been shown to provide relief of clinical signs and symptoms associated with neuropathic pain. Examples include cervical lateral glides (cervical radiculopathy), side-lying lumbar flexion (lumbar radiculopathy), and median nerve glides (carpal tunnel syndrome). It can be argued that container treatments should be considered prior to neural mobilization to optimize neural mobility and reduce the chance of contributing to nerve entrapment with neural mobilization in the presence of limited space.

- **Movement:** Neural tissue must allow for all ranges of movement associated with human function. Neural tissue is designed to move. In rehabilitation, a growing body of evidence is showing that decreased neural mobility is associated with neuropathic pain, including mechanosensitivity. It is argued that neural mobilization techniques (sliders and tensioners) are designed to facilitate and normalize neural mobility (among other mechanisms), and with increased mobility, nerve sensitivity and pain are often eased. In acute and subacute conditions, sliders are often used first and, over time, progressed to tensioners. As with all pain science research, pain is not avoided (“if it hurts, don’t do it”), or ignored (“no pain, no gain”), but graded exposure of pain (“tease it”) is used to foster healthy pain behaviors. In lieu of vascular requirements of the nervous system, neurodynamic treatment techniques are not sustained. Pins and needles are common and expected (reperfusion hyperalgesia), but numbness is to clinically be avoided.
- **Blood flow:** Various studies have shown that decrease in blood flow is associated with increased neuropathic pain, whereas conversely, increased circulation and blood flow are associated with decreased neuropathic pain and nerve sensitivity, hence the therapeutic interest in neural mobilization and exercise. Neurodynamic treatment should thus be focused on repeated movement versus sustained movements/stretches.
- Considering emerging research showing the influence of psychosocial factors in neural tissue movement and sensitivity, treatment of neuropathic pain should also consider addressing these. Clinically, this often pertains to high levels of fear avoidance and/or pain catastrophizing.
- Studies have shown neurodynamic tests to decrease range of motion and increase sensitivity (pressure pain threshold) with higher levels of fear avoidance and pain catastrophizing. Therapeutically, it is thus argued that education, especially PNE, may be considered an additional treatment option for neuropathic pain conditions. Studies have shown that PNE not only reduces fear avoidance and pain catastrophizing but also increases neurodynamic test range of motion and increases pressure pain thresholds. It is argued that PNE may be seen as a precursor to neurodynamics and/or MT (container) treatments, especially patients with neuropathic pain presenting with high fear avoidance and pain catastrophizing.

Abbreviations: MT, manual therapy; PNE, pain neuroscience education. Abbreviations: MT, manual therapy; PNE, pain neuroscience education.

within physical therapy,^{6,55} and the treatment frameworks provided by our working groups appear to be consistent with this trend.

Differences Among Frameworks

The treatment frameworks were notably different in several areas. Although the nociplastic framework did recommend monitoring the treatment approach based on patient response, they emphasized that nociplastic pain was less amenable to typical patient monitoring approaches such as within- and between-session changes, including pain intensity changes. Both the highest-ranked neuropathic and nociplastic frameworks recommended a graded application scheme, with less aggressive techniques early in

order to monitor patient response to treatment. Only the nociceptive framework recommended approaches that are more aggressive once the patient’s symptoms are ameliorated. Both the highest-ranked nociplastic and neuropathic frameworks advocated for reconceptualizing one’s pain experience, creating a healing environment for the condition, and reducing fear and catastrophizing. The neuropathic framework provided very detailed recommendations for improving “space” for nerve movement to improve blood flow during the management of nerve-related conditions, which was not advocated for in the other frameworks.

Perhaps the most notable omission is the lack of recommendation for the use of psychologically informed practice ap-

proaches (ie, cognitive behavioral therapy, mindfulness based stress reduction, or pain neuroscience education) in the nociceptive approach. The reasons for this are not known, but we speculate that psychologically informed practice approaches are more often employed as an intervention directed toward pain presentations characterized by a relative dominance of nociplastic and neuropathic pain mechanisms. Furthermore, it does not appear to have been studied outside of implied nociplastic/neuropathic presentations.

