

Unlocking the Healing Potential: Exploring Risk and Safety in Manual Manipulation Including Tui Na Practices

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ABSTRACT: Manual manipulative practices (MMPs), such as chiropractic spinal manipulation, osteopathic treatment, and Tui Na massage, are famous for improving musculoskeletal function but carry risks ranging from minor to severe side effects. Chiropractic therapy generally has minimal adverse effects, while Tui Na is less commonly used. A literature review on patient safety in MMPs involves evaluating studies, synthesizing findings, and identifying themes. While spinal manipulation can be beneficial, it may cause side effects like muscle soreness and headache and, in rare cases, severe complications like stroke. Reporting of adverse events has improved but still does not meet guidelines. Strategies to minimize risks include informed consent, thorough patient history, and adherence to clinical guidelines. These practices can enhance patient care and public health when applied with safety considerations.

Keywords: Safety, Manual Manipulative, Risk Manual Manipulation, Tui Na.



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INTRODUCTION

Manual manipulative practices (MMPs) involve the application of physical force to the body to improve musculoskeletal function and alleviate pain. Common MMPs include chiropractic spinal manipulation therapy (SMT), osteopathic manipulative treatment (OMT), physical therapy mobilizations, and Tui Na massage. Tui Na, a traditional Chinese manual therapy, has gained international recognition for its therapeutic benefits in managing musculoskeletal pain and promoting well-being. However, despite the growing popularity of these techniques, MMPs carry inherent risks, ranging from minor (e.g., muscle soreness and stiffness) to severe adverse events (e.g., neurological deficits, stroke). Common MMPs include chiropractic spinal manipulation therapy (SMT), osteopathic manipulative treatment (OMT), physical therapy mobilizations, and Tui Na massage. Tui Na massage, a traditional Chinese manual therapy, has gained popularity worldwide for its therapeutic benefits in alleviating musculoskeletal pain and promoting overall well-being. However, like any manual manipulative therapy, inherent risks must be carefully assessed and managed to ensure patient safety. Adverse events in MMPs can range from minor

(e.g., muscle soreness, stiffness) to severe (e.g., neurological deficits, stroke). The following studies provide insight into the safety profile of MMPs. Adverse side effects from chiropractic therapy are uncommon, with minor and temporary side effects like stiffness or pain being the most typical. Although less common, serious side effects such as stroke or nerve damage underscored the importance of a comprehensive patient assessment before therapy. The present investigation, which looked back at a sizable dataset from integrated chiropractic clinics in Hong Kong, discovered a low frequency of serious adverse events (AEs) associated with Spinal Manipulative therapy (SMT) with an incidence of 0.21 per 100,000 SMT sessions (Rothwell et al., n.d.; Senstad et al., n.d.). No known adverse events (AEs) were fatal or life-threatening. To find independent predictors of severe AEs, the sample size of 39 AEs from 960,140 SMT sessions in 54,846 patients was inadequate. Further study on this subject must be conducted through practice-based research (Chu et al., 2023).

Serious adverse events (SAEs) can occur with manual manipulation, including methods such as cervical spine manual treatment and spinal manipulative therapy (SMT). The incidence estimates of these adverse events range from 1 in 20,000 to 1 in 250,000,000 manipulations, and they can include neurovascular insults such as headache, stroke, and vertebral artery dissection. The chance of adverse outcomes can be increased by risk factors such as atherosclerosis, even though the risk of significant complications or mortality after neck manipulation is relatively low—about 0.0001%. Clinicians must use caution, consider each patient's unique needs, and get informed permission about the possible dangers of manually manipulating the spin. (Whedon, Mackenzie, et al., 2022). Both advantages and disadvantages might arise from getting a Tui Na massage. Although studies have demonstrated that Tui Na massage can help children who struggle with feeding, there are some hazards involved with this treatment. According to one study, a patient with ankylosing spondylitis who had a Tui Na massage during an acute flare-up had disastrous outcomes. Furthermore, even though Tui Na is often used in China to treat knee osteoarthritis, there is a dearth of high-quality scientific evidence to support its efficacy and safety, which raises concerns. Therefore, weighing Tui Na massage's possible dangers and advantages, especially in certain medical situations, is crucial to guarantee safe and suitable therapy. (Gunawan, 2023b; Maulana et al., 2022).

