GUIDELINES ON TRAINING, SAFETY, EVIDENCE, QUALITY AND ETHICAL PRINCIPLES

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Short contents

Contents

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SECTION I: GENERAL CONSIDERATIONS

1. Introduction

1.1. Manual Medicine

Manual Medicine is a branch of medicine that addresses management issues relating primarily to the neuromusculoskeletal (nervous and musculoskeletal) system. Physicians [a] practice Manual Medicine worldwide, and it is regulated by law in some 40 countries.

It was developed as a specialty, subspecialty, or capacity within medical science and the medical profession in those countries where a need was identified for non-surgical treatment of disorders of the musculoskeletal system.

In countries where legal regulations do not list the specialty of Musculoskeletal Medicine or its equivalent, Manual Medicine is a subspecialty or an additional qualification related to one of the historically established specialties dealing with the musculoskeletal system, including Neurology, Orthopaedics or Orthopaedic Surgery, Physical and Rehabilitation Medicine, Rheumatology, and Family Medicine (or General Practice). In some countries, Manual Medicine may also be an integrated component of the curriculum of these specialties [1].

1.2. Musculoskeletal Medicine

Musculoskeletal Medicine deals with the medical diagnosis and medical therapy of all functional disorders and structural lesions of the musculoskeletal system. This medical specialty is established predominantly in countries whose national health care systems do not otherwise provide for non-surgical treatment of the musculoskeletal system. Musculoskeletal Medicine is practiced in various countries worldwide and is regulated by law in some of them. In these countries, Manual Medicine is defined as a component of the curriculum of Musculoskeletal Medicine [2].

1.3. Osteopathic Manipulative Medicine and Treatment

Osteopathic Manipulative Medicine (OMM) is defined as “the application of osteopathic philosophy, structural diagnosis, and the use of osteopathic manipulative treatment (OMT) in the diagnosis and management of the patient.”

Osteopathic Manipulative Treatment (OMT) is the therapeutic application of manually guided forces by an osteopathic physician [b] (U.S. term) to improve physiologic function and/or support homeostasis that has been altered by somatic dysfunction.

Training for the *Doctor of Osteopathic Medicine (DO)* degree in the USA uniquely includes comprehensive education in Manual Medicine competencies throughout four

[a] For the purpose of this document the term *physician* includes *surgeon* where not mentioned.

[b] In the United States, specific core Manual Medicine capacities are defined for osteopathic curricula and osteopathic recognition. These are formally assessed at State and/or national levels as part of the licensure process.

years of predoctoral education [3]. All US DOs graduate with a capacity-level to potentially practice *Osteopathic Manipulative Medicine* (see: SECTION I, Chapter 5.2.).

1.4. Osteopathic Neuromusculoskeletal Medicine

Osteopathic Neuromusculoskeletal Medicine (ONMM) is a nationally recognised physician-only specialty in the USA that emphasizes the incorporation of osteopathic manual diagnosis and osteopathic manipulative treatment into the evaluation and treatment of the nervous, muscular, and skeletal systems in their relationships to other systems of the body and to the whole person.

ONMM specialty training requires a 36-month, full-time, supervised, competency-based residency programme, which is open to both MD and DO graduates. [4, 5].

1.5. Manual Therapy

In Russia, the equivalent medical specialty is called *Manual Therapy* and requires complete medical training in Neurology or Orthopaedics (or Traumatology) prior to Manual Medicine training [6, 7].

1.6. Arthrokinematics

The concept of *Arthrokinematics* is an approach to teaching and performing manual techniques designed to influence the interrelation between the surfaces of the synovial joints in vertebral and peripheral joint dysfunctions. It has a scientific basis [8, 9] and is implemented predominantly in some Japanese approaches to Manual Medicine.

1.7. Chuna Manual Medicine

Chuna is a therapeutic modality that addresses biomechanical function, pathology, diagnostics, and theories related to treatment in order to create a balance in orthopaedic structure and function. Chuna emphasizes that both function and structure are systemically correlated [10, 11].

1.8. MM Medicine

In this document, the acronym *MM Medicine* refers collectively to all scopes of Manual Medicine and the non-surgical part of Musculoskeletal Medicine as exemplified above (including Osteopathic Neuromusculoskeletal Medicine, Manual Therapy, Arthrokinematics, and others).

2. Purpose of the Guidelines

2.1. Protection of Patients and the Public

The practice of MM Medicine must be carried out in compliance with the highest qualification and safety standards. The aim is to ensure patient safety and to minimize the risk of adverse events resulting from improper application.

2.2. Standardisation of Training

Training levels, competency standards, and curricula must be clearly defined and structured. These standards should enable national professional societies, educational institutions, and competent authorities to use them as binding references for examination, certification, and licensing procedures.

2.3. Fostering Safety and Evidence-Based Practice

It must be ensured that contraindications, potential complications, and side effects are systematically recorded and documented. Uniform safety standards are to be established and regularly reviewed. Furthermore, the application of MM Medicine must consistently be based on scientific evidence and established clinical guidelines.

2.4. Quality Assurance

To ensure and continuously improve quality in teaching and clinical practice, appropriate instruments must be introduced and regularly applied. These include internal audits, peer review procedures, re-certifications, and a structured, continuous feedback system. These measures serve to promote a transparent and accountable culture of quality within MM Medicine.

2.5. International Harmonization

Competency-based training frameworks and alignment with internationally 12ecognized standards must be actively promoted. The goal is to support mutual recognition of qualifications and to strengthen the global credibility and comparability of MM Medicine.

2.6. Cost Efficiency

MM Medicine should be emphasized as a conservative and non-invasive form of treatment that offers significant potential for cost-effective care of musculoskeletal disorders. These conditions represent a substantial global health and economic burden, the management of which can be supported through evidence-based manual interventions.

2.7. Ethical Guidelines

Clear ethical standards must be established, taking into account issues such as informed consent, professional boundaries, the responsible handling of power asymmetries, and gender-specific aspects. These principles are intended to strengthen the trust between practitioners and patients and to ensure a respectful and transparent therapeutic relationship.

3. How to Use this Document

SECTION I of the Guidelines deals with *general considerations* of MM Medicine.

SECTION II of the Guidelines provides a reference for the establishment of various *training programmes*, particularly where no formal educational degree has been established. If national health care authorities wish to evaluate a training programme, they may consult the *FIMM Education Board* (www.fimm-online.com). This Board does not function as an accrediting agency, but promotes an understanding of the variations between recognised educational and accrediting bodies through dialogue and communication.

A system of examination and licensing may be established or be adapted on the basis of this training programme to ensure the competence of the trainees and to prevent the practice of MM Medicine by unqualified practitioners. It is hoped that this will deter commercial exploitation of MM Medicine education and practice, which is a significant and growing problem in some countries.

SECTION III of the Guidelines deals with contraindications, complications, and side effects of MM Medicine.

SECTION IV deals with *safety* in MM Medicine.

SECTION V deals with the known *evidence* of MM Medicine.

SECTION VI deals with *quality* aspects of MM Medicine.

SECTION VII deals with *ethical principles* in MM Medicine.

SECTION VIII provides the *glossary*.

4. The Value of MM Medicine

4.1. Different Models of MM Medicine

These guidelines encompass both the manual and the non-invasive dimensions of the musculoskeletal approach. They address, in particular, aspects related to training, contraindications, complications, side effects, safety, available evidence, quality assurance, and ethical considerations pertaining to these practices—whether performed as an independent capacity or as a component of a broader medical framework (see **Fig. 1a–4b** below).

In summary, Manual and Musculoskeletal Medicine (MM Medicine) is practiced worldwide primarily according to two distinct models:

- **MM Medicine as a subspecialty or defined capacity** within any medical specialty engaged in clinical medicine.
- **MM Medicine as an integrated component** of **the curriculum** of any medical specialty referred to in *SECTION I, Chapters 1.1.–1.8.*, or within another medical discipline in which the support and maintenance of the musculoskeletal system contribute to preventive healthcare, health promotion, or enhancement of quality of life. The integrated training must be equivalent to, or exceed, the requirements of *Level 3 (Specialty Level)* as defined in *SECTION II, Chapter 6*.

4.2. Cost-Effective Management of MM Medicine

Musculoskeletal (MSK) disorders continue to represent a leading cause of disability and economic loss worldwide. In 2021, the global economic burden of MSK disorders was estimated at USD 2,099.84 billion, equivalent to approximately 1.41 % of global GDP [12]. Recent analyses using Global Burden of Disease (GBD 2021) data show that there were 1.69 billion prevalent cases worldwide, projected to exceed 2.16 billion by 2035, despite declining age-standardized rates [13]. Among these, low back pain remains the single largest contributor to years lived with disability (YLDs) globally [14].

MM Medicine offers a conservative, evidence-informed management model that relies on clinically skilled physicians rather than extensive auxiliary staffing or infrastructure. Diagnostic reasoning in MM Medicine draws on advanced understanding of biomechanics, anatomy, neurophysiology, and psychosocial interactions, typically performed in an ambulatory setting. The MM physician integrates clinical history, examination, and selective investigations to establish a working diagnosis and jointly determine a management plan, including manual techniques, pharmacological therapy, rehabilitation, and preventive counselling.

4.2.1. Cost-Effectiveness Evidence

Emerging literature supports the cost-effectiveness of manual and musculoskeletal interventions as part of integrated conservative care:

- A Swedish randomized controlled trial demonstrated that manual therapy—up to six sessions combining manipulation, mobilisation, massage, and stretching—was cost-effective from a societal perspective compared to advice-only care [15]
- A cost-utility analysis of manual physical therapy for neck pain showed that all probabilistic iterations favored manual therapy as both more effective and less costly than surgery [16]
- Broader evaluations of physiotherapist-led MSK interventions indicate that approximately 43 % of such interventions are both less costly and more ef-

fective than usual or specialist care [17]

4.2.2. Strategic Implications

The potential for cost-effectiveness in MM Medicine is grounded in its low overhead structure, integrated decision-making, early intervention capacity, and efficient resource use. To maximize value, MM Medicine should be supported by rigorous economic evaluations, standardized outcomes, patient stratification models, and integration into primary-care triage systems.

4.2.3. Comparative Health System Perspectives

The cost-effectiveness of MM Medicine varies according to health system design, reimbursement models, and workforce integration. In Nordic countries, early access to manual and multidisciplinary conservative care is associated with reduced chronicity and lower surgical rates [18]. By contrast, in the United States, fragmented insurance coverage and high out-of-pocket costs often delay conservative management, leading to greater use of imaging, pharmaceuticals, and specialist referrals. In publicly funded systems such as the UK NHS, pilot programmes integrating MM physicians into primary care triage have demonstrated improved efficiency and reduced waiting times [19]. Such comparative perspectives underline the necessity for context-specific economic modelling of MM implementation.

4.2.4. Digital Health and Tele-MM Models

Digital transformation in healthcare presents new opportunities for MM Medicine. Telemedicine platforms now facilitate remote triage, patient education, and exercise supervision, while motion-capture and wearable technologies enable objective monitoring of functional outcomes [20]. Artificial intelligence tools are emerging to assist with biomechanical pattern recognition and clinical decision support [21]. Early studies indicate that tele-MM consultations can maintain diagnostic accuracy and patient satisfaction comparable to in-person care for selected conditions. These innovations could further enhance the scalability and cost-effectiveness of MM Medicine, especially in resource-limited settings.

4.2.5. Barriers to Implementation and Policy Recommendations

Despite promising evidence, implementation of MM Medicine faces structural barriers, including inconsistent insurance coverage, lack of awareness among referrers, and limited inclusion in clinical guidelines. Policy frameworks should prioritise: (1) the integration of MM services into primary and community care; (2) reimbursement schemes that reward conservative management and prevention; and (3) investment in training programmes that ensure workforce capacity. Strategic alignment with *WHO Rehabilitation 2030* and health system strengthening initiatives could facilitate sustainable adoption of MM Medicine globally [22].

4.3. Mismatch between Musculoskeletal Burden and Provider Competency

Despite being among the most common presenting complaints in primary care, MSK disorders remain underrepresented in medical education worldwide. Between 13.7 % and 27.8 % of primary care consultations are for MSK complaints, yet medical schools devote an average of only 2.3 % of total curriculum time to MSK topics [23]. In the United States, over half of family physicians report insufficient training in orthopaedics and manual assessment, with 56 % citing medical school as their sole formal exposure [24].

This educational gap persists despite overwhelming burden. The WHO identifies MSK disorders as the leading contributor to global YLDs [25]. Funding for MSK research remains disproportionately low, with neck pain research receiving only 0.83 % of ex-

pected disease-burden-adjusted funding [26]. Cost distribution analyses show that the top 5 % of MSK patients account for approximately 61 % of total costs, often after failing to access timely conservative care [27].

MM Medicine physicians, with dual competencies in diagnosis, manual intervention, and rehabilitation, are well-suited to bridging this divide by providing early management, coordinating interdisciplinary teams, and leading evidence-based strategies for efficient patient care.

4.3.1. Educational Innovations in MM Training

Recent educational reforms emphasize competency-based MM curricula that integrate anatomy, biomechanics, and psychosocial frameworks through simulation and case-based learning. Several universities in Europe and Australasia now employ hybrid teaching models combining virtual dissection, 3D anatomy platforms, and supervised manual practice [28]. These innovations improve diagnostic confidence, motor skills, and patient communication compared to traditional lecture formats.

4.3.2. Continuing Professional Development (CPD) and Certification Pathways

Continuing professional development is critical to maintain competence and ensure evidence-based practice. National societies under the FIMM have developed tiered certification systems that include basic, advanced, and fellowship levels. Such frameworks promote standardized training and facilitate international mobility of qualified practitioners. Integration of online CPD platforms and micro-credentialing is further broadening access for clinicians in low-resource settings.

4.3.3. Research Literacy and Evidence-Based Practice

Embedding research literacy within MM curricula ensures that practitioners can critically appraise literature, interpret clinical data, and apply outcomes research to patient care. Programmes emphasizing clinical audit, case documentation, and pragmatic trials enhance the translational capacity of MM Medicine [29]. This evidence-based foundation is essential for the discipline's legitimacy, funding, and policy inclusion.

4.4. Regulatory Variation in MM Medicine Practice

Regulatory frameworks governing MM Medicine differ widely across regions. In the United States, New Zealand, and Russia, MM Medicine has formal recognition or specialty status. In many European countries, it functions as a subspecialty within physical medicine, rehabilitation, or orthopaedics, requiring postgraduate certification and registration. In low- and middle-income countries, formal MM education and legal recognition remain limited, though interest is increasing under the WHO *Rehabilitation 2030* Initiative [30].

FIMM and associated organisations advocate for international harmonization of MM training standards, clear scopes of practice, and accreditation systems. They emphasize continuing professional development, interdisciplinary collaboration, and integration of MM Medicine into national health systems to optimize safety, quality, and cost-effectiveness.

4.4.1. Ethical and Legal Considerations in Manual Practice

The hands-on nature of MM interventions necessitates high ethical and legal standards. Key principles include informed consent, transparency of technique, and adherence to safety guidelines to minimize adverse events. Regulatory frameworks vary in defining permissible manual techniques and scope of prac-

tice [31]. Establishing international consensus on ethical codes could strengthen patient trust and professional accountability across jurisdictions.

4.4.2. Cross-Border Harmonization and Global Standards

The variability in MM regulation presents challenges for practitioner mobility and research comparability. FIMM's Guideline project seeks to create a unified competency matrix. This initiative aims to facilitate reciprocal recognition of qualifications and promote data sharing for multinational research. Harmonization also supports equitable access to MM care worldwide.

4.4.3. Future Directions: Integration with Preventive and Public Health Frameworks

Beyond individual treatment, MM Medicine holds potential as a preventive and population health tool. Early intervention strategies targeting posture, ergonomics, and workplace modification have demonstrated reductions in absenteeism and chronic pain prevalence [32]. Integrating MM physicians into occupational health and public rehabilitation programmes aligns with global strategies for healthy ageing and sustainable workforce participation. Future policy should view MM Medicine as a core component of preventive, community-based healthcare.

4.5. Training Programmes at Different Educational Levels

With the growing demand for MM Medicine services, other medical specialists may wish to gain additional qualifications in MM Medicine. Special training programmes have been developed to enable physicians with substantial basic medical training to acquire the additional education and skills necessary to safely integrate MM Medicine approaches or become MM specialists. These programmes could be expanded further.

Such programmes should be flexible in order to take into account the different educational backgrounds and previous medical training of the trainees.

In countries where no regulatory legislation currently exists, there may be no educational, professional, or legal framework governing the practice of MM Medicine.

4.6. Minimum of Educational Requirements

FIMM, through its Health Policy and Education Boards, has delineated what the members of its Federation of Societies believe to be the minimum educational requirements physicians need to achieve in order to protect patients. FIMM recommends the recognition and implementation of these minimum requirements by all countries.

In some countries with limited educational structures, lack of financial resources, or limited integration of indigenous communities into mainstream society, non-medical primary healthcare workers trained in specific manual techniques may help enhance healthcare services. This may also help introduce some principles of MM Medicine into national healthcare systems which would otherwise be unavailable, thereby increasing access and quality while reducing costs in managing the burden of musculoskeletal healthcare.

5. Educational Pathways (examples)

5.1. Europe, Australia, New Zealand, Israel, Latin America

The acronym *MM Medicine* defines all scopes of Manual Medicine and the non-surgical part of Musculoskeletal Medicine, also including Osteopathic Neuromusculoskeletal Medicine, Manual Therapy, Arthrokinematics and others.

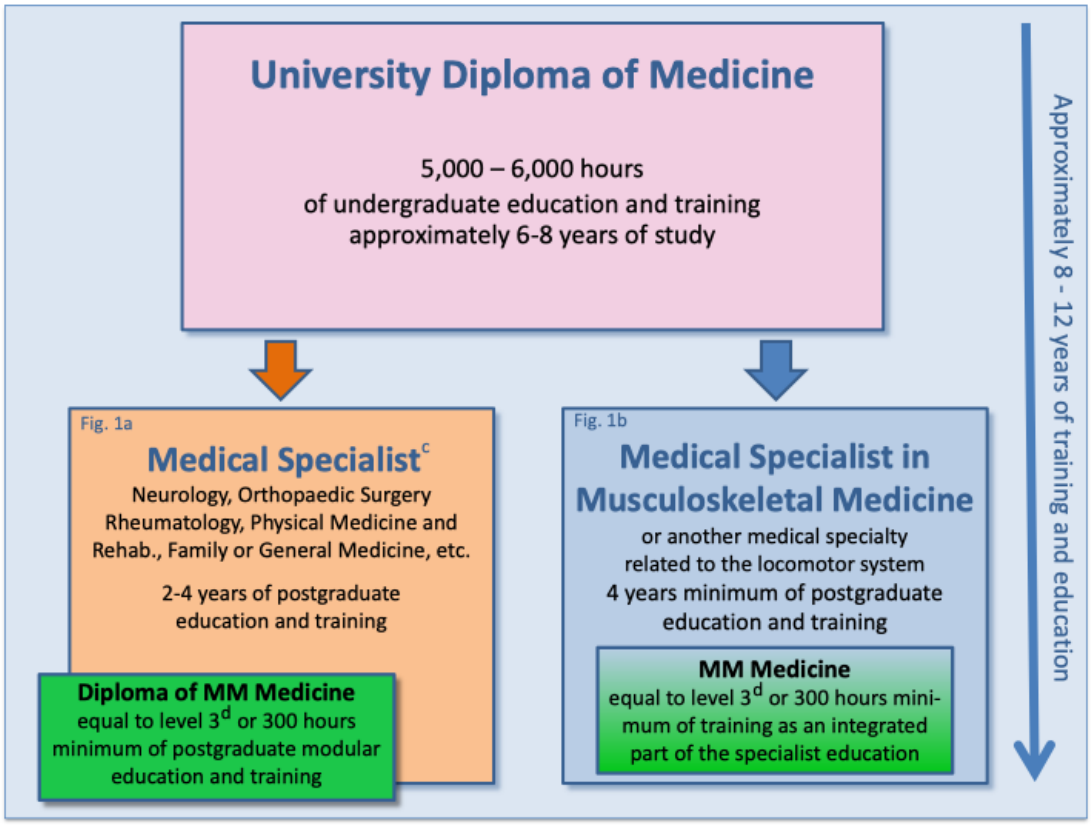

Fig. 1a: The *capacity model*. MM Medicine is a subspecialty or a capacity in relation to any medical or surgical specialty dealing with clinical medicine.

Fig. 1b: The *component model*. MM Medicine is an integrated component of the curriculum of the medical specialty of Musculoskeletal Medicine or of another medical specialty related to the musculoskeletal system.

[c] The term *Medical Specialist* includes physicians and surgeons as defined by the relevant national health regulations.

[d] See SECTION II, Chapter 3: Levels of Training in MM Medicine.

5.2. USA, Canada: Doctors of Osteopathic Medicine (DO) and US-trained DOs in Canada

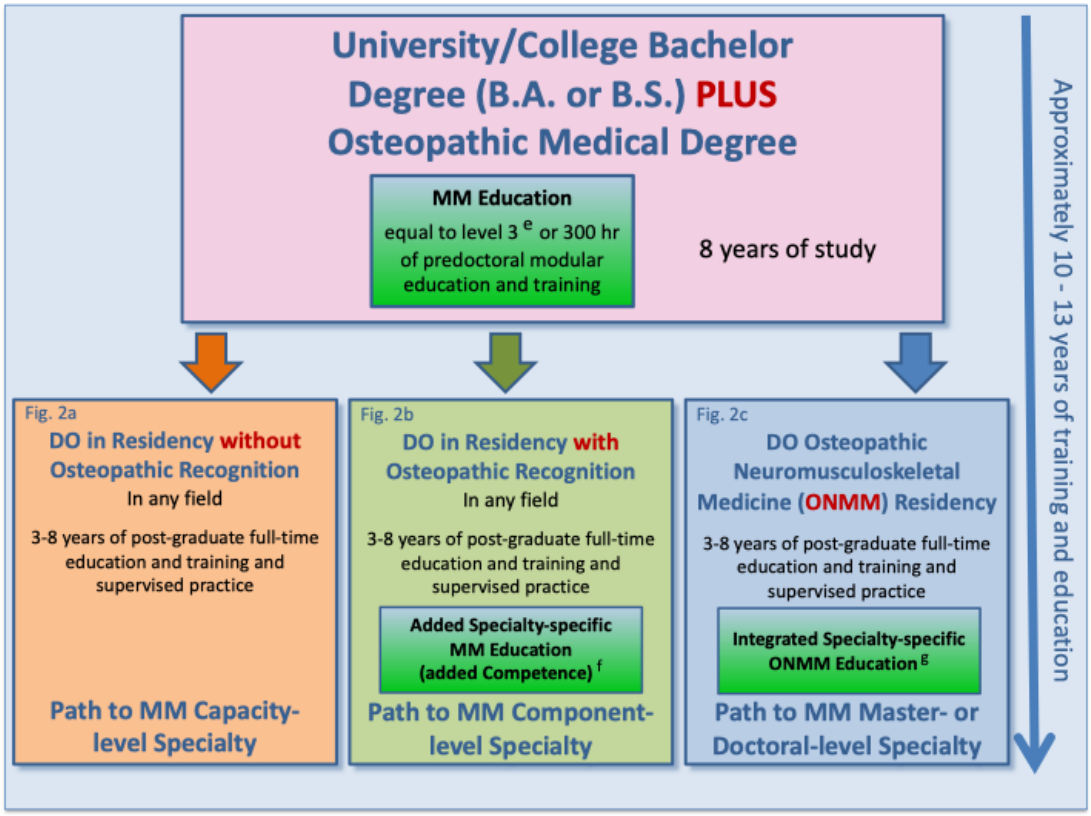

Fig. 2a: *A capacity model.* Osteopathic Manipulative Medicine and Osteopathic Manipulative Treatments are integrated components of the predoctoral curriculum of all US-graduated DO physicians. Such DOs in the USA qualify as MM Capacity-level specialists in any medical or surgical discipline.

Fig. 2b: *A component model.* An allopathic graduate (MD) or US-graduated DO who completes a residency with an "osteopathic recognition" curriculum within a given specialty field may qualify as MM Capacity- or MM Component-level specialists depending on the discipline. (For example, capacity-level Family Practice with OMT specialists).

Fig. 2c: *Master- or Doctoral-level model.* An allopathic graduate (MD) or US-graduated DO who completes an Osteopathic Neuromusculoskeletal Medicine (ONMM) residency or completes qualifications including a thesis defense to obtain an FAAO (Fellow of the American Academy of Osteopathy) award may qualify as a MM Master- or Doctoral-level specialist.

[e] See SECTION II, Chapter 3: Levels of Training in MM Medicine.

[f] Competency-based requirements in Osteopathic-Recognition Residency Programs.

[g] Competency-based requirements (>1,200 hr) in Residency Programs ± Thesis.

All US-trained DO specialists in any field first satisfied the competence of the MM-Specialist level or Specialty Level (Level 3[h]) prior to their post-graduate training (**Fig. 2a-c**). They then have the choice to choose an osteopathic recognition residency programme with specialty-specific MM-integration with regard to an application for an additional competence (**Fig. 2b**). DOs trained and certified in the US in the specialty field of Osteopathic Neuromusculoskeletal Medicine (ONMM) or Osteopathic Manipulative Medicine (OMM) fulfill the Master Level or Doctorate Level (Level 4[h]) of MM-education. In the US, they constitute the bulk of the MM-educators, MM-researchers, and MM-consultants for other physicians' patients (**Fig. 2c**).

See also ANNEXES Chapter 3.1.

B.A. : The Bachelor of Arts is the designation for the bachelor's degree awarded primarily in the fields of humanities, linguistics and cultural studies, media and communication as well as social and societal sciences. Arts does not stand for arts, but for humanities.

B.S. : The Bachelor of Science is a highly professionally qualifying degree. This degree can be obtained in various branches of science, including economics, natural sciences and engineering.

[h] See SECTION II, Chapter 3: Levels of Training in MM Medicine.

