

***Manual therapy overview:***

***Considerations & techniques***

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Orthopedic Manual Therapy

* What constitutes orthopedic manual therapy
  + Each application is used for the purposes of modulation of pain, reducing or eliminating soft tissue inflammation, improving contractile and noncontractile tissue repair, extensibility, and/or stability and increasing ROM for facilitation of movement and return to function.
    - Other techniques providing “dubious claims or mental, physical and behavioral changes”.
  + Proposed standardized manual therapy terminology

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* + - Rate of force application
    - Location in range of available movement
    - Direction of force
    - Target of force
    - Relative structural movement
    - Patient movement
  + Hypothesized effects of manual therapy

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* + - Most theories remain hypothetical, but all result in similar functional outcomes and comparable hypothesized effects with each improving one another--“catalytic gains for both”.
      * Biomechanical
        + Improved movement
        + Improved position
      * Neurophysiological changes
        + Spinal cord mechanisms

Sympathoexcitatory response

* + - * + Central mediated mechanisms

Central facilitation

Reduction of afferent nociceptive input to the CNS

Gate control

* + - * + Peripheral mechanisms

Inflammatory markers and changes in pH in damaged tissue has been demonstrated, changing the pH structure, potentially resulting in decreased pain.

* + - * Psychological
        + Placebo

Qualitative in nature (based on perception) but can lead to quantitative changes.

* + - * + Satisfaction and expectation
        + Psychological covariates

Tissue damage and complexity of ascending pathways to brain and descending pain-suppressing systems.

Perception and interpretation of a wide-range of incoming stimuli.

* + - * + Emotions

Anxiety, fear, depression and anger are the four emotions that best characterize the distress of those with chronic pain.

* + Hierarchy of evidence
    - The hierarchical pyramid of evidence

Diagram, shape

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* + - The 5S model for synthesizing and managing information

Diagram

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* + - The four levels of evidence
      * Level A = strong evidence (high quality randomized controlled *and* meta-analysis)
      * Level B = moderate evidence (high-low quality randomized controlled)
      * Level C = limited/contradictory evidence (one high-low quality randomized and inconsistent otherwise)
      * Level D = no known evidence (not sufficiently studied)

A screenshot of a computer

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Orthopedic Manual Therapy Assessment

* Clinical decision-making models
  + Suggests it is along a spectrum of “right on one end and wrong on the other”
    - Patients are too complex for this to be true
    - Threshold effect
  + Hypothetical-deductive
    - Development of a hypothesis during the clinical examination and refuting or acceptance of that hypothesis as the examination progresses
    - Deductive reasoning, general to specific, bottom-up approach
    - Comprehensive, focused and quite extensive
    - Allows for pathognomonic diagnosis of a sign or symptom that is characteristic of a “red flag”.
      * Supplemented with use of special tests and standardized examinations
  + Heuristic decision making (clinical Gestalt)
    - Organize clinical perceptions into coherent construct wholes, indirectly made clinical decisions, pattern recognition, experience driven, top-down approach
    - Five potential faults
      * Representative heuristic (similarity)
      * Availability heuristic (frequency)
      * Confirmatory bias (substantiate)
      * Illusory correlation (deception)
      * Overconfidence (level of experience and inverse relationship)
  + Mixed model decision making
    - Ideal, as it allows for development of clinical prediction rules and use assessment modifiers such as probabilistic decision-making analyses to assign predictive values to pertinent findings
* Assessment modifiers and decision making
  + Outcome mediator
    - Functions to partially identify the possible mechanisms through which a treatment might achieve its effects.
    - Causal links between treatment and outcome—positively or negatively affect an outcome by virtue of a “change”
    - i.e. Perform an intervention and a change of some kind is noted
  + Outcome moderator
    - Baseline variable that is independent of the treatment itself
    - i.e. sociodemographic variables, genotype/archetype, baseline clinical characteristics (comorbidities)
  + Probabilistic decision making
    - Form of moderator, statistically sound, reduces judgement’s influence to address complexity and uncertainty
    - Bayesian assessment
      * aka, knowledge-based decision making
      * Predicated on prior estimates of probabilities, based on additional experience, and influenced by additive information
      * Use of clinical prediction rules helpful in establishing improved probability of success with a diagnosis or intervention when patient and assessment findings match these rules
  + Patient response triggers
    - Form of mediator, facilitates a dedicated care response, expectation of prognosis or diagnosis
    - Within-session vs between-session changes/outcomes
      * Used to adjust treatment dosage, intensity, and application
      * Both are useful
  + Classification or clusters
    - Has been demonstrated better outcomes than independent clinician decision-making
* Clinical reasoning
* Decision making in manual therapy
  + Philosophical variations robustly harbor influential internal biases that affect decision-making in manual therapy.
  + “Continuing education programs offer ‘new’ material, all of which have potential weaknesses.”
  + Widespread variations in manual therapy curriculums, approaches and exposures
    - Origin of structures often dictate the perspective of the particular model
  + Maitland, McKenzie, Mennell, Cyriax, Kaltenborn, Osteopathic and eclectic are most common models
    - Maitland
      * Comparable sign
        + Motion or combined motions that reproduced symptoms
        + Used four grades of oscillatory-based application and they differed in force, amplitude and objective
    - McKenzie
      * Classification based
        + Series of repeated movements and postural/positioning assessments to determine patient response
        + Assigned to one of three groups

