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A Retrospective Look at the Use of Manual Therapy

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A RETROSPECTIVE LOOK AT THE USE OF MANUAL THERAPY

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This Independent Study, submitted by Susan Adele Sollom in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

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ABSTRACT

Manual Therapy (MT) has been used extensively since the origin of the Physical Therapy profession and includes massage, traction, exercise, stretching or compression of soft tissue, range of motion tests, manual muscle tests, palpation, joint mobilization and manipulation. Interest and enthusiasm for MT has especially grown among clinicians and educators in the last decade. However, despite it's common use, research and documentation involving the efficacy and reliability of MT are extremely rare. Many techniques and concepts have yet to be justified. These concepts need to be critically tested, discussed, and revised, and the profession needs to be challenged to show outcome research or data.

The purpose of this study is to provide a current review of the following critical topics in MT: current definitions, reliability studies of palpation, and the efficacy of selected MT techniques for treatment. Ideas are presented on how to objectify both data and functional outcome measures, while keeping in mind the reality of clinical practice. Conclusions promote the need for testing and inquiry in both practice and labs, leading to solid theory and a more efficacious practice.

INTRODUCTION

Beyond all doubt the use of the human hand,
as a method of reducing human suffering,
is the oldest remedy known to man; historically
no date can be given for its adoption." [1(p843)]

This quote from Mennell is referring to manual therapy and has been experienced in the most simplistic way be every child who has been injured. For instance, when four year old Johnny falls off his new Huffy bike with training wheels, he begins to cry. Then mom and dad come running over, put their hands on his sore knee (elbow, chin, etc.) reassuringly and say, "You'll be okay." In many ways physical /manual therapists do just that-- put their hands on the problem.[2] The therapist becomes the parental figure who can fix things. This all sounds great, except for the overwhelmingly obvious question: "Where is the hard-core proof, support, or scientific evidence that endorses the mysterious 'manual therapy' intervention?" This question is currently staring our profession in the face, because to say there is a lack of research related to the efficacy of manual therapy is a gross understatement. Many techniques and concepts have yet to be justified, and a dilemma exists in whether to categorize manual therapy (MT) as a true science or as an artform.

Despite its shaky foundation, interest and enthusiasm for manual therapy continues to grow among clinicians and educators. It seems any clinician coming back from a Maitland or McKenzie course suddenly feels more powerful, confident, and beneficial to their patients, and their enthusiasm quickly spreads. Even the editor of the APTA

journal,Jules Rothstein, points out that the swell in popularity appears to make things valid, "as if popular opinion precluded the necessity of research and refinement."[3] Now going back to that obvious question, "Where is the scientific evidence to support manual therapy?" "We often borrow from the disciplines of anatomy and neurophysiology to solidify the rationale behind MT treatment choices. We also can add the psychology of the patient and philosophy of each individual therapist as contributing factors. But even though these provide a strong foundation, a problem exists in the application of MT because it demands interaction between human beings, and there is the effect of human behavior.[4,5] Hence, the dilemma between art and science exists. The reality of this tug-of-war is clearly illustrated in the triangulation methodology proposed by Kant and Comte,[6] where quantitative research represents the factual laws and theories as the apex of the triangle, and where ethnology and phenomenology represent the qualitative, patient-physician interaction as the base of the triangle. Since MT sits towards the base of the triangle, it carries certain implications that cannot possibly be answered in a purely quantitative way.

Although obvious, it seems almost necessary here to point out that humans are not reducible, measurable objects, and that therapists should value the whole patient. This is art. We are in such a science-minded age that "art" has become a dirty word, and is seen as an attempt to avoid responsibility for what we do.[7] This simply is not true. We value patient responses and change treatment accordingly; this is precisely what benefits them. If all back patients, for instance, benefited from a technique of mobilizing L5-S1, we would have nothing to worry about. The reality is they don't, so manual therapist takes into consideration all the background of physiology and logical reasons that a treatment should work, weighs them, and selects an appropriate treatment. The therapist constantly uses problem-solving approaches and analytical reasoning to justify any treatment, but because

of the human element, art is inherent in the use of manual therapy. The implication of characterizing MT as such is answered by Richard Di Fabio, PhD, PT, and Director of Graduate Studies in Physical Therapy at the University of Minnesota, "When you characterize MT as an art, it removes it from the realm of replicable method; and if there is no replicable, testable method, it's very difficult to determine efficacy and teach a logical series of procedures that can be called manual therapy."[7]