5.3. USA, Canada: Medical Doctors (MD)

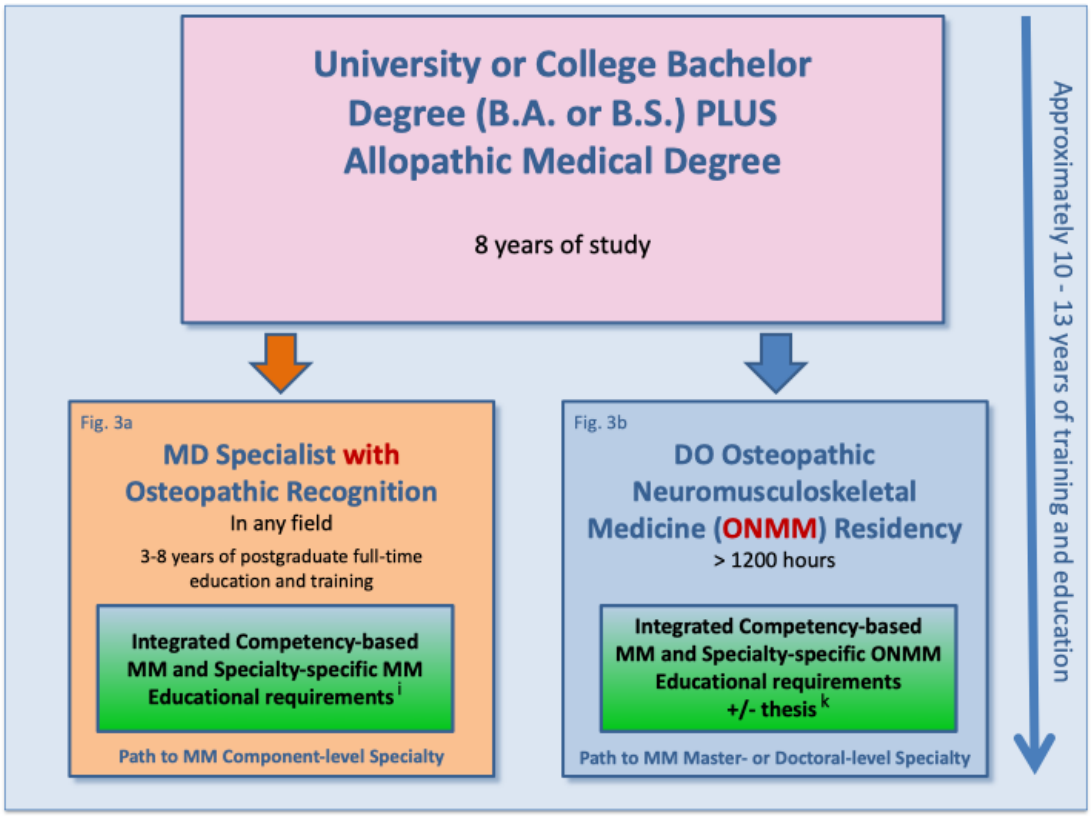

Fig. 3a: MDs educated within a specialty field with osteopathic recognition qualify as a MM *Component*-level Specialist (equal to level 3 [l]).

Fig. 3b: MDs educated in the Osteopathic Neuromusculoskeletal Medicine specialty with osteopathic recognition qualify as a MM *Master*- or *Doctorate-level* Specialist (equal to level 4 [l]).

[i] Equal to level 3 or 300 hours minimum of training (see SECTION II, Chapter 3: Levels of Training in MM Medicine).

[k] Equal to level 4 (see SECTION II, Chapter 3: Levels of Training in MM Medicine).

[l] See SECTION II, Chapter 3: Levels of Training in MM Medicine.

5.4. Republic of Korea

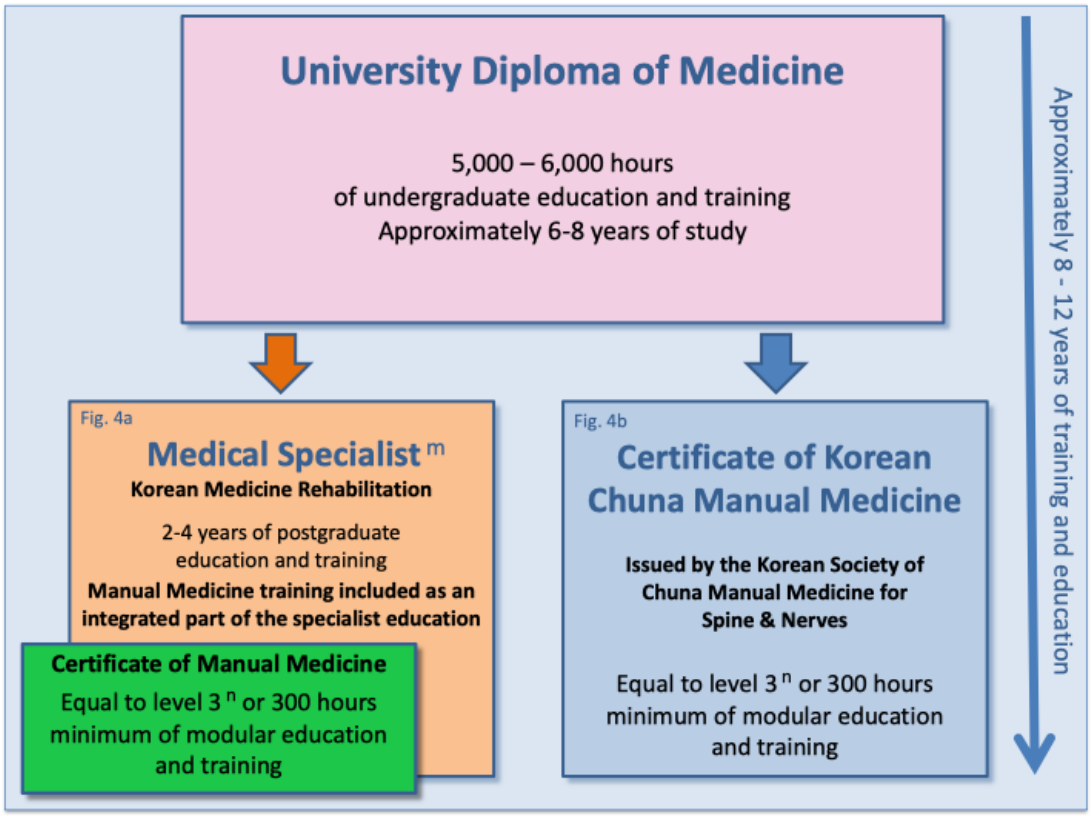

Fig. 4a: *Korean capacity model.* Specialists in Korean Medical Rehabilitation receive basic training in MM Medicine. They can complete this with a Certificate on level 3 [n] or a 300 hour Certificate of Manual Medicine.

Fig. 4b: *Certificate of Korean Chuna Manual Medicine.* Holders of the Certificate of Korean Chuna Manual Medicine receive training at level 3 [n] or at least 300 hours of training in Chuna Manual Medicine.

[m] The term *Medical Specialist* includes physicians and surgeons as defined according to the responsible national Health Regulations.

[n] See SECTION II, Chapter 3: Levels of Training in MM Medicine.

6. History and Principles

6.1. Historical Information

Physicians have used Manual Medicine Techniques of diagnosis and therapy for thousands of years. The *Edwin Smith Papyrus* (3000–2500 B.C.E.)[33] notes, besides surgical diagnoses, some painful conditions of the neck, where the diagnostic manual procedure is remarkably similar to those used today. Physicians in India, such as the surgeon *Susruta* (1500 B.C.E.)[34], believed to be the founder of Ayurvedic Medicine and also used manual techniques. Apart from Ayurveda, the roots of East Asian MM Medicine can be traced[35].

Although spinal manipulation in the West dates back to *Hippocrates* (460–375 B.C.E.)[36] and the ancient Greek physicians, as well as to Galen (130–200 C.E.)[37], the evolution of MM Medicine is difficult to trace during the Middle Ages. During this period, however, the philosopher and physician *Abu Ibn Sina from Bukhara*[38], known as *Avicenna* (980–1037 C.E.), described manual techniques in his *Canon of Medicine*, which were taught for centuries in European universities.

In East Asia, MM Medicine has been used as a treatment method since the Pre-Qin (先秦) period (770–221 B.C.E.) under various names such as Qiaoma (喬摩), Anma (按摩), Angyo (按蹻), Anol (按扤), and Jiaoyin (嬌引). The first records containing the term *Chuna* (推拿) appeared in pediatric medicine classics of the Ming Dynasty (1368–1644 C.E.), such as *Encyclopedia of Pediatric Chuna, Formulas, Pulse, and Rescuing* (小兒推拿方脈活秘旨全書) *and Secret Tips in Pediatric Chuna* (小兒推拿秘訣)[39], which became the origin of this name today. Over time, it has developed through many transformations, absorbing the unique cultures and medical systems of various countries including China, Korea, Japan, and India.

In Korea, the Korean Society of Chuna Manual Medicine for the Spine and Nerves (KSCMM) was established in 1991 and became the focal point for the development of Korean Chuna Manual Medicine.

During the Middle Ages and Renaissance, manual healing persisted through the traditions of so-called bone-setters, lay practitioners who specialized in treating dislocations and fractures using manipulative techniques. These empirical methods were often precursors to modern manual therapy. In the 18th century, European physicians such as *Nicolas Andry* (1658–1742)[40] advanced biomechanical thinking about posture and movement, influencing later developments in MM Medicine.

In 1599, the Spaniard *Luis de Mercado* (1525–1611) published *Institutiones para el aprovechamiento y examen de los Algebristas*, which included instructions on the proper use of manual treatments, particularly for algebristas who were not physicians[41]. The Spanish kings Philip II and Philip III are known to have benefited from such treatments.

In the mid-19th century, the American physician *Andrew Taylor Still* (1828–1917)[42] developed a system of manual techniques that he termed osteopathy, distinguishing it from the dominant medical approaches of his time (allopathy and homeopathy) and grounding it in biomechanical studies of joint function. Osteopathy rapidly gained recognition in the United States, eventually leading to the establishment of Doctors of Osteopathic Medicine (DO) and influencing the development of MM Medicine in Europe.

Towards the end of the 19th century, the Swiss physician *Otto Naegeli* (1871–1938) described therapeutic hand grips for treating neurological and musculoskeletal conditions in his book *Nervenleiden und Nervenschmerzen, ihre Behandlung und Heilung durch Handgriffe* ("Nerve Diseases and Nerve Pain, Their Treatment and Healing by Hand Grips")[43, 44]. Naegeli's adherence to classical naturopathic theories, however, limited the emergence of a comprehensive therapeutic framework. This limited the emergence of a comprehensive therapeutic framework, especially with the advent of osteopathy and chiropractic.

In other countries, such as Japan, MM Medicine Techniques based on *Arthrokinematics* evolved independently.

In the late 19th century, *Daniel David Palmer* (1845–1913)[45] founded chiropractic in the United States, emphasizing spinal manipulation to restore nervous system function. Although initially distinct from osteopathy, chiropractic and osteopathy shared similar diagnostic and therapeutic foundations rooted in manual assessment and mechanical correction.

In the 20th century, European schools—particularly in Germany, France, and the Nordic countries—began integrating osteopathic and chiropractic principles within medical frameworks, leading to the establishment of MM Medicine as a physician-based discipline. Post–World War II collaboration and international congresses, especially through FIMM, unified terminology, training standards, and evidence-based research in MM Medicine.

With the foundation of the *Fédération de Médecine Manuelle* (FIMM) in 1962 in Nice, France, and its triennial international conferences, the process of international exchange and integration of techniques and concepts was strongly promoted. Today, FIMM presents internationally recognised standards for MM Medicine at multiple levels.

These historical developments highlight the interdisciplinary and global evolution of MM Medicine, combining insights from anatomy, biomechanics, and clinical practice to form a unified therapeutic approach recognised internationally today.

6.2. Principles of MM Medicine

- MM Medicine is the medical discipline of enhanced knowledge and skills in the diagnosis, treatment, and prevention of (often painful but reversible) disorders of the functions of the musculoskeletal system.
- Disorders of the musculoskeletal system constitute a large proportion of medical consultations at the primary care level. However, normal function, biomechanics, diagnosis, and management of disorders of the musculoskeletal system are poorly represented in most undergraduate teaching programmes. MM Medicine supplements and complements the syllabi of both undergraduate and postgraduate education underlying the training of physicians.
- Diagnostic skills build on conventional medical techniques, using manual assessment of individual tissues and functional assessment of the entire musculoskeletal system based on scientific anatomy, as well as biomechanical and neurophysiological principles.

- Therapeutic skills add manual and manipulative techniques to conventional treatments for the reduction of pain, improvement of function, or other therapeutic outcomes.
- Patients' understanding of, and involvement in, therapeutic activity helps prevent recurrence.
- While there is no single philosophy of MM Medicine, this field rests upon the following generally accepted principles of today's mainstream medicine:
    - The holistic view of the human being as a unity of body, mind, and spirit is very common.
    - It is also a common view in mainstream medicine that, to a certain degree, the human body has the ability to compensate for disorders through self-regulation. Self-regulation may be influenced by many biological, social, and psychological factors.
    - The current concept of MM Medicine is based on the clinically proven observation of pain-reactive and painful dysfunction of segmentally related tissues. MM specialists describe these findings as segmental or somatic dysfunction, or as painful minor intervertebral dysfunction.

SECTION II: TRAINING IN MM MEDICINE

1. Use of MM Medicine

1.1. Introduction

MM Medicine is used for diagnostic evaluation of painful disorders affecting somatic function, particularly within the musculoskeletal system, and for assessing the system's optimal functional capacity. It is also used for the therapy of all functional disorders, as well as for all painful structural diseases, where at least a part of the function can be restored and in the optimisation of function within its existing structure.

The MM physician starts their diagnostic approach with an extensive and precise history followed by functional investigation predominantly executed by their hands. Only in cases where an important structural lesion is suspected are additional diagnostic approaches like X-ray, CT or MRI scans or biochemical investigations used.

The therapeutic approach prioritises manual treatment, aiming to avoid unnecessary medication whenever appropriate, however, if this approach is not indicated or effective, all medical means, of non-surgical and non-invasive pain therapy, will also be provided. Especially in chronic pain, MM techniques will be combined with other therapies in an interdisciplinary multimodal biopsychosocial approach.

1.2. Administrative and Academic Considerations

The training of physicians in MM involves certain administrative and academic considerations such as:

- Who could be trained?
- What would be the physician's role and responsibilities?
- What education would be required?
- Would suitable programmes have to be developed from scratch, or could existing substandard courses be strengthened or modified appropriately?
- Are suitably qualified educators in MM Medicine available, or would they have to be trained?
- What would be the mechanisms for official recognition of physicians, educators, institutions and programmes?

1.3. Scope of Practice

The scope of practice for the specially trained physician with the full skill set necessary would include full-spectrum diagnosis and differential diagnosis, treatment with MM techniques including prevention, education, therapeutic and rehabilitation advice. It is presumed that this physician – specialist or subspecialist – will treat according to scientific principles, best practices and the published peer reviewed literature.

After establishing the diagnosis, it is nevertheless possible to involve specially trained non-medical professionals (e.g. physiotherapists, occupational therapists etc.) in the application of manual techniques or the education of the patient.

1.4. Examination and Licensing / Registration

For those countries without an established curriculum for training in MM Medicine, different levels of training and skills are set out in Chapter 3 and 4 of SECTION II of this document. This provides training for MM Medicine at a number of different levels.

All education and training in MM Medicine should be completed and should preferably include both written and practical tests. Such assessment needs to be recognised by a licensing body or another authority of the national health care system.

1.5. Supervision, Monitoring, Accreditation and Evaluation

For the safe implementation of MM Medicine, recognition and training should begin at the Predoctoral Level with stepwise progression to the level of expertise required and with assessment at each step by examination as described above.

Most countries that regulate the medical profession use national, regional, state or provincial examinations. Alternatively, health authorities may delegate to the chambers of physicians the right to regulate themselves and to ensure the competence of individuals.

As has been the case in a number of countries or regions in the past, prior to the legislative recognition of MM Medicine, a government may wish to evaluate both the positive and negative consequences of including it within the health care service.

2. Common Competencies Shared by MM Physicians and Surgeons

All physicians offering MM Medicine share common competencies:

- They are trained and experienced in functional testing and analysis of normal and pathological movements of joints and function of muscles.
- They are trained and experienced in manual palpation of all tissues (skin, fascia, muscle, bone and joint capsule).
- They are capable of utilising manual, reliable and reproducible pain provocation tests.
- They are trained and experienced at different levels to provide various manual techniques or other treatments of the musculoskeletal system. These different levels of specialisation are described below.

3. Levels of Education in MM Medicine

3.1. Structure- and Process-Based versus Competency-Based Educational Programmes

For graduates of training and further training programmes in MM Medicine, their level of training or skills and abilities can be checked and tested using various methods. The methods can complement each other, but not necessarily. Depending on the customs or rules of the respective health care systems, elements of this or that method have become established in medical education in different countries or are in a state of flux. In the context of these Guidelines, we will discuss the key values of both the *structure- and process-based* and the *competency-based* variants. In one method, the focus is on the assessment of time spent and the credits awarded for this (for example 300 hours and 30 credits) and in the other, the focus is on the assessment of professional competences and how the trainee deals with them (for example the assessment of knowledge, skills and attitude). Both methods have their advantages and disadvantages. These can be derived from the following table.

Variables	**Educational Programme**	
	Structure- and Process-based	**Competency-based**
Driving force for curriculum	Content – knowledge acquisition	Outcome – knowledge application
Driving force for process	Teacher	Learner
Path of learning	Hierarchical	Non-hierarchical
Responsibility for content	Teacher	Student and teacher
Goal of educational encounter	Knowledge acquisition	Knowledge application
Typical assessment tool	Single subjective measure	Multiple objective measures (evaluation portfolio)
Assessment tool	Proxy	Authentic (mimics real tasks of profession)
Setting of evaluation	Removed	In the trenches (direct observation)
Evaluation	Norm-referenced	Criterion-referenced
Timing of assessment	Emphasis on summative	Emphasis on formative
Programme	Fixed time	Variable time

Tab. 1: Comparison of the elements of Structure- and Process-based versus Competency-based Educational Programmes, adapted from Hanyang Medical Reviews [46].

FIMM members choose from the methods according to their needs and are free to design their own educational programmes. FIMM considers the significance of Structure- and Process-based Training as equivalent to Competency-based Training. Many FIMM member organisations employ hybrid models combining hours-based structure with competency-based assessment.

3.2. Overview of the Training Levels

In the regions and countries where MM Medicine has been established for a long time and where its ongoing development can be observed, the following training levels have been established:

1	Level 1	Medical School Level or Predoctoral Level
2	Level 2	MM-Recognition Level or Facility Level
3	Level 3	MM-Specialist Level or Specialty Level
4	Level 4	Master Level or Doctorate Level

Tab. 2: Levels of education in MM Medicine.

3.3. Level 1 – Medical School Level or Predoctoral Level

Predoctoral training in MM Medicine must include an understanding of movements of the musculoskeletal system. Biomechanical knowledge is imperative to develop a diagnosis and a management plan in disturbances of the musculoskeletal system. The suggested way of achieving this is by including time for this education in the basic anatomy and physiology of the musculoskeletal system of every medical student.

This level does not typically provide any specific diploma or certificate [o].

The basic diagnostic skill set includes inspection, palpation and testing the range of motion.

The basic treatment skill set includes knowledge in self-mobilisation, strengthening and stabilizing techniques. Some undergraduate programmes include training to Facility Level.

This topic should be included specifically in the appropriate predoctoral module or modules (e.g. musculoskeletal, orthopaedic, rheumatology, neurology).

3.4. Level 2 – MM-Recognition Level or Facility Level

This level is designed to achieve facility at primary care level in prevention, management and functional treatment or rehabilitation of dysfunctional conditions of the musculoskeletal system, which constitute a large proportion of consultations. This is typically achieved by either intensive courses or a number of short courses sufficient to provide such competence.

3.4.1. Competency-Based Definition

The skill set includes clinical expertise relating to axial and appendicular structures, pelvis and the associated soft tissues. This consists of adequate knowledge of anatomy, biomechanics, and physiology of the musculoskeletal system to provide a basic skill set of safe and effective manual techniques to accomplish clinical goals.

[o] By the end of their second predoctoral coursework, students of US Colleges of Osteopathic Medicine (COMs) have had supervised training and assessments to Facility Level. COM Graduates of these COMs receive the degree of Doctor of Osteopathic Medicine certifying completion at the Capacity Level.

3.4.2. Structure and Process-Based Definition

This level corresponds for example in the European Bologna concept [47] to a CAS (Certificate of Advanced Studies), which allocates 10 to 15 ECTS (European Credit Transfer System [48]).

3.5. Level 3 – MM-Specialist Level or Specialty Level

This level is intended for medical or surgical practitioners with a special interest in MM Medicine to practice independently and includes the ability to make a specific diagnosis and design and implement a full management and treatment plan including complete functional rehabilitation.

3.5.1. Competency-Based Definition

The skill set includes profound clinical expertise relating to axial and appendicular structures and the associated soft tissues. This consists of clinical reasoning and thorough knowledge of the disorders and treatment techniques, incorporating a complete set of manual techniques related to the physician's or surgeon's specialty.

3.5.2. Structure and Process-Based Definition

This level corresponds to a specialty related competency for MM Medicine used in the broad base of clinical conditions related to that physician's or surgeon's specialty practice. This corresponds within the Bologna concept to a DAS (Diploma of Advanced Studies), which allocates 30 ECTS.

Specialists in a clinical field educated to integrate MM skills specific to patient care in that field can manage with less than 30 ECTS (30-) and with limited scope. Physicians or surgeons educated to integrate MM skills specific to patient care in primary care or as foundation for other specialties are dependent on more than 30 ECTS (30+) and a broader scope.

3.6. Level 4 – Master Level or Doctorate Level

Level 4 specialists are fully trained and experienced in diagnosis and management including recognised methods of functional rehabilitation or treatment. This incorporates elements of research and teaching.

These qualifications require the involvement of a university department or hospital offering a suitable training programme. The Master or Doctorate Level is based on the level 3 curriculum and add academic knowledge and a Masters or Doctoral Thesis or its equivalent. They require an internship or residency with an appointed supervisor.

Those physicians or surgeons completing training at this level primarily specialise in MM Medicine or its equivalent designation.

The curriculum of level 4 is for example equivalent to the curriculum of the medical specialties of Musculoskeletal Medicine or Osteopathic Neuromusculoskeletal Medicine as far as the non-invasive elements of these medical specialties are concerned.

3.6.1. Competency-Based Definition

The skill set includes profound clinical expertise relating to axial and appendicular structures and the associated soft tissues, applying clinical reasoning and thorough knowledge of a wide range of treatment techniques capable of improving the function of the musculoskeletal system and diminishing pain. This also incorporates an extensive knowledge of interpreting musculoskeletal function with a complete set of manual techniques and an understanding of their use in the broad base of musculoskeletal conditions beyond.

3.6.2. Structure and Process-Based Definition

To gain the extensive knowledge needed to interpret musculoskeletal function and a complete set of manual techniques, this level corresponds (for example in the European Bologna concept) to a MAS (Master of Advanced Studies), which allocates 60 ECTS.

4. Education and Training Level 1 – Medical School or Predoctoral Level

4.1. Objective

Musculoskeletal conditions account for up to 20 % of health costs in many communities. It has been established in a US survey that medical school graduates are undertrained in musculoskeletal conditions, diagnosis and treatment [49]. The aim of this level of training is to provide a fundamental understanding of the scope and opportunities offered by musculoskeletal concepts, examinations and treatments.

4.2. Duration of Training

Training is best incorporated in all years of the predoctoral schedule and integrated where possible with relevant specialties including clinical opportunities to experience the practical application of theoretical knowledge and techniques relevant to the neuromusculoskeletal system.

4.3. Core Topics and Syllabus

See Chapter 8, Core topics and Syllabus.

4.4. Practical Supervised Clinical Experience

Where possible and appropriate, exposure to clinical environments where MM Medicine is practised would be expected, with some form of devolved responsibility for the student, to allow basic skills to develop in clinical history taking and examination.

4.5. Assessment

As part of the course work and final assessment of all students, reference questions relating to MM Medicine should be included in the relevant papers. If MM psychomotor skills in palpatory diagnosis of somatic dysfunction and/or MM therapeutic techniques are taught, both formative and summative practical assessments should be included.

4.6. Continuing Professional Development

The responsibility always remains with the qualified physician or surgeon to maintain a good working knowledge of all aspects of medicine relevant to their practice. MM Medicine makes no exception.

5. Education and Training Level 2 – MM-Recognition or Facility Level

This refers to the training programme for physicians and surgeons undergoing medical professional education in general healthcare or a relevant specialty (Family Practice, Orthopaedics, Rheumatology, Neurology, Paediatrics, Rehabilitation Medicine, Accident and Emergency, General Medicine, General Surgery, ENT or Gynaecology for instance), who recognise the need and value for MM Medicine skills within their scope of practice.

5.1. Objective

The aim at this level of education and experience is to engender a fundamental understanding of the scope and opportunities offered by concepts, examination and treatment techniques of MM Medicine to create a competent practitioner able to provide MM Medicine care safely and effectively with the minimum of supervision.

5.2. Duration of Training

A basic programme of approximately 100-hours period of organised tuition, self-learning and supervised practice, as well as approximately 12 months of experience in relevant related medical specialties (Orthopaedics, Accident and Emergency, Rheumatology, Neurology, Paediatrics, General/Family Practice, Pain management, or Rehabilitation Medicine) is recommended before certificate assessment should be undertaken.

5.3. Core Topics and Syllabus

See Chapter 8, Core Topics and Syllabus.

5.4. Practical Supervised Clinical Experience

Exposure to clinically relevant environments where MM Medicine is practised under supervision would be expected, with significant opportunities for devolved responsibility for the trainee, to allow skills to be developed in clinical history taking, palpatory examination for somatic dysfunction and MM treatment techniques. Direct formative feedback regarding clinical, palpatory and MM treatment technique performance is expected. It is anticipated that this training would take no less than approximately 12 months.

5.5. Assessment

As part of the Certification course work and final assessment of trainees all aspects of MM Medicine need to be addressed. Direct assessment of clinical skills will require formative and/or summative practical examinations of standardised patients and oral assessment of examination, diagnostic and treatment planning skills.

5.6. Post-Degree Training

Typically, these Certificate assessments are regarded as post-degree training and require proof of continuing clinical and skills development using all the national and other credentialing criteria relevant at the time.

5.7. Continuing Professional Development

The responsibility always remains with the qualified physician or surgeon to maintain a good working knowledge of all aspects of medicine relevant to their practice. MM Medicine makes no exception.

6. Education and Training Level 3 – MM-Specialist Level or Specialty Level

This refers to the training programme for physicians or surgeons undergoing further professional education in MM Medicine as a specialty related competency wishing to provide unsupervised medical services to patients.

