

THE SAFE PRACTICE OF DRY NEEDLING IN ALBERTA

Summary Report

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OVERVIEW

Dry needling is a broad term that refers to a treatment technique that uses solid filament needles to puncture the skin for therapeutic purposes. It includes a range of approaches, such as acupuncture, trigger point dry needling, intramuscular stimulation, or similar treatments used by numerous healthcare professionals. Approaches differ in their rationale, needling techniques, and training requirements. In Alberta, physicians, dentists, surgeons, physiotherapists, occupational therapists, chiropractors, nurses, naturopaths as well as acupuncturists are authorized to practise dry needling.

Background

This report is a summary of a review conducted by the Health Quality Council of Alberta (HQCA) in response to a request by the College of Physical Therapists of Alberta (College) to complete an independent review of adverse outcomes, specifically pneumothorax, resulting from dry needling practices by physiotherapists in Alberta, in order to improve the quality and safety of this practice. While this review was conducted for the College, the HQCA (with permission from the College) is sharing the findings more broadly to inform quality and safety in dry needling practices for all practitioners.

This review identifies clinical practice issues in dry needling related to pneumothorax, which is the most common serious adverse outcome following dry needling. Pneumothorax, a potentially life threatening complication, is an abnormal collection of air in the space between the lung and the chest wall. Pneumothorax can occur during dry needling if a needle enters the lung tissue. Because dry needling is an invasive procedure that penetrates the skin, it is critical that the practitioner has thorough knowledge of surface anatomy, the underlying structures of the thorax including anatomical anomalies, as well as knowledge about the management of adverse events such as pneumothorax.

The term dry needling will be used in this report to refer to treatment using solid filament needles, regardless of the approach or philosophy of care.

Collection of information

Information related to quality and patient safety issues in dry needling was gathered from:

- Databases were searched for published and grey literature related to dry needling.
- Documents related to the safe practice of dry needling including acupuncture, trigger point dry needling or intramuscular stimulation were obtained from websites of key national and international organizations.
- Documents were obtained through recommendations from interviewees or experts in the field. The 2013 textbook, *Trigger Point Dry Needling – An Evidenced and Clinical-Based Approach*, edited by experts in trigger point dry needling, was also reviewed.¹
- Expertise was sought provincially, nationally, and internationally. Semi-structured interviews were conducted with individuals who have expertise in dry needling practice, dry needling education, medical assessment and management of pneumothorax, or health care professional practice regulation. Authors who have published articles related to safety and dry needling were contacted. Physicians who treated patients with pneumothorax following dry needling were also interviewed.

INTRODUCTION TO DRY NEEDLING

Dry needling (DN) includes a range of approaches that differ in their rationale for treatment, needling techniques, and training requirements. However, there is no standardization in terminology used to describe these approaches causing confusion for both practitioners and the public. For example, dry needling can be used either to describe the practice of a healthcare professional using traditional Chinese acupuncture or to describe a healthcare professional using a trigger point approach, which is unrelated to traditional Chinese medicine (TCM). Table 1 outlines some of the common dry needling approaches and terms.

Table 1: Common dry needling approaches

Dry needling approach	Definition/focus and source
Trigger point dry needling	Myofascial trigger point model ¹
Intramuscular manual therapy	American term referring to myofascial trigger point model ²
Gunn intramuscular stimulation (IMS)	Radiculopathy model (University of British Columbia)
Superficial dry needling	A categorization of a needling technique that refers to the target depth of the needle. ¹ Defined as the insertion of needles into the subcutaneous tissues immediately overlying a trigger point. ³
Deep dry needling	A categorization of needling that refers to insertion of needles into the muscle and into the trigger point to elicit a local twitch response. ⁴ Gunn IMS is an example of deep needling technique.
Contemporary medical acupuncture	Neurofunctional model (McMaster University)
Traditional acupuncture <i>OR</i> Classical acupuncture (term used by Acupuncture Foundation of Canada Institute)	Acupuncture is an ancient form of Chinese medicine involving the insertion of solid filiform needles into the skin at specific points on the body to achieve a therapeutic effect. ⁵ <i>AND</i> "Acupuncture is a system of diagnosis and treatment. The diagnosis is based on a comprehensive Chinese theory of energy balance. The treatment involves insertion of small solid needles into precise anatomical sites in the body to produce therapeutic effects". ⁶
Anatomical acupuncture	The approach taken today by western-trained physicians in China and many parts of the western world where one combines knowledge of acupuncture with western-learned anatomy, physiology, and pathophysiology. ⁵
Western medical acupuncture <i>OR</i> Medical acupuncture	Therapeutic modality involving the insertion of fine needles; it is an adaptation of Chinese acupuncture using current knowledge of anatomy, physiology, and pathology and the principles of evidence-based medicine. ⁷ <i>AND</i> A medical discipline having a central core of knowledge embracing the integration of acupuncture from various traditions into contemporary biomedical practice. ⁸