Stakeholder Comments

There were numerous stakeholder comments (96 individual open-text comments). Many stakeholders reported difficulty in navigating the frameworks provided including the challenges of nuancing the subtle differences between each framework. In the nociceptive frameworks, stakeholders reported notable overlap between the first and second framework choices but selected the second framework as it more comprehensively reflected the role of ongoing assessment and modification of manual therapy techniques based on patient response. This has been advocated previously in a narrative review describing evidence-based manual therapy.⁴²

In the nociplastic framework, comments endorsed the fifth framework choice due to its focus on therapeutic alliance, less emphasis on the technique used, pain intensity as a guiding measure of success, and justification for its use as a desensitizing approach. This type of management based on grouping patients into pain phenotypes to target specific pain mechanisms has been recommended previously.^{19,33,34} Stakeholders were pessimistic about a predominant approach associated with pain science education for the nociplastic framework and believed the top ranked framework incorporated a multimodal approach.

TABLE 4
Unique and Overlapping Aspects of the MT Treatment Frameworks

	Nociceptive	Nociplastic	Neuropathic
Technique is selected based on unique patient presentations.	Strongly advocated	Advocated	Strongly advocated
Treatment is modified based on patient response.	Strongly advocated	Strongly advocated	Strongly advocated
Primary goal of treatment is to reduce pain and improve mobility.	Strongly advocated	Not advocated	Advocated
Patients' pain intensity levels guide treatment progression.	Strongly advocated	Not advocated	Strongly advocated
Success of application depends on assessment at within- and between-session follow-up.	Strongly advocated	Not advocated	Not advocated
MT is incorporated as part of a biopsychosocial, multimodal approach.	Strongly advocated	Strongly advocated	Strongly advocated
MT is promoted as a unique, patient-centered approach to management.	Strongly advocated	Strongly advocated	Strongly advocated
Care is provided concurrently with pain neuroscience education.	Not advocated	Advocated	Strongly advocated
Techniques are selected based on concepts of space, movement, and blood flow.	Advocated (movement only)	Not advocated	Strongly advocated
Less aggressive techniques are recommended with a graded application scheme.	Not advocated	Strongly advocated	Strongly advocated

Abbreviation: MT, manual therapy.

In the neuropathic framework, stakeholders reported that the choices were daunting as they were more descriptive than the (nociceptive and nociplastic) highest-ranked pain mechanisms but were encouraged by the use of space, movement, and blood flow as guide rails for management methods. Several stakeholders reported a preference for the framework options that provided a mechanisms-based description of neuropathic pain versus the diagnostic classification options.

Strengths and Weaknesses of the Study

The working group members included multiple professions, had a rich history of research and clinical practice, and were able to create very strong frameworks for the stakeholders. The hybrid consensus survey is a strength, as selections of preferred frameworks were built upon the suggestions and edits of many partici-

pants. This approach allows the selection of multiple best practice options for voting and reflects the subtle differences that are evidenced in clinical decision making.

A weakness is that the majority of stakeholders and working group members were male physical therapists. Although priority selections of framework choices were very clear in each group, the addition of more chiropractors, osteopaths, or massage therapists may have yielded different results. There is a risk that the process to identify stakeholders may be biased toward the identification of “like-type” thinkers. It is our hope that the broad inclusion of working group members reduced this risk. Another weakness is that conceptually, we asked the stakeholders to rank order frameworks based on a “dominant” pain mechanism. Many (potentially most) individuals in pain will have mixed pain mechanisms. Although

direct e-mails were sent to stakeholders, our survey software did not restrict respondents who were outside the invited individuals. There is a risk that some responses originated from snowballing (ie, stakeholders forwarding the survey to colleagues). Lastly, our study reflects the rank order selection of frameworks, which were created using “expert opinion.” Additional research is needed before full endorsement of these frameworks should occur.

