Patient Safety & Quality Improvement Journal
http://psj.mums.ac.ir
PSQI

# Dry Needling: A Scoping Review of Adverse Outcomes

Brandon Sum,[1], Stephanie Quon[2*]

[1]*Department of Physical Therapy, University of Toronto, Ontario, Canada.*
[2]*Faculty of Medicine, University of British Columbia, Vancouver, Canada.*

**ARTICLEINFO**

***Article type:***
Review Article

***Article History*:**
**Received:** 09 May 2025
**Accepted:** 25 Jun 2025

***Keywords:***
Dry needling, intramuscular stimulation, Musculoskeletal pain, adverse events, complications, patient safety, Physical therapy, Needle injury, Risk reporting, Scoping review

**ABSTRACT**

***Introduction:***
Dry needling (DN) is commonly used in physiotherapy to treat musculoskeletal pain. While some evidence suggests modest short-term relief, the overall efficacy remains inconsistent, and the safety profile is not well established. Adverse events are frequently underreported, and few reviews have systematically examined the range and quality of harm-related evidence. This scoping review aimed to identify and categorize reported adverse outcomes associated with DN and related needling therapies in adults with musculoskeletal conditions. We also evaluated how adverse events are tracked and reported, along with key methodological limitations in the literature.

***Materials and Methods:***
We conducted a comprehensive search of six databases (PubMed, MEDLINE, EMBASE, Scopus, Web of Science, and Google Scholar) for studies published between January 2000 and April 2025. Eligible studies included randomized controlled trials, observational studies, case reports, and systematic reviews reporting adverse events related to DN and intramuscular stimulation (IMS). Data were charted based on adverse event type, severity, and reporting quality.

***Results:***
Of 2,258 records screened, 26 studies met inclusion criteria. Adverse events ranged from minor issues (e.g., bruising, soreness) to serious complications including pneumothorax, deep infection, nerve injury, and spinal hematoma. Minor effects were reported in up to 50% of treatments. Underreporting was widespread, and most studies exhibited significant methodological flaws, such as small sample sizes, inadequate blinding, and publication bias.

***Conclusion:***
DN poses a nontrivial risk of harm. Rigorous safety monitoring, transparent reporting, and stronger study designs are urgently needed to guide responsible clinical use.

► ***Please cite this paper as:***
*Sum B, Quon S. Dry Needling: A Scoping Review of Adverse Outcomes. Journal of Patient Safety and Quality Improvement. 2025; 13(2):139-146. Doi: 10.22038/psj.2025.88117.1471*

***Corresponding author:**
*E-mail: quons@student.ubc.ca*

## *Introduction*

Dry needling (DN) is a technique increasingly used in physiotherapy and rehabilitation to manage musculoskeletal pain. It involves the insertion of fine needles into muscle with the intention of reducing pain and improving function. Although the proposed mechanisms—ranging from mechanical disruption of trigger points to modulation of neural pathways—are frequently cited, they remain poorly understood and largely theoretical.

While dry needling is gaining popularity, the evidence base supporting its clinical utility remains inconsistent. Several systematic reviews and meta-analyses have reported modest short-term pain relief but highlighted substantial heterogeneity and methodological flaws. For example, Sánchez-Infante et al. (1) found that DN performed by physical therapists could reduce pain in the short term, though their findings were limited by variability across studies. Similarly, Gattie et al. (2) reported benefits over sham and no treatment, but the overall quality of evidence was rated very low. An umbrella review by Chys et al. (3) also concluded that DN may reduce short-term pain compared to no treatment, but functional outcomes varied by body region, and long-term data were lacking.

These inconsistencies are compounded by recurring methodological limitations. Many randomized controlled trials evaluating DN suffer from small sample sizes, inadequate blinding, and high or unclear risk of bias (4,5). Blinding is particularly challenging in DN studies, raising concerns about performance and detection bias (5), which may inflate perceived treatment effects.

Equally concerning—but less thoroughly explored—is the safety profile of DN. Although the procedure is often described as low-risk when performed by trained professionals, adverse events are frequently reported and range from minor complications to serious harm. Gattie et al. (6) found that nearly 40% of DN treatments resulted in minor complications such as soreness and bruising, while more serious outcomes like pneumothorax and infection were also documented. Trybulski et al. (7) similarly reported severe adverse events, including nerve palsy, in Polish physiotherapy practice. Alarmingly, adverse outcomes are often underreported or inconsistently tracked, as noted by Malfait et al. (8), contributing to an incomplete understanding of risk.