6.1. Objective

The aim at this level is to provide education and experience to create a detailed knowledge and understanding of concepts, examination, treatment and management techniques of MM Medicine, to develop a competent practitioner capable of providing extensive MM services safely and effectively in a specialty without supervision.

6.2. Duration of Training

After post-registration training is completed, a programme of approximately 300-hours of organised tuition, self-learning and supervised practice will be required before a Diploma assessment can be undertaken. A fully completed training of a medical specialty including a Certificate is required (e.g. Orthopaedics, Accident and Emergency, Rheumatology, Neurology, Paediatrics, General Practice, Pain management, or Rehabilitation Medicine).

6.3. Core Topics and Syllabus

See Chapter 8, Core Topics and Syllabus.

6.4. Practical Supervised Clinical Experience

Exposure to clinical environments where MM Medicine is practised at Specialty Level would be expected, with significant opportunities for devolved responsibility for the trainee, to allow skills to be developed in clinical history taking, examination and treatment techniques. It is anticipated that this training would take no less than 24 months.

6.5. Assessment

A portfolio of experience and signed off procedures together with a suitable written dissertation or research project is typically submitted at the time of the final assessment papers and clinical examinations.

As part of the course work and final assessment of trainees that lead to a Diploma, Certificate of Added Qualification or an equivalent credential, all aspects of MM Medicine need to be addressed. The examining body (University or Academy) must satisfy itself that the written papers are of sufficient standard. Direct assessment of clinical skills will require formative and/or summative practical palpatory and treatment skills, clinical assessment of test patients and oral assessment of examination, diagnostic and treatment planning skills.

6.6. Post-Degree Training

These Diploma assessments are regarded as post-degree training and require proof of continuing clinical and skills development using all the national criteria and/or core competences relevant at the time.

6.7. Continuing Professional Development

The responsibility always remains with the qualified physician or surgeon to maintain a good working knowledge of all aspects of medicine relevant to their practice. MM Medicine makes no exception.

7. Education and Training level 4 – Master Level or Doctorate Level

This refers to the training programme for persons who have undertaken further medical professional education in MM Medicine to specialty related level and wish to develop further skills and expertise to undertake tertiary referrals to provide services usually associated with a MM Medicine hospital department. This equates to specialty training at a master or doctoral level of postgraduate training.

7.1. Objective

The aim at this level is to provide education and experience of a detailed knowledge and understanding of concepts, examination and treatment techniques of MM Medicine beyond those commonly associated with provision of basic services, to create a competent practitioner capable of providing special services, consultation, and undertaking research and teaching at the very highest level.

7.2. Duration of Training

After basic specialty related (Specialty Level) training is completed, a minimum of 24 months of experience in MM Medicine will be required together with evidence of higher skill training in a wide range of MM techniques.

7.3. Core Topics and Syllabus

The interests of the developing doctor will determine the core topics and Syllabus. See also Chapter 8, Core topics and Syllabus.

7.4. Practical Supervised Clinical Experience

During the prescribed 24-month (approximately) programme, evidence will be collected to demonstrate exposure and ability to perform palpatory diagnosis of somatic dysfunction and recognised techniques used in MM Medicine. A peer reviewed research project or suitable written dissertation will be undertaken in a prescribed time frame.

7.5. Assessment

A portfolio of experience and signed off procedures together with a suitable written dissertation or research project will form the basis of the masters-level or doctoral-level submission, defined by the awarding institution or accrediting body. One or more summative written and practical examinations should be satisfactorily passed prior to credentialing at either level.

7.6. Post-Degree Training

These criteria are regarded as post-degree training and require proof of continuing clinical and skills development using all the national criteria and core competencies relevant at the time.

7.7. Continuing Professional Development

The responsibility always remains with the qualified physician or surgeon to maintain a good working knowledge of all aspects of medicine relevant to their practice. MM Medicine makes no exception.

8. Core Topics and Syllabus[o]

8.1. Basic Knowledge

8.1.1. Essential Knowledge

	level			
- Functional anatomy and biomechanics of the musculoskeletal system	1	2	3	4
- Physiology and pathophysiology of the musculoskeletal system	1	2	3	4
- Principles of MM Medicine and major postulated mechanisms of action	1	2	3	4
- Anatomy, physiology and pathophysiology of the nervous system in relation to pain and dysfunction		2	3	4
- Specific postulated mechanisms of MM Medicine diagnostic and therapeutic techniques		2	3	4
- Clinical syndromes and differential diagnostics of the musculoskeletal system			3	4
- Relevant ancillary diagnostics (e.g. laboratory, imaging, electrodiagnostics) to MM Medicine		2	3	4
- Risks and benefits of other relevant therapeutic modalities compared to or in conjunction with MM Medicine		2	3	4
- Indications and contraindications for different therapeutic options		2	3	4

[o] Developed in part from the following: FIMM Core Curriculum for Manual Medicine 2005 [I], European core curriculum „Manual Medicine“ ESSOMM 2018 [II], LOCES II final draft 2006 [III], Osteopathic core competences for medical students 2012 [IV].

[I] International Federation for Manual/Musculoskeletal Medicine (FIMM) Education Committee. Syllabus for the Core Curriculum for Manual Medicine (Core of Musculoskeletal Medicine). 2nd ed. Ratified by FIMM General Assembly; 2005. Available from: https://www.fimm-online.com/file/repository/curriculum_manual_2nd_edition.pdf

[II] Locher H, Terrier B, von Heymann WJ, Habring M, Beyer L, Lechner A; on behalf of the European Scientific Society of Manual Medicine (ESSOMM). European core curriculum “Manual Medicine”: Methodical recommendations and contents for the European postgraduate training and qualification for the additional competence Manual Medicine for European specialists. *Manuelle Medizin*. 2018;56(5):348-358. doi:10.1007/s00337-018-0453-y

[III] Faigaux E, Joder Ch, Lauper M, Wangler M, Wohlhauser I, Zaugg B, et al. LOCES II – Catalogue for Postgraduate Chiropractic Training. Final Draft January 2006. Bern: Swiss Chiropractic Institute (SCI); 2006. Available from: https://loces2.iml.unibe.ch/pdf/Loces_II.pdf

[IV] American Association of Colleges of Osteopathic Medicine. Osteopathic Core Competencies for Medical Students [Internet]. Chevy Chase (MD): AACOM; 2012 Aug. Available from: https://www.aacom.org/docs/default-source/med-ed-documents/corecompetencyreport2012.pdf?sfvrsn=53bed24b_1

8.1.2. Essential Skills

	level			
- Informing the patient adequately about their condition in order to obtain informed consent	1	2	3	4
- Effectively inform the patient about anticipated benefits and outcomes, potential risks and complications of MM treatments		2	3	4
- Applying affective, cognitive, and psychomotor skills to conduct effective history taking and physical examination		2	3	4
- Applying affective, cognitive, and psychomotor skills to conduct effective, accurate palpatory diagnosis		2	3	4
- Applying knowledge and competence to deliver safe, effective MM Medicine treatment in a general population		2	3	4
- Applying knowledge and competence to deliver safe, effective MM Medicine treatment in complex morbidity or special musculoskeletal complaints			3	4
- To critically self-evaluate personal knowledge, clinical skills and outcomes regarding diagnostic and MM Medicine treatment				4
- Use of medical informatics to incorporate the evidence base and best available evidence into MM Medicine practice				4

8.2. Anatomy Objectives

8.2.1. General Anatomy Objectives

- To comprehend and describe the normal functions of the muscles and joints of the axial and appendicular skeleton, and the function of the nervous system as it pertains to the functions of the musculoskeletal system	1	2	3	4
- To understand the anatomical basis of techniques used to investigate and manage complaints of the musculoskeletal system	1	2	3	4
- To evaluate critically the established and new theories on the pathogenesis, mechanisms and management of complaints regarding the musculoskeletal system			3	4

8.2.2. Specific Anatomy Objectives

	level			
- To describe macrostructure, anatomical relations and surface anatomy of the elements of the musculoskeletal system, including bones, joints, intra-articular inclusions, bursae, ligaments, muscles, tendons, entheses, fasciae, and nerves	1	2	3	4
- To understand the principles of tensegrity	1	2	3	4
- To describe the attachments and actions of muscles related to the main syndromes of the musculoskeletal system		2	3	4
- To describe the course and relation of the peripheral arteries (especially the vertebral arteries) and the effects on these vessels of movements of the associated skeletal structures		2	3	4
- To state the peripheral and segmental nerve supply of muscles and joints related to the main musculoskeletal syndromes			3	4
- To describe and demonstrate the course and distribution of the peripheral and autonomic nerves in a detail appropriate to the interpretation of musculoskeletal complaints and the comprehension of investigations involving these nerves as they pertain to musculoskeletal complaints			3	4
- To describe the disposition and attachments of all the structures within the vertebral canal, and the effects on these structures of movements of the vertebral column, head and limbs			3	4
- To describe the basic neuroanatomy to explaining the motor and sensory mechanisms involved in movements and musculoskeletal complaints			3	4
- To recognise anatomical variants in neural and musculoskeletal structures			3	4
- To describe the anatomical basis of mechanotransduction			3	4

8.3. Physiology Objectives

8.3.1. General Physiology Objectives

- To understand the physiological basis of the functions and disorders of the musculoskeletal system	1	2	3	4

8.3.2. Specific Physiology Objectives

- To describe different types of muscular fibres	1	2	3	4
- To describe muscle adaptability	1	2	3	4
- To describe the effects of rest, exercise and ageing on skeletal muscle, in terms of histochemistry and molecular structure		2	3	4
- To describe the neurophysiology, activity and function of reflexes involving the musculoskeletal system including somatovisceral, viscerosomatic, and somatosomatic relationships		2	3	4

	level			
- To describe the basic metabolic principles and physiology of bone, muscle, connective tissue and nerves pertaining to the musculo-skeletal system			3	4
- To describe the molecular and cellular processes implicated in mechanisms of muscle contraction			3	4
- To describe the molecular and cellular processes involved in the generation and propagation of action potentials in nerve, muscles, and excitatory and inhibitory synapses			3	4
- To describe the effects of rest, exercise and ageing on fascia, in terms of histochemistry and molecular structure			3	4
- To discuss the potential role of proposed physiological mechanisms of action such as interfacial water, nitric oxide and mechanotransduction				4
- To describe the motor and sensory neurophysiological mechanisms in sufficient detail to interpret and explain the symptoms and signs of disorders of the musculoskeletal system				4

8.4. Biomechanics Objectives

8.4.1. General Biomechanics Objective

- To understand certain precepts of biomechanics and apply them to the musculoskeletal system	1	2	3	4
- To recognise and describe the aberrations of function of the musculoskeletal system		2	3	4

8.4.2. Specific Biomechanics Objectives

- To define, in biomechanical terms, the following terms as they are applied to joints: hypomobility, hypermobility, and instability	1	2	3	4
- To describe biomechanical differences between capsular and somatic dysfunction and capsular patterns	1	2	3	4
- To demonstrate an ability to apply and interpret the following terms with respect to any of the tissues of the musculoskeletal system: stress, strain, stiffness, toughness, viscoelasticity, creep, hysteresis, and fatigue failure		2	3	4
- To describe the movement of any joint in terms of translation and rotation about biomechanical axes		2	3	4
- To demonstrate an ability to apply precepts of biomechanics to clinical features, posture, the gait cycle, and activities of daily living, including occupational and recreational activities			3	4

8.5. Pain Objectives

8.5.1. General Pain Objective

	level			
- To understand the physiology of pain and the pathophysiologic and biopsychosocial implications of pain	1	2	3	4
- To understand the somatic and visceral structures which contain receptors capable of creating pain		2	3	4

8.5.2. Specific Pain Objectives

- To describe, at an appropriate level, the taxonomy of pain	1	2	3	4
- To differentiate acute and chronic pain and their proposed mechanisms	1	2	3	4
- To describe the anatomy, physiology, pathophysiology, and currently understood mechanisms of pain	1	2	3	4
- To describe the understood patterns of referred pain to and from the musculoskeletal system		2	3	4
- To describe the relationship between psychosocial factors and chronic pain			3	4
- To describe the role of the autonomic nervous system in relation to pain			3	4
- To describe the anatomy, physiology, pathophysiology, and all proposed mechanisms and models of pain				4

8.6. Diagnostic Examination

8.6.1. Conventional Medical Examination

- To perform a conventional medical examination to understand the condition of the patient with respect to indications, contraindications and therapeutic options		2	3	4
- To perform thorough history and examination with emphasis on biomechanical, occupational, orthopaedic, neurological, biopsychosocial factors, to inspect posture, gait, and gross ranges of motion		2	3	4
- To perform orthopaedic, neurological, systemic and ancillary tests where indicated		2	3	4
- To prioritise diagnostic tests based on sensitivity, specificity and cost-effectiveness			3	4
- To describe practice guidelines or critical pathways in sequencing diagnostic evaluation for the patient			3	4

8.6.2. Examination Using MM Techniques

	level			
- To perform screening examination to identify if there is a problem in the musculoskeletal system that deserves additional evaluation		2	3	4
- To perform a scanning examination to identify which regions and tissues within the region are dysfunctional and of relevance at a level appropriate to the treatment skills		2	3	4
- To conduct regional palpatory examinations of the tissues of the musculoskeletal system to identify dysfunctions		2	3	4
- To conduct palpatory examinations of local tissues to determine the specific dysfunctions considered for MM treatment and the characteristics important in the selection of the treatment modality including indications and contraindications		2	3	4
- To conduct different palpatory examinations in order to look at and record elements of pain provocation, sensory changes, tissue texture changes, examination of range of motion, and characteristics of end-feel barrier		2	3	4
- To document reproducibility and inter-examiner reliability of MM Medicine diagnostic tests				4

8.6.3. Recording Diagnostic Findings

- To record the patient evaluation and patient progress by using various methods of measurement	1	2	3	4
- To record relevant specific findings in terms of MM Medicine	1	2	3	4
- To record pertinent related outcomes measures e.g. visual analogue scale (VAS), dolorimeter, impairment scales, general health scales			3	4
- To interpret and report epidemiologic data from patient populations with musculoskeletal disorders				4

8.7. Treatment Modalities

8.7.1. General Treatment

- To conduct mobilisation techniques including specific techniques for muscle inhibition or muscle relaxing (muscle energy techniques, techniques based on post isometric relaxation and on reciprocal inhibition, and positioning techniques)	1	2	3	4
- To conduct segmental manipulation techniques of the spine and the peripheral joints		2	3	4
- To supervise or monitor physiotherapy and training for rehabilitation		2	3	4
- To conduct myofascial techniques		2	3	4
- To conduct trigger-point therapy		2	3	4
- To apply treatment strategies for interlinked functional (chain-reaction) syndromes			3	4

	level		
- To integrate the principles of treatment of MM Medicine into multimodal treatment concepts		3	4
- To actively teach and promote integration of MM Medicine treatment to improve anatomic and physiologic function in patient care			4

8.7.2. Disease Prevention and Health Promotion

- To use all treatment modalities to prevent recurrence of presenting problems in MM Medicine	2	3	4
- To maximise biomechanical and physiological functions in activities of daily living, in activities in work and in sports		3	4
- To recommend exercise and sound ergonomic behaviour for rehabilitation and prevention		3	4

8.8. Clinical Pictures

8.8.1. Clinical Pictures in MM Medicine

- Recognise disorders or dysfunctions of axial and appendicular structures: Cranium Cranio-cervical junction Cervical spine Cervico-thoracic junction Thoracic spine Thoraco-lumbar junction Lumbar spine Lumbo-sacral junction Sacroiliac joints, pelvic girdle Peripheral joints	2	3	4
- Recognise visceral organ dysfunction related to biomechanical disorders		3	4
- Recognise viscera-somatic, somato-visceral, psycho-somatic and somato-somatic reflexes		3	4

8.8.2. Diseases, Disorders and Conditions

	level			
- To understand the differential diagnosis, relevance and interrelationship to MM Medicine of the following: General neurological semiology (signs and symptoms) Neurological disorders Headache due to metabolic pathologies Orthopaedic disorders Rheumatologic disorders Spinal affections Vascular abnormalities Paediatric disorders Trauma of the spine Tumours of the spine	1	2	3	4
- To understand special consideration with respect to age and development (esp. paediatrics and geriatrics)	1	2	3	4

SECTION III: CONTRAINDICATIONS, COMPLICATIONS, AND SIDE EFFECTS

1. Introduction

MM Medicine procedures are generally regarded as safe and effective when performed by appropriately trained practitioners. Safety remains the paramount concern in all medical interventions, consistent with the foundational ethical principle of *Primum non nocere*—first, do no harm. In the context of MM, harm encompasses both physiological and psychological domains. Effective treatment thus requires not only physical rehabilitation but also the support of psychological well-being through reassurance, empowerment, and fostering patient autonomy rather than dependency.

Diagnostic accuracy and individualized clinical reasoning are critical prerequisites for any manual therapeutic intervention. A precise clinical diagnosis—or at least a working hypothesis that is comprehensible to the patient—forms the basis for safe application of MM modalities, which may be pharmacological, physical, or interventional in nature. Comprehensive history taking, physical examination, and, when indicated, imaging and laboratory investigations, must precede manual techniques. This section focuses specifically on contraindications, complications, and side effects within the field of MM Medicine.

2. Contraindications in MM Medicine

Contraindications in MM Medicine are determined by assessing the risk–benefit ratio for each patient, considering their individual clinical status. Two principal categories of MM procedures are recognised: direct (manipulative) and indirect (mobilisation and reflex-based) techniques.

2.1. Direct Techniques

For the purposes of this document, the term *manipulation* refers to the application of a controlled impulse of specific amplitude and velocity to a targeted structure to restore physiological motion and function. This typically involves a high-velocity, low-amplitude (HVLA) thrust. It is noteworthy that the term *manipulation* carries different meanings globally; for instance, in the United States, it may refer broadly to all manual interventions conducted by physicians trained in MM Medicine.

Conversely, *mobilisation* denotes the application of low-velocity, repetitive movements of controlled magnitude and duration aimed at restoring joint motion without exceeding physiological limits. The decision to apply any technique must be informed by the practitioner's expertise, patient consent, and appropriate clinical environment.

2.1.1. Contraindications with the Intention of Spinal Treatment

Absolute contraindications include:

- Lack of informed consent
- Operator without adequate MM training
- Acute or subacute vertebral fracture or dislocation
- Vertebral sepsis (e.g., discitis, osteomyelitis, meningitis)

- Primary or metastatic spinal malignancy
- Carotid or vertebrobasilar insufficiency (VBI)
- Spinal cord compression or irritation (positive Kernig's or Lhermitte's signs)
- Myelopathy
- Cauda equina syndrome
- Neurological disorders with potential cord compromise (e.g., syringomyelia)

These contraindications are grounded in the potential for catastrophic neurological or vascular consequences following inappropriate manual intervention.

2.1.2. Precautions with the Intention of Spinal Treatment

Relative contraindications or precautions necessitate heightened clinical vigilance and patient-specific risk stratification. These include:

- Spondylolysis with spondylolisthesis
- Severe instability or hypermobility
- Aortic aneurysm
- Cervico-occipital malformations
- Spinal stenosis
- Osteoporosis
- Inflammatory arthritis or connective tissue disease
- Spina bifida and other congenital anomalies
- Presence of internal fixation devices
- Pain during positioning or fear of manipulation
- Inadequate practitioner skill or suboptimal clinical setting

2.2. Indirect and Reflex based Techniques

Soft tissue, muscle energy, myofascial release, and indirect techniques are associated with a lower risk profile. Nonetheless, practitioners must apply these techniques judiciously, ensuring clear communication and informed consent. Although adverse effects are rare, any untoward event temporally associated with treatment may be attributed to it, underscoring the need for thorough documentation.

3. Complications and Side Effects in MM Medicine

3.1. Introduction

A complication or side effect is defined as any unintended adverse event occurring during or immediately after the application of manual diagnostic or therapeutic procedures, whether due to undetected patient pathology or procedural factors. Complications vary in severity, from minor transient discomfort to serious neurological or vascular injury. The literature consistently emphasizes that severe adverse outcomes are exceedingly rare, particularly when interventions are performed by trained professionals [50].

In a 2018 study by Degenhardt et al., 887 patients were followed after osteopathic manipulative treatment (OMT) and provided data at 1847 office visits. Patients reported they felt worse or much worse immediately after OMT at 45 office visits; the incidence rate for adverse events was 2.5 %. Pain or discomfort was the most commonly identified type of adverse event. Women reported adverse events more frequently than men [51].

3.2. Most Severe Complications

The most severe complications include death [52], spinal cord injury, and cerebrovascular accident (CVA). Fatal outcomes have been documented secondary to vertebrobasilar artery dissection or brainstem infarction following cervical HVLA manipulation in patients with unrecognised vascular pathology [53]. Spinal cord injury may result in quadriplegia, sensory loss, incontinence, or sexual dysfunction depending on the lesion level. Similarly, cerebrovascular injuries can lead to lateral medullary syndrome, cerebellar dysfunction, or ischemic stroke.

3.3. Serious Complications

Serious complications, although uncommon, may include vertebral fracture, dislocation, dissemination of infection or neoplasm, and aggravation of pain, or disability. Large-scale observational studies have reported rates of major adverse events ranging from 1 per 50,000 to 1 per 5 million cervical manipulations [54, 55]. Recent systematic reviews indicate that risk correlates strongly with pre-existing vascular or skeletal pathology rather than the manipulative technique itself [56].

3.4. Complications and Side Effects of Less Consequence

Mild, transient side effects are relatively common and typically self-limiting. These include local discomfort, transient headache, dizziness, light-headedness, fatigue, and short-term pain exacerbation. Prospective studies show such events occur in 20–45 % of patients but resolve spontaneously within 24–48 hours [57, 58].

SECTION IV: SAFETY IN MM MEDICINE

In coordination with the *European Core Curriculum and Principles of Manual Medicine* (ESSOMM, 2022), patient safety remains the primary consideration in the practice of MM Medicine. The safety of spinal manipulative therapy (SMT) has been extensively discussed in the literature [59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80,81, 82, 83, 84, 85, 86 87, 88].

A review on the existing literature [p].

1. Risks of Cervical Spine High-Velocity Thrust Treatments

1.1. General Considerations from the Literature

The quantification of risks associated with high-velocity, low-amplitude (HVLA) manipulation of the cervical spine remains a debated area within MM Medicine. Modern evidence from large-scale reviews and population-based studies indicates that the absolute risk of serious adverse vascular or neurological events remains exceedingly low [89, 90]. Biomechanical and hemodynamic investigations demonstrate that the forces generated during properly performed cervical HVLA techniques are below the thresholds required to cause arterial injury [91]. Recent systematic reviews and clinical guidelines continue to support cervical manual therapy as a safe and effective option for selected cases of mechanical neck pain when appropriate patient screening and technique precautions are observed [92, 93, 94].

Updated biomechanical studies using duplex Doppler, transcranial Doppler, and magnetic resonance angiography confirm that arterial compression or occlusion during clinically applied cervical manipulation is biomechanically improbable when techniques are applied by skilled practitioners [95, 96]. Systematic reviews published between 2020 and 2025 reaffirm that the incidence of severe adverse events following cervical HVLA manipulation is extremely low and comparable to other conservative interventions such as exercise or mobilisation [97, 98, 99, 100]. While minor adverse effects such as temporary soreness or dizziness may occur in up to 30–40 % of patients, these are typically mild and self-limiting.

Contemporary reviews consistently report that vertebrobasilar accidents (VBAs) temporally associated with cervical manipulation are more likely related to pre-existing arterial pathology rather than caused by manual therapy itself [101, 102, 103]. This conclusion aligns with the 2025 systematic review and meta-analysis demonstrating no excess risk of stroke associated with chiropractic or manual care relative to medical care for similar presenting complaints. Modern guideline frameworks, including those published by Corp et al. [104] and the WHO [105] in 2023, recognise spinal manipulation as an evidence-based, low-risk intervention within multimodal management of neck and back pain.

[p] For the purpose of this paper, all reports from the literature referring to any kind of manual techniques were reviewed, including reports concerning chiropractic techniques. Although direct cervical HVLA thrust techniques used by the chiropractic profession sometimes differ considerably from HVLA techniques taught in most manual medicine seminaries, these chiropractic observations needed to be mentioned and discussed as well. Therefore, the report on complications comprises all manual techniques used for the treatment of dysfunctional neck pain, including chiropractic HVLA thrust techniques.

Current evidence-based clinical practice guidelines emphasize that cervical HVLA manipulation should only be performed after thorough screening for vascular risk factors, neurological deficits, and connective tissue vulnerabilities. Practitioners are advised to avoid end-range rotational thrusts, especially in patients with atherosclerosis or recent infection [106, 107]. Recent international guidelines, including those from the Ontario OPTIMa Collaboration [108, 109], recommend HVLA manipulation as an appropriate component of a multimodal approach for non-specific neck pain, alongside exercise and education interventions.

Overall, contemporary scientific consensus supports the conclusion that cervical HVLA manipulation, when performed by trained clinicians following established contraindication screening, is not an independent risk factor for vertebrobasilar accidents. Ongoing surveillance, practitioner education, and adherence to updated safety and screening guidelines remain essential to maintaining the high safety profile of this therapeutic procedure.

1.2. Vertebrobasilar Accidents and Cervical Spine High-Velocity Thrust Therapy

Vertebrobasilar accidents (VBAs) following cervical spine high-velocity, low-amplitude (HVLA) thrust manipulation have long been a topic of debate within the field of MM Medicine. Early landmark studies by Haldeman et al. (2001, 2002) [110] identified vertebrobasilar ischemic events as rare and largely unpredictable adverse reactions potentially associated with cervical spine manual therapy. In a retrospective review of 64 medicolegal cases of stroke temporally related to cervical spine manipulation, Haldeman and colleagues found that 92 % of patients presented with prior head and/or neck pain, and 25 % reported the sudden onset of atypical pain and neurological symptoms indicative of a possible dissection in progress. No specific manipulation technique, dosage, or mechanical vector was consistently associated with the adverse outcomes (Haldeman et al., 2002). The authors concluded that such vascular events should be considered stochastic and unpredictable, possibly triggered by any cervical movement, including routine neck motion, independent of therapeutic intent.

Subsequent research corroborated these findings. Epidemiological analyses from Canada [111, 112] demonstrated that the incidence of vertebral artery dissection temporally associated with manual therapy is exceedingly low, estimated at approximately 1 per 5.8 million cervical manipulations. Notably, Cassidy et al. (2008) showed no increased risk of vertebrobasilar stroke in patients consulting chiropractors compared with those visiting primary care physicians, suggesting that patients often seek care for early dissection symptoms such as neck pain and headache, rather than sustaining injury from manipulation itself.