CONCLUSION, CLINICAL IMPACT, AND NEXT STEPS

Developing a comprehensive understanding of dominant or prevailing pain mechanisms may help clinicians reconcile variability in patient pain experiences and responses to treatment, thus facilitating custom care for precision medicine. Manual therapy involves a heterogeneous series of interventions that differ markedly. In this framework study, we have outlined 3 suggested manual therapy approaches for the dominant pain mechanisms of nociceptive, nociplastic, and neuropathic pain. It is likely that further modification of these frameworks will occur as additional research is published. Further, intentional work is needed to determine if a similar strategy of recognizing a dominant pain type and modifying treatment based on the identified pain type is suitable and meaningful to clinical practice. ■

KEY POINTS

- Key differences were found in manual therapy frameworks for the 3 dominant pain mechanisms groups identified by the International Association for the Study of Pain (IASP).
- Similarities in frameworks included the emphasis on the importance of selecting a therapeutic manual therapy approach including interventions that are based on each patient’s unique presentation.

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- Both the highest-ranked nociceptive and neuropathic frameworks advocated for reconceptualizing one's pain experience, creating a healing environment for the condition, and reducing fear and catastrophizing.

STUDY DETAILS

AUTHOR CONTRIBUTIONS: Drs Cook and Puentedura were involved in the study idea and coordinating the methodological logistics. Drs Cook, Rhon, and Puentedura were involved in the initial draft of the manuscript and the oversight of the working groups. All authors were involved in development of the treatment frameworks (within the working groups), identification of external stakeholders, and review/approval of the final manuscript. Dr Cook was involved in securing funding for the project and tabulating the descriptive analysis for the project.

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APPENDIX A

NOCICEPTIVE FRAMEWORK OPTIONS THAT WERE NOT SELECTED

Choice 1 (Mean = 2.0, Median = 2, Mode = 2; second place):

- For pain presentations attributable, either predominantly or significantly, to nociceptive pain mechanisms, manual therapy involving passive, or active-assisted joint or soft-tissue massage, mobilization and manipulation techniques may be performed by the clinician.
- Manual therapy may be performed according to various therapeutic paradigms, using varying magnitudes and directions of force, intensities, speeds, rhythms, and dosages (repetitions, sets, frequencies).
- Precise treatment parameters and objectives are generally determined by the clinician considering the severity, irritability, and nature of the patient's presentation.
- In this context, manual therapy techniques are generally targeted toward known or hypothesized peripheral somatic sources or causes of pain or dysfunction in an attempt to modulate nociceptive input and processing within the peripheral and central nervous systems in a way that reduces pain perception and ultimately optimizes patients' function and wellbeing.
- Potential contributions from contextual and non-specific therapeutic effects are acknowledged.
- Patients may perceive improvements in pain perception or wellbeing and/or demonstrate improvements in motion or function after the application of manual therapy.
- Responses to manual therapy are variable but are likely to be short-lasting and can include exacerbations of pain and other adverse effects.
- Patients' symptoms and tolerance for manual therapy should be actively monitored during and immediately after their application and at follow-up appointments.
- It is recommended that manual therapy should be used as an adjunctive, rather than stand-alone, intervention as part of a multimodal, biopsychosocial treatment approach tailored toward patients' individual needs and circumstances.
- It is assumed that clinicians perform manual therapy competently and safely, based on appropriate clinical indications, sound clinical reasoning and according to evidence-based practice and guidelines, and with the patients' consent.

Choice 3 (Mean = 2.3, Median = 3, Mode = 3; third place):