Despite the prevalence of reviews evaluating the efficacy of DN, few have systematically examined its adverse effects. Most existing studies emphasize short-term pain outcomes without adequately addressing long-term safety, functional impairment, or patient-specific risks (3,8–10). Moreover, there is limited synthesis of how negative outcomes are reported and the overall quality of safety-related evidence.

Given these gaps, this scoping review aims to comprehensively evaluate the reported adverse outcomes of dry needling in adults with musculoskeletal conditions. Specifically, we aim to: (1) identify and categorize the range and severity of adverse events associated with DN, (2) assess how frequently and systematically negative outcomes are reported in the literature, and (3) highlight methodological strengths and limitations of the current safety evidence base. By focusing on adverse effects, this review seeks to inform safer clinical practice, guide future research, and support evidence-based decision-making.

## *Materials and Methods*

This scoping review was conducted in accordance with the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) guidelines. A comprehensive search strategy was developed in collaboration with a medical librarian and applied across six databases: PubMed, MEDLINE, EMBASE, Scopus, Web of Science, and Google Scholar. Search terms included “dry needling,” “myofascial trigger points,” “musculoskeletal pain,” “physical therapy,” “adverse events,” “complications,” “harms,” and “safety.” Boolean operators (AND/OR) were used to combine terms, and filters were applied to limit results to English-language publications within the date range of January 2000 to April 2025.

Eligible sources included peer-reviewed randomized controlled trials (RCTs), observational studies (cohort and case-control), case reports, and existing

systematic reviews that focused on adult populations undergoing dry needling for any musculoskeletal condition. Studies were included if they explicitly reported adverse outcomes or complications related to the intervention, regardless of whether treatment efficacy was also assessed. Exclusion criteria included opinion pieces, conference abstracts, animal studies, and studies involving pediatric populations.

While our primary focus was on dry needling, studies were included if they investigated techniques closely aligned with dry needling, specifically, those involving needle insertion into musculoskeletal structures for therapeutic purposes. We explicitly distinguished and excluded studies where traditional acupuncture styles based on TCM meridian theories were the primary focus, unless safety data were applicable to dry needling practice.

Study selection was carried out by two independent reviewers who screened titles and abstracts to identify potentially relevant records. Full-text articles were then reviewed in detail to determine final inclusion. Discrepancies were resolved through discussion or, when needed, consultation with a third reviewer.

Data were charted using a standardized extraction form that captured the following variables: author, publication year, country, study design, sample size, population characteristics, dry needling techniques used, setting, reported adverse events (type, severity, and frequency), follow-up duration, and sources of funding or potential conflicts of interest. The classification of adverse event severity (minor vs. major) was primarily guided by the terminology and frameworks used in the included studies, and supplemented by authors' interpretation when formal classification criteria were not provided.

In our review, adverse events were generally classified as "minor" if they were transient, self-limited, and did not require medical intervention—examples include localized soreness, bruising, mild bleeding, or transient discomfort following treatment. In contrast, "major" adverse events were those resulting in significant morbidity, prolonged symptoms, the need for urgent medical care or hospitalization, or the risk of long-term disability. These included serious complications such as pneumothorax, deep tissue or systemic infections, nerve injury, and spinal or epidural hematoma. Where the included studies did not specify a classification, we applied these definitions to categorize reported outcomes based on the severity and clinical consequences described.

Given the objective of mapping existing evidence rather than synthesizing effect sizes, no formal risk of bias assessment or grading of evidence (e.g., GRADE) was conducted. Instead, findings were summarized descriptively to identify the range and nature of reported adverse outcomes and to highlight gaps in the literature for future research.

## *Discussion*

The initial search yielded 2258 records, of which 26 studies met the inclusion criteria and were included in the final synthesis. The included literature comprised randomized controlled trials (RCTs), observational studies, case reports, and systematic reviews examining the use of dry needling and intramuscular stimulation (IMS) for musculoskeletal pain. The majority of included studies were small-scale, underpowered, and characterized by considerable variability in treatment protocols, anatomical targets, practitioner training, and control conditions. Follow-up durations were typically short, limiting insight into long-term safety or efficacy.