Meta-analytic evidence further supports this interpretation. The Cochrane Collaboration [113] reported that manipulation or mobilisation combined with exercise is beneficial for persistent mechanical neck disorders, but manipulation alone offers no superiority over mobilisation or exercise. Similarly, Canadian professional guidelines [114] concluded that no definitive predisposing factors can reliably predict dissection-related cerebrovascular ischemia. Haneline and Lewkovich [115] found that among 606 reported cases of cervical artery dissection, only 9 % were temporally associated with cervical manipulation, with most cases classified as spontaneous or trauma-related. More recent biomechanical analyses have indicated that the forces applied during HVLA manipulation are well below those required to mechanically damage vertebral arteries [116, 117].

Case-control studies, such as Smith et al. [118], initially suggested an independent association between cervical manipulation and vertebral artery dissection, though subse-

quent epidemiological re-evaluation has largely refuted a direct causal relationship [119]. A comprehensive review by Taylor and Kerry [120] emphasized that the focus should shift from identifying "at-risk" patients to recognising clinical signs of vertebral artery dissection in progress, such as sudden neck pain, dizziness, or neurological deficits.

Large-scale national surveys have also reinforced the rarity of serious adverse events. Haymo et al. [121] evaluated over 50,000 cervical manipulations and reported no serious adverse events, estimating a maximum risk of approximately 6 per 100,000 manipulations. Mild transient effects such as dizziness or localized soreness were more common but self-limiting. Similar findings were reported by Carnes et al. [122] and Ernst [123], supporting the conclusion that serious complications following cervical manipulation are exceedingly rare.

The Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders [124] recommended a triage-based approach to neck pain, emphasizing non-invasive and multimodal management. Manual therapy, including HVLA thrust techniques, remains a treatment option for selected patients when integrated within a comprehensive, evidence-informed plan of care. Current systematic reviews [125, 126] confirm that while cervical manipulation may provide short-term relief for neck pain, no clear superiority over mobilisation or exercise-based approaches has been established, and safety remains acceptable when performed by qualified practitioners.

In summary, the preponderance of current evidence suggests that vertebrobasilar artery dissection temporally associated with cervical spine manipulation is an extremely rare and largely coincidental event. Clinicians should maintain a high index of suspicion for pre-existing vascular pathology in patients presenting with acute neck pain or neurological symptoms, prioritise early recognition of vertebral artery dissection, and ensure informed consent that accurately reflects the low but non-zero risk of vascular complications.

2. Risks of Lumbar Spine Manipulation Therapy

Lumbar spine manipulation therapy (LSMT) remains a widely used conservative intervention for the management of low back pain and lumbar intervertebral disc herniation. Despite its established therapeutic role, concerns regarding potential adverse events continue to be discussed within the scientific and clinical communities. The following synthesis critically evaluates available evidence on the safety profile of LSMT, integrating both historical and contemporary findings.

In 1993 Cassidy et al. conducted one of the earliest systematic investigations into the safety and efficacy of side-posture spinal manipulation for patients with lumbar intervertebral disc herniation, concluding that the intervention was both safe and effective when performed by appropriately trained clinicians [127]. Subsequent analyses, such as Oliphant's graded review of prospective and retrospective studies, offered a quantitative estimate of risk. Oliphant calculated that the probability of lumbar manipulation resulting in clinically significant disc herniation progression or cauda equina syndrome (CES) was less than 1 per 3.7 million treatments [128]. This risk estimate compared favorably with the safety profiles of nonsteroidal anti-inflammatory drugs and surgical interventions for similar indications, emphasizing the relative safety of LSMT within multimodal conservative management frameworks.

Oppenheim et al. retrospectively reviewed medical and radiological records of 18 patients who experienced neurological deterioration following spinal manipulation. The

reported complications included myelopathy, paraparesis, CES, and radiculopathy, with 89 % of cases requiring surgical intervention and 87.5 % achieving good-to-excellent outcomes post-operatively [129]. Although the series highlighted that severe complications can occur, it also demonstrated their rarity relative to the total number of manipulative procedures performed. The authors recommended pre-treatment imaging and comprehensive risk stratification—particularly in individuals with significant or occult pathology—to mitigate preventable adverse outcomes.

Large-scale epidemiological data from Dvořák et al. (1993, 1999) remain among the most frequently cited assessments of manipulation-related risk. Based on surveys among members of the Swiss Medical Association for Manual Medicine (SAMM), the mean annual frequency of manual therapy for low back pain was approximately 805 cases per physician [130]. The overall incidence of transient side effects, such as localized discomfort or transient radicular symptoms, was approximately 1 in 16,716 for cervical manipulations and 1 in 20,125 for lumbar manipulations. Only nine patients (1 in 38,013) developed progressive radicular syndromes requiring surgery. Extrapolating from these data, a physician practicing manual medicine in Switzerland would encounter one complication due to lumbar manipulation approximately every 38 years. These data collectively underscore the low incidence of major adverse events relative to the total procedural volume.

Recent systematic reviews corroborate the safety profile reported in earlier literature. A meta-analysis by Paige et al. in the Annals of Internal Medicine concluded that spinal manipulation produces small to moderate improvements in pain and function for acute low back pain with an extremely low rate of serious adverse events [131]. Beliveau et al. similarly found that serious complications following manual therapy for back pain are rare and typically associated with pre-existing contraindications [132]. Ernst reinforced this finding, emphasizing that while mild and transient side effects (e.g., local soreness, stiffness) are common, major complications such as CES or vertebral fracture are exceedingly uncommon and usually linked to practitioner error or inappropriate patient selection [133]. A population-based cohort study by Whedon et al. reported no increased risk of lumbar disc herniation or CES hospitalization following chiropractic care compared to primary medical care, further supporting the relative safety of manipulation when contraindications are respected [134]. More recently, Swait et al. and Rubinstein et al. reiterated that spinal manipulation for low back pain is generally safe, provided evidence-based screening and technique application are observed [135, 136].

Cumulative evidence spanning three decades suggests that LSMT, when applied in appropriately screened patients and executed by qualified practitioners, is a safe intervention relative to pharmacological or surgical alternatives. The incidence of serious adverse events remains exceedingly low—estimated at fewer than 1 case per million manipulations—and is typically preventable through thorough clinical evaluation and adherence to contraindication guidelines. Pre-manipulative assessment, including neuroimaging when indicated, remains crucial in minimizing risk in patients with suspected disc pathology or neurological compromise. In conclusion, consistent with contemporary randomized controlled trials and systematic reviews, lumbar spine manipulation therapy can be considered a safe and effective modality in the conservative management of lumbar disc herniation and mechanical low back pain, provided that patient selection, clinician competence, and post-treatment monitoring are rigorously maintained.

3. Risks of Thoracic Spine and Rib Manipulation Therapy

There is very little literature available on specific risks of thoracic spine or rib manipulation therapy. Out of the last 30 years there are only four case-reports on epidural thoracic hematoma (partially combined with leakage of cerebrospinal fluid) [137, 138, 139] and one case-report of esophageal rupture [140] following not classified, but presumably direct chiropractic manipulations. In addition there is one case-report on rib fractures in an infant following chiropractic manipulations for the treatment of a colic [141].

Recent biomechanical and clinical research reinforces the safety profile of thoracic spinal manipulation when performed by trained clinicians. Three-dimensional force analyses demonstrate that high-velocity, low-amplitude (HVLA) thoracic manipulative thrusts transmit complex but controlled multidirectional forces, remaining within physiological joint limits when properly applied [142]. Cadaveric investigations have clarified that factors such as thoracic wall thickness and force–time characteristics significantly influence force transmission, suggesting the need for clinician awareness of patient-specific biomechanics [143]. A systematic review of adverse events found that while serious complications from thoracic thrust joint manipulation (TJM) can occur, they remain exceedingly rare, with most events related to excessive peak forces or unrecognised contraindications; the most frequent reported injuries involved mechanical or vascular trauma to the spinal cord or pleura [144]. Complementary imaging and mechanistic studies have further shown measurable but reversible changes in vertebral kinematics and intervertebral disc metabolism following spinal manipulation, supporting a plausible physiological basis for its therapeutic effects without evidence of structural harm [145, 146]. Collectively, these findings emphasize that adherence to established safety principles—appropriate patient selection, force moderation, and precise technique—remains the cornerstone for minimizing risk and maintaining the excellent safety record of thoracic manual procedures.

4. Risks of Pelvic Ring Manipulation Therapy (Sacroiliac and Pubic Symphysis Joints)

In a recent study of Hansel et al. [147] the applied techniques were safe and when using high-risk status and labor and delivery outcomes as an index for safety, no greater risk in the OMT group was found. Rather, there was a trend toward a mild protective effect of the OMT protocol on the development of high-risk status. This trend would indicate that the OMT protocol as applied in the PROMOTE study is a safe intervention during the third trimester. Otherwise, there is no literature available on specific risks of manipulation therapy of the pelvic ring or the sacroiliac and/or pubic symphysis joints. The data from the literature available in terms of lumbar spine manipulation therapy suggests the assumption that, after an initial assessment excluding patients with contraindications, manipulation therapy of the pelvic ring or the sacroiliac joints is safe compared to other non-invasive treatment modalities.

5. Risks of Dry Needling

Dry needling (DN) is increasingly employed within musculoskeletal and pain management practices as a minimally invasive technique for the inactivation of myofascial trigger points and modulation of neuromuscular dysfunction. While evidence supports its therapeutic efficacy in pain reduction and functional improvement, awareness of

potential adverse events (AEs) remains essential for clinical safety and patient education. This section presents a scientific appraisal of the risks associated with DN, integrating current literature and recent findings to outline its safety profile.

5.1. Incidence of Adverse Events

The majority of reported adverse events following DN are mild, transient, and self-limiting. These typically include local post-needling soreness, minor bleeding, bruising, and transient discomfort during or after treatment [148, 149, 150]. Post-needling soreness generally peaks within 24 to 48 hours and resolves spontaneously [151]. Minor bleeding or hematoma formation, occurring in approximately 7–17 % of sessions, represents the most frequent minor complication [152, 153].

Recent large-scale studies further reinforce the low rate of serious complications. For example, Brady et al. [154] reported mild AEs in 19.18 % of 7,629 DN sessions, with no major events observed. Similarly, Boyce et al. [155] synthesized over 20,000 DN treatments, noting that more than 99 % of AEs were minor. These data align with earlier findings by Padel et al. [156], who recorded only two pneumothoraces among 47,000 chest-region DN treatments, corresponding to a risk of approximately 0.004 %.

A recent review of DN safety literature between 2019 and 2024 concluded that overall AE incidence rates vary between 19 % and 36 %, depending on practitioner technique, anatomical region, and patient factors [157]. Collectively, these findings demonstrate that DN, when performed by qualified practitioners, presents a low risk of significant harm.

5.2. Serious Complications

Serious AEs are rare but clinically relevant. Pneumothorax remains the most frequently reported serious complication, particularly when needling is performed near the thoracic cage, upper trapezius, or paraspinal regions [158]. While case reports document such incidents, their occurrence remains exceedingly low in proportion to total DN applications [159].

Other serious complications, though infrequent, include infection or abscess formation secondary to breaches in aseptic technique [160], nerve injury or transient neuropraxia due to proximity to neural structures [161], and deep hematoma in anticoagulated or coagulopathic patients [162]. There are also isolated reports of spinal cord irritation or dural puncture during high cervical DN; however, these remain exceptionally rare [163].

The current body of evidence therefore supports the conclusion that DN is generally safe when performed by clinicians with comprehensive anatomical knowledge and adherence to sterile technique.

5.3. Factors Modulating the Risk

Several factors influence the likelihood and severity of DN-related adverse events:

- Practitioner expertise and anatomical proficiency – Inadequate training is a major predictor of complications. Proficiency in regional anatomy, including knowledge of pleural depth and neurovascular structures, is critical [164].
- Needle depth and anatomical region – Deep insertions near the thoracic cavity, neck, or abdomen increase risk of pneumothorax or organ puncture [165].
- Needling technique parameters – Needle size, insertion angle, and manipulation frequency (pistoning or rotation) can influence tissue trauma [166].

- Patient-specific factors – Coagulopathy, anticoagulant therapy, infection risk, or structural variations from previous surgery can elevate complication likelihood [167].
- Aseptic procedures – The use of sterile, single-use needles and proper skin disinfection remains non-negotiable for infection prevention [168].

These modulating factors underscore the necessity of standardized protocols and practitioner competency requirements in DN training and certification programmes.

5.4. Risk Mitigation and Clinical Implications

The consensus across recent systematic reviews and safety audits is that DN is a low-risk intervention when performed by appropriately trained healthcare professionals. Nonetheless, risk reduction strategies must be integral to all clinical applications:

- Adherence to comprehensive anatomy-based DN education and supervised clinical training [169, 170].
- Utilization of conservative insertion depths in anatomically sensitive regions such as the thorax and neck.
- Pre-procedural screening for bleeding disorders, anticoagulant use, and infection susceptibility.
- Maintenance of strict aseptic technique and immediate disposal of used needles.
- Clear patient consent procedures that include discussion of potential complications, including pneumothorax, infection, and bleeding.
- Standardized documentation and reporting of AEs to enhance safety surveillance and improve evidence quality.

5.5. Summary

Dry needling demonstrates a strong safety profile supported by extensive clinical data. While mild adverse events such as pain, bleeding, and bruising are relatively common (10–30 % of cases), serious complications occur infrequently—typically below 0.01 % in large datasets. Pneumothorax remains the most significant but rare risk. Proper practitioner training, anatomical precision, and rigorous aseptic technique are key to minimizing patient harm. Ongoing education, standardized safety reporting, and integration of DN safety guidelines across disciplines will further reinforce its clinical reliability.

6. Risks of Prolotherapy

Prolotherapy, also known as proliferative injection therapy, is an injection-based regenerative procedure intended to stimulate tissue repair in chronic musculoskeletal pain conditions. While its use dates back to the 1950s, when George Hackett formalized injection protocols, its modern applications continue to evolve under more standardized scientific and clinical scrutiny [171]. Evidence supports its use in various conditions including low back pain, tendinopathies, and osteoarthritis, though the consistency of efficacy and safety data remains under evaluation [172, 173, 174].

The vast majority of adverse effects associated with prolotherapy are localized, mild, and self-limited. Patients commonly experience transient soreness, localized swelling, mild bruising, or bleeding related to needle trauma. These events are typically short-

lived and reflect expected inflammatory and nociceptive responses rather than pathological complications.

A post-injection pain flare during the first 72 hours after treatment is a well-recognised clinical phenomenon, reported in approximately 10–20 % of patients receiving dextrose prolotherapy for knee osteoarthritis. The discomfort usually subsides within several days without long-term sequelae [175].

Adverse effects may depend on the composition and concentration of the injected proliferant. Dextrose, the most widely used agent, is considered extremely safe and is FDA-approved for intravenous use in hypoglycemia management; notably, 25 % dextrose has been in use for more than six decades with no reported systemic adverse events. Morrhuate sodium, a vascular sclerosant also used in gastrointestinal and varicose vein procedures, may rarely cause allergic reaction. Phenol–glycerin–glucose (P2G) solutions, though not FDA-approved, have not been associated with significant adverse reactions in published clinical trials.

Serious adverse events are exceedingly uncommon in prolotherapy and, when reported, have typically been linked to obsolete or unsafe techniques. Rabago and colleagues described several historical cases of neurological injury following perispinal injections using concentrated zinc-sulfate solutions, including one fatal case in 1959. These solutions are no longer in use.

In a survey of 95 clinicians performing prolotherapy, 29 pneumothoraces (two requiring chest-tube insertion) and 14 allergic reactions were reported, none classified as severe [176]. A later survey produced similar findings: transient spinal headache, pneumothorax, and minor nerve irritation occurred at rates comparable to other spinal injection procedures. Importantly, no serious side effects were identified when prolotherapy was used in peripheral joint indications [177].

Recent systematic reviews and meta-analyses reinforce the impression that prolotherapy is generally safe, though adverse event reporting remains inconsistent and underpowered. A 2024 evidence synthesis by the U.S. Department of Veterans Affairs concluded that while prolotherapy appears low-risk, most available safety data are of low or moderate certainty due to methodological limitations [178].

In a 2022 systematic review and meta-analysis, Chung et al. found that dextrose prolotherapy for chronic musculoskeletal pain produced only mild local reactions, with no serious adverse events reported [179]. Similarly, McDonough et al., in an umbrella review of injection therapies, identified minor adverse effects such as transient pain or swelling but no severe outcomes [180].

Further, Lee et al. [181] investigated the concurrent use of non-steroidal anti-inflammatory drugs (NSAIDs) during dextrose prolotherapy for knee osteoarthritis and found no increase in adverse events, indicating that such combination therapy may be safely tolerated. A narrative review by Reeves & Sit underscored the importance of ultrasound guidance and aseptic technique in minimizing even minor risks [182].

In an updated analysis of osteoarthritis management, Zhao et al. described prolotherapy as a “very low-risk procedure,” with serious complications remaining extraordinarily rare [183]. The most frequent side effects were short-term local soreness and swelling. A meta-analysis of rotator cuff disorders similarly reported no significant safety concerns, observing only temporary irritation at the injection site [184]. A scoping review by Tognolo et al. reported no adverse events across studies of chronic tendinopathy treated with dextrose prolotherapy [185].

Conversely, a 2022 meta-analysis on lateral elbow tendinopathy noted that while prolotherapy produced favorable outcomes, the rate of minor adverse events was slightly higher than in noninvasive control groups [186]. The VA Evidence Synthesis Programme (2024) reaffirmed that evidence on harms remains uncertain due to sparse and heterogeneous data[2]. Moreover, Goh et al. (2021) emphasized in a network meta-analysis that standardized adverse event reporting should become mandatory for future trials [187].

A 2025 randomized trial by Mociu et al. reported transient adverse effects such as injection-site pain, dizziness, and leg numbness, occurring more frequently in prolotherapy than in control mechanical needling groups but resolving spontaneously [188]. Conversely, in a case series after total knee arthroplasty, no complications were observed with periarticular dextrose prolotherapy [189].

A 2022 case report by Suryadi et al. described complete symptom resolution in a patient with a partial supraspinatus tear following 15 % dextrose prolotherapy, with no adverse effects documented [190]. Another series by Sam et al. noted successful outcomes in patients with comorbidities undergoing prolotherapy in combination with rehabilitation, again reporting no serious complications [191].

The cumulative evidence from 2010 through 2025 consistently indicates that serious adverse events from prolotherapy are exceedingly rare, with minor, self-limiting discomfort representing the majority of adverse reactions. Improved reporting practices in newer studies have likely led to more transparent documentation of mild effects rather than an increase in complications.

Nevertheless, clinicians must remain vigilant. Injections near the spine or pleura carry a small but real risk of neurological or pulmonary injury, underscoring the need for anatomical expertise and image-guided technique. Future studies should integrate standardized adverse event grading, multicenter safety registries, and long-term follow-up to establish a comprehensive risk profile.

In conclusion, when prolotherapy is performed by trained practitioners using proper aseptic protocols, it remains a safe, minimally invasive regenerative therapy with a favorable benefit–risk ratio.

SECTION V: EVIDENCE IN MM MEDICINE

Evidence-based MM Medicine (EBM) is not different from evidence-based medicine in other medical specialties.

"Evidence-based medicine is the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients. EBM integrates clinical experience and patient values with the best available research information. […] The practice of evidence-based medicine is a process of lifelong, self-directed, problem-based learning in which caring for one's own patients creates the need for clinically important information about diagnosis, prognosis, therapy and other clinical and health care issues. It is not 'cookbook' with recipes, but its good application brings cost-effective and better health care. The key difference between evidence-based medicine and traditional medicine is not that EBM considers the evidence while the latter does not. Both take evidence into account; however, EBM demands better evidence than has traditionally been used." (Masic et al. [192])

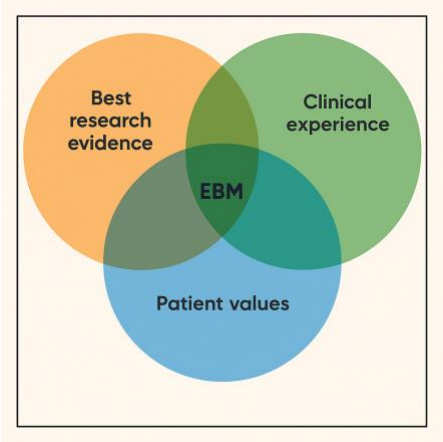

Fig. 5: EBM modified from Haneline (2007) [193].

The complexity of EBM described above is reflected in the development of MM Medicine since the middle of the 20th century.

During this period, a complex system of national and transnational scientific societies has developed from the activities of individual MM therapists and individual seminaries of small groups of doctors, which have ensured that the criteria of an EBM in clinic, teaching and research are met.

In an earlier publication from 2004, FIMM and its exponents Dr R. Palmer and Prof J. Patijn already commented on EBM [194].

In regular meetings of the MM societies, academies, teachers and expert commissions, opinions and convictions from clinical experience are agreed and published in relevant international journals. This corresponds to level IV of the evidence classes according to the recommendations of the Agency for Healthcare Research and Quality (AHRQ) [195]. A higher level of evidence is dependent on methodologically high-quality non-experimental studies such as comparative studies, correlation studies, or case-control studies (level III) and high-quality studies without randomization (level IIb) as well as sufficiently large, methodologically high-quality randomized controlled studies (RCT) (level Ib).

EBM is not limited to randomized controlled trials (RCTs) and meta-analyses; however, these are considered the gold standard for most questions assessing the benefits and risks of therapies.

A prerequisite for evidence-based diagnostics in MM is good reproducibility, validity, sensitivity and specificity studies of the diagnostic procedures. To ensure the quality of such studies, the former *Scientific Committee* of FIMM has developed a *Reproducibility protocol for diagnostic procedures in MM* [196] in recent years. The protocol can be used as a kind of cookbook format to perform reproducibility studies with kappa statistics. It makes it feasible to perform reproducibility studies in MM Medicine clinics and by Educational Boards of the MM Societies [197].

On behalf of the *European Scientific Society of Manual Medicine* (ESSOMM), the Research Advisory Center of the GSMM in 2019 carried out a literature search on current study results (2009-2019) on diagnostics and therapy in MM Medicine. Items for search: The search identified 1,499 unique citations limited to humans. After screening titles and abstracts, 482 full text manuscripts were retrieved for further assessment, 216 of them were systematic reviews. The individual publications were subdivided by hand according to their target content: diagnostics (n=85), specific therapy (n=119), basics and safety (n=39).

In a recent systematic review, Beyer et al. including 67 publications conclude based on the available scientific material that a general evidence-based medicine level III is available, with individual studies reaching level II or Ib, which creates the prerequisite and the ability to fulfil tasks for a satisfactory or expected verification (validity) of MM diagnostic and therapeutic procedures [198]. Two studies are mentioned here as examples for good quality studies (level Ib), first focused on functional disorders and pain in the lower spine, the other on functional disorders of the head joints in babies:

The first is demonstrating a clear difference between patients with low back pain and subjects without back pain regarding their ability (in 5 of 6 tests) to actively control the movements of the low back [199]. The second used a setting with 202 infants at the age of 14-24 weeks with postural and movement findings, examined in four study centers using a standardized 4-item symmetry-score. Result: The single MM treatment significantly improves postural and motor asymmetries in infants with articular and segmental dysfunctions causing tonic asymmetric positions [200].

A large systematic review investigating prognostic factors for musculoskeletal pain in primary care included over 48,000 participants and assessed 18 different outcome domains. Of the included studies, 51 focused on spinal, back, or low back pain; 12 on neck, shoulder, or arm pain; 3 on knee pain; 3 on hip pain; and 9 on multisite or widespread pain. Quality scores ranged from 5 to 14 (mean 11), with 65 studies (83 %) scoring 9 or higher. This review provides new evidence supporting the presence of generic prognostic factors across MSK conditions in primary care. Such factors include pain intensity, widespread pain, high functional disability, somatization and movement restriction. This information can be used to screen and select patients for targeted treatment in clinical research as well as to inform the management of MSK conditions in primary care [201].

Recently, a literature search from the ESSOMM found 24 relevant systematic reviews or meta-analyzes related to manual therapy. The individual reviews are aimed at different therapy goals for different complaints in different parts of the body. The search results have not yet been evaluated coherently.

An update of the Bone and Joint Decade Task Force on Neck Pain and its Associated Disorders by the OPTIMa collaboration [202] concluded: Our review adds new evidence to the Neck Pain Task Force and suggests that mobilisation, manipulation (HVLA), and clinical massage

are effective interventions for the management of neck pain. It also suggests that electro-acupuncture, strain-counterstrain, relaxation massage, and some passive physical modalities (heat, cold, diathermy, hydrotherapy, and ultrasound) are not effective and should not be used to manage neck pain.

A double-blinded randomized controlled trial concerning spinal high-velocity low-amplitude manipulation in acute nonspecific low back pain [203] where 47 subjects received spinal manipulation, showed in a subgroup of patients with acute nonspecific low back pain: *Spinal manipulation was significantly better than nonsteroidal anti-inflammatory drug diclofenac and clinically superior to placebo*.

Other reviews are dedicated to:

- Low back pain [204, 205]
- Neck and/or low back pain [206, 207]
- Upper limb pain [208]
- Knee pain [209, 210]
- Function of the temporomantibular joint [211, 212]

In practically all studies, there are limiting factors that limit the informative value. For example, one of the limiting factors is that there is often no distinction between manipulation and mobilisation.

The results of this systematic review showed:

- Spinal manipulation, and mobilisation, acupuncture, massage treatments were significantly more efficacious for neck or low-back pain than no treatment, placebo, physical therapy, or usual care in reducing pain.
- Spinal high-velocity low-amplitude procedures are cost-effective treatments to manage spinal pain when used alone or in combination with general practitioner care or advice and exercise compared to general practitioner care alone, exercise or any combination of these.
- Spinal high-velocity, low-amplitude procedures have a statistically significant association with improvements in function and pain improvement in patients with acute low back pain.
- Preliminary evidence that sub-group specific manual therapy may produce a greater reduction in pain and increase in activity in people with low back pain when compared with other treatments. Individual trials with low risk of bias found large and significant effect sizes in favour of specific manual therapy.
- Upper cervical manipulation or mobilisation, and protocols of mixed manual therapy techniques presented the strongest evidence for symptom control and improvement of maximum mouth opening.
- Musculoskeletal manipulations are effective for the treatment of temporomandibular joint disorders and there is a greater effect for musculoskeletal manual approaches compared to other conservative treatments for temporomandibular joint disorders.
- The results of the available reviews and the evidence found on the effect of manual medical treatment form the basis for the inclusion of manual therapy in guidelines for the treatment of acute and chronic pain in the musculoskeletal system, especially in the spine, joints and muscles.