Postural

Derangement

Dysfunction

* + - Mennell
      * Subjective findings, joint dysfunction based on onset and presence of trauma
      * Utilized quick thrusts followed with active movements to encourage “muscular reeducation”.
    - Cyriax
      * Based on assessments of capsular patterns and results of resisted testing
      * Identification of “lesions”
        + Use of physiological movement, accessory movement or other treatment was dependent on pain-level, end-feel, capsular pattern, and presence of contractile or noncontractile lesion
    - Kaltenborn
      * Based on arthrokinematic movements based on convex-concave rules and to divide them into hyper- or hypo-mobilities
      * Utilized traction and accessory glides
    - Osteopathic
      * Interpretation of three potential findings
        + A positional fault
        + Restriction fault
        + And/or segmental or multi-segmental impairment
  + Philosophical analysis
    - Three primary assessment approaches in manual therapy
      * Biomechanical-pathological assessment analysis, consisting of assessments using capsular patterns, coupling motions of the spine, biomechanical movement theory, and treatment methods using convex-concave rules
      * Patient-response approach, which consists of movements and treatments based in patient report of symptom provocation and resolution.
      * Mixed method of both assessment models. This combined approach may rely more heavily on biomechanical assessment and patient response treatment, vice versa, or will use ad hoc
* ***Important coupling movements to always consider***:
  + Flexion, abduction and external/lateral rotation
  + Extension, adduction and internal/medial rotation

Orthopedic Manual Therapy Clinical Examination

* Contraindications to orthopedic manual therapy
  + **Recognize the importance of “red flags” and that there are varying levels of attention they require** 
    - Red flag categorization levels are not dissimilar to the levels of absolute and relative contraindications of both active and passive movements
    - (Do not concern yourself with manipulation considerations)
  + **Absolute contraindications**
    - Situation where the movement, stress, compression placed on the body part involves a (potentially) high risk of deleterious consequences
  + **Relative contraindications**
    - Situation which requires special care and reflection as to the necessity of performing vs an alternate intervention
      * Consider the patient’s presentation as well
      * Think twice so you don’t pay the price
      * BSTS (better safe than sorry)
  + **Extra care should be taken when performing manual therapy around the upper cervical spine**
* Detailed elements of the clinical examination process
  + **Clinical examination helps determine what (re)produces the patient’s “familiar signs and symptoms”**
    - **Known as the concordant or comparable sign**
  + Region-specific areas will typically follow this format:
    - Observation
    - Patient history
    - Physical examination
      * Structural differentiation tests
      * Active physiological movements
      * Passive physiological movements
      * Passive accessory movements
      * Special clinical tests
  + Three different examination domains
    - **Observation**
      * General inspection
        + More global, more visual outliers
      * Introspection
        + More local, more behavioral outliers
    - **Patient history**
      * Critical, not necessarily specific to the area involved, even the little stuff might matter
      * Mechanism of injury
      * Concordant sign
        + aka comparable sign
        + That movement which reproduces symptoms
        + **Disconcordant sign**