### *Efficacy Findings*

Evidence on the efficacy of dry needling remains inconclusive and often of low quality. Several studies reported modest short-term reductions in pain following dry needling interventions (2,12), but these effects were inconsistent, and no clinically meaningful improvements in long-term function were demonstrated. Some trials found no significant differences between dry needling and sham treatments (2,12), and improvements in muscle performance were minimal (14). These trends are mirrored in the broader literature, which suggests limited or no superiority of dry needling over placebo or other standard therapies (1,14). IMS, while promoted for neuropathic

pain, demonstrated similarly weak outcomes, with some studies showing no benefit over sham procedures (15). Acupuncture performed as dry needling remains controversial due to inconsistent outcomes, strong placebo effects, and methodological challenges in blinding and standardization (16,17).

### *Adverse Outcomes*

Adverse events associated with needling therapies were frequently reported and ranged in severity. Adverse events such as localized soreness, bruising, bleeding, and increased pain were among the most common and occurred in approximately half of all treatments (7,18). Despite being generally self-limited, these effects were not always trivial and contributed to patient discomfort and dissatisfaction. Large-scale surveys (7,18,19) revealed that minor events such as bleeding, bruising, and pain during or after treatment occurred in up to 70% of cases, underscoring the frequency and variability of these reactions. In a recent prospective observational study of 229,230 patients who received treatments from 13,679 providers, 8.6% of patients reported experiencing adverse effects (20).

Serious complications were also documented across multiple studies and case reports. Pneumothorax emerged as the most commonly reported major adverse event, particularly during thoracic needling (21). Several reports described traumatic pneumothorax requiring emergency intervention (18,20,22–30), and across the 26 sources in Table 1, at least 12 individual cases of pneumothorax were identified, often requiring hospitalization or ICU admission ranging from 2 to 5 days (24-26).

Infections, both localized and systemic, were also noted. Particularly concerning were reports of needle reuse—reported in some training programs—which substantially increased the risk of deep infections that required surgical drainage and hospitalization (34). A systematic review of 202 cases highlighted severe infections, including hepatitis and HIV (23), adding to the gravity of infection risk. Nerve injury represented another significant adverse outcome. Case reports and practitioner surveys detailed instances of neuropathic pain, paresthesia, wrist drop, and nerve palsy following needling treatments (7,35–37), some of which led to long-term functional impairments. Nerve injuries and epidural hematomas were associated with severe consequences such as ICU admissions, surgical intervention, and permanent deficits (36,38–40).

While minor bleeding and hematoma formation were commonly reported, more severe cases were also observed. For instance, acute spinal epidural hematomas have been documented, underscoring the potential for serious adverse events even when complications initially appear minor (38,41). Other reported adverse events included vasovagal syncope, dizziness, nausea, shock, and increased or persistent pain following treatment (7,18,42).

Overall, the frequency of adverse events raises concern. A 2020 study found that adverse events occur in approximately 1 in every 2 treatments (18). Similarly, a survey of physiotherapists found that 8-13% reported experiencing serious complications in their patients (42), pointing to a pattern of risk that is likely underrepresented in the literature.

A review of adverse event data across the 26 sources in Table 1 reveals a consistent pattern of both high-frequency minor events and recurrent, serious complications. Collectively, the compiled reports reveal over 1653 documented cases of harm, with the most commonly recurring serious events being pneumothorax, nerve damage, and epidural hematoma. These data reinforce that while needling is often considered minimally invasive, its complication profile is far from benign and warrants greater attention to safety, reporting, and informed consent.

### *Underreporting of Adverse Events*

A consistent theme across studies was the substantial underreporting of adverse outcomes. Many trials failed to systematically track, define, or disclose harms. This limitation is compounded by the absence of standardized adverse event monitoring systems in clinical settings and the lack of mandatory reporting requirements for non-pharmaceutical interventions (43). Voluntary reporting and

self-selection bias further distort risk estimates, and many studies did not differentiate between adverse events caused by the procedure versus pre-existing conditions.

### *Methodological Limitations*

The overall quality of evidence was very low, with most studies assessed as having high or unclear risk of bias. Frequent methodological limitations included small sample sizes, inadequate blinding, non-standardized protocols, inconsistent outcome reporting, and short follow-up durations (1). Many positive studies disclosed industry funding or practitioner conflicts of interest, raising concerns about publication bias. Moreover, placebo effects were substantial and often poorly controlled, further challenging the interpretation of efficacy data (16).

### *Synthesis*

This scoping review highlights significant gaps and concerns in the current evidence base surrounding DN, particularly regarding safety. While some studies suggest that DN may offer modest short-term pain relief, these effects are inconsistent, often not sustained, and unsupported by meaningful improvements in functional outcomes or muscle performance. These findings echo earlier reviews questioning the clinical utility of DN relative to sham or placebo interventions.