- Nociceptive pain is presumed to come about from activation of nociceptors (mechanical [pinch, crush, stretch], thermal [cold/heat], and polymodal).
- For this reason, a specific mechanism of injury or incident can often be identified by the patient.
- Manual therapy should include mobilizations and/or manipulation, with application tailored to the patient based on the clinician's intent and the patient's preference and clinical presentation.
- The goal should be pain modulation and facilitation of quick return to safe movement/activity (tolerated exercise is the greater and eventual end state).
- Patients with greater symptom irritability may receive manual therapy approaches with modified application parameters.
- The target of the intervention is usually at site of symptoms, or adjacent segments that might influence movement impairments at the site of symptoms.
- The overall treatment plan should be developed with exercise as a core part of the treatment, and the manual application/component as a means to facilitate/expedite that priority.
- Reproducing symptoms with manual therapy techniques may be acceptable and appropriate in individuals with lower symptom irritability.
- After application of manual therapy (between sessions and across the spectrum of care), patients should move better (less pain), report a short-term improvement in symptoms, and be able to engage better in appropriate therapeutic exercises.
- Patients should always receive an augmented home exercise program meant to reinforce the exercises conducted under supervision and reinforce the therapeutic focus of the manual application component (eg, mobilization or manipulation) of the intervention.

APPENDIX B

NOCIOPLASTIC FRAMEWORK OPTIONS THAT WERE NOT SELECTED

Choice 1 (Mean = 3.7, Median = 4, Mode = 3; fifth place):

- For nociplastic pain phenotypes, it is important to limit the afferent barrage of painful stimuli by avoiding aggressive or heavy MT techniques, which may sustain or amplify the processes underlying nociplastic pain.
- While transient reproduction of the experience of pain with the implementation of MT techniques might be acceptable (and indeed sometimes called for), it should first be reconceptualized (ie, the pain system has become sensitized) through educating the patient about pain science.
- What patients are told during a manual technique is very important as clinicians should educate patients about its current mechanisms of action (ie, neurophysiological mechanisms) and avoid contradictory messages provided with pain science education.
- A more central approach including not only MT but other adjunctive treatments such as exercise (adapted to this phenotype, ie, dysfunctional exercise-induced hypoalgesia), centrally acting drugs, sleep, and stress management, etc, is recommended.

Choice 2 (Mean = 3.6, Median = 4, Mode = 4; fourth place):

- Prior to implementing MT for nociplastic pain phenotypes, it is important to examine for sensitivity of the nervous system.
- Clinicians should assess the sensitivity of the nervous system and for nociplastic changes such as altered laterality, 2-point discrimination, pressure pain thresholds, and altered brain body maps.
- Any dysfunction noted should be addressed prior to implementing any MT interventions to prepare the patient and ensure they understand 'why' MT is being provided - to prepare them for engagement in exercise or active interventions.
- Complementary interventions, for example, graded motor imagery, education, etc, can be used alongside MT interventions to assist with the reconceptualization of pain (ie, hurt does not equal harm).
- Having the patient involved in treatment decisions is important to ensure buy-in and commitment to improvement.

Choice 3 (Mean = 5.2, Median = 6, Mode = 6; sixth place):

- Patients with nociplastic pain usually provide vastly discrepant reports of symptom causality and severity, therefore it is important to apply a general MT approach and to avoid heavy techniques that might amplify the pain perception.
- While it may be appropriate to apply MT interventions to non-painful areas (ie, regional interdependence) they should also be applied to the areas of reported pain to meet patient expectations.
- In this case, clinicians should consider techniques with low speed and low forces (ie, gentle joint mobilizations), and treatment duration should not exceed 30 minutes to avoid any aggravation of symptoms.

Choice 4 (Mean = 3.2, Median = 3, Mode = 2; third place):

- MT techniques should be framed in light of their neurophysiological and emotional effects, rather than any presumed biomechanical effects.
- Any use of MT should be preceded by a detailed biopsychosocial assessment of the patient.
- As general principles, MT techniques should be global and gentle (low force and low velocity), applied preferentially without pain or discomfort, and aiming to facilitate active movement by the patient.
- When involving touch, they should be applied on areas where touch is comfortable, including away from the most painful/hypersensitive region.
- Neurodynamic techniques, which facilitate nerve movement and vascularization, might help desensitize the nervous system can be applied passively at an initial phase but, preference should be given to sliding techniques performed actively, which can be performed in small amounts (10 to 20 repetitions) by the patient throughout the day.
- Joint mobilization can be applied preferentially in body areas/segments that are less hypersensitive (might include applying the techniques outside the most painful/hypersensitive region).
- Sensory discrimination, using different types of stimuli and actively involving the patient by asking to discriminate between stimuli or the location where the stimuli are applied might contribute to cortical (somatosensory) reorganization.
- Soft tissue mobilization may be used if touch is comfortable for the patient, in particular for its relaxing, emotional, and sensorial effects.
- MT's application should be preceded by PNE and the explanation accompanying its application must be consistent with the definition of nociplastic pain and PNE content.
- In addition to education, the intervention should include exercise, self-management techniques, and sleep management, among other lifestyle modifications.