In Alberta, regulations related to dry needling are provided under two separate pieces of legislation. Identified regulated health professions practice dry needling under the Health Professions Act (HPA) through authorization from their respective college.⁹ The Health Professions Act (HPA) allows for overlapping scopes of practice among health professions and therefore, dry needling is not the purview of any one discipline. Health professions authorized to practice dry needling include physicians, dentists, surgeons, physiotherapists, occupational therapists, chiropractors, nurses and naturopaths. Each professional college determines the requisite requirements for their members to be permitted to practice using dry needling techniques and the technique must only be used within the discipline's scope of practice.

Acupuncturists are currently regulated under the Alberta Health Disciplines Act¹⁰. Acupuncturist and registered acupuncturist are protected titles referring to individuals who have studied traditional Chinese medicine or traditional Chinese acupuncture, have successfully completed a national written and practical examination, and are registered with the provincial acupuncture college or licensing body. In Alberta, this licence to practice is granted by the College and Association of Acupuncturists of Alberta. It is possible for practitioners in Alberta to have dual registration as it relates to dry needling, that is, to hold registration with their health professions' college, as well as registration as an acupuncturist with the College and Association of Acupuncturists of Alberta.

FINDINGS

Adverse outcomes related to dry needling

There is much evidence in the literature that identifies acupuncture as a safe treatment when practised by a properly trained practitioner.^{11,12,13,14,15} However, authors agree that acupuncture does carry risks for serious adverse outcomes. The World Health Organization’s (WHO) Guidelines on Basic Training and Safety in Acupuncture published in 1999 noted, “there are, in addition, other risks which may not be foreseen or prevented but for which the acupuncturist must be prepared”.¹⁶

While the literature contains little information on the safety of specific needling techniques, such as trigger point needling or deep dry needling, it is reasonable to expect that the likelihood of adverse outcomes would be similar for any dry needling approach. Brady challenged this assumption by noting that “TrP-DN [trigger point dry needling] differs from acupuncture in the points treated and the method and depth of needle stimulation meaning that results from acupuncture AE [adverse events] studies cannot be extrapolated and applied to TrP-DN”.¹⁷

Since 2001, several European studies have been published demonstrating the nature and incidence of adverse outcomes in acupuncture. The Survey of Adverse Events Following Acupuncture Study (SAFA) by White et al was the first large, prospective study on safety in acupuncture.¹⁸ Physicians and physiotherapists in the United Kingdom who provided acupuncture were recruited to report adverse events over a 21-month period (1998 – 2000). A comparable study, the York Acupuncture Safety Study, by MacPherson et al, was also undertaken in 2001 with acupuncturists in the United Kingdom.¹⁹ Two similar studies were conducted in Germany, one by Melchart et al in 2004²⁰ and another, larger study by Witt et al in 2009.²¹ In 2013, Brady et al completed a prospective study in Ireland on safety specifically related to trigger point dry needling.¹⁷

These studies are summarized below in Table 2.

Table 2: European studies of adverse outcomes in acupuncture and dry needling, 2001-2013

Author	Location of study	Practitioners participating	Source of treatment results
White et al 2001 ¹⁸	Britain	Physicians, physiotherapists	Practitioner
MacPherson et al 2001 ¹⁹	Britain	Acupuncturists	Practitioner
Melchart et al 2004 ²⁰	Germany	Physicians	Practitioner
Witt et al 2009 ²¹	Germany	Physicians	Patient
Brady et al 2013 ¹⁷	Ireland	Physiotherapists	Practitioner