Adverse outcomes, however, were reported across nearly all included studies and ranged from minor to serious complications. Common minor events—such as bruising, soreness, and transient pain—occurred in up to half of all treatments, contributing to patient discomfort and dissatisfaction. More concerning, serious complications, including pneumothorax, deep infections, nerve injuries, and spinal hematoma,s were well documented. Given DN's invasive nature and its expanding use in physiotherapy, the frequency and severity of reported harms warrant close attention. These findings highlight the urgent need for improved practitioner training, informed consent protocols, and the development of standardized clinical safety guidelines. Importantly, the true incidence of adverse outcomes is likely substantially underestimated. Many studies failed to define, monitor, or report adverse events systematically, and there is currently no standardized reporting framework for treatment-related harms in non-pharmaceutical interventions like DN. Unlike drug therapies, which are subject to pharmacovigilance systems, dry needling lacks equivalent oversight, making it difficult to detect safety signals or implement harm-reduction strategies.

Underreporting is further compounded by the clinical pathway of harm detection. Complications such as pneumothorax or infection often present in emergency departments or primary care, not at the site where dry needling was performed. As a result, there is a disconnect between the provider responsible for the procedure and the practitioner documenting or managing the harm, limiting accountability and impeding adverse event tracking. DN may not even be recognized as the causative factor if patients fail to report it or if documentation is absent in referrals.

Legal case records and tribunal decisions, while illuminating, capture only a fraction of real-world harm. Most patients do not pursue formal complaints or lawsuits, especially when injury severity is ambiguous, or when barriers such as cost, stigma, or legal literacy exist. Medico-legal data therefore, represent only the most severe, and most reported, cases, masking a broader spectrum of harm.

A lack of centralized adverse event registries further limits the ability to quantify risk or improve clinical protocols. In contrast to medications and medical devices, no mandatory reporting mechanisms exist for DN, despite its procedural risks. This gap reflects broader regulatory inertia and hinders the ability to ensure patient safety on a systemic level.

Practitioners themselves may be reluctant to report complications, whether due to fear of reputational damage, professional liability, or insufficient training in harm documentation. In jurisdictions where DN is contested or unregulated, professional self-protection may further suppress transparency. Moreover, DN is often

delivered as part of private pay services or wellness packages, bypassing public documentation systems and further limiting integration into formal clinical records.

Equity concerns also arise. Patients from marginalized groups—including those with lower health literacy, language barriers, or distrust of the healthcare system—may be less likely to report harm, and more vulnerable to poor outcomes. This adds an important but overlooked dimension to risk communication, informed consent, and safety surveillance in DN practice.

Indeed, informed consent remains inconsistently implemented and poorly standardized. Many patients may consent without a clear understanding of potential risks—particularly when DN is marketed as "minimally invasive" or "completely safe." Without clear disclosure of both common and serious complications, patients may not be truly informed participants in their care decisions. Finally, most safety surveys rely on self-reported data from physiotherapists, which are inherently subject to social desirability and recall bias. Practitioners may underreport complications, especially if they were unresolved or led to negative outcomes. These biases further obscure the true risk landscape and diminish the reliability of existing safety literature.

Collectively, these challenges reveal a fragmented and incomplete safety profile for dry needling, made worse by structural gaps in regulation, reporting, and research methodology. Methodologically, the current evidence base is weakened by small sample sizes, inadequate blinding, high heterogeneity, and short follow-up durations. Publication bias is another concern, particularly in studies authored or funded by advocates of DN. Moreover, placebo effects—difficult to control in needling trials—may distort perceived efficacy and limit generalizability.

## *Conclusion*

In summary, while dry needling may offer short-term pain relief for some patients, the overall quality of evidence is low and fails to support meaningful long-term benefits. Adverse events, both minor and serious, are frequently reported but poorly documented, raising concerns about the intervention's safety. Given these findings, the use of dry needling should be approached with caution, and future research should prioritize robust safety monitoring, standardized protocols, and transparent reporting to ensure patient safety.