Choice 6 (Mean = 3.0, Median = 3, Mode = 2; second place):

- A graded, progressive, and integrated approach is paramount for patients presenting with a nociplastic pain phenotype.
- For this phenotype, pain represents a barrier to engagement with life and behavior change and the effective and judicious use of MT can contribute to appropriate symptom modification.
- It can provide a consistent context for the therapeutic intervention, which should include: active listening and validation of the experience of pain, discussions to help the person make sense of their pain (including delivery of some form of pain education), shared decision-making on what strategies can be implemented which will help achieve the goals set.
- Affective touch, through the stimulation of C-tactile fibers can create a pleasant experience, provide a sense of safety and comfort, and therefore facilitate Therapeutic alliance, all of which are necessary for supporting the person to make sense of their pain.
- The discriminatory aspect of touch, through more focused techniques on the areas of pain, can provide a sense of validation, a confirmation that the pain they are experiencing is real.

(Table continues on next page.)

APPENDIX B (CONTINUED)

- And in this safe and comfortable environment of the therapeutic space, they can reconceptualize their pain as safe, and not dangerous.
- The symptom modification effects of MT in all its forms can expose the person to a pain-free movement that was previously considered restricted, painful, and threatening thus helping them to reconceptualize their pain.
- In this phenotype, the more forceful and dynamic MT approaches like thrust techniques may not be well received at the beginning.
- This is also the case for exercise advice.
- Therefore, massage and a mobilization-based approach where the person can experience movement, first passively, and then progress to more active exercise is recommended.

Abbreviations: MT, manual therapy; PNE, pain neuroscience education.

APPENDIX C

NEUROPATHIC FRAMEWORK OPTIONS THAT WERE NOT SELECTED

Choice 1 (Mean = 4.8, Median = 5, Mode = 6; sixth place):

- Neuropathic pain is heterogeneous and consists of many different diagnostic conditions/classification.
- Manual therapy for radiculopathy should either include light to moderate mobilization to the opposite side of the affected region (eg, mobilization to the left side of the neck for right sided radiculopathy) to reduce joint-related pain and encourage movement or traction-based techniques, which cause centralization or reduction of radicular symptoms.
- In addition, nerve gliding exercises may be useful when performed pain free.
- Manual therapy for degenerative cervical myelopathy (DCM) should be limited to light pressure relaxing massage (Swedish Massage) or medium pressure massage with no specific trigger point work of affected tissue and/or traction-based techniques designed to improve posture and symptoms.
- Manual therapy for peripheral neuropathies should focus on moderate mobilization to improve joint mobility in areas in which the nerve crosses the joint (ie, wrist mobilization for carpal tunnel syndrome) and nerve gliding exercise when performed pain free and interventions directed at soft-tissue along the nerve pathway.
- In addition, there may be some value in moderate mobilization or manipulation of the spine proximal to the peripheral neuropathic condition or close to the region for a carry-over effect (regional interdependence).
- Other neuropathic conditions such as diabetic neuropathy, shingles, infectious neuropathy, pain associated with multiple sclerosis, and phantom limb pain from limb loss are less likely to benefit from manual therapy strategies.