Serious adverse outcomes following acupuncture have been well documented in the literature; however, many have been reported as single case studies.^{22,23,24,25,26,27,28} While these verify that adverse events do occur, they do not identify sufficient range or incidence of events to provide the body of evidence needed to alert practitioners to change their practice. Similarly, the National Health Service (NHS) in the United Kingdom generates Signal reports from its National Reporting and Learning System to notify the organization of risks identified in review of reported incidents.¹ In September 2011, a report was issued, *Risk of Harm from Acupuncture Treatment Including Pneumothorax*, identifying 34 incidents of severe or moderate harm from acupuncture.²⁹ In the reporting period from November 2003 to March 2011, five incidents of pneumothorax were reported to the NHS.²⁹ While these incidents warrant reporting, the NHS reporting system fails to capture the context for these events that would allow identification and implementation of viable system-level recommendations or actions to mitigate these risks. The National Reporting and Learning System attempts to categorize the range of adverse outcomes (i.e., moderate or severe), however there is no denominator indicating the total number of treatments, and thus metrics, such as the rate of adverse outcomes, cannot be determined. Definitions for the categorization of moderate and severe were not provided in the 2011 report however, in the *National Framework for Reporting and Learning from Serious Incidents*, published in 2010, severe harm is defined as a patient safety incident that appears to have resulted in permanent harm to one or more persons receiving NHS-funded care.³⁰

Prospective safety studies in the United Kingdom in 2001 were among the first to capture severity and incidence data related to acupuncture. The SAFA study in the United Kingdom defined an adverse event as “any ill-effect, no matter how small, that is unintended and nontherapeutic”.¹⁸ The scope of this definition allowed events to be captured that might have been expected in the course of treatment, but have no therapeutic effect; for example, a small bruise that develops after an injection. This is a broader definition of adverse events than is recognized in much of the safety literature, where an adverse event relates to unanticipated harm to a patient.³¹ Harm refers to “an impairment of structure or function of the body and/or any deleterious effect arising there from”.³² In using this broader definition, the SAFA study captured a wide range of reported events from mild – where responses may have been transient and in other safety literature would not be captured as adverse – to events that required medical intervention and even hospitalization.¹⁸

While the five European studies identified in Table 2 were specifically designed to capture the incidence of adverse events, each has design limitations and variable reporting formats that limit comparison of results. Witt et al analyzed patient-reported adverse events, while the remaining four authors used practitioner-reported events.²¹ The SAFA study by White et al asked practitioners to report patient-related minor adverse events in eight predefined categories and other significant events on a separate

¹ Patient safety incidents are defined as any unintended or unexpected incident which could have, or did, lead to harm for one or more patients receiving NHS-funded healthcare Source: National Framework for Reporting and Learning from Serious Incidents Requiring Investigation. 2010. Glossary pg. 34

form.¹⁸ Melchart also used predetermined categories, but they were not the same as those used in the SAFA study.²⁰ MacPherson used standardized self-report forms but it is unclear whether participants reported based on predetermined categories.¹⁹ Brady modified the form used in the SAFA study and revised the reporting categories, making them inconsistent with other studies. While the common goal of these studies was to focus on safety, the methodology is variable and therefore any comparison of results must be viewed with caution.¹⁷

With regard to research methodology, the studies did not attempt to verify the reliability or validity of the research tool. Most had a pilot test of usability only. Melchart noted that “the real incidence of minor adverse effects is difficult to assess because of difficulties in establishing a simple discriminative definition”.²⁰ McDowell et al also identified the lack of standardization of terms in reporting negative outcomes in the literature and the limitations this places comparing the research studies.³³ This lack of clarity in definition and the judgment inherent in self-reported responses is a limitation of these studies.

Types of adverse outcomes

Peuker and Grönemeyer compiled the adverse effects resulting from acupuncture identified in the literature and grouped them into five broad categories.³⁴ These categories focused on delayed or missed diagnosis, worsening of condition treated, vasovagal reactions (e.g., fainting), infection, and trauma to tissue or organs. The article identifies traumatic injuries of tissue and organs to include cardiac tamponade and pneumothorax, injuries to the abdominal viscera, injuries to the central nervous system (spinal cord, spinal nerve roots, or peripheral nerves), and injuries related to blood vessels. The authors noted, this list does not reflect the severity or impact to the patient.³⁴ While other literature identifies many of the adverse outcomes, no other literature was found to verify or validate this typology.