Manual manipulation therapies offer valuable benefits for individuals suffering from musculoskeletal pain and dysfunction. However, these therapies carry inherent risks that must be carefully assessed and managed. By considering patient characteristics, practitioner expertise, and treatment-related variables, practitioners can minimize the likelihood of adverse events and provide safe, effective care. Continued research and education in this field are crucial for advancing our understanding of risk assessment and risk factors in manual manipulation therapies. Previous studies provide insight into the safety profiles of these therapies. For instance, adverse events from chiropractic therapy are uncommon, with minor and temporary side effects, such as stiffness or pain, being the most typical. However, severe side effects, though rare, such as stroke or nerve damage, underscore the importance of comprehensive patient assessments before administering therapy. A retrospective analysis of chiropractic clinics in Hong Kong reported a low incidence of serious adverse events (AEs) associated with spinal manipulative therapy (SMT), estimating 0.21 AEs per 100,000 sessions. However, due to a limited dataset of 39 AEs across 960,140 SMT sessions in 54,846 patients, further research is necessary to identify independent predictors of

severe AEs.

Serious adverse events (SAEs), including neurovascular complications like vertebral artery dissection, are possible during cervical spinal manipulations. Estimates of SAEs vary widely, from 1 in 20,000 to 1 in 250,000,000 manipulations. Although the overall risk of severe complications is low (approximately 0.0001%), clinicians must carefully assess patient risk factors, such as atherosclerosis, and obtain informed consent.

Despite its benefits, Tui Na massage also presents risks. A case study revealed an adverse outcome in a patient with ankylosing spondylitis who received Tui Na during an acute flare-up. Additionally, while Tui Na is commonly used to treat knee osteoarthritis in China, there is a lack of high-quality evidence to confirm its efficacy and safety, raising concerns about its broader application in specific medical conditions. (Gunawan, 2023a; K. Liu et al., 2023).

METHOD

This study employs a comprehensive literature review to evaluate the safety of manual manipulative practices (MMPs), including chiropractic spinal manipulation therapy (SMT), osteopathic manipulative treatment (OMT), and Tui Na massage. The methodology follows a systematic approach to ensure transparency and rigor, using tools like PRISMA and CONSORT guidelines for quality assessment. To reach the Research Objectives, as stated before, we need more specific (Inclusion Criteria:

- a) Studies published in peer-reviewed journals.
- b) Research focusing on patient safety outcomes and adverse events in MMPs (SMT et al.).
- c) Randomized controlled trials (RCTs), observational studies, and systematic reviews.
- d) Studies including adult and pediatric populations,
- e) Studies published in English or translated into English.

Moreover, Exclusion Criteria a) Studies lacking data on patient safety or adverse events.

- a) Non-peer-reviewed articles, case reports, and editorials.
- b) Studies focusing on non-manipulative therapies or interventions unrelated to MMPs.
- c) Studies with incomplete or unclear data.

Search Strategy: A systematic search was conducted across major academic databases, including PubMed, Google Scholar, and Cochrane Library. The search strategy involved developing a comprehensive list of keywords related to MMPs and patient safety (e.g., “manual manipulation,” “chiropractic care,” “osteopathic manipulation,” “Tui Na massage,” “adverse events,” and “patient safety”). Boolean operators (AND, OR) were applied to refine the search and capture all relevant studies.

Screening Process Phase 1: Titles and abstracts were initially screened to identify relevant studies to the review. Duplicates were removed. **Phase 2:** Full-text screening was conducted on selected studies based on inclusion and exclusion criteria. The PRISMA flowchart was utilized to track the

selection process, ensuring transparency in how studies were included or excluded from the final analysis.

Data Extraction Key data were extracted from the selected studies, including a) Study design (RCT, observational, etc.). b) Patient characteristics (age, gender, comorbidities). c) Type of intervention (SMT, OMT, Tui Na). d) Safety outcomes (types and frequency of adverse events). e) Risk factors associated with adverse events.

Quality Assessment

The quality of the included studies was assessed using PRISMA guidelines for systematic reviews. Studies were rated based on criteria such as sample size, study design, blinding, and the completeness of safety reporting.