Choice 2 (Mean = 4.4, Median = 5, Mode = 5; fifth place):

- Neuropathic conditions arising from spinal radiculopathies respond well to light to moderate mobilization of the symptomatic spinal region and demonstrate a short-term, positive response to spinal manipulation of the thoracic spine.
- Cervical radiculopathy should be treated with manual, mechanical or home-unit traction.
- Lumbar radiculopathy should not be treated with traction but should utilize repeated movements that centralize or reduce peripheral symptoms (repeated extension or repeated flexion).
- Both cervical and lumbar radiculopathy may include peripheral nerve mobilizing exercises when spinal treatments do not eliminate all peripheral symptoms.
- Mobilization of adjacent areas to the spine (shoulder, hip) are not likely to yield clinically important results.
- For degenerative lumbar spinal stenosis (LSS), manual therapy may be beneficial directed at light to moderate mobilizations of the lumbar spine and improving hip and thoracic extension.
- It is important to continually monitor neural function so that declining neural function can be medically addressed expeditiously.
- Peripheral nerve neuropathic conditions may present in a variety of ways from classic symptoms such as numbness/tingling/loss of motor function to diffuse achy sensations or a mixture of these.
- The clinical exam will include neurodynamic tests and should include examination of areas along the symptomatic nerve pathway, which include joints, contractile and non-contractile tissues.
- Treatment will first address impairments along this pathway, which may include joint mobilizations to restore range of motion and/or soft-tissue treatments to restore normal tone, flexibility, and extensibility of those structures.
- Treatment will also likely involve restoring normal neural dynamics with manual and/or patient-directed neural gliding techniques.
- In addition to manual therapy and exercise, education should be included to avoid positions of compression or excessive tension of the sensitized nerve (eg ulnar nerve pain at cubital tunnel should avoid resting elbows on a surface, those with tibial nerve pain should avoid prolonged driving with foot on pedals).

Choice 3 (Mean = 3.0, Median = 3, Mode = 3; third place):

- Nerve-related pain is a heterogeneous condition, arising from a range of different disorders, responding variably to manual therapy and exercise interventions.
- Examples responding favorably include spinal related disorders such as radicular pain associated with radiculopathy as well as peripheral disorders such as carpal tunnel syndrome.
- Those not likely to respond include neuropathic pain associated with radiotherapy, multiple sclerosis, diabetes, and herpes zoster.
- Clinical categorization of nerve-related pain into different conditions and phenotypes, with matched treatment is therefore potentially valuable.
- Broadly speaking, 3 different clinically relevant mechanism-based subtypes can be distinguished: (1) patients with loss of nerve conductivity, (2) patients with neuropathic pain and (3) patients with heightened neural mechanosensitivity.
- Patients with loss of nerve conductivity present with numbness, muscle weakness or reduced/absent reflexes.
- A typical example is a lumbar radiculopathy with a foot drop and a reduction in dermatomal sensation.
- An example of the second category neuropathic pain is a patient with cervical radicular pain who experiences paraesthesia, burning and electric shock-like pain in a neuroanatomically plausible distribution of their arm.
- In the third category, patients with heightened nerve mechanosensitivity have provocation of their symptoms upon an increase in tension or compression of nerves such as during neurodynamic testing.
- Such heightened nerve mechanosensitivity may be accompanied by neuropathic pain, but often is nociceptive in nature (presumably mediated by activation of nervi nervorum).
- An example of nociceptive heightened neural mechanosensitivity is a patient with radiating ulnar-sided forearm pain which they describe as pulling and aching (not typical neuropathic characteristics).
- Symptoms are provoked with neurodynamic tests (eg, upper limb neurodynamic tests and compression over the ulnar nerve) but there is no loss of sensory function and diagnostic tests do not indicate a nerve compromise (eg, MRI, ultrasound, and electrodiagnostic testing).

(Table continues on next page.)