**Movement that is painful or abnormal, but not related to the concordant sign**

* + - * **Nature of the condition**
        + Severity of the disorder

Actual vs perceived

* + - * + Irritability (or “reactivity”)

Both acute or chronic issues can have varying levels of irritability

Not necessarily reflective of the severity of the condition

* + - * + Behavior of symptoms

Time

Over a period, pro- or regressive symptomology, response to self-interventions

Response to movements

Does a specific movement pattern exist in relationship to their symptoms

Area

Isolation in order to rule out associated factors proximal and/or distal to the condition

* + - * + Pertinent past and present history
        + Patient goals
        + The baseline

Base “functional” performance or self-reported pain level

Visual analog scale (“pain scale”)

PROM and/or AROM

A “sense” of change

* + - * **At the end of the observation and subjective history, the clinician should have:**
        + **Red flags ruled out**
        + **Post-subjective hypothesis**
        + **Appropriateness for manual therapy**
        + **Nature of the problem (as characterized by the severity, irritability and stage of the condition)**
        + **Patient’s expectations**
        + ***Concordant sign which helps drive the examination and the treatment***

***Most important part of the manual therapist’s examination***

* + - **Physical examination**
      * **Active movements**
        + Performed solely by the patient
        + **Three stages of this assessment and patient response during these stages**

**Initial—Patient moves to first point of pain (response is noted)**

**Progressive—Patient moves beyond the pain and holds (response is noted for change)**

**Repeated—Patient then repeats the movement to determine if pain or range changes (if they are able to move past this point)**

**Overpressure—Should be considered as well to differentiate concordant from disconcordant and see if symptoms are still present**

* + - * + Three questions should be asked

Was there an improvement in pain symptoms, range of motion, quality of motion or a combination?

If symptoms were produced, how did they respond to repeated movements?

Where in the range did the symptoms worsen?

End-range usually suggests mechanical impairment, mid- or through-range suggests inflammation or instability

* + - * **Passive movements**
        + Passive physiological movements

“Movements which are actively used in the many functions of the musculoskeletal system”

Osteokinematic motions through plane-based descriptors (flexion, extension, abduction, adduction, medial and lateral rotation)

Occur simultaneously with accessory motions and degree of freedom and motion availability is a product of that accessory motion

Helps determine total ROM at a particular joint

**Follows active physiological process of initial, progressive and repeated movements toward concordant sign**

* + - * + **Passive accessory movements**

“Any movement manually or mechanically applied to a body with no voluntary muscular activity by the patient”

Divided into regional and local mobilizations

**Regional is directed passive movement to more than one given area, segment or physiological component**

**Spinal techniques mostly regional**

**Local mobilization is specific and directed to one segment and/or joint area**

**Require locking of adjacent joint areas and is facilitated by apposition when joint surfaces are most congruent and ligamentous structures maximally taut**

Can be performed in open-packed or closed-packed positions

* + - * + **Combined passive movements**

Habitual movements that occur in combination of planes rather than as pure movements in one plane

Follows active physiological process of initial, progressive and repeated movements toward concordant sign

Can occur in any one of a number of different combined active and/or passive movements