Consequently, the struggle now is to perhaps "pull" MT toward the apex of the triangle, toward the scientific evidence that is needed for objectivity, quantifiable outcomes, and repeatable measures. Although MT will never lose the"art" term, many educators and researchers are taking steps towards the science and of the dilemma and slowly advancing the basis of what the pioneers of manual therapy first developed. Interestingly, when Bobath, Knott/Voss, or Maitland first inspired their schools of thought, faithful followers strictly adhered to a certain name and rationale. However, after finding out that one particular school did not provide all the answers, therapists started melding the thoughts and moving toward what benefited the patient most. Similarly, Rothstein[3] points out that these pioneers should be viewed as a source of ideas that can be " discussed, tested, refined, and revised." If there isn't any critical dialogue and we don't challenge our profession to show outcome research or data, we will not grow and there will never be clarity. There is a constant nagging to link clinical practice and science. Perhaps Joseph Farrell and Gail Jensen [8] put this eloquently when they insisted we embrace " healthy skepticism" and "allow untested assumptions to be challenged," while keeping in mind the reality of clinical practice. Ironically, as more is written in journals and peer-reviewed magazines, additional questions are being raised. However, this is the first step towards advancement and growth in the science realm, rather than acceptance by popular demand.

The purpose of this project is to provide an overview of the key issues in manual therapy: the definitions, the patient's psychological profile, the reliability of evaluation using palpation, and the efficacy/justification of certain MT techniques for treatment. Ideas are also presented on how to objectify both data and functional outcome measures. The last section emphasizes the present activities and role of the APTA in guiding the evolution of manual therapy.

This project will provide a current review of some critical topics in manual therapy and possibly raise even more questions, so that the dialogue will continue, and MT can become more and more refined. Of course, the words "gurus, science, and critical thinking" will always apply to manual therapy,[8] and it will forever be a cross between art and science because our hands will be our tool-- "the remedy." But how manual therapy, or putting hands on a patient, is used, this has been evolving from the time when mom and dad touched the scratched elbows or skinned knees of their children and said, "You'll be okay." and it's still evolving.

DEFINITION

Since manual therapy has developed from numerous clinicians (Paris, Maitland, Cyriax, McKenzie, Mennell, etc.), it currently envelops a vast set of evaluation and treatment procedures for musculoskeletal and CNS dysfunction. It is only one component of a treatment package used to increase function and to decrease pain. When thinking of manual therapy, the predominant definition that comes to mind is treating or assessing soft tissue texture-- palpating skin, muscle, and connective tissue structures while feeling for thickness, swelling, or tightness.[4] However, it encompasses much more than this, and the general consensus is that manual therapy includes massage, traction, and distraction, exercise, stretching or compression of soft tissues, ROM tests, manual muscle tests, palpation, accessory motion tests, joint mobilization, and high-velocity manipulation techniques. [1,9-12]

Presently, the term manipulation has been avoided by many therapists in the United States, possibly because of its strong association with chiropractic professions, and the fact that the term"mobilization" is accepted in some physical therapy state practice acts.[1] The difference between these two will be addressed later, but it is important to realize that manipulative techniques for evaluation and treatment of individuals has always been a component within the scope of physical therapy. The Practice Affairs Committee of the Orthopaedics Section of the American Physical Therapy Association (APTA) pointed out:

> 1. Manipulation in all forms is within the scope of practice of the licensed physical therapist.
> 2. The force, amplitude, direction, duration, and frequency of manipulative treatment is a discretionary decision made by the physical therapist on the basis of education and clinical experience and on the patient's clinical profile.
> 3. Manipulation implies a variety of manual techniques which is not exclusive to any specific profession.