Synthesis of Findings A qualitative synthesis of the evidence was conducted, focusing on a) Common themes regarding patient safety and adverse events in MMPs and b) the Identification of patterns and trends across different manual manipulative therapies. c) Areas of consensus and controversy in the literature. The synthesis also considered the strength of evidence and limitations (e.g., small sample sizes and lack of long-term follow-up) that may affect the interpretation of results.

Interpretation and Limitations The strength of the evidence was critically evaluated, considering both the quality of individual studies and the overall consistency of findings. Potential limitations, such as publication bias or heterogeneity in study design, were acknowledged when interpreting the results.

RESULT AND DISCUSSION

The safety profile of manual manipulative therapies (MMTs), particularly spinal manipulation and Tui Na, has been the subject of ongoing research and debate within the field. This section compares the current study's findings with those of other relevant studies, emphasizing the implications for patient safety.

Adverse Effects of Spinal Manipulation:

Similar to the findings of Gorrell et al. (2023), which highlighted that while minor adverse effects of spinal manipulation—such as muscle soreness and headaches—are common and generally resolve quickly, the potential for severe complications, particularly in the cervical spine, remains a critical concern. Serious complications, though rare, include vertebral artery dissection and stroke, emphasizing the need for improved reporting standards in clinical trials. This supports the assertion in our study that adverse event reporting should adhere to established guidelines like the CONSORT Harms checklist to ensure a balanced view of risks and benefits (Gorrell et al., 2023).

Spinal manipulation, often performed by chiropractors or osteopaths, is a therapeutic technique to treat musculoskeletal conditions, particularly back and neck pain. While it can relieve some

patients, adverse effects are also a concern and have been documented in various studies. The severity of these adverse effects can range from mild, transient discomfort to severe complications. This section will detail the adverse effects of spinal manipulation, supported by relevant studies and references.

1. Mild to Moderate Adverse Effects
2. Neurological Complications
3. Vertebrobasilar Insufficiency and Stroke
4. Musculoskeletal Injuries
5. Adverse Effects in Pediatric Patients
6. Case Reports of Serious Adverse Effects

Risk of Neurological Damage:

The risk of severe neurological damage, including vertebral artery and carotid artery dissections, was examined by (Whedon, Toler, et al., 2022). They found no significant increase in the risk of these serious adverse events among Medicare beneficiaries undergoing cervical spinal manipulation compared to control groups. This finding aligns with our research, which stresses that serious adverse events are rare but highlights the need for proper assessment and qualification of practitioners to mitigate risks. The emphasis on informed consent and comprehensive assessment is echoed in multiple studies, including those by Finch and Swait (2017), reinforcing that appropriate patient evaluation is vital for reducing complications. (Finch & Swait, 2017).

Spinal manipulation, particularly of the cervical spine, has raised concerns about the potential for severe neurological damage, including vertebral artery dissection (VAD), carotid artery dissection (CAD), and other forms of neurovascular injuries. These adverse effects, though rare, have been the focus of various studies that seek to assess the actual risk posed by this form of therapy. While some research has downplayed the occurrence of these severe events, it remains a critical issue in the medical community, as improper techniques or inadequate patient screening can lead to devastating outcomes.

1. Vertebral Artery and Carotid Artery Dissection
2. Stroke Risk and Cervical Manipulation
3. Rarity of Serious Neurological Events
4. Importance of Informed Consent and Practitioner Qualification
5. Case Reports and Risk Assessment

Risk and Safety Profile of Tui Na

Tui Na therapy is generally safe and effective, as indicated by Marinova et al. (2019) and further supported by our study's findings (Marinova et al., 2019). However, it is crucial to note that while Tui Na can alleviate various conditions, it can also lead to adverse effects if not performed correctly, as demonstrated in the case presented by Zou et al. (2017). This duality highlights the necessity of tailored treatment approaches and practitioner qualifications, which aligns with the recommendations in our study for rigorous patient assessment prior to treatment.

Tui Na, a traditional Chinese manual therapy that combines massage, acupressure, and

manipulative techniques, has been widely used for thousands of years to treat a variety of musculoskeletal and internal disorders. While it is generally considered a safe and effective treatment modality, Tui Na carries potential risks and adverse effects, similar to other manual therapies such as chiropractic or osteopathic manipulation. The safety profile of Tui Na depends on several factors, including the practitioner's expertise, the patient's condition, and the intensity of the applied techniques.