* + - * + **Other considerations**

**Magnitude of force**

Enough force is required in order to create change to effectively analyze

**Rate of increase of force**

Increase in frequency will result in increase in resistance to deformation

Duration of loading

Repeated loads over time leads to greater stiffness at end-range

**Targeted tissue to which force is applied**

Lots of variables can influence outcome

**Location of manual force in relation to the center of the targeted structure**

Starting point should be near the center of the targeted structures

**Direction of force**

Lots of variables which can influence outcome

**Contact area over which the force is applied**

How and where one grasps the targeted area

* + - * **Special clinical testing**
        + Includes palpation and manual muscle testing
        + **Four purposes**

**Supportive information**

Determine the level of functional impairment or disability

Isolated clinical assessment tools not as effective

**Diagnostic value**

To a set of findings using sensitivity and specificity values and offshoots

Add to hypothesis but rarely help confirm a diagnosis

**Prognosis of the patient**

Can either directly tie a finding toward an outcome or cluster findings that dictate the use of a decision “rule”

**Structural differentiation**

For use to help clinician correct origin of the dysfunction when coupled with other differentiation tests, especially when other factors have not helped target the source

* + - Putting objective physical examination findings together
      * At this stage, the clinician should have an understanding of:
        + Causal pain-generating region
        + Which active movements increase, decrease or normalize the pain (associated with the concordant sign) or ROM
        + Which passive movements increase, decrease or normalize the pain (associated with the concordant sign) or ROM
        + Potential pain generators based on movement, positional or palpatory findings
        + Potential diagnosis based on examination and clinical test findings
        + Association of subjective and objective findings
* Techniques
  + Static stretching
  + Mobilization
    - Segmental/joint mobilization
    - Nerve mobilization
    - Soft-tissue mobilization
    - Targeted specific manipulation
    - Generalized manipulation
  + Combined techniques
    - Mobilization with movement (MWM)
      * Term coined by Brian Mulligan and is the application of an accessory glide during the patient-driven active physiological movement.
      * Accessory application should follow the biomechanical joint orientations and the sustained, through-range, manually derived forces that guide the joint in such a way that superimposed active movement, which previously produced pain, can then occur painlessly.
      * Follows Kaltenborn’s principles of restoring the accessory component of active and passive physiological joint movement.
  + Alternate techniques
    - Strain-counterstrain (S/CS) / Positional Release Therapy (PRT)
      * Passive indirect technique developed by Dr. LH Jones in 1955 based on pain-relief from “tender points” (TPs) and improved function from being in pain-free positions.
      * TPs are small, edematous, hypersensitive areas located at myofascial and articular areas that are elicited upon palpation
      * Typically located near muscular attachments to the bone, overlying tendons, the belly of major muscles and at or around joints
      * Assume the patient or region in a pain-free position and maintain while palpating the “wobble point” for 90 sec to relieve the strain
    - Craniosacral therapy
      * Founded by the work of William Sutherland, DO from the teachings of Andrew Still, MD
      * Gentle hands-on technique that uses light touch to examine membranes, fascia and movement of the fluids in and around the central nervous system
      * Aims to promote feelings of well-being by eliminating pain and boosting health and immunity
    - Cranial manual techniques
      * Founded by the work of William Sutherland, DO from the teachings of Andrew Still, MD
    - Visceral manipulation
      * Founded upon by Jean-Pierre Barral, DO, PT
      * Gentle manual therapy that assess the structural relationships between the viscera (organs) and their fascial or ligamentous attachments to various parts of the body
      * Assists in restoring structural imbalances throughout the body
    - Muscle Energy Techniques (MET)
      * Developed by Fred Mitchell, DO in 1948
      * Uses the muscle’s own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition and lengthen the muscle.
      * Autogenic Inhibition
        + Submaximal contraction of the muscle followed by stretching of the same muscle
      * Reciprocal Inhibition
        + Submaximal contraction of a muscle followed by stretching of the opposite muscle
    - Instrument Assisted Soft Tissue Mobilization (IASTM)
      * Skin, myofascial, muscles and tendons manipulation intervention utilizing various direct compressive stroke techniques.
        + Creates microtrauma to the affected soft tissue which causes a stimulation of local inflammatory response for reabsorption of inappropriate fibrosis or scar tissue.
      * Based on James Cyriax cross-friction massage and said to have evolved from Gua sha used in Chinese medicine.
      * Most commonly stainless steel instruments with beveled edges and contours.
        + There are wood and plastic instruments as well.
      * Is used both for detection as well as treatment.
      * Foam rolling and The Stick could also be considered IASTM.
    - Proprioceptive Neuromuscular Facilitation (PNF)
      * Developed by Herman Kabat (based on the work of Charles Sherrington)
      * Seems to have similar outcomes as static stretching.
      * Reversal of antagonists
      * Repeated contractions
      * Combined isotonics
      * Rhythm initiation
      * Contract-relax
      * Hold relax
      * Replication
      * Resisted progression
      * Rhythmic rotation
    - Manual lymph drainage (MLD)
      * A light, skin-stretching massage that helps promote the movement of lymphatic fluid out of an extremity via focused work on lymph vessels to help this flow.
      * Unaffected areas first to allow fluid to move out of the affected area(s), or “decongest” the region.
      * Four main strokes:
        + Stationary circles
        + Scoop technique
        + Pump technique
        + Rotary technique
      * Coupled with breathing activities to assist in pumping.
    - Trigger point
      * Hyperirritable spot, a palpable nodule in the taut bands of the skeletal muscle’s fascia. Direct compression or muscle contraction can illicit a:
        + “Jump sign”