Recent randomized controlled trials and neurophysiological studies have further strengthened the evidence base for MM interventions, particularly spinal manipulative therapy (SMT). A 2024 RCT demonstrated that a single lumbar SMT significantly increased pressure pain thresholds at the posterior superior iliac spine compared to a sham ultrasound control,

with effects persisting up to 30 minutes post-intervention, suggesting measurable short-term neurophysiological modulation through both peripheral and central mechanisms of pain processing [213]. Complementary findings were reported by Puntumetakul et al., where the combination of thoracic manipulation and the Rungthip massage technique resulted in greater reductions in mechanical neck pain and neural tension compared to manipulation alone [214]. Systematic review data confirm these findings: a 2023 meta-analysis of randomized trials found thoracic manipulation to significantly reduce pain intensity and neck-related disability in chronic mechanical neck pain, providing low-to-moderate quality evidence for its clinical effectiveness [215]. Other experimental work has broadened the mechanistic understanding of manual therapy. Sillevis et al. demonstrated changes in EEG brainwave activity following thoracic thrust manipulation—both with and without an audible cavitation—indicating cortical relaxation responses independent of the audible "pop" phenomenon [216]. Additionally, a Turkish single-blinded RCT on lumbar disc herniation showed manual therapy to significantly improve not only pain and mobility but also psychological outcomes such as anxiety, depression, kinesiophobia, and pain catastrophizing, confirming the biopsychosocial relevance of manipulative interventions [217]. Experimental research on healthy volunteers has also shown that thoracic thrust manipulation can increase lower limb neurodynamics, supporting the concept of regional interdependence across the kinetic chain [218]. Collectively, these studies reinforce the growing body of evidence that MM Medicine produces quantifiable neuromechanical and psychophysiological effects, with both short-term and sustained clinical benefits.

In December 2023 WHO issued its first guideline for the non-surgical management of chronic primary low back pain in adults. WHO recommends education, exercise, some physical therapies (including spinal manipulative therapy and massage), psychological therapies, and selected medicines (e.g., NSAIDs), emphasizing multimodal care delivered in primary/community settings. Manual therapy is recommended as part of a package alongside exercise and education, not as a stand-alone intervention [219].

Evidence published since 2020 continues to show small-to-moderate average effects for manual therapy, with important nuances:

- A 2025 Cochrane overview of non-pharmacological, non-surgical treatments reported that for acute/subacute LBP, spinal manipulation probably makes no difference to function vs placebo in the short term; effects for chronic LBP were generally modest, and benefits were clearer for exercise and psychologically informed care [220].
- Conversely, a placebo-controlled RCT (participant-blinded) in 2024 found spinal manipulation superior to sham for chronic LBP pain reduction, with blinding and expectation effectively controlled. This supports a small but clinically relevant benefit in selected chronic LBP patients [221].
- Comparative and adjunct trials suggest manual therapy combined with exercise can yield greater short-term improvements in pain and disability than exercise alone; however, effects tend to attenuate at medium/long-term follow-up and adherence to exercise remains a key determinant of outcome [222].
- Contemporary syntheses continue to support manual therapy (mobilisation/manipulation) as part of a multimodal approach for mechanical/non-specific neck pain, with effects similar to neck-specific exercise when adherence is high [223].
- For cervicogenic headache and cervical radiculopathy, recent network/meta-analyses indicate benefits of specific manual therapy approaches (e.g., SNAGs, joint mobilisations) for pain and disability, though heterogeneity and risk-of-bias limit certainty and head-to-head superiority among techniques remains unclear [224, 225].

- Multiple up-to-date reviews (2023–2025) report small-to-moderate improvements in pain, maximum mouth opening, and disability with manual therapy or TMJ mobilisation; effects are often small and the overall certainty varies from very low to high depending on outcome and study quality. These data support manual therapy as an option within multimodal TMD care [226].
- A 2021 critical review concluded that static and motion palpation for the lumbar spine have poor inter-rater reliability and limited validity for identifying symptomatic levels or facet/SI joint pain generators; this underscores the need for standardized protocols and complementary assessment strategies [227].
- Emerging evidence (2023–2024) shows good diagnostic/treatment-plan concordance for telehealth MSK assessments and interest in objective tools (e.g., MyotonPro) to improve reliability, though these do not replace clinical reasoning [228].
- A 2023 review of adverse events associated with spinal manipulation reports that most events are benign and transient, while serious events are rare; causality, particularly for cervical artery dissection, remains difficult to establish due to methodological constraints [229].
- More recent mappings (2024–2025) catalog serious adverse events primarily of vascular origin after cervical manipulation; absolute risk remains very low but warrants screening for red flags, shared decision-making, and informed consent [230].
- The weight of recent evidence supports MM Medicine/MM Therapy as a component of multimodal care, particularly when integrated with exercise, education, and (where indicated) psychologically informed interventions. Effect sizes are typically small-to-moderate on average, with larger benefits possible in well-selected subgroups (e.g., chronic LBP responding to high-quality manipulation protocols, adherence-optimized neck pain programmes). Current data continue to emphasize care package design, patient stratification, and adherence, rather than reliance on single modalities [231].

SECTION VI: QUALITY IN EDUCATION AND TRAINING IN MM MEDICINE

1. Initial Situation

MM Medicine has developed from empirical medical experience that has never been precisely defined in history. This might explain why education and training of physicians and surgeons in MM Medicine is quite variable all over the world. This was one of the reasons why in 2013 FIMM published the first edition of *the Guidelines on Basic Training and Safety* [232]. Since then, the quality of outcomes of many FIMM member societies has improved significantly. However, a common standard of training in MM Medicine has not yet been realised. Nevertheless, the aim will not be to strive for a complete *unité de doctrine* (doctrinal unity), as diversity is the prerequisite for further discussions and thus also for an improvement in quality. Nevertheless, the need for some kind of standardisation also on quality in MM Medicine remains evident [233]. The *European Scientific Society for Manual Medicine* (ESSOMM) addressed this issue in detail in 2015 in its submission to the *European Union for Medical Specialists* (UEMS) entitled *Training Requirements for the Additional Competence Manual Medicine for European Medical Specialists* [234].

2. Quality Objectives

According to the World Health Organization (WHO) quality of health care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes [235]. It is based on evidence-based professional knowledge and is critical for achieving universal health coverage. As countries commit to achieving *health for all*, it is imperative to carefully consider the quality of health care and health services. Quality health care can be defined in many ways but there is growing acknowledgement that quality health care should be:

- **effective** – providing evidence-based healthcare services to those who need them,
- **safe** – avoiding harm to people for whom the care is intended, and
- **people-centred** – providing care that responds to individual preferences, needs and values.

One of the intentions of these Guidelines is to provide support within the framework of MM Medicine that serves these objectives. The various and graduated contents of training and education in MM Medicine will not be discussed in this chapter. These contents can be looked up in the previous chapters. There, the content qualities are discussed in detail.

One of the quality gaps in the concepts currently practiced in MM Medicine must nevertheless be addressed. Only a few countries have *educational programmes* in MM Medicine that are university-based. This affects research and teaching where this has not yet been achieved.

3. Different Aspects of Quality

Three aspects of quality can be identified. They may be called quality of structure, process and outcome [236]. Quality standards in education are especially required for the following:

3.1. Personal Qualification of Trainers

3.1.1. Requested Qualifications of Trainers

A *trainer* should be a registered medical specialist recognised and registered to having additional MM competence at a minimum of a level 3 (Specialist Level or Specialty Level). They will have satisfied any relevant national requirements as regards accreditation, appraisal, or training to be a trainer. A *programme (or course) director* should be someone who has been or is a trainer and who has considerable knowledge and experience of training physicians or surgeons. Trainers and programme or course directors should preferably be in active clinical practice and engaged in training in a training centre or network.

Their work should be reviewed within the training centre or network on a regular basis at staff appraisals or equivalent procedures but in any case, it should be a requirement that their training activities are reviewed regularly.

3.1.2. Core Competencies for Trainers

A trainer shall be:

- Familiar with all aspects of the overall MM curriculum as it relates to practice within their country or their society.
- Experienced in teaching and in supporting learners.
- Skilled in identifying the learning needs of their trainees and in guiding the trainees to achieve their educational and clinical goals.
- Able to recognise trainees whose professional behaviours are unsatisfactory and initiate supportive measures as needed.
- Trained in the principles and practice of medical education.

3.1.3. Quality Management for Trainers

It is presumed that trainers and programme or course directors will have their job description agreed with their employer which will allow them sufficient time for support of trainees and in the case of programme or course directors, sufficient time for their work with trainers.

It should be unusual for a single trainer to have more than 14 trainees in a course; more trainees should warrant more trainers to maintain this ratio. The number of trainees would determine the amount of time each day that should be allocated to their individual support.

Trainers and programme or course directors will collaborate with trainees, the programme or course director and their Institution to ensure that the delivery of training is optimal. Feedback from trainees will assist in this regard.

3.2. Quality of the Organisation or Institution Providing the Education

In order to guarantee structural quality, a number of requirements must be met.

- Definition of criteria for participants acceptance.
- Selection of teachers.
- Presentation of an educational programme.
- Provision of room facilities, treatment-tables, time-schedules, media etc.
- Controlling of presence of participants, the time schedules for lectures, evaluate the individual training and provide the discussion of the participant's questions during the courses.
- Providing methods to assess outcomes and evaluate results for the participants (multiple-choice questionnaires, verbal or written assessments).
- Standardised evaluation of every course, with information to the teacher.
- Producing certificates of participation with all necessary information.
- Transparency of all external sponsoring – sponsoring may not influence the contents of teaching in any respect.
- On-demand presentation of all information regarding the teaching towards the governmental health care institutions or towards external quality organisations.

A *training centre* is a place or a number of places where trainees are able to develop their MM competence in courses. Such provision may include sites that are condition specific and thus not offer a wide clinical experience such as that provided by a large centre. Thus, MM training may take place in a single institution or in a network of institutions working together, to provide training in the full-spectrum of clinical conditions and skills detailed in the curriculum. This should preferably include a hospital or institution that provides academic activity and is recognised for training with favour in rehabilitation or orthopaedics.

It would be disadvantageous for a trainee to have only one trainer during their entire training period. It would be more usual for a trainee to have a number of named trainers with whom they work in the different courses. It is not a requirement that a training centre is also an academic centre but it is desirable that a training centre should have strong academic links and contribute to research.

4. Quality Tools in MM Medicine [q]

4.1. Quality Tools in MM Medicine Training

Within the framework of the tools available for promoting quality in MM training, 3 levels can be identified.

4.1.1. Quality Level 1: Postgraduate Education

- Multi-modular structure with continuous learning progress checks.
- Teaching of textbook-based techniques.
- Participant surveys after every module.
- Ongoing further development of the educational programme.
- Continuous further development of learning content and quality monitoring.
- Compulsory learning group activities and logging.
- Two assessments to be passed (written and practical).
- Top trainers as lecturers and self-checking of competences.

4.1.2. Quality Level 2: Re-Certification

- High-quality educational programme: tutorials, training circles, updates, and congresses.
- Multi-stage reminder system to remind title holders of their educational obligations.
- Quality monitoring.
- Recognition guidelines for external educational courses.
- Compulsory continuing education, which is monitored.

4.1.3. Quality Level 3: Teacher Education

- Control of the skills and abilities.
- Periodic performance appraisal.
- Multilevel teaching skills (level 1 and level 2).

The Quality Tools in MM Medicine training described here are reflected in **Fig. 6** below.

[q] In 2019, the Executive Board of the Swiss Medical Association for Manual Medicine (SAMM) extensively addressed the topic of quality in manual medicine in an internal document. The following tables and charts are taken from that work and have been adapted here.

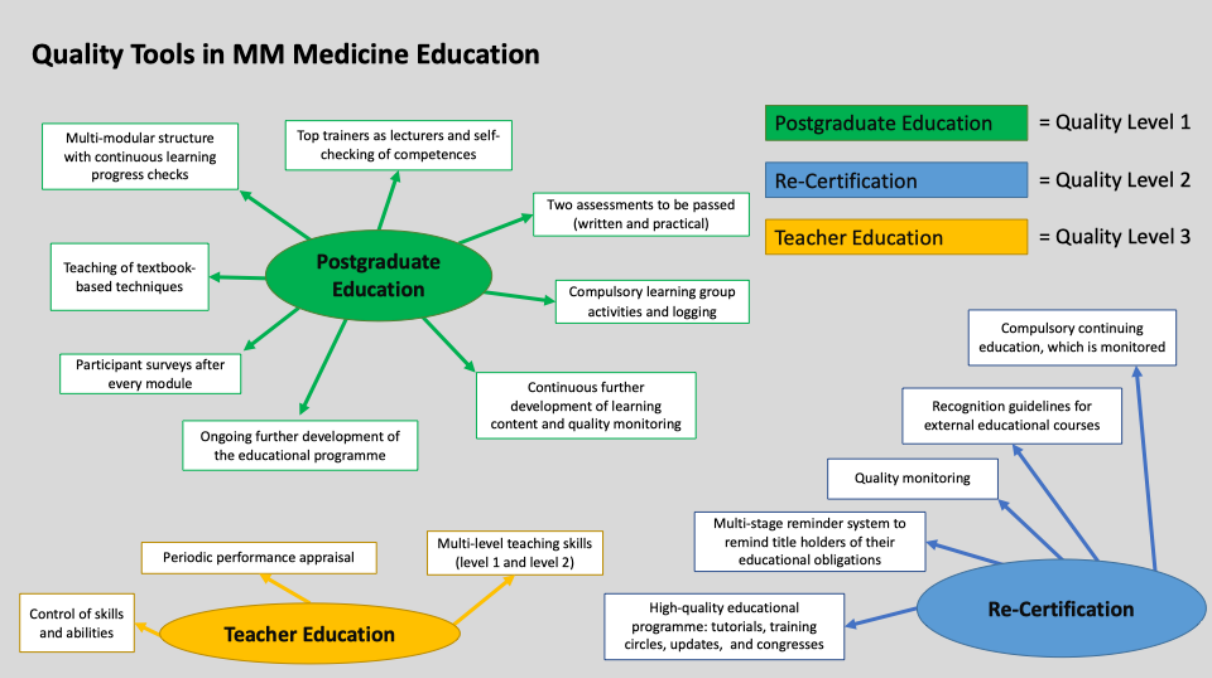

Fig. 6: Quality Tools in MM Medicine Education.

4.2. Quality Tools of Providers of MM Training

4.2.1. Executive Board

- Quality and progress controls in the strategic path.
- Professional policy positioning on MM Medicine issues.
- Exchange with expert networks, universities and medical associations.
- Responsibility towards continuing and postgraduate education, re-certification and the awarding of titles.
- Selection of the best-performing teachers.
- Expansion of the partner network.
- Implementation of a status-appropriate concept for exams.
- Regular meetings and dialogue with the specialised boards.
- Election proposal of the members of the specialised boards.

4.2.2. Continuing Education Board

- Evaluation and recognition of educational courses.
- Re-certification.
- Assessment of the claim for re-certification.
- Assessment of externally acquired credits.
- Recognition of foreign continuing education diplomas.
- Regular meetings and dialogue with the Executive Board and the Postgraduate Education Board.

4.2.3. Postgraduate Education Board

- Preparation, evaluation and documentation of the assessments.
- Quality controls for postgraduate and continuing education.
- Congress organisation and scientific programmes.
- Teacher education with multi-level control system.
- Definition of teaching and learning content in MM Medicine.
- Taking Quality Measures and monitoring.
- Organisation of further education for teachers.
- Regular meetings and dialogue with the Executive Board and the Continuing Education Board.

The Quality Tools of providers of MM Medicine training described here are reflected in **Fig. 7** below.

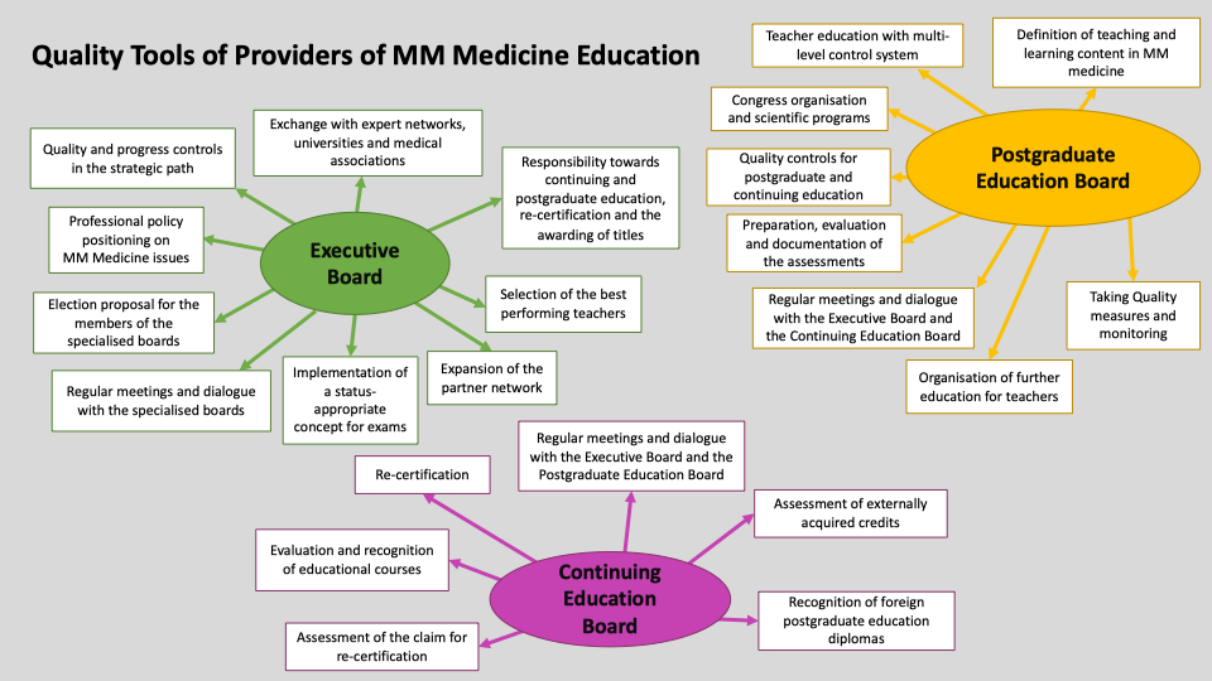

Fig. 7: Quality Tools of providers of MM Medicine education.

4.3. Further Quality Tools

- Co-operation and exchange between expert networks, universities and medical associations.
- Co-operation with international umbrella societies in MM Medicine.
- Clearly structured education in MM Medicine.
- Regularly organised congresses or conventions.

- Co-operation with a journal on MM Medicine and developments in medical science.
- Publishing on MM Medicine.
- Creation and evaluation of surveys on training, congress and lecturer services.
- Maintaining a directory for referring clinics and practices specialising in MM Medicine.
- Regular information on offers and innovations via newsletter.
- Provision of congress documents, lectures and presentations on the society's website.

Further Quality Tools in MM Medicine described here are reflected in **Fig. 8** below.

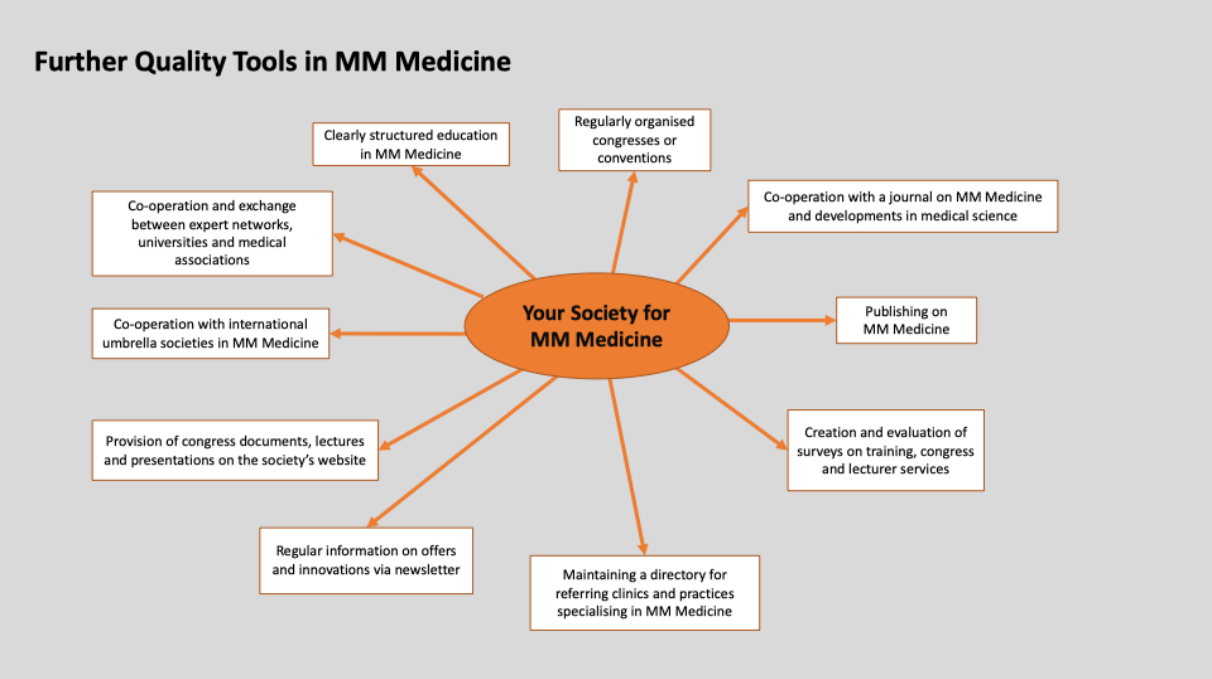

Fig. 8: Further Quality Tools in MM Medicine.

5. Competent and Independent Quality Institution

Every university, institute or organisation that wants to become involved in medical education in the future needs accreditation and audit-based certification or certification for this task. Accreditation or certification audits will be conducted exclusively by independent organisations that are officially authorized by the national healthcare authorities responsible for the relevant government regulations. Thus, any organisational or fiscal link between the *external quality assurance provider* and the one to be investigated threatens the accreditation or certification which may lead to revocation of accreditation.

To avoid being checked by *non-medical technicians* who are not able to define evidence-based indicators for medical education, it is necessary for the international MM community to have an independent, but nevertheless competent scientific external quality assurance partner. This organisation must be formally recognised by the stakeholders of the health care system to be competent to independently check the regulated procedures. Following a positive audit process, it is authorised to grant accreditation or certification.

Such an international institution has not yet been established for MM Medicine.

SECTION VII: ETHICAL PRINCIPLES IN MM MEDICINE

1. Fundamental Ethical Frameworks

MM Medicine is uniquely characterised by intensive and often repeated physical contact between physician and patient. This clinical intimacy places heightened demands on ethical awareness, professionalism, and communication skills. The foundation of ethical practice in MM Medicine rests on the four classical principles of biomedical ethics—respect for autonomy, beneficence, non-maleficence, and justice—as articulated by Beauchamp and Childress [237]. These principles form the ethical substrate of all patient-centred healthcare, yet require contextual interpretation within the hands-on nature of MM Medicine.

Modern frameworks of medical professionalism further integrate these principles with competencies in empathy, integrity, accountability, and inter-professional collaboration [238]. In international and multicultural contexts, physicians must also recognise that conceptions of autonomy, consent, and bodily integrity are influenced by cultural norms, historical traditions, and social power structures [239]. Ethical sensitivity therefore entails not only adherence to universal principles but also an appreciation of cultural diversity in the doctor–patient relationship.

2. Informed Consent as a Dynamic Process

Informed consent in MM Medicine transcends its legal function; it represents an ongoing dialogical process that manifests respect for patient autonomy [240]. This process should enable patients to make informed choices about diagnostic and therapeutic interventions, particularly when procedures involve direct physical manipulation of the body.

Patients must receive information in language that is comprehensible and relevant relevant to their health literacy level [241]. They should be informed about the purpose, expected benefits, possible risks, alternative approaches, and the right to withdraw consent at any stage. Explicit verbal and written consent is essential for any procedure that carries inherent risk—particularly for manipulative techniques involving the cervical spine or other sensitive regions [242]. When language, cognitive, or cultural barriers exist, professional interpreters and culturally sensitive communication strategies must be employed [243].

Through this process, informed consent strengthens mutual trust, mitigates medicolegal risks, and promotes a partnership model of care.

3. Boundaries and Power Relations in the Clinical Encounter

The physical proximity inherent in MM Medicine introduces particular vulnerabilities with respect to professional boundaries. The physician–patient relationship is inherently asymmetrical, as patients rely on the clinician's knowledge, skill, and authority [244]. Ethical competence requires conscious effort to neutralise this imbalance through transparency, patient participation, and respect for bodily and emotional boundaries.

All forms of ambiguous communication, suggestive language, or inappropriate touch are ethically impermissible [245]. Physicians must obtain explicit consent before examin-

ing or treating sensitive areas and ensure that chaperones are available upon request [246]. Institutions should provide training on boundary management, ethical communication, and recognition of potential transgressions. The goal is to establish a clinical atmosphere characterised by safety, dignity, and mutual respect.

4. Gender Sensitivity and Diversity in Practice

MM Medicine serves an increasingly diverse patient population. Ethical and effective practice therefore requires gender sensitivity and cultural competence. Sex and gender differences influence musculoskeletal anatomy, pain perception, hormonal modulation of connective tissues, and health-seeking behaviour [247]. Clinicians must integrate these factors into diagnostic reasoning and treatment planning.

Patients should be offered the option of requesting a practitioner or chaperone of the same gender, particularly when examination involves intimate regions or when dictated by cultural or religious considerations [248]. Moreover, ethical medical practice entails non-discrimination with respect to gender, age, ethnicity, religion, disability, or sexual orientation [249]. Such inclusivity aligns with EU legislation on equality and protection against gender-based violence [250] and with WHO recommendations for patient-centred care [251].

5. Prevention of Abuse and Misconduct

The close physical nature of MM practice renders it a high-risk field for potential boundary violations or abuse. Any form of sexual, physical, or psychological misconduct constitutes a serious breach of medical ethics and may have criminal implications [252]. Physicians must be vigilant not only about their own conduct but also about institutional safeguards that prevent abuse.