1. Mild to Moderate Adverse Effects
2. Soft Tissue Injury
3. Risk of Bone and Joint Injury
4. Neurological Complications
5. Contraindications and Risk Factors
6. Informed Consent and Practitioner Expertise

Need for Robust Data and Reporting in Manual Manipulative Therapies (MMTs)

The safety profile of manual manipulative therapies (MMTs) such as chiropractic, osteopathic, and traditional Chinese therapies like Tui Na remains a topic of significant debate, primarily due to the lack of robust data on adverse event incidence. Many studies on MMTs rely on case reports or small sample sizes, making ascertaining adverse events' frequency and severity difficult. Without a comprehensive data pool, it is challenging for healthcare providers and patients to make informed decisions regarding the risks and benefits of these therapies.

1. Gaps in Data Collection and Reporting

Several recent reviews and studies have highlighted the insufficient reporting of adverse events related to MMTs. Their study emphasized the need for more extensive, well-designed observational studies and the establishment of better communication pathways between practitioners and researchers to obtain more reliable data. They pointed out that adverse events are often underreported due to the lack of standardized data collection systems and a general reluctance among patients and practitioners to report mild or moderate adverse effects.

This lack of comprehensive reporting is problematic because the data on adverse events is often skewed toward more severe cases, such as strokes or fractures, which receive more attention. As a result, the true incidence of mild to moderate side effects, which may occur more frequently, remains unclear. As noted, creating standardized reporting systems that enable practitioners to document all adverse events—mild and severe—is essential to developing a more accurate understanding of MMT safety profiles.

The literature emphasizes a significant gap in robust data regarding the incidence of adverse events related to MMTs. Dolbec et al. (2024) proposed that more extensive studies and direct communication with practitioners could yield more accurate data on adverse events (Dolbec et al., 2024). Our study agrees with this perspective, advocating for improved reporting standards and methodologies to enhance the understanding of the safety profile of MMTs.

A systematic review by Kazemi et al. (2023) also identified similar gaps in the literature. Their review noted that only a handful of studies followed patients long enough to capture delayed

adverse events, which may manifest days or weeks after treatment. These long-term effects are often missed in clinical trials focusing on immediate outcomes, underscoring the need for longitudinal studies with robust follow-up mechanisms to capture a more complete picture of MMT-related risks.

2. Challenges in Data Collection

Collecting accurate data on MMTs is further complicated by different practitioners' various techniques and methodologies. As MMTs encompass a wide range of manual therapies, from high-velocity spinal adjustments to soft tissue massage, it becomes difficult to categorize and compare adverse events across different techniques. In their review of musculoskeletal therapies, Delaney et al. (2022) noted that adverse event reporting often lacks the specificity required to distinguish between different types of manipulations, making it harder to identify which techniques are associated with higher risks.

Additionally, the global variation in regulatory standards for MMTs further complicates data collection. In some countries, practitioners are not required to report adverse events; in others, reporting is only recommended but not enforced. Johnson et al. (2021) highlighted this inconsistency in reporting standards and advocated for international guidelines to improve the comparability of adverse event data across different regions. They proposed the creation of a global registry for MMT-related adverse events, which could help track and analyze trends over time and provide more reliable risk estimates.

Risk Mitigation Strategies

Several strategies have been proposed to ensure patient safety and mitigate the risks associated with MMTs. These strategies emphasize the need for better patient screening, practitioner education, and standardization of techniques. Below are key areas where risk mitigation can be effectively implemented.

1. Comprehensive Patient Screening

Comprehensive patient screening is one of the most essential strategies for reducing the risk of adverse events. As several studies have pointed out, the risks associated with MMTs are significantly higher in patients with predisposing conditions, such as osteoporosis, vascular disorders, or spinal abnormalities. For example, Katz et al. (2023) demonstrated that patients with undiagnosed vertebrobasilar insufficiency or other vascular risk factors were at a higher risk of stroke following cervical manipulations.

In response to these findings, Katz et al. (2023) recommend that practitioners conduct thorough patient histories and physical examinations to identify potential contraindications before performing any high-velocity or aggressive manipulations. This aligns with the proposal by Fong et al. (2023), who suggested using pre-treatment risk assessment tools designed explicitly for MMTs. These tools would allow practitioners to identify better patients who may be at risk of severe complications, thus preventing adverse events before they occur.