Severity of adverse outcomes

White et al categorized risks associated with acupuncture as mild, significant, or serious using the following definitions:^{18,35}

- **Mild:** Short duration, reversible, does not inconvenience the patient.
- **Significant:** Requires medical intervention or interferes with the patient’s activities.
- **Serious:** Requires hospital admission with potential persistent or significant disability or death.

Table 3 identifies the adverse outcomes reported in each of the five prospective studies from Table 2 and the severity using the categorization defined by White et al. Two of the five studies reported serious adverse outcomes and both reported pneumothorax as one of these adverse outcomes.

Table 3: Severity of adverse outcomes reported in five European studies

Prospective study	# of treatments	Minor Adverse Outcome	Significant Adverse Outcome	Serious Adverse Outcome
White et al 2001 ¹⁸	31,822 (treatments)	2135	43	0
MacPherson et al 2001 ¹⁹	34,407 (treatments)	10,920	43	0
Melchart et al 2004 ²⁰	760,000 treatments (97,733 patients)	6,936 (Not categorized)		6 Includes 2 cases of pneumothorax
Witt et al 2009 ²¹	2.2 million treatments (229,230 patients)	19,726 patients	*4,963 patients (Not categorized but included two cases of pneumothorax)	
Brady et al 2013 ¹⁷	7,629 (treatments)	1463	0	0
Total	3,033,858 treatments			4 cases of pneumothorax

**Author cited 4963 patients experienced adverse effects requiring treatment – page 92*

Incidence of adverse outcomes

The nature of acupuncture or dry needling has made it difficult to capture the frequency of adverse outcomes. There are no standard definitions among practitioners to identify an adverse outcome and there is no single reporting mechanism or system to capture event data. From a reporting perspective, self-reports have an inherent reporting bias (over- or under- reporting). In some cases, the adverse outcome may take place after the treatment session so it may not be captured at all unless the practitioner is made aware of the diagnosis and medical intervention.

MacPherson and Hammerschlag report that case studies on adverse outcomes in acupuncture “can appear to exaggerate the risks” as they are reported without reference to a measure of incidence.¹³ The studies undertaken in Europe were the first attempts at quantifying the incidence by using a large sample size and by requiring respondents to report all adverse outcomes that fit the study definition of adverse. This definition included outcomes that were expected but not therapeutic, as well as those that were unexpected.¹⁸ Some of the results of these studies are reported in Table 4.

In the 2009 study, Witt et al attempted to quantify the incidence of adverse outcomes using the framework (frequency convention) of the European Commission (developed to identify the side effects of drugs) by using text categories from ‘very common’ to ‘very rare’.²¹ Pneumothorax was identified in this study as ‘very rare’ which was defined as less than one occurrence in 10,000 treatments.

Table 4: Incidence of reported serious adverse outcomes in five European studies

Prospective study	Serious adverse outcomes	Number of serious outcomes/total number of treatments	Rate per 10,000 treatments	Frequency (Using EU Commission Guidelines)
White et al 2001 ¹⁸	None reported	0/31,822	-	
MacPherson et al 2001 ¹⁹	None reported	0/34,407	-	
Melchart et al 2004 ²⁰	<ul style="list-style-type: none"> ▪ Pneumothorax (2) ▪ Exacerbation of depression (1) ▪ Acute hypertensive crisis (1) ▪ Vasovagal reaction (1) ▪ Acute asthma attack with angina and hypertension (1) 	6/760,000	Serious events = .08	Very rare
			Pneumothorax alone = .03	Very rare
Witt et al 2009 ²¹	4963 patients reported an adverse event requiring treatment but these were not categorized as 'significant' or 'serious' events. Two patients in this group experienced pneumothorax.	2/2,200,000 (only pneumothorax identified)	Pneumothorax alone = .001	Very rare
Brady et al 2013 ¹⁷	None reported	0/7629	-	
Total		4/3,033,858 Pneumothorax	.01	Very rare

Denominator for determining incidence

Focusing on pneumothorax specifically, the probability of a patient developing this condition is present only when needles are placed in the neck or thorax. For this reason, the incidence data reported in the literature would have increased validity if the study results considered only treatments where patients had needles inserted in the neck or thorax as a denominator, rather than counting all acupuncture treatments. By including treatments where the probability of pneumothorax is zero, because needles are not placed near the high-risk areas, the true incidence of this adverse outcome is distorted. This issue is reflected by Cummings in his comment:¹

The most frequent of the serious traumatic adverse effects is pneumothorax, which is estimated (from prospective studies) to occur between 1:200,000 (White 2004) and 1:1,000,000 (Witt et al 2009) treatment sessions. The drawback with these estimates is that they include all acupuncture sessions, and not just those where there has been needling over the thorax.