Healthcare organisations and professional associations should implement transparent reporting mechanisms, independent complaint procedures, and whistleblower protections [253]. Regular ethics audits, supervision, and mentoring help identify risks and support practitioners in maintaining ethical integrity. The overarching ethical obligation is to ensure a safe, respectful, and trust-based therapeutic environment.

6. Documentation and Transparency

Ethical practice is inseparable from accurate and transparent documentation. Comprehensive record-keeping ensures clinical continuity, supports research and quality assurance, and provides legal protection for both patients and clinicians [254]. Documentation must include details of information provided, consent obtained or refused, and any adverse or unexpected events.

Transparency is also a core ethical principle in professional accountability. Open disclosure of adverse outcomes—delivered with empathy and honesty—reinforces patient trust and aligns with international safety standards [255].

7. Continuous Ethical Education and Reflective Practice

Ethical competence is not a static attribute but a lifelong process of reflection and learning. Continuous professional development should therefore include structured modules on bioethics, communication, and diversity awareness [256]. Reflective practice, peer supervision, and intervision groups help practitioners identify ethical blind spots and prevent moral distress [257].

Professional bodies should establish mandatory ethics curricula in postgraduate training and continuing education for MM Medicine. Integrating ethical reflection into clinical decision-making enhances both patient outcomes and professional resilience.

8. Conclusions

Embedding explicit ethical standards within the FIMM Guidelines consolidates the professional identity and societal legitimacy of MM Medicine. Ethical awareness protects patients from misconduct, fosters trust in the discipline, and aligns manual practice with international bioethical norms and legal frameworks [258].

SECTION VIII: GLOSSARY

The glossary contains only expressions of this document.

Accreditation | Formal recognition that an institution, programme, or organisation meets established standards of quality and competence defined by FIMM or the relevant national authority.

Adverse event | An unintended, unfavourable medical occurrence that happens during or after a manual technique, procedure, or intervention, whether or not it is causally related to that intervention.

Arthrokinematics | Arthrokinematics is the field of kinematics that studies the interrelation between the surfaces of synovial joints.

Articular neurology | The branch of neurology that involves the study of the anatomical, physiological, and clinical features of the nerve supply of the joint systems in various parts of the body [259].

Capacity-level training | Post-graduate training in which MM Medicine functions as a defined subspecialty capacity within another medical specialty (e.g., Family Practice, Orthopaedics, Neurology).

Capacity-model | The term capacity is part of nomenclature of the Bologna process, which is a series of ministerial meetings and agreements between European countries designed to ensure comparability in the standards and quality of higher education qualifications. The capacity-model describes Manual Medicine as a subspecialty or a capacity in relation with any medical specialty dealing with clinical medicine. It presupposes at least a level of training which continues in the post-graduate, including an assessment based on Specialty Level.

Certification | Official attestation confirming that an individual practitioner has met specific educational and competency standards in MM Medicine.

Competency | An observable ability integrating knowledge, clinical skills, decision-making, and professional attitudes essential for effective performance in real clinical situations.

Competency-based Education | An educational framework emphasizing outcomes and demonstration of competencies rather than completion of prescribed instructional hours.

Complication | A type of adverse event that represents an unintended, unfavourable outcome or condition arising during or after an intervention.

Component-model | The component-model describes Manual Medicine as an integrated component of the curriculum of the medical specialty of Musculoskeletal Medicine or another medical specialty related to the musculoskeletal system.

Contraindication | A medical condition or circumstance in which a specific manual technique, procedure, or intervention should not be used due to the risk of harm or adverse outcomes.

Convergence | In the neural system: Afferents of different tissues converge to dorsal horn neurones in the spinal cord and in the medulla oblongata. In biomechanics: position of the facet joints (convergence resp. divergence).

Counternutation | Counternutation is the minimal movement of the sacrum. The base of the sacrum shifts backwards and upwards, the tip frontwards and slightly downwards (0.5°-1.5°). The countermovement is called nutation.

Diagnosis in Manual Medicine | Diagnostic skills in MM Medicine build upon conventional medical techniques with manual assessment of individual tissues and functional assessment of the whole musculoskeletal system based upon scientific biomechanical and neurophysiological principles. In particular, reversible somatic dysfunction and its differential diagnosis related to reversible dysfunction is sought by MM Medicine practitioners.

Dry needling | Intramuscular application of acupuncture needles in order to release contracted muscle areas (myofascial trigger points) by mechanical micro-stimulation and microtraumatization.

Evidence-based practice (EBP) | The conscientious, explicit, and judicious use of the best current evidence in making decisions about patient care, integrating clinical expertise with patient values and preferences.

Free direction | Free direction is the direction of movement in an articular system in which the intensity of nociceptive afference is not enhanced. It is also the direction of "ease" which is the relative palpable freedom of motion of an articulation or tissue. Opposite: The direction of movement provoking increase of nociception (direction of painful movement) or of "bind" which is palpable resistance to motion of an articulation or tissue.

Global range of motion | See range of motion.

High-velocity low-amplitude Technique | A manual manipulative procedure involving a rapid, controlled thrust of small amplitude delivered at the end range of joint motion, used to restore joint mobility or reduce pain.

HVLA thrust | High-velocity, low-amplitude thrust.

Hypermobility | Increase in mobility resulting from congenital, constitutional, structural or functional changes of the joints or soft tissue. It may occur locally, regionally, or generalised.

Joint play | All passive movements of a joint such as roll, glide, distraction and spin combinations which are independent of voluntary muscle contraction [260].

Locomotor system | In the context of MM Medicine the locomotor (or musculoskeletal) system includes the muscles, aponeuroses, bones and joints of the axial and appendicular skeleton, ligaments, and those parts of the nervous system or the visceral system associated with or significantly affected by their function.

Manipulation | Traditionally, the term manipulation has been understood to refer to the technique of high-velocity, low-amplitude thrust (HVLA). With the development of other techniques, manipulation is understood to refer to a variety of methods that restore normal anatomic and functional relationships within the musculoskeletal system. In some countries and in most European countries, the term is used exclusively for the technique of high-velocity, low-amplitude thrust while in the USA, it is a generic term for any MM technique.

Manual Medicine | A collective term encompassing all scopes of physician-led Manual and Musculoskeletal medicine. It includes Manual Therapy, Osteopathic Manipulative Medicine, Arthrokinematics, Chuna Manual Medicine, and other medically regulated non-surgical approaches to the musculoskeletal system.

Manual Therapy related to the Russian Federation | In Russia the equivalent medical specialty to Musculoskeletal Medicine is called Manual Therapy and requires a complete medical training of Neurology or Orthopaedics or Traumatology, prior to the MM Medicine Training.

Master / Doctorate Level | The highest educational level in MM Medicine, integrating advanced clinical competence, research, teaching, and leadership within the discipline.

Mechanotransduction | The process by which cells convert mechanical stimuli into a chemical response. It can occur in both cells specialized for sensing mechanical cues such as mechanoreceptors, and in parenchymal cells whose primary function is not mechanosensory.

Mechanoreceptor | Encapsulated nerve endings (receptor endings classified by the method of Freeman and Wyke meeting the following three criteria: [1] encapsulation, [2] identifiable morphometry, and [3] consistent morphometry on serial sections) are believed to be primarily mechanosensitive and may provide proprioceptive and protective information to the central nervous system regarding joint function and position [261].

MM Medicine | The term defines all scopes of MM Medicine and the non-invasive part of Musculoskeletal Medicine (including Osteopathic Manipulative Treatment [USA] and Manual Therapy [Russian Federation]).

MM physician | Physician who performs MM Medicine either as a capacity or as a component.

MM techniques | Methods, procedures, or manoeuvres taught in a recognised seminar of MM Medicine or employed by a MM physician for therapeutic purposes.

Mobilisation | A low-velocity, passive, oscillatory manual technique applied within the physiological joint range to restore mobility, relieve pain, or improve function.

Multi-receptive dorsal horn neuron | Is a dorsal horn neuron especially represented in lamina V to which a variety of afferents with different qualities and from different organ systems (joints, muscles, skin, viscera, etc.) converge [262, 263, 264, 265, 266, 267]. This results in the first summary of information of the dorsal horn. Synonym: Spinothalamic projection neuron. Synonym: WDR Neuron.

Musculoskeletal Medicine | A medical specialty focused on the diagnosis, management, and prevention of functional and structural disorders of the locomotor system using medical, rehabilitative, and manual interventions [268]. Musculoskeletal Medicine is a branch of medicine that deals with acute or chronic musculoskeletal injury, disease or dysfunction. Its aim is to address the somatic dysfunction, which is an impaired or altered function of the components of the somatic (body framework) system. The somatic system includes the skeletal, arthrodial and myofascial structures with their related vascular, lymphatic and neural elements [269].

Myofascial trigger point | A hyperirritable spot within a taut band of skeletal muscle or fascia that is painful on compression and may produce characteristic referred pain or autonomic phenomena [270].

Neuromuscular techniques (NMT) | A group of manual techniques that incorporate mobilisation by using the contraction force of the agonists (NMT 1), mobilisation after post isometric relaxation of the antagonists (NMT 2), or mobilisation using reciprocal inhibition of the antagonists (NMT 3).

Neuromusculoskeletal Medicine (NMM) | A specialty field in the United States that emphasizes the incorporation of osteopathic manual diagnosis and osteopathic manipulative treatment into the evaluation and treatment of the nervous, muscular, and skeletal systems in their relationships to other systems of the body as well as the whole person. It requires a primary Osteopathic Neuromusculoskeletal Medicine (ONMM) residency disciplined in the neuromusculoskeletal system, its comprehensive relationship to other organ systems, and its dynamic function of locomotion.

NMM | See: Neuromusculoskeletal Medicine.

NMT | See: Neuromuscular techniques.

Noci-generator | Noci-generator (pain generator) is an organ or anatomical region that contains C-fibres. It gives information to the central nervous system that there are ongoing activities threatening the body, e.g. tissue damage inflammation, mechanical irritation, etc.

Noci-reaction | Noci-reaction (pain response) is the response of connective tissue, sympathetic and parasympathetic system, endocrine system, motor system and spinal, subcortical and cortical structures to noci-afferent input to the body (hurt, heat, acid mechano-trauma).

Nutation | Nutation is the minimal movement of the sacrum. The base of the sacrum shifts forwards and downwards, the tip backwards and slightly upwards (0.5-1.5 °). The countermovement is called counternutation.

OMM | See: Osteopathic Manipulative Medicine.

OMT | See: Osteopathic Manipulative Treatment.

ONMM | See: Neuromusculoskeletal Medicine.

Quality assurance | A continuous process ensuring that education, clinical practice, and outcomes in MM Medicine meet defined standards of excellence, safety, and ethical integrity.

Osteopathic Manipulative Medicine (OMM) | A clinical discipline integrating osteopathic philosophy, structural diagnosis, and the therapeutic use of Osteopathic Manipulative Treatment (OMT) in patient care.

Osteopathic Manipulative Treatment (OMT) | The therapeutic application of manually guided forces by an osteopathic physician to improve physiological function and/or support homeostasis altered by somatic dysfunction.

Osteopathic principles and practice | A concept of health care supported by expanding scientific knowledge that embraces the concept of the unity of the living organism's structure (anatomy) and function (physiology). Osteopathic philosophy emphasizes the following principles: (1) The human being is a dynamic unit of function; (2) The body possesses self-regulatory mechanisms that are self-healing in nature; (3) Structure and function are interrelated at all levels; and (4) Rational treatment is based on these principles [271].

Pain provocation test | A test which stresses the part(s) of the body being tested with functional or physical force in order to elicit diagnostic pain.

Painful minor intervertebral dysfunction | A term used in some European countries to describe the nature of painful dysfunction.

Pre-tensioning | Is part of the preparation of an articular structure in order to perform HVLA thrust.

Prevention in MM Medicine | Patient involvement in the therapeutic activity, resulting from the detailed diagnosis, helps in the prevention of recurrence of somatic dysfunction.

Prolotherapy | A regenerative injection therapy that stimulates the body’s healing processes by injecting irritant or proliferative solutions into ligaments or tendons to promote tissue repair.

Range of motion | Range of motion refers to the distance and direction a joint can move between two different end-phase movement position.

Reversible dysfunction | A peripheral articular or segmental dysfunction is responsive to MM Medicine techniques in the sense of improved or restored function. MM Medicine deals primarily with the diagnosis and treatment of reversible dysfunction. See also somatic dysfunction.

Segmental cellulo-periosteal-myalgic syndrome | Painful minor intervertebral Dysfunction causes reflex reactions within the same metamer leading to spinal segmental dysfunction (french: *syndrome cellulo-périosto-myalgique segmentaire*).

Segmental dysfunction | Segmental dysfunction is an alteration of the normal or physiological vertebral segmental function in the sense of hypo- or hypermobility. Such dysfunction may be reversible or not.

Segmental irritation | Activation of afferent neurones followed by noci-reaction.

Self-mobilisation | Self-stretching techniques that specifically use joint traction or glides that direct the stretch force to the joint capsule or the muscles involved.

Sensitization | The receptive fields are enlarged, the threshold in the first (peripheral) or second (central) neuron is lowered leading to hyperalgesia.

Soft tissue treatment techniques | A group of direct techniques that usually involve lateral stretching, linear stretching, myofascial release, visceral technique, deep pressure, traction and/or separation of muscle origin and insertion while monitoring tissue response and motion changes by palpation. Historically considered a form of myofascial treatment.

Somatic dysfunction | Impaired or altered function of the components of the somatic system—skeletal, arthrodial, myofascial structures, and their associated vascular, lymphatic, and neural elements.

Spinothalamic projection neuron | See: multi-receptive dorsal horn neuron.

Stabilizing techniques | Stabilizing techniques in terms of MM Medicine consider sensory and motor components related to the musculoskeletal system for optimal stabilization of the core, the spine, or a joint.

Strengthening techniques | Strengthening techniques involve exercises increasing muscle strength by putting more strain on a muscle than it is accustomed to receive. This increased load stimulates the growth of proteins inside each muscle cell that allow the muscle as a whole to contract.

Structure- and process-based Education | Training method that focuses on the assessment of time spent and credits awarded (e.g. 300 hours and 30 credits).

Tender point | Small, hypersensitive points in the myofascial tissues of the body that do not have a pattern of pain radiation. These points are a manifestation of somatic dysfunction and are used as diagnostic criteria and for monitoring treatment.

Tensegrity | An architectural principle in which compression and tension are used to give a structure its form.

Trial mobilisation | A testing maneuver to predict possible adverse reactions of MM treatments.

Trial tensioning | See: Trial mobilisation.

Trigger Point, myofascial | See : Myofascial trigger point.

Undirected movement dysfunction | The presence of more than one movement direction in an articular system causing pain-reaction.

Viscerosomatic and Somatovisceral Reflexes | Physiological interactions between visceral organs and somatic structures mediated by the nervous system, influencing pain patterns or functional disturbances.

WDR neuron | Wide dynamic range neuron, special kind of dorsal horn multi-receptive neuron predominantly found in lamina V (see convergence). Synonym: Spinothalamic projection neuron. Synonym: Multi-receptive dorsal horn neuron.

ANNEXES

1. Examples of Curricula for Post-Graduate Education and Training in MM Medicine

1.1. Curriculum of the Swiss Society for Manual Medicine (SAMM)

The Swiss Chamber of Physicians and the Swiss Institute of Medical Postgraduate and Continued Medical Education SIWF approved the Curriculum of the Swiss Medical Society for Manuel Medicine SAMM in 2012.

Manual Medicine CAS – DAS
Description of the modules

1. Short summary and conception
The Certificate of Advanced studies (CAS) "Basics in Manual Medicine" and the Diploma of Advanced Studies (DAS) "Manual Medicine" are part time educational programmes, which conclude with a title of a Certificate respectively a Diploma of Advanced Studies. The CAS "Basics in Manual Medicine" is part of the DAS "Manual Medicine". The CAS is an introduction in Manual Medicine (diagnostics and introduction in therapeutic procedures). The DAS "Manual Medicine" contains the complete curriculum of the Proficiency of Manual Medicine SAMM according to the Education Programme of the Swiss Federation of Physicians FMH.

1.1. Description of the field
Manual Medicine is a medical discipline performed by physicians of different medical specialties, which covers diagnostic, prevention, therapeutic and rehabilitation procedures applying manual techniques focussed on functional disorders of the musculoskeletal system including myofascial and neuro-meningeal structures. Manual Medicine is performed holistically and respecting the individual needs of patients be it in a hospital or outpatient setting. Diagnostic or therapeutic procedures are based on biomechanical or neurophysiological principles.

Manual Medicine is applied as a multi-modular therapeutic concept and includes an interdisciplinary diagnostic approach in order to identify and treat dysfunctions of the musculoskeletal system and associated complaints. Complex dysfunctional disorders of the musculoskeletal system, vertebra-visceral, viscera-vertebral and psychosocial impacts including chronicity processes are taken care of appropriately.

1.2. Short description of the structure of education and training

A) Certificate of Advanced Studies (CAS) "Basics in Manual Medicine"
The curriculum of this Certificate offers advanced knowledge in anatomy, biomechanics and pathophysiology of the musculoskeletal system. This is the base for learning targeted manual diagnostic procedures of the musculoskeletal system. Graduates of the CAS will reach competences to investigate the spine, the peripheral joints, the most important muscles and to perform pain analyses in order to develop a targeted therapeutic action plan. The principles of the manual therapeutic procedures and some of the most frequent and elementary therapeutic techniques of mobilisation and manipulations are instructed. This title is the precondition for billing manual medicine diagnostic techniques (in combination with a medical specialty).

B) Diploma of Advanced Studies (DAS) "Manual Medicine"
The Certificate of Advanced Studies CAS is together with further modules of education and training part of the DAS "Manual Medicine". Graduates learn a complete set of diagnostic and therapeutic procedures of the musculoskeletal system including techniques of mobilisation, neuro-muscular inhibition and soft tissue-techniques as well as specific HVLA techniques. Diagnostic and therapeutic procedures of the different regional pain syndromes of the body resp. the musculoskeletal system including the muscles will be presented. This postgraduate education and training module will be concluded by a theoretical and practical exam. This exam will be certified by a title delivered by the Swiss Chamber of Physicians called "Manual Medicine SAMM". This title is the precondition for billing manual medicine diagnostics and treatment techniques (in combination with a medical specialty). In respects to time and contents the DAS diploma corresponds to the Core Curriculum "Manual Medicine" of the European Scientific Society of Manual Medicine (ESSOMM) as it is presented and accepted by the European Medical Specialists Union (UEMS).

Who shall achieve this education and training; and what are the aims?
The basic training course "Basics in Manual Medicine" CAS is proposed to all physicians dealing with dysfunction or pain conditions of the musculoskeletal system during or after their specialty training. Graduates of the training course "Basics of Manual Medicine" (CAS) will be able to perform an elaborated examination of the whole musculoskeletal system with respect to clinical function; he or she is able to analyse pain syndromes of the musculoskeletal system and is able to detect indications for manual therapeutic procedures. He or she is able to perform mobilizing techniques of all regions of the spine except high-velocity low-amplitude thrust techniques.

The *complete education and training to become a sub-specialist according to the DAS "Manual Medicine"* is designed for physicians who want to treat often and with high expertise and competency patients with problems of the total musculoskeletal system including dysfunction and pain of the cervical spine and the head. This education course is aimed at general practitioners with special interest in this field as well as at specialists for rheumatology and rehabilitation and other specialists of the musculoskeletal system. Graduates of this diploma know all regional or peripheral pain syndromes of the musculoskeletal system and are able to apply Manual Medicine in any respect of diagnostics and therapy, including HVLA-manipulation.

A physician having achieved the level of a DAS "Manual Medicine" is particularly able to apply:

- All commonly used diagnostic procedures of the musculoskeletal system,
- Anatomy, biomechanics, pathophysiology and concepts of development of pain of the musculoskeletal system,
- Clinical pain analysis and planning competently further diagnostic procedures,
- Planning the therapy of neuromuscular dysfunctions and pathologies also in co-operation with physiotherapists,
- A broad scheme of treatment techniques and options for soft tissues, joints, muscles and nerves of the vertebral spine and the extremities,
- Therapeutic techniques with HVLA-thrust as well as recognising risks, contraindication and so called "red flags".

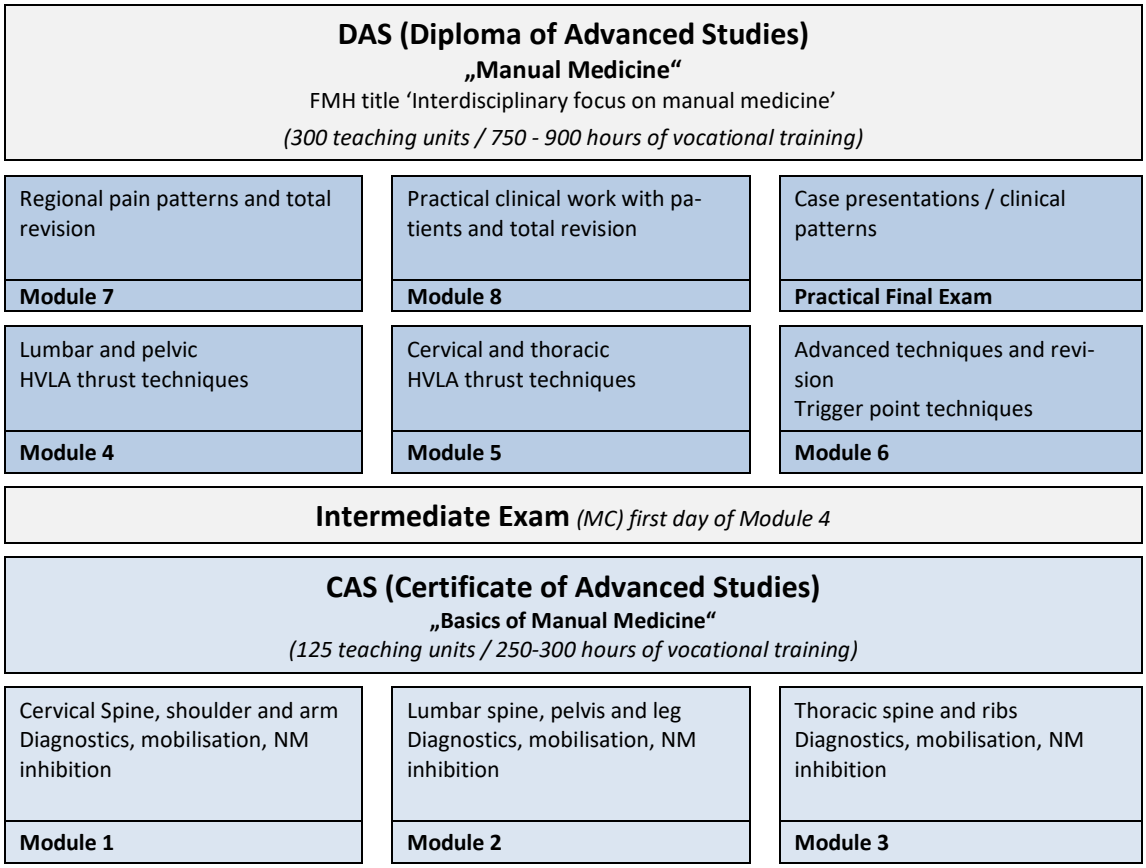

Fig. A: Curriculum of the Swiss Medical Society for Manual Medicine SAMM.

1.2. Guidelines of the German Federal Chamber of Physicians

(Sample) Course Book Manual Medicine

Based on the (sample) continuing education regulations 2018

2nd edition

Berlin, February 17th-18th, 2022

Texts and materials from the German Medical Association on continuing education and training

Publisher: German Medical Association

This (sample) course book was approved by the Executive Board of the German Medical Association (2019–2023 term) on April 28th, 2020, updated on the basis of the Executive Board resolution of June 8th, 2021 and amended by the addenda adopted by the Executive Board of the German Medical Association on February 17th-18th, 2022 (see the document information at the end of the document).

1. Preliminary remarks and objectives

See original document [272].

2. Concept and implementation

2.1. Regulation in the (Model) Further Training Regulations (MWBO)

The "Manual Medicine" continuing education course is part of the additional continuing education programme in manual medicine.

The statutes section of the MWBO regulates the minimum requirements in accordance with § 11 MWBO as well as the further training content required to acquire the further training designation.

Additional training in Manual Medicine	
Definition	In addition to specialist medical expertise, the additional training in manual medicine covers the recognition and treatment of reversible functional disorders of the musculoskeletal system, including their interaction with other organ systems, using manual examination and treatment techniques.
Minimum requirements in accordance with Section 11 MWBO	– Specialist recognition in an area of direct patient care and additionally – 320 hours of further training in manual medicine in accordance with Section 4 (8), of which – 120 hours of basic training followed by – 200 hours of advanced course and additionally – Manual Medicine in accordance with further training content under authorisation

The course training can be completed at the same time as the practical training. All evidence of the minimum requirements being met must be submitted to the Medical Association at the time of registration for the examination:

- Specialist recognition in an area of direct patient care
- Proof of 320 hours of continuing education in manual medicine in accordance with Section 4 (8) (see also Chapter 2.2)
- Logbook documentation of all further training content specified in the further training regulations.

Recognition and eligibility for the additional designation is granted by the relevant medical association after successful examination.

This continuing education course can also be completed as medical training.

2.2. Note on continuing education content that may need to be provided separately

If the further training content is not fully covered in the course, it must be provided separately and documented in the eLogbook.

2.3. Course structure

The total number of hours for the "Manual Medicine" course is 320 hours, comprising 120 hours of basic training followed by 200 hours of advanced training. The basic course consists of four modules of 30 hours each and the advanced course consists of four modules of 50 hours each.

Completion of the basic course is a prerequisite for participation in the advanced course.

It is possible to attend individual modules offered by different course providers. The order in which the basic course modules are taken is freely selectable. The advanced course must begin with Module V and end with Module VIII; Modules VI and VII can be taken in any order. All modules of the continuing education course must be completed in order for the course to be recognised as successfully completed.

An essential part of the continuing education in manual medicine are the supervised practical exercises that course participants perform on each other in order to acquire and practise the skills necessary for patient safety.

2.4. Course duration

When conducting the course, care must be taken to ensure that the individual modules are spread over a sufficiently long period of at least 12 months.

Courses that cover the required course hours in an extremely short period of time and thus have a negative impact on the learning process are not permitted.

The continuing education course should be completed within a reasonable period of time so that the skills acquired are in line with the current state of scientific knowledge.

2.5. Recommendations for continuing medical education from the German Medical Association

The German Medical Association's "Recommendations for continuing medical education" must be observed when organising and conducting courses. If information on course organisation and implementation is noted in the (sample) course book, this information is binding.