2. Standardization of Techniques

Standardizing techniques used in MMTs is another critical strategy for reducing the risk of harm. As mentioned earlier, MMTs include a wide range of manipulative techniques, each with varying degrees of intensity and associated risks. Studies like that of Liu (J. Liu et al., 2020) have demonstrated that improper technique, particularly during high-velocity manipulations of the cervical spine, is a leading cause of serious complications such as vertebral artery dissection and stroke. Their findings suggest that improper application of force, especially by inexperienced practitioners, can increase the likelihood of severe adverse outcomes.

Standardizing techniques through clinical guidelines and training programs can help mitigate these risks. Fong et al. (2023) advocate developing evidence-based guidelines for MMTs, outlining the appropriate techniques, force levels, and contraindications for different patient populations. Furthermore, mandatory training and certification for practitioners could ensure that these guidelines are followed consistently, reducing the variability in treatment approaches and lowering the risk of harm.

3. Informed Consent and Patient Education

Another critical risk mitigation strategy involves improving informed consent processes and patient education. Patients need to be fully informed about the potential risks and benefits of MMTs before undergoing treatment. According to Hensel et al. (2022), many patients are unaware of the potential for serious adverse effects, such as stroke or spinal injury, particularly when receiving high-velocity manipulations. Their study suggested that providing patients with detailed, easy-to-understand information about these risks would enable them to make more informed decisions about their care.

Hensel et al. (2022) also proposed that informed consent should be documented as part of the treatment process, with practitioners required to explain the potential benefits and risks specific to the patient's condition. This would help protect patients and practitioners by ensuring that treatment is provided only when the potential benefits outweigh the risks.

Strategies to minimize risks associated with spinal manipulation have been highlighted in several studies. For instance, Swait and Finch (2017) underscored the importance of informed consent, thorough patient history, and adherence to clinical guidelines in reducing adverse events. Our findings support these strategies and call for practitioners to remain vigilant about potential complications, ensuring that safety protocols are followed rigorously.

4. Ongoing Practitioner Education and Monitoring

Practitioner education and monitoring are essential to maintaining patient safety. As Dolbec et al. (2024) and other researchers have emphasized, many adverse events in MMTs result from insufficient practitioner training or a lack of adherence to proper techniques. Continuous education and recertification programs can help practitioners stay updated on the latest evidence-based practices and safety guidelines.

Moreover, Johnson et al. (2021) suggested that practitioner monitoring through regular performance audits and outcome reporting could help identify practitioners at higher risk for causing adverse events. These audits could assess compliance with safety protocols and identify areas where additional training may be needed. Furthermore, establishing an adverse event

reporting system that links practitioner outcomes to patient safety data could provide valuable feedback for improving practice standards.

While manual manipulative therapies are widely used to treat musculoskeletal conditions, more robust data and comprehensive reporting are critical to fully understanding their safety profile. Adverse event reporting systems must be standardized to capture a broad spectrum of mild to severe outcomes across different populations and treatment modalities. By implementing risk mitigation strategies such as comprehensive patient screening, standardizing techniques, improving informed consent processes, and enhancing practitioner education and monitoring, the risks associated with MMTs can be significantly reduced, ensuring safer outcomes for patients.

Contributions of Manual Manipulative Therapies (MMT) and Tui Na to the Current Body of Knowledge on Patient Safety

Manual Manipulative Therapies (MMTs), including chiropractic, osteopathic manipulation, and traditional therapies like Tui Na, are integral components of complementary and alternative medicine (CAM) that focus on restoring musculoskeletal and nervous system function through physical manipulation. These therapies are increasingly used worldwide to treat back pain, neck pain, and joint dysfunction. However, as their use expands, questions about their long-term safety and efficacy persist. While MMTs, mainly Tui Na, have shown benefits in pain relief and functional improvement, the lack of comprehensive, long-term studies and standardized reporting methods limits the ability to draw definitive conclusions about their safety profile.

This research synthesizes findings across various studies to provide a comprehensive overview of the safety profile of MMTs, including both common and rare adverse effects. It highlights the necessity for practitioners to remain informed about potential complications and encourages adopting standardized reporting practices.

The study reinforces the critical role of patient education and informed consent in the practice of MMTs. By emphasizing the importance of communicating risks and ensuring that patients understand their treatment options, the research advocates for a patient-centered approach to care.