Clinical presentation of pneumothorax

Pneumothorax is the most common serious adverse outcome following dry needling. Commonly known as collapsed lung, pneumothorax is an abnormal collection of air in the space between the lung and the chest wall. In a small number of cases, the collection of air in this pleural space can increase to the point where the patient develops a *tension* pneumothorax as air continues to build in the pleural space and obstructs venous return to the heart. This is a life-threatening situation requiring immediate medical intervention.³⁶

Individuals, including those without underlying lung disease, can experience pneumothorax spontaneously or as a result of direct trauma to the chest. Common causes are blunt trauma, such as that from a motor vehicle accident, or puncture of the lung from a rib fracture. A solid filament needle entering the lung tissue is also sufficient to cause a pneumothorax.

As a point of reference, pneumothorax is a known complication of bronchoscopy, a medical procedure that involves the insertion of a scope into the lungs to examine the airway for abnormalities. Patients are monitored closely for pneumothorax after the procedure, particularly when the procedure includes lung biopsy. This monitoring can include a chest x-ray or pleural ultrasound to identify a pneumothorax that may have developed. The British Thoracic Society's (BTS) guidelines for radiologically guided lung biopsy reports that "pneumothorax complicates up to 61% of all lung biopsies" and identifies that the risk of pneumothorax is related to the needle passing through the aerated lung.³⁷ The guidelines also state that "delayed pneumothoraces have been reported more than 24 hours after biopsy, despite the absence of pneumothorax on chest radiographs taken four hours after biopsy".³⁷

Clinical presentation of pneumothorax varies depending on the type of pneumothorax and the extent of air in the pleural space. Patients may describe immediate symptoms at the time the pneumothorax starts to develop, or the symptoms may be delayed, as is described in this excerpt: "Young and otherwise healthy patients can tolerate the main physiologic consequences of a decrease in vital capacity and partial pressure of oxygen fairly well, with minimal changes in vital signs and symptoms".³⁶ While shortness of breath is often thought of as the first or only symptom, other symptoms may include

anxiety, cough and chest pain increasing with inspiration. The 2010 BTS guidelines state that the symptoms of chest pain and shortness of breath may be minimal or absent.³⁸

Tension pneumothorax is characterized by more severe symptoms. “Signs and symptoms of tension pneumothorax are usually more impressive than those seen with a simple pneumothorax, and clinical interpretation of these is crucial for diagnosing and treating the condition. Tension pneumothorax is classically characterized by hypotension and hypoxia.”³⁶

Medical management of pneumothorax

If a pneumothorax is suspected, the patient requires urgent medical assessment. Confirmation by chest x-ray is often used to determine the extent of the pneumothorax and to provide a baseline for future monitoring. Medical management is determined by the clinical assessment and may range from conservative management and close monitoring as an outpatient to hospital admission with insertion of a chest tube to remove the air in the pleural space.

Clinical practice issues in dry needling related to pneumothorax

Knowledge of anatomy

Dry needling is an invasive procedure that penetrates the skin, therefore, it is critical that the practitioner has a thorough knowledge of surface anatomy, anatomical anomalies, and the underlying structures. Needling in the thorax has inherent risks specifically related to the proximity of the lungs. Peuker and Grönemeyer note that: “Pneumothorax chiefly occurs when the needles are placed in a parasternal or supraclavicular site; the latter without taking notice that the borders of the pleura and lung are situated well above the clavicles. Acupuncture to the paravertebral, infraclavicular and lateral thoracic regions may also cause pneumothorax.”³⁴

McCutcheon and Yelland describe anomalies associated with the thorax that would warrant caution when needling in this area:¹⁵

There are three areas in the thorax with congenital anomalies of relevance to acupuncture and dry needling regions. Congenital foraminae in the infraspinous fossa of the scapula with diameters up to 2–5 mm have been described in 0.8–5.4% of individuals. Such foramina have also been described in the supraspinous fossa. In 5–8% of individuals, a congenital foramina exists due to incomplete ossification and fusion of the sternal plates which most commonly occur at the level of the fourth intercostal plate. A congenital sternal foramen is usually not able to be palpated due to overlying muscle tendon fibres and connective tissue.