2.6. Recommendations for teaching methods

The didactic methods must be adapted to the learning content and competence objectives (theoretical knowledge, practical skills, personal attitude).

The teaching of the material should be theoretically sound and application-oriented. In addition to the classic form of lecture in the form of frontal teaching, the use of various teaching methods is recommended, for example role-playing, case studies, problem-oriented learning, simulations and self-study.

2.7. Teaching/course format

The continuing education course can be implemented as a blended learning measure (combination of physical and/or virtual face-to-face sessions and e-learning).

The 320-hour continuing education course must include 256 hours of classroom instruction; the proportion of physical attendance must be at least 256 hours.

The e-learning portion may not exceed 64 hours. Note on terminology:

Face-to-face teaching is understood to mean the following:

"Teachers" and "participants" can interact with each other in real time. This can take the form of

- physical presence = real geographically/on site (e.g. hands-on formats),
- virtual presence = in a virtual space on the internet (e.g. live webinar).

E-learning is defined as media-supported learning in the sense of an umbrella term for the use of electronically available learning materials and/or learning formats (e.g. guidelines, eBooks).

2.8. Framework conditions for learning scenarios

The group size should be adapted to the competence goals to be taught and the teaching methods used. Accordingly, suitable premises (size and number) with the usual technical requirements must be provided.

The number of course participants per lecturer should not exceed 15.

Appropriate premises must include rooms for theoretical instruction and practical training with height-adjustable couches. No more than three participants should be assigned to each couch.

2.9. Materials and literature references

Participants should be provided with learning materials to accompany the lessons as well as for preparation and follow-up work. In addition to a summary of the lesson content, further literature references should be provided.

A course library or internet access to relevant information platforms can supplement this offer. This gives participants the opportunity to gain insight into standard works and basic literature during the course.

2.10. Attendance

The personal attendance of course participants at physical and virtual face-to-face events is essential and must be verified by means of attendance lists and random checks. Participation in e-learning must be documented by the course provider in an appropriate form.

2.11. Qualification of the course instructor

The course instructor in charge must have the additional qualification in manual medicine and should ideally be authorised to provide further training in manual medicine. The course instructor must have worked in the relevant field for several years and should have several years of teaching experience and didactic expertise.

2.12. Qualifications of participating lecturers

The lecturers involved must have in-depth knowledge and experience in their respective subject areas and should be trained in teaching methods.

2.13. Evaluation and learning success monitoring

Course participants should be given the opportunity to self-assess their learning process and learning success.

The courses are always evaluated by the participants. The evaluation results must be communicated to the Medical Association upon request.

The skills and knowledge acquired are assessed during the course through technical discussions, colloquiums, practical tests (case presentations with therapy demonstrations) and theoretical (multiple-choice) tests.

Before starting the advanced course, the basic course must be completed with an individual learning assessment.

2.14. Course recognition

In accordance with Section 4 (8) MWBO, the course instructor and the continuing education course must be recognised by the medical association responsible for the venue before the course is held. The courses recognised by the locally responsible medical association are mutually recognised by all other medical associations, so that participants can take advantage of corresponding courses nationwide.

2.15. Continuing education credits

The continuing education course can be recognised by the medical association responsible for the venue for the acquisition of continuing education credits.

2.16. Issuing of certificates of attendance

The organiser will issue participants with a certificate confirming successful completion of the continuing education course or participation in individual modules.

2.17. Transitional arrangement

During the transition period, trainees can transfer modules already completed according to the previous (sample) course book to the current course training, provided that equivalence has been determined by the Medical Association.

3. Structure and scope

	(Sample) course book Manual Medicine	**320 hours**
Basic course		**120 hours**
Module I	Spine 1	30
Module II	Spine 2	30
Module III	Extremities 1	30
Module IV	Extremities 2	30
Advanced course		**200 hours**
Module V	Manipulation techniques for the spine and extremity joints	50
Module VI	Neck, shoulder and arm region, thoracic region	50
Module VII	Lumbar-pelvic-leg region	50
Module VIII	Clinical integration	50

hour = 1 teaching unit (TU) = 45 minutes

4. Contents and structure

Competency objective Basic course Modules I-IV:

Participants learn MM diagnosis and mobilisation therapy for the spine and extremities. Basic knowledge.

4.1. Module I – Spine 1 (30 hours)

Learning content:

- Functional anatomy, physiology, pathophysiology and biomechanics of the sacroiliac joints, lumbar spine and thoracic spine, as well as the associated fasciae
- Fundamentals of imaging and laboratory diagnostics of manual medicine-relevant clinical pictures of sacroiliac joints, lumbar spine and thoracic spine
- Orientation and special MM diagnostics of the sacroiliac joints, lumbar spine and thoracic spine
- MM documentation of examination results on sacroiliac joints, lumbar spine and thoracic spine
- Mobilisation treatment techniques on sacroiliac joints, lumbar spine and thoracic spine, including positioning techniques and techniques based on post-isometric relaxation and reciprocal inhibition.
- Neurophysiology of pain perception and processing.

4.2. Module II – Spine 2 (30 hours)

Learning content:

- Functional anatomy, physiology, pathophysiology and biomechanics of the rib joints, cervical spine, head joints and temporomandibular joint, as well as the associated fasciae
- Anatomy, physiology and pathophysiology of the autonomic nervous system and its relationship to musculoskeletal complaints
- Fundamentals of imaging and laboratory diagnostics of manual medicine-relevant clinical pictures of the ribs, cervical spine, head joints and temporomandibular joint
- MM anamnesis
- Orientation and special MM diagnostics on rib joints, cervical spine, head joints and temporomandibular joint
- MM documentation of examination results on rib joints, cervical spine, head joints and temporomandibular joint
- Mobilisation techniques for rib joints, cervical spine, head joints and temporomandibular joint, including positioning techniques and techniques based on post-isometric relaxation and reciprocal inhibition
- Psyche and musculoskeletal system

4.3. Module III – Upper extremity 2 (30 hours)

Learning content:

- Functional anatomy, physiology, pathophysiology and biomechanics of the joints, muscles and other soft tissue of the upper extremity
- Fundamentals of imaging and laboratory diagnostics of clinical pictures relevant to manual medicine in the upper extremity
- Orientation and special MM diagnostics of the joints, muscles and other soft tissue of the upper extremity
- Manual Medicine documentation of examination results on the upper extremity
- Mobilisation treatment techniques for articular and muscular dysfunctions of the upper extremities, including positioning techniques and techniques based on post-isometric relaxation and reciprocal inhibition.

4.4. Module IV – Lower extremity 2 (30 hours)

Learning content:

- Functional anatomy, physiology, pathophysiology and biomechanics of the joints, muscles and other soft tissue of the lower extremity
- Fundamentals of imaging and laboratory diagnostics of clinical pictures relevant to manual medicine in the lower extremities
- Orientation and special MM diagnostics of the joints, muscles and other soft tissue of the lower extremities
- Manual Medicine documentation of examination results on the lower extremities
- Mobilisation treatment techniques for articular and muscular dysfunctions of the lower extremities, including positioning techniques and techniques based on post-isometric relaxation and reciprocal inhibition

4.5. Module V – Manipulation techniques on the spine and the extremity joints (50 hours)

Competency objective:

Participants learn manipulation techniques for the spine and extremity joints.

Learning content:

- Theory and practice, risk assessment and contraindications

- Evaluation of examinations with imaging procedures in the context of manual medicine
- manipulation techniques on the spine and extremity joints
- Differential diagnosis lumbopelvic, cervicobrachial, and cervicocranial pain syndromes
- differential diagnosis structural and functional disorders of the musculoskeletal system and internal organs
- Differential diagnosis of radicular and pseudoradicular syndromes

4.6. Module VI – Neck-shoulder-arm region, thoracic region (50 hours)

Competency objective:

Participants learn manual medical examination and therapy for clinical presentations in the neck, shoulder and arm region and thoracic region.

Learning content:

- Expansion of mobilisation techniques to include specific muscle inhibition and muscle activation techniques (muscle energy techniques, techniques with post-isometric relaxation, positioning techniques)
- Evaluation of examinations using imaging techniques
- Treatment strategies for chain syndromes
- Differential diagnosis of motor function disorders at their various levels of regulation and control

4.7. Module VII – Lumbar-pelvic-leg region (50 hours)

Competency objective:

Participants learn manual medical examination and therapy for clinical presentations in the lumbar-pelvic-leg region.

Learning content:

- Expansion of mobilisation techniques to include specific muscle inhibition and muscle activation techniques (muscle energy techniques, techniques with post-isometric relaxation, positioning techniques)
- Evaluation of examinations using imaging techniques
- Treatment strategies for chain syndromes
- Differentiated diagnosis of motor function disorders at their various levels of regulation and control

4.8. Module VIII – Clinical integration (50 hours)

Competency objective:

Participants learn differential diagnosis for headaches, dizziness and motor control disorders, differential diagnosis for neurological disorders, mental health and the musculoskeletal system, craniomandibular dysfunction, recurrence expectations (chronicity), hypermobility and pain, special features of manual medical examination and treatment of children, and the basics of visceral treatment techniques.

Learning content:

- Fundamentals of manual examination and treatment of infants, toddlers and children
- Fundamentals of myofascial and visceral techniques
- Differential examination:
  - of functional disorders and structural diseases (musculoskeletal system/internal disease)
  - craniomandibular dysfunction
  - radicular and pseudoradicular pain syndromes
  - of sacral and pelvic-leg pain

  - cervicocranial and cervicobrachial pain
  - of hypermobility
  - Control of the musculoskeletal system: movement patterns, their development and plasticity
  - Motor stereotypes and their disorders
  - Introduction to motor coordination disorder syndromes
- Evaluation of findings at the beginning and during the course of treatment, as well as treatment planning
- Diagnosis planning and treatment in connection with functional disorders of the spine and limb joints, development of treatment steps
- Self-exercises and guidance on self-exercises for limb joints, spine and muscles
- Basics of relaxation techniques
- Practical introduction to proprioceptive sensorimotor facilitation
- Documentation of manual examinations and treatments
- Differentiated diagnosis of motor function disorders at their various levels of regulation and control
- Indications for remedies and aids, prevention and rehabilitation, multimodal treatment programmes
- Preparation and presentation of at least one case study of a real patient-related MM diagnosis and therapy (including course of therapy), which was critically discussed with the trainer

This (sample) course book has been developed in collaboration with the following organisations:

- German Society for Manual Medicine (DGMM)
- German Society for Musculoskeletal Medicine (DGMSM)
- Medical Association for Manual Medicine – Medical Seminar Berlin (ÄMM)
- MWE, Dr. Karl Sell Medical Seminar (MWE)

1.3. Inter-University Diploma (DIU) in Manual Medicine and Osteopathic Medicine in France

THEORETICAL INSTRUCTION

1. FUNDAMENTALS OF ANATOMY, BIOMECHANICS AND CINESIOLOGY

- Notion of Biomechanics (mobile segment)
- Upper cervical spine and occipito-cervical hinge
- Lower cervical spine and cervicothoracic hinge
- Thoracic spine and thoraco-lumbar hinge and thoracic parietum (ribs, sternum)
- Lumbar spine
- Sacroiliac joint
- Scapular belt
- Pelvic girdle
- Elbow, wrist, hand
- Knee
- Ankle and foot
- Segmental and truncal innervation of the limbs and trunk
- Spinal and peripheral musculature, Diaphragm (list of muscles) Orthostatism – Posture

2. FUNDAMENTALS OF PHYSIOLOGY AND NEUROLOGY

- Physiology of pain
- Physiology of the neuromuscular spindle
- Skin, muscle and joint receptors
- Basic neurological semiology: sensitivities, motor skills, postural tone
- Balance disorders, dizziness and accouphenes
- Myofacial pain and trigger points
- Experimentally induced pain of vertebral origin Neurophysiological data on vertebral manipulation
- Human walking (basic concepts)
- Electromyography (basic concepts)

3. FUNDAMENTALS OF MANUAL MEDICINE

- Osteopathy, chiropractic, history and philosophy
- History of manual medicine and osteopathy in France
- Osteopathy in France, Europe (UEMMOO) and the rest of the world (FIMM, IAMMM etc.)
- Osteopathic legislation
- The different types of manual therapy and osteopathy
- Definition of manipulations, mechanisms of action
- Principles of segmental vertebral examination, star diagram (Maigne - Lesage)
- The concept of Minor Intervertebral Disruption (DIM) (R. Maigne)
- The cellulo-teno-periosto-myalgic reflex syndrome of vertebral origin (SCTM) (R. Maigne)
- Myofascial pain and disorders (Travell and Simons)

4. BASICS OF BONE AND JOINT MANIPULATION

- Indications for handling
- Contraindications of manipulations
- Handling accidents
- Different types of handling
- Application rules for handling Handling equipment
- Assessment of manipulations Regulations – Medical liability

5. CLINIC

- Questioning
- Palpatory anatomy
- Spinal and peripheral clinical examination Neurological examination
- Chiropody examination
- Postural examination
- Orthoptic and dental examination

6. MECHANICAL PATHOLOGIES OF THE MUSCULOSKELETAL SYSTEM

- Common low back pain
- Non-common low back pain
- Thoracolumbar junction syndrome (R. Maigne)
- Sciatica and sciaticalgia L5 and S1
- L3 and L4 crural neuralgia and cruralgia
- Femorocutaneous and abdominogenital nerve neuralgia
- Residual pain after disc surgery, nucleolysis or nucleotomy Pathologies of the lumbopelvic-femoral complex
- Narrow spinal canal
- Lumbar instabilityHyperlordosis – Spondylolisthesis – Spondylolysis
- Cauda equina syndrome – Myelopathies
- Sacral pain, coccygodynia
- Common thoracic spinal pain
- Thoracic spinal pain of cervical origin
- Thoracic spinal pain of visceral origin
- Parieto-thoracic syndromes
- Headaches of cervical origin
- Acute cervical pain
- Whiplash injuries and post-traumatic cervical syndromes
- Cervicobrachial neuralgia
- Headaches, migraines
- Dizziness, balance disorders
- Vertebrobasilar insufficiency
- Scapular elevator syndrome
- Scoliosis
- Thoracic kyphosis, hypercyphosis in children

- Spinal growth dystrophy
- Inflammatory rheumatism
- Non-mechanical spinal diseases
- Piriformis muscle syndrome
- Sacroiliac derangements
- Inequality of lower limb length
- Transitional zone pain syndrome
- After-effects of spinal trauma and fractures
- Pathologies of the temporomandibular joint
- Algodysfunctional syndrome of the masticatory apparatus or Costen's syndrome
- Diagnosis and treatment of hip and buttock pain
- Osteoarthritis
- Joint stiffness and hyperlaxity

7. TRAUMATIC MECHANICAL DISORDERS OF THE MUSCULOSKELETAL SYSTEM

- Knee sprains and sprain sequelae
- Sprains and sequelae of tibiofibular and ankle sprains
- Tendinopathies and bursitis
- Anterior tibial syndrome – Periostitis – Fatigue fracture
- Foot pathologies
- Shoulder dislocations and trauma and their sequelae
- Chronic tendon damage of the shoulder
- Wrist sprain and carpal pathology
- Medial and lateral epicondylalgia
- Pubalgia
- Periostosis and bone fatigue fracture
- Osteochondrosis of growth
- Anterior hip impingement, Iliotibial band syndrome
- Patellar syndrome
- Sub-acromial conflicts
- Rotator cuff injuries
- Pathologies of the carpus
- Pathology of the thumb and fingers
- Compartment syndrome

8. PARACLINICAL INVESTIGATIONS

- Osteoarticular imaging (spine, upper and lower limbs): ultrasound, X-rays, CT, MRI, scintigraphy
- Biological tests: routine, specialised, etc.
- Electromyography

9. NON-MECHANICAL PATHOLOGIES OF THE MUSCULOSKELETAL SYSTEM

- Inflammatory rheumatism (basic concepts)
- Bone demineralisation

- Compression syndromes of the upper limbs
- Compression syndromes of the lower limbs
- Complex regional pain syndrome type I (Algoneurodystrophies)
- Fibromyalgia, polyalgic syndrome, spasmophilia, hysteria, depression, chronic fatigue
- Walking disorders
- Thoracic outlet syndrome
- Ehlers Danlos syndrome
- Superior fibular tibial Syndrome (SFTS)

10. THERAPIES COMBINED WITH MANUAL MEDICINE

- Analgesics and NSAIDs
- Local medical treatments: infiltrations, ultrasound-guided infiltrations, mesotherapy, topical gels
- Spinal traction
- Spinal and limb orthoses
- Balneotherapy
- Massokinesitherapy: techniques, application, prescribing, follow-up
- Physiotherapy: electrotherapy, techniques, indications, validation
- Spinal physiotherapy
- Disc surgery, nucleolysis, nucleotomy
- Arthrodesis, disc prosthesis
- Tai Chi
- Botulinum toxin
- Infiltrations

PRACTICAL INSTRUCTION

1. SEMIOLOGY AND CLINICAL EXAMINATION

- Orthopaedic clinical examination, manual medicine and osteopathy
- Static and dynamic spine, complete examination, posture
- Lumbar and lumbosacral spine
- Cervical and cervicothoracic spine
- Thoracic spine
- Sacroiliac hips
- Knees
- Ankle and foot
- Shoulder
- Elbow, wrist, hand
- Muscle Testing
- Neurological examination
- Vascular tests

2. SOFT TISSUE TECHNIQUES

- Massages, various techniques
- The skin rolling
- Neuromuscular facilitation techniques
- Myofascial techniques: resting, stretching, contracted-released, neuromuscular, untwisting, inhibition: applied to the trunk and limbs
- List of muscles you need to know

3. MOBILISATION OF THE SPINE – GENERAL OSTEOPATHIC TREATMENT

- Lumbar and lumbopelvic
- Dorsal and dorsolumbar
- Cervical and cervico-dorsal

4. BASIC SPINAL MANIPULATIONS

- Lumbar in kyphosis
- Lumbar lordosis
- Thoracic epigastric
- Thoracic rotation while seated at end of table
- Thoracic in supine position (unwound)
- Upper thoracic in sternal support Cervical in latero-flexion
- Cervical in rotation
- Cervicothoracic junction in latero-flexion, seated
- Cervicothoracic junction with chin pivot
- Cervical in rotation, seated (anterior hand)
- Thoraco-lumbar at the knees (with stool)
- Direct thoracic manipulations (recoil)
- Parieto-thoracic (rib) manipulations
- Manipulation of the sacroiliac joints

5. MOBILISATIONS – GENERAL OSTEOPATHIC TREATMENT AND LIMB MANIPULATIONS

- Sternoclavicular and acromioclavicular
- Shoulder
- Elbow
- Wrist, hand, thumb and fingers
- Hip
- Knee and superior tibiofibular syndesmosis, ankle and foot, toes

TREATMENT OF MAJOR SYNDROMES

- Lumbopelvic-femoral syndrome
- Craniocervical syndrome
- Parieto-thoracic syndrome
- Scapular and upper limb pathologies
- Pelvic and lower limb pathologies
- Related pathologies

2. Examples of Master Programmes in MM Medicine

2.1. Master Degree in Manual Musculoskeletal Medicine of the University of Valencia

In co-operation with the Spanisch Society for Orthopaedic and Manual Medicine SEMOYM

FIRST EDITION

TYPE OF DEGREE: Master of Advanced Studies (MAS). 60 ECTS in 2 years. 360 on-site teaching hours. 240 home study hours of provided material. Remaining hours: self-study.

ADDRESSED TO: Physicians. Specially specialists and residents in Rehabilitation, Orthopaedic Surgery, Anaesthetics, Obstetrics & Gynaecology, Urology, Rheumatology, Neurology, General Practitioners, Sports Medicine and any physician aiming for a deeper and more integrative approach to pain.

TIMETABLE: 19 three-day weekends.

VENUE: Valencia (Spain)

DIRECTORS:

Javier Miranda Alonso, MD PhD. Professor and Chair of Physiology, University of Valencia.

Pedro Castells Ayuso, MD. Consultant in Rehabilitation, Quirón and IMKSE Clinics, Valencia. Trainer in MM. Member of SEMOYM Education Board

Francisco Javier Martínez Romero, MD. Consultant Orthopaedic Surgeon, Valdepeñas General Hospital, Ciudad Real. Trainer in MM. Member of Education Board.

Lourdes Ruiz Jareño, MD PhD. Head of Department of Rehabilitation, Sagunto University Hospital, Valencia. Trainer in MM. Director of SEMOYM SEMOYM Education Board.

Victoria Sotos Borrás, MD. Head of Department of Rehabilitation, Vinalopó University Hospitals, Elche, Alicante. Professor of Anatomy and Physiology at CEU University Elche. Trainer in MM. Member of SEMOYM Education Board.

SUBJECTS:

INTRODUCTION TO MANUAL MEDICINE
LUMBAR SPINE AND LOWER LIMBS
CERVICAL SPINE AND UPPER LIMBS
MISCELLANEA

FIRST YEAR

SEMINAR #1: INTRODUCTION TO MANUAL MEDICINE (Part 1)

1 weekend in December

- Introduction to Manual Medicine: historical context and approaches.
- Medical utility of MOM: diagnosis and modalities of treatment. Mechanisms of action.Indications. Contraindications.
- Definition of Painful Minor Intervertebral Dysfunction (PMID).
- Main painful syndromes of vertebral origin.

WORKSHOPS:

- Segmental examination.
- Cellulo-teno-myalgic syndrome.
- Patient's clinical history in MM.

SEMINAR #2: INTRODUCTION TO MANUAL MEDICINE (Part 2)

1 weekend in January

- Pain in musculoskeletal system: pathways and types. Referred pain. Psyche and musculoskeletal system.
- Physiology of tone and muscle contraction and its meaning in manual medicine. Types of muscle fibres. Muscular adaptability.
- The skin and fascia. Bio tensegrity.

WORKSHOPS:

- Development of palpatory skills. Muscle tone.
- Basic mobilisations.
- Muscular energy techniques: post isometric relaxation, reciprocal inhibition and correction spontaneous by position.

SEMINAR 3: INTRODUCTION TO MANUAL MEDICINE (Part 3)

1 weekend in February

- Physiological and pathophysiological concepts in bone tissue.
- Musculoskeletal system: red flags.
- Complementary examinations in MM. Basic concepts in diagnostic imaging.
- Anatomy and biomechanics of the thoracic spine and ribs.

WORKSHOPS:

- Segmental diagnosis.
- Basic manipulations of the thoracic spine and ribs.
- Patient's informed consent in MM.

SEMINAR #4: LUMBAR SPINE AND LOWER LIMBS (Part 1)

1 weekend in March

- Anatomy and biomechanics of thoracolumbar junction, lumbar spine, sacral and coccygeal spine and sacroiliac joints.
- Types of low back pain. Clinical pictures and differential diagnosis. Low back pain of lumbar, thoracolumbar and sacroiliac origins.

WORKSHOPS:

- Diagnostic tests in lumbar pathology.
- Basic diagnostic tests in sacroiliac pathology.
- Muscular and soft tissue techniques of the lumbosacral spine and sacroiliac joints
- Non-forced techniques of the lumbosacral and sacroiliac spine
- Basic manipulations of the lumbar spine and sacroiliac joints.

SEMINAR #5: LUMBAR SPINE AND LOWER LIMBS (Part 2)

1 weekend in April

- Anatomy and biomechanics of the lower limb.
- Types of manual techniques in lower limbs.
- The Kaltenborn concept.
- Diagnosis and treatment of main dysfunctions in the lower limbs.

WORKSHOPS:

- Mobilisations, neuromuscular techniques and basic manipulations of the lower limb.

SEMINAR #6: CERVICAL SPINE AND UPPER LIMBS (Part 1)

1 weekend in May

- Anatomy and biomechanics of the craneo-cervical junction, cervical spine and cervical-thoracic junction.
- Headache of cervical origin, cervical pain, shoulder pain of cervical origin, dysfunction of the first rib and thoracic back pain of cervical origin. Clinical pictures and differential diagnosis.

WORKSHOPS:

- Cervical and dorsal spine diagnostic tests. First rib.
- Muscular and soft tissue techniques for cervical and thoracic spine.
- Non-forced techniques for the cervical spine.

SEMINAR #7: CERVICAL SPINE AND UPPER LIMBS (Part 2)

1 weekend in June

- Anatomy and biomechanics of the upper limb.
- Clinical examination of the upper limb.
- Diagnosis and treatment of the main dysfunctions of the upper limb.

PRACTICES:

- Mobilisations and manipulations of the shoulder: sternoclavicular, acromioclavicular, scapulo-thoracic and gleno-humeral joints.
- Mobilisations and manipulations of the elbow.
- Mobilisations and manipulations of the wrist and hand.

SEMINAR #8: INTRODUCTION TO MANUAL MEDICINE (Part 4)

1 weekend in September

- Body posture and its importance.
- Chain reactions in musculoskeletal system.
- Myofascial syndrome: definition and clinical diagnosis. Nature and biochemistry of the myo-fascial trigger point. Dry needling Fascia treatment.
- Prescription of physical exercise and physiotherapy in affections of the musculoskeletal system.

WORKSHOPS:

- Palpation and infiltration of myofascial trigger points. Dry needling.
- Neuromuscular and fascial techniques.
- Assessment and diagnosis of postural disorders and muscular chains.

SEMINAR #9: MISCELLANEA (Part 1)

1 weekend in October

- Research in Manual Medicine.
- How to orientate an end-of-Master's project?
- Clinical integration.

SECOND YEAR

SEMINAR #1: LUMBAR SPINE AND LOWER LIMBS (Part 3)

1 weekend in November

- Spondylogenic syndromes: concept and application in the lumbar spine.
- Differential diagnosis between painful radicular and pseudo radicular syndrome.
- Concepts for advanced spinal manipulation.

PRACTICES:

- Manipulations of the lumbar spine and thoracolumbar junction.
- Review of mobilisations and soft tissue techniques in the thoracic and lumbar spine.

SEMINAR #2: LUMBAR SPINE AND LOWER LIMBS (Part 4)

1 weekend in December

- Lumbo-pelvic-femoral complex.
- Dysfunction of the sacroiliac joint and coccyx.
- Pelvic pain.

WORKSHOPS:

- Diagnostic tests in sacroiliac dysfunction.
- Manipulations of the sacroiliac joint and coccyx.
- Review of mobilisations and soft tissue techniques.