1. Current Understanding of MMTs and Tui Na

Research has demonstrated that MMTs, including Tui Na, are generally safe when performed by trained practitioners. However, mild to moderate adverse events, such as soreness, bruising, and fatigue, are relatively common (Yuan et al., 2015). Serious adverse events, such as spinal injury, vertebral artery dissection, or neurological complications, are rare but well-documented in case reports. These adverse events typically occur due to improper technique, poor patient selection, or failure to identify contraindications like osteoporosis, vascular diseases, or spinal abnormalities (Hensel et al., 2022).

Tui Na, in particular, is a traditional Chinese therapeutic practice that combines acupuncture, massage, and joint manipulation techniques. It has gained attention for its ability to treat musculoskeletal pain and functional impairments. Despite its long history of use, systematic research on the safety and efficacy of Tui Na remains limited compared to Western MMTs like chiropractic and osteopathy. Argue that while Tui Na is effective in treating pain and improving function in conditions like chronic low back pain and osteoarthritis, the lack of standardized

training and technique across practitioners poses a safety risk, mainly when performed in settings outside of China where regulatory oversight may be weaker.(Zhang et al., 2021).

The current body of knowledge on MMTs has established that these therapies can offer non-invasive, drug-free options for managing musculoskeletal disorders. However, the limited scope of high-quality clinical trials, inconsistencies in reporting adverse events, and varying techniques among practitioners make it difficult to fully understand the risk-benefit profile of MMTs, particularly for vulnerable populations such as the elderly or those with chronic conditions(Katz et al., 2023).

2. Recommendations for Future Research: Addressing Gaps in the Literature

The findings from existing studies underscore the need for future research to address several critical gaps in the literature on MMTs and Tui Na. The following recommendations aim to enhance the current understanding of these therapies and improve patient safety:

a. Long-Term Safety and Efficacy Studies

Most studies on MMTs and Tui Na focus on short-term outcomes, with few addressing these treatments' long-term safety and efficacy. To fill this gap, longitudinal studies are needed to track the outcomes of patients who undergo MMTs, particularly in terms of recurrence of pain, functional improvement, and the incidence of delayed adverse events. According to Fong et al. (2023), long-term research would provide a more comprehensive view of how patients respond to these therapies over time and help determine whether MMTs can offer sustained relief or need to be supplemented with other treatment modalities.

b. Standardization of Reporting and Methodologies

A key challenge in the study of MMTs is the lack of standardized reporting for adverse events and treatment methodologies. This inconsistency makes it difficult to compare results across studies and to generalize findings to broader populations. Future research should adopt standardized protocols for reporting adverse events and use consistent outcome measurement methods. Dolbec et al. (2024) argue that employing standardized, validated tools to track patient-reported outcomes and adverse events would improve the reliability of clinical trials and enhance the quality of evidence available to inform clinical decision-making.

c. Randomized Controlled Trials (RCTs) with Large Sample Sizes

While MMTs, including Tui Na, are widely practiced, high-quality RCTs with large sample sizes are still lacking. Many studies on MMTs are small, uncontrolled, or rely heavily on subjective measures like pain scores. Large-scale RCTs would provide more reliable data on the effectiveness of these therapies and reduce the risk of bias. Furthermore, Katz et al. (2023) recommend conducting head-to-head comparisons of MMTs with conventional treatments (e.g., physical therapy or medication) to understand better where MMTs can serve as first-line treatments and should be considered adjunct therapies.

d. Patient Subgroup Analyses

Future research should focus on specific patient subgroups, such as older adults, children, or individuals with chronic diseases, who may respond differently to MMTs compared to the general population. Liu et al. (2022) emphasize the need for targeted studies on high-risk populations, such as those with osteoporosis or cardiovascular diseases, who may be at greater risk for complications from manual manipulations(S. Liu et al., 2022)These subgroup analyses would help

refine guidelines for when and how MMTs should be used and for more precisely identifying contraindications.

e. Global Data Sharing and Collaboration

Given the global nature of MMTs, mainly Tui Na, future research would benefit from international collaboration and the creation of global data registries to track adverse events and treatment outcomes. Johnson et al. (2021) advocate for establishing an international adverse event reporting system, which would allow researchers and clinicians worldwide to share data on the safety and efficacy of MMTs. Such a registry could track rare adverse events, monitor practitioner performance, and identify trends over time, ultimately improving patient safety and treatment protocols.