APPENDIX C (CONTINUED)

- Of note, these different subtypes (heightened neural mechanosensitivity, neuropathic pain, loss of function) often co-exist (eg, a patient with lumbar radiculopathy and radicular pain plus/minus heightened nerve mechanosensitivity).
- We currently have most evidence for the effectiveness of manual therapy for patients with heightened nerve mechanosensitivity.
- Pain-free (or non-provoking) light to moderate mobilization of the nerve tissue interface can be applied along the course of the affected nerve.
- Immediate improvement in movement should be noted following treatment, with a positive subjective response expected within 4 sessions.
- An example is the cervical lateral glide technique with a home program of neural slider exercises for patients with nerve-related neck-arm pain with neural mechanosensitivity.
- Home exercise can be performed daily.
- Large amplitude and pain-free (or non-provoking) neural gliding techniques and exercises, that maximize movement while minimizing tension on the affected nerve, are provided in the clinic and also as a home exercise.
- These exercises should be ramped up in frequency as tolerated.
- Do not progress if symptoms increase beyond 24 hours.
- Patients with more profound features of neuropathic pain or loss of nerve conductivity appear less likely to respond to manual therapy neural mobilization techniques or nerve gliding exercise.
- When painful radiculopathy or peripheral compressive neuropathy with loss of nerve conductivity and/or neuropathic is identified, focus should be to mobilize the site of nerve compromise with gentle to moderate manual techniques and exercise that increase the space around the affected nerve (unloading).
- Techniques should not increase neuropathic limb symptoms or further reduce nerve conductivity.
- Oscillating techniques or sustained manual traction can be applied for radiculopathy (evidence for cervical but not lumbar radiculopathy).
- Sustained techniques are used for more severe presentations, while oscillations are used for less severe presentations.
- Oscillating technique duration is approximately 1 minute and repeated 5 times with a slow frequency of 1 Hz.
- For traction techniques, start with a low duration of 30 seconds and increase according to response.
- An example of a mobilization technique would be to use a spine contralateral lateral flexion technique in a maximally decompressed position such as flexion and lateral flexion to the opposite side of symptoms in a patient with painful cervical radiculopathy.
- Monitor improvement through a reduction in limb symptom severity, centralization of limb symptoms or increase in pain free range of motion.
- Always monitor the neurological deficit to assure nerve conductivity does not deteriorate.
- Progressive neurological deficits are an indication for medical referral even if symptoms improve. In addition to manual therapy, consider active rehabilitation (eg, aerobic exercise, functional restoration) and psychosocial aspects which are often more dominant in neuropathic pain.
- Uncontrollable neuropathic pain may also require specific pharmacological treatment (eg, first line neuropathic pain medication).

Choice 4 (Mean = 3.1, Median = 3, Mode = 2; fourth place):

- Manual therapy techniques should be framed in light of their neurophysiological and emotional effects, rather than any presumed biomechanical effects.
- Any use of MT should be preceded by a detailed biopsychosocial assessment of the patient.
- As general principles, MT techniques should be global and gentle (low force and low velocity), applied preferentially without pain or discomfort, and aiming to facilitate active movement by the patient.
- When involving touch, they should be applied on areas where touch is comfortable, including away from the most painful/hypersensitive region.
- Neurodynamic techniques, which facilitate nerve movement and vascularization, might help desensitize the nervous system can be applied passively at an initial phase but, preference should be given to sliding techniques performed actively, which can be performed in small amounts (10 to 20 repetitions) by the patient throughout the day.
- Joint mobilization can be applied preferentially in body areas/segments that are less hypersensitive (might include applying the techniques outside the most painful/hypersensitive region).
- Sensory discrimination, using different types of stimuli and actively involving the patient by asking to discriminate between stimuli or the location where the stimuli are applied might contribute to cortical (somatosensory) reorganization.
- Soft tissue mobilization may be used if touch is comfortable for the patient, in particular for its relaxing, emotional, and sensorial effects.
- Manual therapy's application should be preceded by pain neuroscience education (PNE) and the explanation accompanying its application must be consistent with the definition of nociplastic pain and PNE content.
- In addition to education, the intervention should include exercise, self-management techniques, and sleep management, among other lifestyle modifications.