## *References*

1. Sánchez-Infante J, Navarro-Santana MJ, Bravo-Sánchez A, Jiménez-Diaz F, Abián-Vicén J. Is Dry Needling Applied by Physical Therapists Effective for Pain in Musculoskeletal Conditions? A Systematic Review and Meta-Analysis. Phys Ther. 2021 Mar 3;101(3): pzab070.
2. Gattie E, Cleland JA, Snodgrass S. The Effectiveness of Trigger Point Dry Needling for Musculoskeletal Conditions by Physical Therapists: A Systematic Review and Meta-analysis. J Orthop Sports Phys Ther. 2017 Mar; 47(3):133–49.
3. Chys M, De Meulemeester K, De Greef I, Murillo C, Kindt W, Kouzouz Y, et al. Clinical Effectiveness of Dry Needling in Patients with Musculoskeletal Pain—An Umbrella Review. J Clin Med. 2023 Feb 2;12(3):1205.
4. Hu HT, Gao H, Ma RJ, Zhao XF, Tian HF, Li L. Is dry needling effective for low back pain?: A systematic review and PRISMA-compliant meta-analysis. Medicine (Baltimore). 2018 Jun; 97(26): e11225.
5. Braithwaite FA, Walters JL, Li LSK, Moseley GL, Williams MT, McEvoy MP. Effectiveness and adequacy of blinding in the moderation of pain outcomes: Systematic review and meta-analyses of dry needling trials. PeerJ. 2018 Jul 31;6:e5318.
6. Gattie E, Cleland JA, Snodgrass S. A survey of American physical therapists' current practice of dry needling: Practice patterns and adverse events. Musculoskelet Sci Pract. 2020 Dec; 50: 102255.
7. Trybulski R, Kużdżał A, Kiljański M, Gałęziok K, Matuszczyk F, Kawczyński A, et al. Adverse Reactions to Dry Needling Therapy: Insights from Polish Physiotherapy Practice. J Clin Med. 2024 Nov 21;13(23):7032.
8. Malfait I, Gijsbers S, Smeets A, Hanssen B, Pick A, Peers K, et al. Safety of dry needling in stroke patients: a scoping review. Eur J Phys Rehabil Med [Internet]. 2024 Apr [cited 2025 Jun 21]; 60(2). Available from: https:// www.minervamedica.it/index2.php?show=R33Y2024N02A0225
9. Hernández-Secorún M, Abenia-Benedí H, Borrella-Andrés S, Marqués-García I, Lucha-López MO, Herrero P, et al. Effectiveness of Dry Needling in Improving Pain and Function in Comparison with Other Techniques in Patients with Chronic Neck Pain: A Systematic Review and Meta-