Integration of MMT and Tui Na into Mainstream Healthcare

For MMTs and Tui Na to be more widely accepted and integrated into mainstream healthcare, several key steps must be taken. First, there needs to be a more robust evidence base demonstrating the clinical efficacy of these therapies across a range of conditions. This would require large-scale clinical trials that meet the standards of evidence-based medicine. Once a clearer understanding of the risks and benefits is established, MMTs can be more confidently recommended as part of multidisciplinary treatment plans for patients with musculoskeletal disorders.

1. Establishing Clinical Practice Guidelines

As MMTs gain wider acceptance, it will be essential to establish clinical practice guidelines that inform healthcare providers about the appropriate use of these therapies. These guidelines should be based on the best available evidence and recommend patient selection, treatment protocols, and contraindications. Hensel et al. (2022) argue that guidelines will help ensure MMTs are used safely and effectively, particularly when integrated with conventional treatments such as physical therapy, pharmacotherapy, or surgery. Recommendations for Clinical Guidelines

- a. Standardized Protocols for Patient Screening and Treatment
- b. Prioritize patient screening to identify contraindications such as osteoporosis, vertebral artery insufficiency, or neurological conditions that increase the risk of serious adverse events.
- c. Fong et al. (2023) recommended including pre-treatment risk assessment tools to ensure that high-risk patients are carefully evaluated before undergoing high-velocity manipulations, particularly in the cervical spine region.
- d. Establish protocols for different patient populations, such as the elderly or individuals with chronic conditions, to tailor manipulations appropriately and avoid complications.

2. Improved Practitioner Training and Certification

For MMTs and Tui Na to be safely integrated into mainstream care, practitioner training, and certification standards need to be improved. There is currently significant variability in the training of practitioners across different countries and even within specific fields. As Johnson et al. (2021) noted, better training and continuing education would help practitioners stay updated on the latest safety protocols and treatment techniques. Regulatory bodies should work to develop standardized

certification processes for MMT practitioners to ensure competency and adherence to best practices.

3. Interdisciplinary Collaboration

Successful integration of MMTs into mainstream healthcare requires interdisciplinary collaboration between chiropractors, osteopaths, physical therapists, and other healthcare professionals. This collaboration would ensure that patients receive comprehensive care that addresses their conditions' mechanical and physiological aspects. According to Kazemi et al. (2023), interdisciplinary treatment models that include both MMTs and conventional medical care can offer better outcomes for patients with complex musculoskeletal issues as they combine the strengths of both approaches.

MMTs, including Tui Na, offer potential benefits for managing musculoskeletal disorders, but more robust research is needed to understand their long-term safety and efficacy fully. Standardized reporting, more extensive randomized trials, and comprehensive patient subgroup analyses will help fill current gaps in the literature. To ensure the safe and effective integration of MMTs into mainstream healthcare, future research should focus on establishing clinical guidelines, improving practitioner training, and promoting interdisciplinary collaboration. By enhancing the evidence base and addressing patient safety concerns, MMTs can play a more significant role in modern healthcare.

a. Emphasis on Multidisciplinary Care

Clinical guidelines should encourage collaborative care models, where MMTs are integrated into a broader healthcare strategy involving physical therapy, pharmacotherapy, and conventional medical care. Interdisciplinary collaboration ensures that patients receive comprehensive treatment plans that combine manual therapies with other interventions to optimize outcomes. (Kazemi et al., 2023) This approach allows healthcare providers to deliver personalized care, considering the patient's mechanical and systemic health needs.

b. Guidelines for Informed Consent and Patient Education

Practitioners should be required to follow standardized procedures for obtaining informed consent from patients. This includes explaining potential risks, benefits, and alternative treatment options before initiating MMTs. Hensel et al. (2022) emphasize the importance of patient education, ensuring that individuals fully understand the nature of the treatment, possible outcomes, and adverse effects. Documenting informed consent as part of the medical record is critical for ensuring legal and ethical compliance in practice.

4. Recommendations for Training Programs

a. Establishing Rigorous Practitioner Certification and Continuing Education

The lack of uniformity in practitioner training across different countries and practices poses a significant safety risk. To improve the safety profile of MMTs and Tui Na, mandatory certification programs should be established that:

- Ensure that practitioners meet minimum competency standards before practicing MMTs, including thorough knowledge of anatomy, contraindications, and evidence-based treatment techniques.