Choice 6 (Mean = 2.97; Median = 3, Mode = 1; second place):

- Neuropathic pain is caused by a lesion or disease of the somatosensory nervous system.
- Neuropathic pain is notably heterogeneous and consists of many different diagnostic conditions/classification, and a litany of potential neurophysiological mechanisms.
- Neuropathic pain may involve peripheral and/or central mechanisms, and can involve a number of lesions/diseases (ie, vascular, compression, auto-immune, demyelination, or dissection).
- These lesions/diseases can lead to 4 primary changes within the nerve:
 - (1) Changes in transduction: a function of nociceptors that converts noxious stimulation to nociceptive signals.
 - (2) Changes in transmission: a process that sends nociceptive signals along nerve fibers from the site of injury to the central nervous system (CNS).
 - (3) Changes in transformation or plasticity: a mechanism that modulates nociceptive signals at synaptic sites and at the level of the central nervous system through ascending, descending, or regional facilitation and inhibition;

(Table continues on next page.)

APPENDIX C (CONTINUED)

- o and (4) Changes in perception: a key component of the clinical pain experience that integrates cognitive and affective (emotional) responses.
- Neuropathic pain may include sensitization-based presentations (ie, spontaneous, aftersensations, hyperpathia, and referred symptoms) or may be evoked with selected activities or mechanical input (ie, compression, tension).
- To reflect the 4 potential changes associated with neuropathic pain, manual therapy techniques should influence the origins of neuropathic pain directly (ie, nerve gliding exercise, soft tissue/joint mobilization, mechanoreceptor stimulation etc) or indirectly (ie, improve microcirculation, nutritional state, endorphin release, excitation-inhibition imbalance of the spinal cord, surrounding tissue relaxation, etc).
- Each technique should consider whether the nerve has adequate space for optimal health, adequate nutrition and blood flow, and the freedom of movement that is required for normal functioning.
- Techniques should be avoided if they lead to signs and symptoms such as numbness, weakness, allodynia, hyperalgesia, or peripheral referral.
- The following techniques are recommended for management of neuropathic pain.
- Traction/opening-based techniques:
 - o This treatment approach is targeted toward compression-based neuropathic pain conditions.
 - o The intent of the technique is to reduce the structural composition that is contributing to the nerve compression.
 - o The traction should be site-specific, involve just enough force to see symptom alteration (pain relief), may involve static or oscillatory movements, and should be used when signs and symptoms are present.
- Mobilization techniques:
 - o Mobilization approaches, generally to the opposite side of the affected region (eg, mobilization to the left side of the neck for right sided radiculopathy), may provide both pain relief and a reduction of compressive forces to the nerve.
 - o Forces should be dictated by sign or symptom change and is best used if clinician-administered.
- Nerve glides:
 - o Neural mobilization techniques (sliders) are designed to facilitate and normalize neural mobility (among other mechanisms) and with increased mobility, nerve sensitivity and pain is often eased.
 - o Sliding procedures should be performed in pain free positions, without providing tension, with just enough force for the patient to feel the movement, but not experience increased pain.
- Soft-tissue mobilization:
 - o Soft-tissue mobilization methods are used to improve tissue extensibility, improve blood flow and nutrition to the site targeted, and to reduce tension of surrounding tissues.
 - o One method could be Swedish Massage, which involves light to medium pressure without specific trigger point work.
 - o The approach should not further provoke pain during and after the treatment.
- PNE:
 - o PNE may be especially beneficial to address the cognitive and affective (emotional) responses that are common with neuropathic pain disorders.
 - o In addition to education on the mechanisms of the condition, PNE should focus on reduction of fear-avoidance and pain catastrophizing, specifically when implementing movement based programs with the potential of evoked pain (eg, neurodynamic testing and treatment).
- Multimodal, in-clinic interventions, including aerobic exercise and resistance training:
 - o Multimodal exercises are suggested by clinical practice guidelines and may assist in addressing the sensitized nervous system.
- Augmented home exercise programs (HEP):
 - o Augmented HEPs are used to encourage similar targeted movements (ie, decompression, nerve sliders) that are administered in the clinical domain.
 - o Augmented HEPs are performed by the patient, may be active or passive, but always follow the same principles of expected patient response (eg, not further pain provoking, no stimulation of neuropathic signs and symptoms).

Abbreviation: MT, manual therapy.