Analysis. Rakhshan V, editor. Pain Res Manag. 2023 Aug 23; 2023:1–14.
10. Kużdżał A, Trybulski R, Muracki J, Klich S, Clemente FM, Kawczyński A. Dry Needling in Sports and Sport Recovery: A Systematic Review with an Evidence Gap Map. Sports Med. 2025 Apr;55(4):811–44.
11. Physiopedia. Dry Needling [Internet]. Available from: https://www.physio-pedia.com/Dry_Needling
12. Pérez-Palomares S, Oliván-Blázquez B, Pérez-Palomares A, Gaspar-Calvo E, Pérez-Benito M, López-Lapeña E, et al. Contribution of Dry Needling to Individualized Physical Therapy Treatment of Shoulder Pain: A Randomized Clinical Trial. J Orthop Sports Phys Ther. 2017 Jan; 47(1):11–20.
13. Mansfield CJ, Vanetten L, Willy R, di Stasi S, Magnussen R, Briggs M. The Effects of Needling Therapies on Muscle Force Production: A Systematic Review and Meta-analysis. J Orthop Sports Phys Ther. 2019 Mar;49(3):154–70.
14. Cummings TM, White AR. Needling therapies in the management of myofascial trigger point pain: a systematic review. Arch Phys Med Rehabil. 2001 Jul;82(7):986–92.
15. Solomons L, Lee JJY, Bruce M, White LD, Scott A. Intramuscular stimulation vs sham needling for the treatment of chronic midportion Achilles tendinopathy: A randomized controlled clinical trial. Tsuchiya H, editor. PLOS ONE. 2020 Sep 8;15(9):e0238579.
16. Kaptchuk TJ. Placebo Effects in Acupuncture. Med Acupunct. 2020 Dec 1; 32(6): 352–6.
17. Ernst E, Lee MS, Choi TY. Acupuncture: Does it alleviate pain and are there serious risks? A review of reviews. Pain. 2011 Apr;152(4):755–64.
18. Boyce D, Wempe H, Campbell C, Fuehne S, Zylstra E, Smith G, et al. ADVERSE EVENTS ASSOCIATED WITH THERAPEUTIC DRY NEEDLING. Int J Sports Phys Ther. 2020 Feb;15(1):103–13.
19. Brady S, McEvoy J, Dommerholt J, Doody C. Adverse events following trigger point dry needling: a prospective survey of chartered physiotherapists. J Man Manip Ther. 2014 Aug; 22(3):134–40.
20. Kalichman L, Vulfsons S. Dry Needling in the Management of Musculoskeletal Pain. J Am Board Fam Med. 2010 Sep 1;23(5):640–6.
21. Valdes V. Dry Needling in Physical Therapy Practice: Adverse Events Part 2: Serious Adverse Events. Orthop Pract. 2021;33(2):96–100.
22. Naeem A, Soultan KM, Khan MH, Vemula SL, Sharma S, Naeem M, et al. A Case of Acupuncture Induced Pneumothorax. J Community Hosp Intern Med Perspect. 2024;14(1):98–100.
23. Lao L, Hamilton GR, Fu J, Berman BM. Is acupuncture safe? A systematic review of case reports. Altern Ther Health Med. 2003;9(1):72–83.
24. Public notice under s. 39.3 of the Health Professions Act: Amanda Wong (Updated). 2019.
25. Lisa Kerscher v. Theraphysics Partners of Colorado, Inc. Colo. Dist. Ct., Denver Cnty; 2017.
26. Jamie Del Fierro v. Walker Scott Chiropractic Corp. Cal. Super. Ct., San Diego Cnty; 2015.
27. N.C. Acupuncture Licensing Board v. N.C. Board of Physical Therapy Examiners. N.C. Bus. Ct., Wake Cnty; 2016.
28. Bierman v. Ligman PT. Ohio C.P. Ct., Lucas Cnty; 2017.
29. Stewart J. My patient had a pneumothorax from dry needling. Virginia Regulatory Town Hall [Internet]. 2017 Feb 17; Available from: https://www.townhall.virginia.gov/L/viewcomments.cfm? commentid=57088
30. Knauer J. Pneumothorax from an allied health professional performing dry needling in Virginia. Virginia Regulatory Town Hall. 2017 Feb 17;
31. Jenkins W. Received pneumothorax from dry needling. Virginia Regulatory Town Hall [Internet]. 2017 Feb 13; Available from: https://www.townhall.virginia.gov/L/viewcomments.cfm?commentid=56747
32. National Center for Acupuncture Safety and Integrity. Top 3 Facts You REALLY Need to Know about Dry Needling. 2019.
33. Axon R. Torin Yater-Wallace bounces back from collapsed lung with top run. USA Today. 2013 Dec 14;
34. Kim DC, Glenzer S, Johnson A, Nimityongskul P. Deep Infection Following Dry Needling in a Young Athlete: An Underreported Complication of an Increasingly Prevalent Modality: A Case Report. JBJS Case Connect. 2018;8(3):e73.
35. Sayed D, Grider J, Strand N, Hagedorn JM, Falowski S, Lam CM, et al. The American Society of Pain and Neuroscience (ASPN) Evidence-Based Clinical Guideline of Interventional Treatments for Low Back Pain. J Pain Res. 2022; 15: 3729–832.
36. McManus R, Cleary M. Radial nerve injury following dry needling. BMJ Case Rep. 2018 Jan 26; 2018: bcr2017221302, bcr-2017–221302.
37. WCAT-2012-00233. 2012.
38. Berrigan WA, Whitehair CL, Zorowitz RD. Acute Spinal Epidural Hematoma as a Complication of Dry Needling: A Case Report. PM&R. 2019 Mar;11(3):313–6.
39. Pipatjarasgit v. ProMedica. Ohio C.P. Ct., Lucas Cnty; 2017.
40. Kuykendall E. Complaint to the Maryland Board of Acupuncture. 2012.
41. Lee JH, Lee H, Jo DJ. An acute cervical epidural hematoma as a complication of dry needling. Spine. 2011 Jun;36(13):E891-893.
42. Jenkins LC, Summers SJ, Nasser A, Verhagen

A. Dry needling perceptions and experiences: A survey of Australian physiotherapists. Musculoskelet Sci Pract. 2024 Feb; 69:102895.
43. Valdes V. Dry Needling in Physical Therapy Practice: Adverse Events Part 1: Types and Frequency of Adverse Events. Orthop Pract. 2021;33(1):34–9.