SEMINAR #3: LUMBAR SPINE AND LOWER LIMBS (Part 5)

1 weekend in January

- Deepening in the diagnosis and treatment of the main dysfunctions of the lower limb: femoro-acetabular impingement, iliotibial band syndrome, meniscal block, tibio-talar impaction syndrome, etc .
- Lower limb clinical integration seminar.

WORKSHOPS:

- Advanced mobilisations and neuromuscular techniques in the lower limbs.
- Advanced manipulations of the lower limbs.

SEMINAR #4: CERVICAL SPINE AND UPPER LIMBS (Part 3)

1 weekend in February

- Anatomy and biomechanics of the upper cervical region, including craneo-cervical junction
- Differential diagnosis of craneo-cervical pain: vertebral dysfunction, headache, dysfunction of the temporomandibular joint (TMJ).
- Differential diagnosis of balance dysfunctions and vertigo.

WORKSHOPS:

- Mobilisation and soft tissue techniques in cranio-cervical junction and upper cervical segments.
- Manipulations of cranio-cervical junction and upper cervical segments.

SEMINAR #5: CERVICAL SPINE AND UPPER LIMBS (Part 4)

1 weekend in March

- Anatomy and biomechanics of the mid-cervical region and cervical-thoracic junction.
- Differential diagnosis of cervical and dorsal pain. Cervical spondylogenic syndromes.
- Dysfunction of the first rib.

WORKSHOPS:

- Non-forced and soft tissue techniques in mid and lower cervical spine.
- Manipulations of the mid and lower cervical spine.
- Manipulations of the cervical-thoracic junction.
- Manipulations of the first rib.

SEMINAR #6: CERVICAL SPINE AND UPPER LIMBS (Part 5)

1 weekend in April

- Differential diagnosis between cervico-brachialgia, referred pain in the upper limb and pain with origin in the upper limb itself.
- Diaphragm and rib cage.
- Chain reactions in the musculoskeletal system. Janda concept. Lewitt concept.
- Interrelation between PMID and visceral pain.
- Medicine of the autonomic nervous system. The autonomic nervous system (ANS). Extracellular matrix and Pischinger basic system. Interference fields.

WORKSHOPS:

- Review of cervical and thoracic manipulations and rest of manual techniques in upper limbs.
- Treatment of chain reactions.
- Patient history taking in medicine of the ANS.
- Ways of treating interference fields.

SEMINAR #7: MISCELLANEA (Part 2)

1 weekend in May

- Miofascial pain. Trigger points: histologic, EMG.
- Dry needling.
- Regional syndromes with summatory myofascial patterns: cervico-thoracic, lumbosacral upper limbs, lower limbs. Headaches.
- Chronic pain: Spinal and central sensitization.

WORKSHOPS:

- Examination of myofascial pain.
- Dry Needling: Hong, Baldry, screwing in-and-out.
- Local twitch response echo-guided.

SEMINAR #8: MISCELLANEA (Part 3)

1 weekend in June

- Spinal and peripheral infiltrations using anatomical references.
- Spinal and peripheral infiltrations using ultrasound guidance.
- Indication of physiotherapy and rehabilitation in patients with somatic dysfunction.
- Clinical integration.

WORKSHOPS:

- Search for anatomical references for infiltrations.
- Search for ultrasound references for infiltrations.
- Clinical cases: diagnosis; manual treatment and prescription of infiltrations; physiotherapy.

SEMINAR #9: MISCELLANEA (Part 4)

1 weekend in June

- Review of the second year: vertebral and peripheral manipulations. Infiltrations. Other treatments.
- Presentation of clinical cases. Clinical integration.
- Exam 2nd course.

END-OF-MASTER'S PROJECT

1 weekend in September

- Individual presentation of the end-of-Master's project.

3. Examples of Competency-Based Programmes in MM Medicine in the USA

3.1. Summary of MM Educational Pathways in the USA

In the United States, manual medicine (MM) treatment by physicians and surgeons is designated as "osteopathic manipulative treatment (OMT)" and for more than a century, the most prevalent MM school of practice in the USA has incorporated "osteopathic principles and practices (OPP)" [r].

Several educational pathways are approved to obtain the palpatory and treatment skills needed if U.S. physicians and surgeons doctors wish to safely integrate MM Medicine in their practices. These are offered in predoctoral colleges, postdoctoral-residencies and postdoctoral-CME programmes at multiple sites. All degree or certification programme curricular elements are competency-based (as opposed to strictly hour-based) while continuing medical education (CME) programmes or recertification processes are now predominantly hour-based (see SECTION I Chapter 5.2. and SECTION II Chapter 3.1.).

The most common MM educational route in the USA is the predoctoral one. This is achieved by those who matriculate and successfully graduate from colleges of osteopathic medicine (COMs). In 2024, there were 41 COMs accredited to deliver instruction at 66 teaching locations in 35 of the United States of America. The U.S. Department of Education recognises the American Osteopathic Association's Commission on Osteopathic College Accreditation (COCA) to accredit U.S. osteopathic medical schools. Today, these colleges are educating more than 35,000 future physicians—25 % of all U.S. medical students. All COM curricula contain both didactic and supervised hands-on education in osteopathic principles and practices (OPP) including palpatory diagnosis of somatic dysfunction and a wide range of manual methods and techniques referred to as "osteopathic manipulative treatment (OMT)". The baseline common curriculum guidelines are agreed upon by the Educational Council on Osteopathic Principles (ECOP) which is made up of the chairpersons of all of the COM teaching departments of Osteopathic Manipulative Medicine. COM students all undergo both institutional and independent national OPP/OMT testing and graduates of these medical colleges earn the degree, Doctor of Osteopathic Medicine (DO) (see Chapter 3.2. below).

A second route for MM education, open to both MDs and DOs, takes place at the postdoctoral residency-training level. Specialty residency-training programmes in multiple medical and surgical disciplines in the United States may submit their competency-based curricula for "osteopathic recognition" with various combinations of OPP and OMT emphases. In particular, the specialty of "Family Medicine with OMT" (which takes place in a full-time, hospital-based supervised residency over 3 years) provides for significant supervised education in palpatory diagnosis of somatic dysfunction and OMT techniques integrated into clinical practice. Osteopathic recognition specialty programmes are accredited by the national Accreditation Council for Graduation Medical Education (ACGME) for both MDs and DOs in training. For each specialty board in the USA, there are both MD and DO representatives to review and approve each specialty programme's competency-based guidelines to determine if it meets the "osteopathic recognition" status.

Education in the specialty of Osteopathic Neuromusculoskeletal Medicine (ONMM) represents the most extensive MM training in the USA. This competency-based programme, which is open to both MD and DO graduates, requires a 36-month supervised postdoctoral residency and produces the majority of this specialty's consultants, educators and researchers. It also leads to certification in the nationally-recognised specialty in ONMM. These programmes are also accredited by the national Accreditation Council for Graduation Medical Education (ACGME) for both MDs and DOs in training. The ONMM specialty college for ONMM is the American Academy of Ostopathy (AAO) which is a member society of FIMM.

Finally, continuing medical education (CME) related to OMT is offered for MDs and DOs by many COMs, state osteopathic associations, osteopathic specialty organisations and the American Academy of Osteopathy (AAO). These CME programmes are available (and required) to maintain specialty credentials related to osteopathic recognition and ONMM specialty status. They also provide physicians with basic MM skills

[r] There are various manual therapies offered in the USA but only Doctors of Osteopathic Medicine (DO) educated in the United States and Doctors of Medicine (MD) are to permitted to use therapeutic coding for osteopathic manipulative treatment (OMT) by physicians and surgeons. Physical therapists and chiropractors have separate therapeutic coding. Non-physician osteopaths are not allowed to use the protected term "osteopathic" in the USA. In the USA, there is a differentiation between "osteopathic manipulative treatment (OMT) by USA-trained DO physicians" and "osteopathic manipulative therapy (OMTh)" by internationally-trained non-physician osteopaths.

designed to help these practitioners to promote patient health and musculoskeletal function as well as aid in pain reduction.

3.2. Curricula and Testing Related to Manual Medicine in Colleges of Osteopathic Medicine in the United States of America (USA)

Both allopathic (MD) and osteopathic (DO) colleges of medicine in the United States share six competency-based curricular components; osteopathic education outlines a seventh.

The six similar core competency educational pathway for MD and DO physicians and surgeons encompasses these competency headings:

- Patient care
- Medical Knowledge
- Professionalism
- Systems-based Practice
- Practice-based Learning
- Interpersonal and Communication Skills

A 7th core competency is unique to colleges of osteopathic medicine (COMs). It is specifically related to MM education, manual skills and integrating osteopathic philosophy in healthcare. Designated as *"Competency One: Osteopathic Principles & Practice (OPP)"*, acquiring these competencies requires several years of supervised training and testing to ensure the acquisition of the palpatory skills needed to identify somatic dysfunction and effective skills to treat it with multiple manual methods and treatment techniques to positively affect healthcare.

The designated predoctoral core competencies in OPP and OMT in the predoctoral curriculum include:

	Osteopathic Principles and Practices
1.	**Approach the patient with recognition of the entire clinical context, including mind-body and psychosocial interrelationships.**
a.	Recognise and treat each patient as a whole person, integrating body, mind, and spirit.
b.	Listen and communicate effectively during the assessment and treatment of a patient presenting with somatic and/or visceral dysfunction.
c.	Obtain consent for procedures, and effectively answer the patient's questions about potential risks, benefits and complications.
d.	Demonstrate caring, compassionate, and empathetic behaviour during the application of OMT in the clinical setting.
e.	Identify potential contraindications to treatment or assessment.
f.	Demonstrate in a patient encounter the impact of culture and world view on the presentation of somatic and/or visceral dysfunctions.
2.	Use the relationship between structure and function to promote health.
a.	Promote and integrate OMT as a method of improving the anatomic and physiologic functioning of the patient both as a stand-alone treatment and as a component of a treatment plan.

b.	Apply knowledge of the biomedical sciences, such as functional anatomy, physiology, biochemistry, histology, pathology, and pharmacology, to support the appropriate application of osteopathic principles and OMT.
c.	Utilize knowledge of the clinical sciences to formulate a treatment plan, emphasizing the correction of clinical manifestations resulting from somatic dysfunction.
d.	Identify the association between organ systems, function, and structural findings.
e.	Understand how structure can adversely affect fluid in low-pressure systems (venous and lymphatic).
f.	Identify somatic dysfunctions that may affect sympathetic or parasympathetic nervous tone.
g.	Demonstrate appropriate OMT to normalize autonomic tone.
h.	Prescribe rehabilitative/therapeutic exercises to address specific musculoskeletal imbalances to more effectively manage conditions that otherwise would become chronic.
i.	Identify common and referred pain patterns.
3.	Use OPP to perform competent physical, neurologic, and structural examinations incorporating analysis of laboratory and radiology results, diagnostic testing, and physical examination.
a.	Obtain historical information to advance the care and treatment of the patient that integrates physical, psychosocial, and cultural factors.
b.	Perform a physical exam incorporating visual inspection, auscultation, palpation, percussion, and range of motion testing.
c.	Perform a structural examination:
c.1	Perform palpation of the spine and Chapman's Reflex points.
c.2	Perform an osteopathic structural screening assessment, noting spinal curvatures, posture, and positioning, including the ten areas of the body (cranium, cervical, thoracic, lumbar, ribs, pelvis, sacrum, upper and lower extremities, and abdomen).
d.	Determine asymmetry or restriction of motion through static and dynamic evaluation of a patient.
e.	Assess paravertebral tissue for tissue texture abnormalities, asymmetry, restriction of motion, and tenderness.
f.	Use anatomical landmarks in the seated, prone, and supine positions to identify correct vertebral levels.
g.	Identify appropriate patterns of somatic dysfunction to evaluate in the differentiation of primary musculoskeletal disorders from primary visceral dysfunction.
g.1	Describe the symptoms and physical findings that are consistent with viscerovisceral, viscerosomatic, somatovisceral, and somatosomatic reflexes.
h.	Demonstrate the ability to diagnose and evaluate somatic dysfunction in the cervical, thoracic, lumbar, and sacral spinal regions; head, rib cage, abdominal and pelvis regions; and upper and lower extremities regions.
i.	Perform spinal segmental evaluation for evidence of facilitation related to viscerally mediated sympathetic and parasympathetic influences.
j.	Appropriately document somatic dysfunction related to primary medical diagnoses assessing for tenderness, asymmetry, restricted motion, and tissue texture abnormalities.

4.	Diagnose clinical conditions and plan patient care.
a.	Identify the patient's chief complaints and appropriately perform a logical physical examination in order to properly diagnose the condition.
b.	Identify key history and physical examination findings pertinent to the differential diagnosis.
c.	Use appropriate information resources to determine diagnostic options for patients with common and uncommon medical problems.
d.	Diagnose somatic dysfunction within the ten body regions relevant to the diagnosis (i.e., head, cervical, thoracic, rib, lumbar, abdomen, pelvic, sacral, upper extremity, and lower extremity body regions), prioritise a differential diagnosis, and develop an appropriate care plan.
e.	Describe how critical pathways or practice guidelines can be useful in sequencing diagnostic evaluations for the patient.
f.	Determine appropriate treatment for autonomic nervous system mediated symptoms.
g.	Formulate a differential diagnosis based on findings from the history and physical examination of the patient.
h.	Consider the patient's perspective and values in diagnostic decision making.
i.	Prioritise diagnostic tests based on sensitivity, specificity, and cost-effectiveness.
5.	Perform or recommend OMT as part of a treatment plan.
a.	Appropriately evaluate, position, and treat a patient with OMT while demonstrating cognizance of patient safety and dignity.
b.	Differentiate and perform specific manipulative techniques and assess their outcomes, e.g., high-velocity low-amplitude (HVLA), articulatory, muscle energy, soft tissue, strain-counterstrain, myofascial release, lymphatic balanced ligamentous, ligamentous articular strain, facilitated positional release, Still, visceral, and cranial techniques.
c.	Differentiate specific visceral techniques and their expected outcomes, e.g., liver and splenic pump, mesenteric lift, colon release, collateral ganglia inhibition, and abdominal lymphatic drainage techniques.
6.	Communicate and document treatment details.
a.	Explain the anticipated benefits, potential complications and untoward effects) of Osteopathic Manipulative Medicine to the patient and family members and/or caregivers.
b.	Respect and abide by an individual patient's decision to incorporate, or not incorporate, specific manipulative techniques (OMT) to specific body regions.
c.	Critically evaluate the relative value, advantages, and disadvantages of each treatment, indications, contraindications, and alternative treatments.
d.	Prescribe rehabilitative/therapeutic exercises to address specific musculoskeletal imbalances and improve management of these conditions.
e.	Use appropriate clinical documentation of structural findings and procedures, including the use of appropriate ICD and CPT terminology when documenting patient assessments.

7.	Collaborate with OMM specialists and other health care providers to maximize patient treatment and outcomes, as well as to advance osteopathic manipulation research and knowledge.
a.	Recognise the role of and demonstrate a commitment to the utilization of other health care professionals in the diagnosis and treatment of the patient.
b.	Critically self-evaluate your knowledge and clinical skills regarding the diagnosis of somatic dysfunction and pathological structure and function in patients, your ability to apply treatments for somatic dysfunction, obtain clinical improvement for your patient, and incorporate other physicians with additional expertise and skills when indicated for the benefit of the patient.
c.	Communicate appropriately with specialists as part of the health care team to engage in collaborative medical decision making.
d.	Advocate for the use of OMT in the appropriate clinical setting by advancing the utilization of OMM/OPP in the diagnosis and treatment of patients and its recognition as a contributing medical therapy among physicians, regulators, payors and patients.
8.	Evaluate the medical evidence concerning the utilization of Osteopathic Manipulative Medicine.
a.	Understand and apply current OMT practice guidelines and evidence-based medicine to improve patient outcomes and conditions in the prevention and treatment of disease and pathology among patients.
b.	Use medical informatics to access the evidence base for OMT and demonstrate the ability to b. incorporate best-available medical evidence into clinical practice.
c.	Interpret and report epidemiologic data in the patient population with musculoskeletal dysfunction.
d.	Demonstrate the ability to explain to non-osteopathic health professionals and patients the indications and benefits of osteopathic medicine and manipulative therapies, including the clinical indications for its application and risks.
e.	Teach medical student peers and facilitate their development of osteopathic manipulative skills as appropriate.

A US national consensus was reached on assessing minimal safe and effective didactic and psychomotor core competency testing parameters of OPP and OMT training. This was established by a blue ribbon educational committee. In addition to providing structure to the national testing boards for osteopathic physicians-in-training, this consensus document also help inform a uniform base for on-site institutional (college and university) didactic and psychomotor assessments. (See https://www.nbome.org/wp-content/uploads/pdf/COMLEX-USA_Master_Blueprint_2024.pdf for the entire blueprint, including Core Competency Domain One).

3.3. 'Osteopathic Recognition' Residencies Open to Both MDs and DOs in Various Specialties

Across the USA, there are 234 residency programmes in 27 specialties that have applied for and have been approved for "Osteopathic Recognition." All residency programmes accredited by the American Council on Graduate Medical Education (ACGME), including osteopathic neuromusculoskeletal medicine programmes ONMM), can accept both allopathic and osteopathic medical school graduates.

Osteopathic recognition programmes must ensure that all residents have sufficient background or instruction in osteopathic philosophy and techniques in manipulative medicine (MM) to prepare them to engage in the curriculum of that programme, as outlined in the Programme Requirements. An allopathic medical school graduate would need additional education related to Osteopathic Principles and Practice prior to matriculation into the programme. The programme would determine how much education is required and can define how and/or where the education be obtained. For ONMM2 and ONMM3 levels of entry, programmes can require that graduates complete another specialty's ACGME-accredited programme with Osteopathic Recognition in a designated osteopathic position.

3.4. Residency Training and Competency-Based Milestones in the Specialty of Osteopathic Neuromusculoskeletal Medicine (ONMM)

1. Specialty Description and Educational Pathway

The osteopathic neuromusculoskeletal medicine residency programme is a primary residency disciplined in the neuromusculoskeletal system, its comprehensive relationship to other organ systems, and its dynamic function of locomotion. The principle focus of the discipline is osteopathic and patient-centered; specifically, it embodies structural and functional interrelation, body unity, self-healing, and self-maintenance. Specialists in this discipline must interpret and demonstrate specialized knowledge of the basic and clinical sciences, clinical evaluation, and management of disorders of the neuromusculoskeletal system and its related visceral and somatic structures. Specialists in this discipline demonstrate knowledge of the indications, risks, and benefits of manipulative medicine in treatment of patients with neuromusculoskeletal disorders.

The educational programme is accredited by the American Council of Graduate Medical Education (ACGME). The requirements for this residency can be found at https://www.acgme.org/globalassets/pfassets/programrequirements/275_osteopathicneuromusculoskeletalmedicine_2023.pdf

2. Milestone Assessment of ONMM Competencies

ONMM Residency faculty are charged with assessing ONMM core competency formative milestones. Along with periodic national specialty inservice examinations and a final summative specialty board examination, these milestones constitute assessments contributing to the eventual certification needed to practice this specialty.

Programmes use published "Milestones" in a semi-annual review of resident performance, and then report to the ACGME. Milestones describe knowledge, skills, attitudes, and other attributes for each of the ACGME Competencies and are organized in a developmental framework. They provide narrative descriptions that are targets for resident performance throughout their educational programme. Competency Milestones are arranged into levels. Tracking from Level 1 to Level 5 is synonymous with moving from novice to expert resident in the specialty or subspecialty. For each reporting period, the Clinical Competency Committee will review the completed evaluations to select the milestone levels that best describe each learner's current performance, abilities, and attributes for each subcompetency. These levels do not correspond with post-graduate year of education. Depending on previous experience, a junior resident may achieve higher levels early in his/her educational programme just as a senior resident may be at a lower level later in his/her educational programme. There is no predetermined timing for a resident to attain any particular level. Residents may also regress in achievement of their milestones. This may happen for many reasons, such as over scoring in a previous review, a disjointed experience in a particular procedure, or a significant act by the resident.

A selection of MM-related milestones from the document include the following descriptors. (Not listed below are the various Milestones related to Systems-Based Practice (including Patient safety and quality im-

provement), Practice-Based Learning and Improvement, Professionalism, and Interpersonal and Communication Skills.)

Patient Care 1: Patient Management: Osteopathic Approach to Patient Care				
Level 1	Level 2	Level 3	Level 4	Level 5
Integrates history, examination, diagnostic testing, and medication management into osteopathic patient car plan, with direct supervision and guidance.	Integrates history, examination, diagnostic testing, and medication management into osteopathic patient plan, with indirect supervision.	Independently integrates history, examination, diagnostic testing, and management into osteopathic patient plan.	Independently integrates history, examination, diagnostic testing, and medication management into osteopathic patient care plan in complex patients.	Role models the effective use of osteopathic-focused history, examination, diagnostic testing, and medication management to minimize the need for further diagnostic testing or intervention.
Performs osteopathic structural examination and diagnoses somatic dysfunction appropriate to patient condition, with direct supervision and guidance.	Performs osteopathic structural examination and diagnoses somatic dysfunction appropriate to patient condition, with indirect supervision.	Independently performs accurate and complete osteopathic structural examination and diagnoses somatic dysfunction appropriate to patient condition.	Independently performs accurate and complete osteopathic structural examination and diagnoses somatic dysfunction appropriate to complex patients.	Role models the complete osteopathic structural examination and diagnoses somatic dysfunction in patient care.
Incorporates osteopathic principles to promote health and wellness in patients with acute and chronic conditions, with direct supervision.	Incorporates osteopathic principles to promote health and wellness in patients with acute and chronic conditions, with indirect supervision.	Incorporates osteopathic principles to promote health and wellness in patients with complex conditions, with indirect supervision.	Independently incorporates osteopathic principles to promote health and wellness in patients with complex conditions.	Role models the integration of osteopathic principles to optimize patient health.
Comments:			**Not Yet Completed Level 1:** **Not Yet Assessable:**	

Patient Care 2: Osteopathic Manipulative Treatment (OMT) (Direct)				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs direct OMT for identified somatic dysfunction, with direct supervision and guidance.	Performs direct OMT for identified somatic dysfunction, with indirect supervision.	Independently and effectively performs direct OMT for identified somatic dysfunction in routine patient presentation.	Independently and effectively performs direct OMT for identified somatic dysfunction in complex patient presentations.	Mentors others to become competent in performing direct OMT for identified somatic dysfunction in complex patient presentations.
Comments:			**Not Yet Completed Level 1:** **Not Yet Assessable:**	

Patient Care 3: Osteopathic Manipulative Treatments (OMT) (Indirect)				
Level 1	Level 2	Level 3	Level 4	Level 5
Performs indirect OMT for identified somatic dysfunction, with direct supervision and guidance.	Performs indirect OMT for identified somatic dysfunction, with indirect supervision.	Independently and effectively performs indirect OMT for identified somatic dysfunction in routine patient presentations.	Independently and effectively performs indirect OMT for identified somatic dysfunction in complex patient presentations.	Mentors others to become competent in performing indirect OMT for identified somatic dysfunction in complex patient presentations.
Comments:			**Not Yet Completed Level 1:** **Not Yet Assessable:**	

Patient Care 4: Diagnostic Screening, Testing, and Interpretation				
Level 1	Level 2	Level 3	Level 4	Level 5
Explains the rational, risk, and benefits for common diagnostic testing.	Explains the rational, risk, and benefits for common diagnostic testing.	Integrates value and test characteristics of various diagnostic strategies in patients with common diseases.	Integrates value and test characteristics of various diagnostic strategies in patients with comorbid conditions of multisystem disease.	Demonstrates a nuanced understanding of emerging diagnostic tests and procedures.
Interprets results of common diagnostic tests.	Interprets complex diagnostic data.	Integrates complex diagnostic data accurately to reach high-probability diagnosis.	Anticipates and accounts for limitations when interpreting diagnostic data.	
Comments:			**Not Yet Completed Level 1:** **Not Yet Assessable:**	

Patient Care 5: Management of Procedural Care (e.g., Trigger Point Injections, Joint Aspirations, Joint Injections)				
Level 1	Level 2	Level 3	Level 4	Level 5
Identifies the procedures that osteopathic neuromusculoskeletal medicine physicians perform.	Identifies patients for whom a procedure is indicated and who is equipped to perform it.	Demonstrates confidence and motor skills while performing procedures, including addressing complications.	Identifies and acquires the skill to independently perform procedures in the current practice environment.	Identifies procedures needed in future practice and peruses supplemental training to independently perform.
Recognises osteopathic neuromusculoskeletal medicine physicians' role in referring patients for appropriate procedural care.	Counsels patients about expectations for common procedures performed by osteopathic neuromusculoskeletal medicine physicians and consultants.	Performs independent risk and appropriateness assessment based on patient-centered priorities for procedures performed by consultants.	Collaborates with procedural colleagues to match patients with appropriate procedures, including declining support for procedures that are not in the patient's best interest.	
Comments:			**Not Yet Completed Level 1:** **Not Yet Assessable:**	

Medical Knowledge 1: Applied Foundational Sciences				
Level 1	Level 2	Level 3	Level 4	Level 5
Explains the scientific knowledge (e.g. physiologic, pathologic, socioeconomic, and behavioural) for normal function and common conditions.	Explains the scientific knowledge for complex conditions.	Integrates scientific knowledge into an osteopathic treatment plan while respecting patient's comorbid conditions.	Integrates scientific knowledge into an osteopathic treatment plan while respecting the patient's complex comorbid conditions	Demonstrates a nuanced understanding of the scientific knowledge related to uncommon, atypical, or complex conditions.
Comments:			**Not Yet Completed Level 1:** **Not Yet Assessable:**	

Medical Knowledge 2: Manifestation of Systemic Disease through Neuromusculoskeletal System				
Level 1	Level 2	Level 3	Level 4	Level 5
Describes the basic interrelationship of structure and function through osteopathic structural findings.	Consistently describes the interrelationship of structure and function through osteopathic structural findings.	Consistently describes the interrelationship of structure and function through osteopathic structural findings as relates to the patient's systemic disease.	Demonstrates knowledge of the effects of health and illness on the whole patient – body mind, and spirit..	Teaches the osteopathic tenets to the multidisciplinary team.
Forms a osteopathic treatment plan based on the patient's history and physical exam findings, with guidance.	Forms a osteopathic treatment plan based on the patient's history and physical exam findings.	Consistently forms an appropriate osteopathic treatment plan based on the patient's complex history and physical exam findings..	Develops a long-range treatment plan to support the health and well-being of the patient.	Is a leader in the development and dissemination of osteopathic knowledge.
Comments:			**Not Yet Completed Level 1:** **Not Yet Assessable:**	

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