Manual therapy, then, is not exclusive to any profession, and different professionals use a variety of techniques, depending on their educational background, experience, and the patient's clinical profile.

PSYCHOLOGICAL PROFILE

Is there any objective laboratory or radiographic examination that tells us whether a person may be suitable for manual therapy?[13] The answer is obviously no, but in examining a meta-analysis, Di Fabio was able to compile a typical profile of a patient with low back pain who would most likely benefit from MT. The patients who were between the ages of 21-57, had symptoms less than one month (acute onset), had no previous history of lumbar injury (6 months pain-free prior to current onset), had no previous experience with manipulation on her back or back surgery, demonstrated normal deep tendon reflexes and muscle strength, and were not receiving payments involved in litigation, such as workers' compensation or disability insurance.[9]

Other therapists interviewed in the PT Magazine's special focus on manual therapy[13] add insight as to when and how long MT should be used with patients. Wayne Rath, Dip MDT, PT, and CoDirector at the Center for Spine and Orthopedic Therapy uses McKenzie's repeated end-range movements, then instructs the patient in self-treatment. He feels if this provides some benefit in 24-48 hours, then MT is indicated as an adjunct treatment tool. Conversely, Richard Erhard, PT, DC, and Assistant Professor at the University Of Pittsburgh feels that when active movement or exercise improves status, then it's time to stop manual therapy (passive) intervention. This depends upon the patient response and provides goal-orientated or "staged" levels of treatment. In his practice, they also use tools to determine or predict how much time should be invested in a patient (treatment duration), particularly those with low back pain. One of these tools is the modified Oswestry Low Back Pain Disability Questionnaire. If the patient scores 50-75, then they have to fill out another test for nonorganic physical signs, and the results are used

to "stage" the patient. If they score above 75, then they are not accepted for treatment at all, but are referred to a multidisciplinary pain center for chronic patients, because, Erhard says, experience shows that these patients will not benefit from MT or physical therapy alone.

Treatment duration for chronic patients is quite a controversy in manual therapy.. At Erhard's practice these people are "weeded" out prior to acceptance, but because of insurance reimbursement limitations, chronic patients will eventually be eliminated anyway. For example, Vincent Basile, who has been a PT for 28 years, called his clinic the "Last-Chance Saloon" because often the patients are not perfect candidates for any treatment. They have tried almost every type of intervention without success, and so are less-than-appropriate candidates. Although a patient should not be given treatment when there isn't any benefit, Basile points out that many patients obtain "relief and improved function through manual therapy and cannot maintain that status when therapy is discontinued."[13] Third-party payers, of course, hold that if there is no progress, there should be no treatment. Then the question is asked, "Why is maintenance care acceptable in treatment by medication, but not in physical therapy?"[13] Perhaps periodic manual therapy may be more reasonable and cost-effective with these chronic patients.

One final opinion is given by Stanley Paris, PhD, PT, and Chairman of the Institute of Physical Therapy. Paris emphasizes patient education and states that after three visits, clinicians have no business treating a patient unless there is a subjective or objective change. More importantly, he feels that MT has no role in the management of chronic patients, not only because they need to take responsibility for their well-being, but also because therapists lose their manual skills when they spend so much time with chronic conditions. There are no fast responses or feedback, so "to work with chronic cases, the therapist musts have a wealth of clinical experience with acute cases."[13]

Whether chronic or acute, many patients receive relief and improved function from MT, especially the young to middle age adults who aren't on workman's compensation, as Di Fabio[9] pointed out. Unfortunately, even though patients get better, when palpation is used, treatment drifts farther and farther from proven medical methods. As one author put eloquently, "Incompatibility between clinical usefulness and levels of reliability of manual examination techniques produces an enormous chasm, into which any hope of accurate diagnosis falls and flounders. Bridging this chasm will require validation of the examination techniques..."[14(p54)] Consequently, assessment/examination routines need to be analyzed, refined, and ushered into the science realm of reproducibility.