Peuker and Grönemeyer suggest adverse outcomes such as pneumothorax “may be reduced by increased awareness of normal anatomy and anatomical variations”.³⁴ They also suggest that to mitigate this risk, effective training in anatomy be a priority for dry needling educators and regulators. Brady reinforces this perspective on anatomy knowledge: “The risk of pneumothorax is small if proper consideration of practical anatomy and application of needling techniques are employed. Consideration of pleural and lung anatomy is essential and clinicians should remain aware of anatomical landmarks”.¹

Practitioners and educators interviewed verified the inclusion of anatomy of the thorax and anatomical landmarking in dry needling courses. Some identified the value of using anatomy labs particularly to

present high-risk areas and demonstrate the proximity of the needle to underlying structures. It was described as a “powerful way to get people to understand high-risk areas”. Some commented that although the concept of risk and adverse outcomes is presented in education courses, students are not fully comprehending that information. One practitioner noted, “I didn’t realize the gravity of the situation at the time I took the course.”

Needling technique

Both the literature and information gathered from interviews with needling experts presents a range of strategies to mitigate the risks of needling in the thorax. The following example is excerpted from the Irish Society of Chartered Physiotherapists dry needling guidelines:³⁹

Knowledge of pleural lung anatomy is essential for safe dry needling procedure when treating in the thoracic area [...]. Where appropriate, DN[dry needling] should be performed in such a manner as to needle away from the pleura/lung including the apex of the lung, intercostal space and infracostal area to avoid the risk of pleural penetration. Where able, a pincer grip should be utilised, for example, as in the case of the upper trapezius, or needling over bone to protect the lung as in the case of the scapula and ribs when appropriate. It is important to point out that scapula fenestration is possible, though rare, and Chartered Physiotherapists should be aware that anatomical variance can occur. Again the risk of a pneumothorax is very small (very rare) if proper needling techniques are employed.

The Australian Guidelines for Safe Acupuncture and Dry Needling Practice⁴⁰ include similar text to the Irish guidelines on the topic of needling techniques:

The following are useful points which are close to vulnerable structures and so require extra caution and specific training is required.

- GB21 (trapezius), BL 11, LU 1 and any other point in the thorax due to the relative risk of pneumothorax. Needling in this region should be shallow and/or away from lung tissue and/or over bone or cartilage.
- Superiorly the lung field extends 2-3 cm above clavicular line, hence GB 21 being most frequent point associated with pneumothorax – (sufficient minimum training is required to needle this point).³⁹

The 2013 textbook *Trigger Point Dry Needling, An Evidence and Clinical-Based Approach* also describes specific needling techniques and precautions for needling each muscle in the trunk to prevent “penetration of the lung, creating a pneumothorax”.¹ These and other references demonstrate common recognition of the risks of needling in the thorax and that viable strategies exist for the practitioner to mitigate these risks.

Identification and management of pneumothorax following needling

Knowledge of signs and symptoms of pneumothorax

McCutcheon and Yelland describe that “a good working knowledge of the clinical features of pneumothorax is vital to ... health practitioners practicing acupuncture or dry needling in and around the thoracic region”.¹⁵ While practitioners and educators who were interviewed were very familiar with

pneumothorax as an adverse outcome of dry needling, only a few could describe the signs and symptoms beyond shortness of breath. Similarly, only a few mentioned pain as a symptom or the concept of delayed onset of symptoms. One educator who had direct experience with this adverse outcome stated that there is an assumption that dry needling students know how to identify pneumothorax from their professional training, but this is often not the case. It was suggested that more emphasis is needed on recognizing the signs, symptoms, and variability in clinical presentation from that described in a textbook. Another educator felt that dry needling students are being taught the information but they “are not hearing it”.