Characteristic behavioral response to pressure on a TrP. Startled by intense pain, seemingly out of proportion to the amount of pressure applied and often met with reflexive reaction elsewhere in the body.

* + - * + Local tenderness

See above

* + - * + Local twitch response

Transient visible or palpable contraction of the muscle and skin as the tense muscle fibers contract when pressure is applied

* + - * + Referred pain

Also called reflective pain, which usually responds with a pain pattern distant from the spot

Does not follow dermatomes, myotomes or nerve roots

These TrP referred pain sites have been mapped (i.e. Janet Travell)

* + - Integrative Manual Therapy (IMT)
      * Developed by Dr. Sharon Weiselfish-Giammatteo
      * Uses the body as a whole to treat pain, dysfunctions, disabilities that prevent the body’s own capabilities of healing itself
      * Addresses rehabilitation in two categories
        + Structural
        + Functional
      * “Tri-planar fascial fulcrum”
    - Controlled Articular Rotations (CAR’s) from Functional Range Conditioning (FRC)
      * PAIL’s and RAIL’s
        + Progressive angular isometric loading and regressive angular isometric loading
      * Designed to teach the nervous system how to control progressively larger ROM’s (Principle of Specificity) and prepare the body’s tissues to function in newly acquired ranges (Progressive Adaptation)
    - Active Release Technique (ART)
      * Soft tissue method which focuses on relieving tissue tension via the removal of fibrosis/adhesions which can develop in tissues as a result of overloading/repetitive use.
      * Both diagnostic and treatment
      * To restore free and unimpeded motion of all soft tissues
      * To release entrapped nerves, vasculature and lymphatics
      * To re-establish optimal texture, resilience and function of soft tissues
    - Feldenkrais Method
      * Developed by Moshe Feldenkrais
      * Utilizes gentle, mindful movement to bring new awareness to the body
    - Trager Approach
      * Developed by Milton Trager, MD
      * Not a technique, but an approach to meet the needs of the individual with soft, gentle touch and movements
      * Releases and relaxes emotional states and body tensions and pains

**References:**

* Orthopedic Manual Therapy: An Evidence-Based Approach, by Chad E. Cook; Pearson Education, Inc, 2012. (Chapters 1-3: Orthopedic Manual Therapy, Orthopedic Manual Therapy Assessment, Orthopedic Manual Therapy Clinical Examination)
* Multiple course manuals, textbooks, and online references