RELIABILITY of PALPATION in ASSESSMENT

Obviously, palpation plays a major role in any manual therapy technique, whether in assessment or treatment, but the proficiency level for palpating range of motion (ROM), trigger points, and even bony (seemingly easy) landmarks is poor.[15-17] However, intrarater reliability is consistently higher than interrater assessments,[18-21] and both can be improved dramatically when integrated with the simplest technology, such as algometry.[22-27]

Just one example of the subjectivity of assessment using palpation is a study of intertester reliability for 13 tests of the SI joint.[15] Examiners were asked to palpate the following bony landmarks: ASIS, PSIS, and iliac crest height in standing and sitting. They also determined results of the supine to long sit test, sitting and standing flexion tests, and recorded responses to the supine iliac gapping and the side-lying compression test. Operational definitions for each test were agreed upon beforehand, and essentially, the only patients chosen as subjects (N=17) were those in whom sacroiliac joint (SIJ) testing would routinely be done, as their chief complaint was unilateral buttock pain for not more than one year. Therapists were paired so that after an initial evaluation a second therapist examined the patient. Therefore, two therapists looked at each patient, writing down the findings of the 13 most common tests. Possible findings for each test were very simplified--left high, right high, or even. Two of the tests required subjective input by the patient and results were still simple--pain left, pain right, or no pain. Results in percent agreement for palpation of bony landmarks ranged from 35%-43%. Overall, 11 of the 13 tests had extremely low intertester reliability with less than 70% agreement. Furthermore, the two tests that had values better than 70% (supine iliac gapping and side-lying iliac compression)

relied solely on the patient's subjective response, giving no information about joint position or mobility. The authors concluded that evaluation skills and testing procedures need to be examined critically, not only to ensure continuity of patient care, but also to provide repeatedly effective treatments for SIJ dysfunction.

Nice et al[16] in 1992 critically examined a frequently used evaluation technique, determining the presence of trigger points in patients with LBP. The reliability of judgments of the presence of these points made by use of the method described by Travell and Simons had not been investigated, yet Travell argued that since trigger points refer pain in predictable patterns, the patterns should be used as clinical guides, and that body diagrams illustrate the location of these trigger points and associated zones of reference.[16] For the study, fifty patients with low back pain were tested by 12 therapists at a specialized back clinic. The testers routinely treated patients with LBP and had from three to 17 years experience. Two therapists examined four to six patients a week, and five therapists examined one to three patients a week for the presence of trigger points. Before the study, the testers practiced finding three specific Travell trigger points located in the iliocostalis and longissimus thoracic muscles in the spine, and then were randomly paired. An examiner placed the tip of an index finger on the patient at the site corresponding to a possible trigger point. The tester then applied firm pressure and slowly moved the finger tip repeatedly in a medial and lateral direction until the site in which the patient reported the most intense pain was identified. The examiner kept firm pressure on the hyperirritable spot for a maximum of 10 seconds, and a trigger point was judged to be present when the patient reported increased pain present in the zone of reference. A few minutes after the first therapist was done examining, a second tester assessed the same patient. There were 197 trigger point exams, and the results produced Kappa coefficients of .29-.38 for those three points in the low back. (Kappa values represent the proportion of agreement after chance

agreement is excluded.) The results showed extremely poor reliability, and the authors questioned the usefulness of examining for the presence of trigger points in patients with LBP.

Complimenting these articles was another interexaminer reliability study done in 1990 by Keating and Bergman.[17] Three experienced chiropractic examiners explored lumbar segmental abnormality in 21 symptomatic and 25 asymptomatic subjects. They examined the spine from T11/T12 to L5/S1 noninvasively at each spinal segment and, as in the first article, there was good agreement (K=.48) for palpatory pain (subjective) over osseous structures and also for temperature differences (greater than or equal to 1.5 degrees F). Similarly, there was virtually no agreement between examiners for passive motion palpation (K=.07), muscle tension palpation (K=.07), and misalignment palpation (K=.00). This study suggested that pain may be among the most reliable of conservative spinal observations.