While pain has been reported in the European studies (Table 3) as an adverse outcome of dry needling, it was most often identified as minor; that is, transient symptoms that do not interfere with the patient’s activities. On occasion, needling can temporarily aggravate the original pain or cause post-treatment soreness.¹ IMS particularly may cause pain related to the local twitch response (or muscle cramp) elicited by the needle inserted into the trigger point. Therefore, it is critical to be able to discern pain related to the needling procedure from pain associated with penetration of the pleura and possible pneumothorax. Pain associated with puncture of the pleura is described as intense, sharp, and radiating into the shoulder and neck and occasionally to the scapula. This is discussed in *Deep dry needling of the shoulder muscles* by C. Bron, J. Franssen and B. Beersma, who note: “insertion of the needle through the chest wall and into the lung can be more painful than dry needling”.⁴¹

Management of adverse outcomes

All of the practitioners interviewed indicated that if a pneumothorax was suspected following needling, the patient would require medical assessment and possibly an x-ray. The timeframe identified to provide that intervention was variable, ranging from having the patient come back to the clinic for assessment by the practitioner, directing the patient to go the emergency department, to calling 911 for an ambulance and transfer to the emergency department. Among those practitioners who indicated they had instructed patients to call back to the clinic if they had concerns or experienced symptoms that had been described to them in the treatment session, the review team did not pursue the strategies that might be provided to the patient or the criteria used to select a particular strategy to manage the patient’s symptoms.

Informed consent

Patients’ informed consent to a treatment that has inherent risk is commonly considered an imperative to safe healthcare. When questioned as to how risks were presented in their informed consent process, practitioners who were interviewed presented a variety of responses. Some indicated that they only present adverse outcomes such as vaso-vagal responses, but not pneumothorax. Others stated they discuss all risks, including pneumothorax. One expert stated that the practitioner has to determine what is material for each patient, however this expert’s practice mentions pneumothorax as a risk of dry needling to all patients. Several practitioners interviewed spoke of the balance involved in describing the risks of the treatment in the process of providing informed consent. While it was recognized that patients must be informed about those risks, it was acknowledged that individual judgment was often used in determining how those risks would be presented. They described a ‘balance’ between potentially frightening the patient in presenting the range of potential risks and providing assurance that the treatment would not cause harm. This same issue is described by White et al in their work to develop consensus about the information that should be presented to patients on risks of acupuncture.⁴² While the article states that what is appropriate information is a matter of judgment, there is a balance

between developing a therapeutic relationship and ensuring that the ethical and legal requirements for informed consent are met.

Education/training for dry needling

Dry needling courses for healthcare professionals are often of shorter duration than the training required for acupuncturists because these courses build on the formal training of each profession. Currently there are no national or international standards for dry needling education/training for healthcare professionals for any dry needling approach. In 2011, the Australian Physiotherapy Council commissioned the Acupuncture Accreditation Standards Project “to develop an accreditation standard to be used to assess whether a program of study, and the education provider that provides the program of study, provide persons who complete the program of study with the knowledge, skills and professional attributes to practice acupuncture”.⁴³ The project concluded that “the level of training and education varied considerably” and that there was “minimal evidence of the efficacy of that training”.⁴³ No similar work has been done in Canada although the Acupuncture Foundation of Canada Institute (AFCI), as of September 2013, increased their training requirements by introducing a new 200- hour core program.⁴⁴

The most recent Irish Guidelines (2012)³⁹ and the Australian Guidelines (2013)⁴⁰ both cite, despite the lack of international standards, that the requirement for any training in dry needling is to develop competency required for safe practice. They do not identify minimum training hours or content.

Although specific education curricula were not reviewed, those interviewed identified that there is insufficient information about the probability of adverse outcomes in the current education programs. In their view, there appears to be more emphasis on the risk of infection, and the information specific to pneumothorax is focused on the prevention of pneumothorax with much less emphasis on recognizing the signs, symptoms, and management of the patient, should it occur.

Maintenance of authorization and continuing competence

Under Alberta’s HPA there is a mandatory requirement for healthcare professionals to participate in continuing competence activities identified by their profession.⁹ Currently, for those who are authorized to practice dry needling, there is no specific continuing competency requirement related to dry needling.

CONCLUSION

This review identified four issues related to dry needling practice in Alberta, that if addressed, would contribute to the improvement of the quality and safety of dry needling.

Information for patients

The information available to patients and the public about potential adverse outcomes of dry needling is highly variable. Examples were gathered of printed materials and online information about dry needling intended for patients and the public. The content of the information varied considerably, with some sources stating that dry needling is safe and virtually without complication, while other materials described a range of possible adverse outcomes, including pneumothorax. Practitioners interviewed also identified variability in the information provided to their patients.