- Incorporate continuing education and recertification programs to update practitioners on the latest research, safety protocols, and clinical advancements. Given the rapid evolution of healthcare practices, continuing education can help prevent adverse outcomes associated with outdated or inappropriate techniques (Zhang et al., 2021).
- Standardize training on patient screening techniques to enable practitioners to identify high-risk individuals effectively, thus preventing severe complications from improper manipulations (Fong et al., 2023).

b. Emphasis on Technique Standardization

One of the challenges in ensuring patient safety is the wide variation in techniques used in MMTs and Tui Na. Training programs should emphasize the standardization of manipulative techniques to reduce variability in patient outcomes. This includes:

- Clear guidelines on the appropriate intensity, force, and frequency of manipulations for different conditions and patient populations.
- Specialized training on the risks associated with high-velocity manipulations of the cervical spine, with detailed instruction on how to safely perform these techniques. Training programs should also emphasize the importance of adapting techniques based on individual patient needs, as improper technique is often a significant contributor to adverse outcomes.

5. Policy Recommendations for Healthcare Policymakers

a. Creation of a Global Adverse Event Reporting System

To address the lack of robust data on MMT-related adverse events, policymakers should advocate for establishing a global adverse event reporting system. Such a system would:

- Enable practitioners and healthcare institutions to report adverse events related to MMTs in a standardized manner, contributing to a comprehensive global database for tracking outcomes and risks.
- Provide researchers with valuable data for analyzing trends and identifying potential areas for improving the safety of MMTs. As Dolbec et al. (2024) suggest, better data collection will facilitate the creation of evidence-based clinical guidelines that can inform practice and patient safety.
- Require participation from practitioners across different healthcare settings, ensuring that the data is representative of real-world outcomes in diverse populations and practice environments (Johnson et al., 2021).

b. Regulatory Oversight and Practitioner Accountability

Policymakers should establish clear regulatory frameworks that mandate licensing and certification for practitioners of MMTs, including Tui Na. Regulatory bodies should:

- Develop standardized criteria for practitioner qualification, ensuring that individuals performing MMTs meet internationally recognized competency standards (Kazemi et al., 2023).
- Implement accountability measures, such as performance audits and outcome reporting, to track practitioner compliance with safety guidelines. These measures would help identify practitioners at higher risk for causing adverse events and provide targeted interventions to improve patient care (Hensel et al., 2022).

c. Support for Research and Development

Governments and healthcare organizations should allocate funding to support research into the long-term safety and efficacy of MMTs. This includes:

- Funding large-scale randomized controlled trials (RCTs) and longitudinal studies to track patient outcomes and adverse events over time. Such studies are critical for understanding how MMTs impact patient health over the long term, particularly for chronic conditions (Fong et al., 2023).
- Supporting the development of pre-treatment risk assessment tools to help practitioners better identify patients at risk for complications and make more informed treatment decisions.

The findings from this paper highlight the need for more comprehensive data collection, standardized practices, and robust clinical guidelines to improve the safety and efficacy of MMTs and Tui Na. By addressing these gaps through better practitioner training, international collaboration, and policy reform, the healthcare community can make MMTs safer and more accessible to patients who benefit from these treatments.

These recommendations allow MMTs, including Tui Na, to be integrated more effectively into mainstream healthcare while minimizing risks and optimizing outcomes. Future research, driven by rigorous methodologies and improved reporting systems, will play a pivotal role in supporting these efforts and guiding clinical practices to improve patient safety and quality of care.

CONCLUSION

Manual manipulation techniques, including Tui Na, have emerged as valuable therapeutic modalities with a favorable safety profile and demonstrated efficacy in addressing various health concerns. The practical integration of these techniques into patient care requires a thorough understanding of safety considerations and the development of standardized guidelines to ensure consistent and effective treatment outcomes.(Vohra et al., 2007; Zou et al., 2017).

Given the current evidence, healthcare providers can confidently incorporate these techniques into multidisciplinary treatment plans, provided they are trained in their proper application. However, future research should focus on long-term patient outcomes to unlock their potential fully.(Xiao et al., 2014; Yan et al., 2019).

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