Keating and Bergman's study is also relevant in demonstrating the inadequacy of passive motion palpation. Physical therapists perform accessory motion tests (AMT), or joint mobilizations, because they believe meaningful inferences can be made about the amount and type of movement at a given joint surface. This movement , then, has to be measurable and predictable, but unfortunately, the literature does not support this contention.

Two of the most common AMTs are the Lachman's test and valgus stress of the knee. Although these are ligamentous tests, they require therapists to judge the amount of motion present, the end-feel, and whether pain was produced, so ligamentous tests are reflective of other AMTs. A study in 1990[28] examined the validity and reliability of the Lachman's test, using 32 patients with knee problems, 13 of whom had documented ACL tears. Two physical therapists and two orthopedic surgeons assessed positive or negative

results, the end-feel, and the amount of translation. The predictive value for a positive test was 47%, but the predictive value for a negative test was 70%.[28,29] Kappa values for intertester and intratester reliability of whether the test result was positive or negative ranged from .02-.69, and values for the amount of motion present (0, 1+,2+,3+) were from .22-.46. It seems then, that reliability for passive motion may be unreliable, and that judgments of a positive Lachman's are not accurate for determining an injured ACL. However, a negative Lachman's test may be fairly useful for predicting whether a patient has an intact ACL.

The valgus stress of the knee is the other commonly used AMT, and McClure et al[30] examined intertester reliability of the medial collateral ligament. Three therapists (randomly paired) applied the valgus stress test in the 0- and 30-degree positions for 50 subjects. Here again, the testers were to determine the amount of motion as well as the patient's pain perception during the test. The Kappa values ranged from .06-.4 in the 0-degree position, and .16-.38 in the 30-degree position.[30] The results were poor; however, the author pointed out that the results are limited because these were chronic knee injuries, and results may have differed if they were acute. But despite the limitation, it is interesting to note that the valgus stress test and the Lachman's are not only frequently used, but they are also two of the simpler AMTs, since the knee is large and more superficial in comparison to other smaller joints, such as facets in the spine. If reliability is so poor in a seemingly easy joint to assess, the usefulness of AMTs for joint problems is questionable.

Finally, in addition to assessing joint surface motion, therapists commonly assess the nature of the resistance (end-feel) present at a joint's end-range position.[29] Daniel Riddle, in his article, "Measurement of Accessory Motion: Critical Issues and Related Concepts," states that the use of the end-feel classification system of Cyriax (capsular,

empty, spasm, springy block, approximation, boney) is not proven. "No data exist to support the criterion-related validity of the use of the end-feel classification system of Cyriax."[29] The meaningfulness of end-feel assessments during AMTs is addressed in his article, but the driving point is that the validity and reliability of AMT results need to be developed, since most therapists rely on these results to make important clinical decisions. Riddle, PT, suggests that manual therapists use the results of AMTs only in conjunction with other measurements when making decisions.

These articles on AMT, trigger points, and SIJ testing demonstrate the discrepancy that constantly exists between therapists when palpation must be used, primarily because there is a difference in applied force by each therapist as well as a difference in palpation techniques. It isn't surprising then, that *intra* rater reliability may be slightly better than *inter* rater testing in studies of palpation.

This is exactly the conclusion that Panzer made after a comprehensive literature review of references pertaining to reliability of lumbar motion palpation. He stated that, "To date, most studies have demonstrated marginal to poor interexaminer reliability, with good to moderate intrarater reliability being reported."[19] For example, just one of these many articles demonstrated moderate test-retest agreement beyond chance for passive physiologic movement testing at L1/2 ($K=.48$, $p<.0005$), minimal reliability at L4/5 ($K=.29$, $p<.05$), and no significant agreement within examiners for midlumbar segments. This is compared to interexaminer agreement, which was absent for all segments assessed.[20] Other studies of manual muscle tests[18] and accessory motion tests on the spine[29] also concur that intratester reliability is inherently more accurate in manual examinations.