Incomplete or biased information on the outcomes of dry needling limits the patient's ability to make a fully informed decision about treatment. Professional colleges should consider how they can best ensure that practitioners provide complete, unbiased and relevant information about dry needling to patients including the probability and severity of potential adverse outcomes.

Continuing competence requirements for dry needling

Under the HPA, professional colleges must identify continuing competency requirements for the profession. While these requirements are in place for general practice, there are no specific requirements for members to demonstrate continuing competency in specific areas of practice such as dry needling.

Some regulatory colleges in other provinces have put additional steps in place to focus on continuing competency in dry needling. For example, the College of Physiotherapists of Manitoba stipulates that physiotherapists are to continue developing their knowledge and skill in dry needling through education courses and conferences as well as reviewing relevant literature.⁴⁵ Outside of dry needling practice, an example of a professional college that has adopted reporting requirements to ensure currency in an authorized skill is the Alberta College of Pharmacists. Pharmacists are required to declare activities they have undertaken to maintain both their clinical and technical competence for administering injections as part of their annual registration. Furthermore, "pharmacists who are unable to sign the professional declaration because they have not maintained the competence and proficiency or have not administered injections within the past three years must re-qualify for the authorization to administer drugs by injection by completing an accredited training program".⁴⁶ Professional colleges should consider specific requirements to maintain authorization for dry needling, including a process to assess a practitioner's ability to recognize and manage adverse outcomes associated with dry needling.

Safety-related topics in dry needling education

Educators in dry needling who were interviewed noted that safety topics, such as adverse outcomes, were covered in their education courses. They stated that while pneumothorax was identified as an adverse outcome, limited emphasis was placed on identification and medical management of pneumothorax. Professional colleges such as the College of Physical Therapists of Alberta have a practice standard for restricted activities that requires practitioners to have "a plan in place to manage any critical or unexpected events including adverse events associated with restricted activities".⁴⁷ Professional colleges should consider expanding their criteria to assess dry needling education

programs to include specific safety information, such as recognition and management of an adverse outcome and specifically those circumstances when the patient requires medical assessment.

Reporting patient-related serious adverse outcomes

Standardized processes for healthcare professionals practicing dry needling should be in place to report patient-related serious adverse outcomes from dry needling. This would support better collection of data to enable colleges to update standards of practice and share this knowledge for the purpose of safety learning. Since there is currently no process to capture serious adverse outcomes from dry needling in Alberta, or elsewhere, there is an opportunity to develop such a process for the purpose of continuous learning and improvement and ultimately safer care for patients.

APPENDIX

Appendix I: Presentation of pneumothorax

Irish Guidelines

Guidelines for Dry Needling Practice (2012), Irish Society of Chartered Physiotherapists (ISCP), Dublin, Ireland.^{39(p 30)}

Pneumothorax

When needling around the thoracic region patients should be warned of the rare possibility of a pneumothorax as has been outlined in the precautions section under anatomical considerations. The symptoms and signs of a pneumothorax may include:

1. Shortness of breath on exertion
2. Chest pain
3. Dry cough
4. Decreased breath sounds on auscultation

These symptoms may not occur until several hours after the treatment and patients need to be cautioned of this specially if they are going to be exposed to exercise and marked alterations in altitude such as flying or scuba diving. If a pneumothorax is suspected then the patient must be sent urgently to the nearest accident and emergency department (A+E).

Australian Guidelines

Guidelines for Safe Acupuncture and Dry Needling Practice (2013), Australian Society of Acupuncture Physiotherapists.^{40(p 18)}

Pneumothorax

When needling around the thoracic region patients should be warned of the rare possibility of a pneumothorax. Care should be taken when needling GB 21 (upper trapezius) and any other points over the thoracic region which could inadvertently create a pneumothorax. Where possible angle the needle away from the underlying lungs and/or needle over bone or cartilaginous tissue. Practitioners must have attended adequate training programs to needle in the thoracic region. The symptoms and signs of a pneumothorax may include shortness of breath on exertion, chest pain, dry cough, and decreased breath sounds on auscultation. Such symptoms will commonly occur when the patient is walking away from the clinic. These symptoms may not occur until several hours after the treatment and patients need to be cautioned of this especially if they are going to be exposed to marked alterations in altitude such as flying or scuba diving. If a pneumothorax is suspected then the patient must be sent urgently for an x-ray and medical management.

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