Not only is data more consistent and reproducible when done by the same therapist, but experience also increases intrarater reliability. One interesting study on sacroiliac

motion palpation assessed the interexaminer reliability of interns in their final year at a chiropractic college, and compared their results after one year of clinical field work. In addition, the study compared the intra- and interexaminer reliability of experienced clinicians.The interns/new graduates had extremely low kappa values for both intra and interrater agreements, with no significant improvement noted at the end of a year of clinical practice. The interexaminer reliability of experienced clinicians was also poor, 0.00 - 0.167; however, the intraexaminer reliability ranged from .15-1.00 (moderate to almost perfect).[21] Therefore, only the role of experience in improving accuracy **between** therapists performing SI motion palpation is questionable. More importantly though, the author's conclusion was that "experience doesn't play a significant role in the diagnostic test analyzed, but rather the clinicians may establish their own criteria by which to determine the standards of a given test."[21]

So, with years of practice, a manual therapist becomes more adept at performing and assessing patients with consistency. This "wealth of clinical experience" needed to become an expert in manual therapy has been estimated from at least five years[2] to around 10 years.[7] Although intuition and skill are developed with time, it is important to realize manual therapy is teachable. Margaret Anderson, GDMT, PT of Marin Orthopedic Rehabilitation, says the technique is only a small part, and that it's very cerebral. Skill is hard to quantify, but Anderson says that a PT in Australia has begun to document it, using an electronic device that tests skill in palpating different levels of resistance.[2]

This electronic device is just one of a number of new and sophisticated imaging techniques that are being used to show assessment validity and reliability, without which measurements and information are not meaningful. Since it is apparent that MT needs to become more sophisticated and replicable, there is a major push for our profession to integrate technology and manual skills so that treatment consistency and effectiveness are

improved. Quantitative evaluations using pressure algometry, for instance, have become a major advance in objectifying assessment results.

PRESSURE ALGOMETRY

Algometry (dolorimetry) actually assesses sensitivity to pain and pressure perception[27] with the capability of objectively quantifying tenderness and finding trigger points. One type of algometer is the pocket-sized pressure threshold meter (PTM), a small mechanical force gauge with a metal rod, at the end of which is a hard rubber tip one cm in diameter. The algometer is inexpensive, simple to use, and provides valuable information that cannot be obtained by other methods.[22] Another hand held instrument which quantitatively assesses muscle consistency is the tissue compliance meter. Both of these meters are significant in advancing the diagnosis and treatment of myofascial pain.

The PTM, commercially available through Pain Diagnostics and Thermography (17 Wooley Lane East, Great Neck, NY 11021), displays minimum force readings in kg/cm^2 and ranges from 0 to 11 kg/cm^2, with 0.1 kg/cm^2 divisions. In the clinic, the therapist finds a tender point through palpation, then the meter tip is applied with gradually increasing force. The amount of pressure that is needed to elicit a noticeable amount of pain is considered the minimum pressure threshold. A pressure threshold of 2 kg less than the opposite (normal) area or an adjacent spot indicates abnormal pressure sensitivity. The reliability, validity, and reproducibility of the meter readings for the diagnosis of tender spots has been proven.[22-27] In 1987, Fischer established norms for pressure sensitivity over different muscles. He examined 24 males and 26 females for control values by measuring common trigger point sites bilaterally over the teres major, upper trapezius, levator scapulae, supraspinatus, infraspinatus, pectoralis, gluteus medius and paraspinals at the L4 level.[27] The subject was instructed to acknowledge when he/she started feeling pain or discomfort. The examiner then put the rubber tip of the PTM on the point with the

shaft vertical to the surface, and the pressure was increased continuously until the subject said yes. Readings were taken this way, and almost identical results were obtained for corresponding muscles on opposite sides, proving the excellent reproducibility and validity of PTM. This study also serves as a reference for clinical diagnosis of abnormal tenderness, from two different points of view:

1. Differences in pressure threshold between males and females -- Females had lower pressure thresholds than males in every muscle, and the relative sensitivity of some muscles differs in the two sexes. For example the difference between females and males in the upper trapezius was minimal (2.7 and 2.9 kg), while females had significantly lower values in the teres major (2.7 kg vs. 4.1 kg in males).[27]

2. Differences in pressure thresholds of individual muscles-- The pressure thresholds show the most sensitive muscle is the upper trapezius (3.7 kg in females, 5.4 kg in males), and the least sensitive are the lower back muscles such as the lumbar paraspinals and gluteus medius, (paraspinals =6.8 kg females, 9.0 kg males).

Reeves et al [26] also submitted an article combining three reliability studies. All showed high reliability between and within experimenters in locating and measuring trigger points. Just one of the studies, for instance, had two experimenters independently apply PTM to 12 subjects at five unmarked myofascial trigger point locations: the masseter, the anterior temporalis, splenius capitis, trapezius, and semispinalis capitis muscles. These head and neck locations are frequently involved in neck pain in the clinic. Pressure was applied at a constant rate of 1 kg/cm^2 until the patient verbally reported the "just noticeable amount of pain." This value was recorded The Pearson correlations for these points was excellent, r=.69-.86, with the exception of the mastoid process, which had r=.45.[26]

Since trigger point sensitivity is a clinical sign that changes with treatment, the pressure algometer may provide a useful tool to quantify the clinical outcome of various treatment modalities. The pressure measurements can be used clinically to quantitatively diagnose tenderness (tender spots, fibromyalgia, diagnosis of low pain tolerance) and also measure treatment results (immediately after procedure, after injections, long-term effects).

Also, muscle consistency can be objectively assessed by using a tissue compliance meter, another hand-held instrument which looks like the PTM. At the end of the long shaft is a rubber disk, which is pressed into the tissue. The depth of penetration is indicated on the force gauge by a sliding disk, and compliance is expressed as the depth of penetration at a known force.[22,27] Tissue compliance measurements are beneficial in that they can objectively identify muscle spasm and the presence of trigger points.[22]

The reliability of the PTM and tissue compliance meters literally opens the door to a range of clinical and experimental possibilities in the area of manual therapy and myofascial pain specifically. There are many other laboratory techniques that can identify the presence of a hypersensitive area: O_2 levels, thermography, electromyography, and phosphate levels to name a few. The question is whether these can be economically and practically integrated to help therapists become more adept and reliable at finding these points in patients.

Not only could technology secure and improve the reliability of palpation skills, but it could also demonstrate the validity of manual examinations. One classic example that demonstrates the use of both technology and palpation was done in 1988, where 20 patients who had chronic head and neck aches for at least a year were evaluated by a manual therapist (PT).[31] The author questioned whether AMTs for the cervical spine could be used to correctly identify zygapophyseal joints which were inflamed. Without knowing the diagnosis, the therapist examined the cervical spine for physiologic motion, abnormal quality of resistance to motion, and reproduction of pain during AMT procedures. Through

this assessment, the PT selected the symptomatic joint(s). Also, radiographically controlled diagnostic nerve blocks, done during a fluoroscopic procedure for placement of the needle, were used to establish the presence or absence of symptoms associated with the joints. The nerve blocks were administered to the medial branches of the dorsal rami, which were thought to innervate the zygapophyseal joints. Eleven of the patients received the diagnostic nerve block first and then were evaluated by the PT one to four weeks later, while the other patients experienced the reverse sequence of events. If the block completely relieved the patient's symptoms for three hours, the judgment that the joint was inflamed was determined valid. Of the 20 patients, the PT correctly identified all 15 patients who had symptomatic joints and also the five patients who didn't.[31] This is an example of the "art" of palpation, and how it can be validly used to assess conditions.

It is encouraging to find studies such as this, which show we can (and need to) improve the reliability of manual skills by utilizing modern technology in both clinical and experimental research. Without reliability, physical therapy is vulnerable to the criticism that these patients are receiving sub-optimal care, or that they could just have easily recovered on their own. Consequently, the notion of efficacy--whether MT alleviates musculoskeletal dysfunction-- isn't clearly established either. Since efficacy, reliability, and validity are inherently related, it is extremely important at this time to have a clear understanding of the scientific basis for any MT technique and moreover, to be able to justify what we do as professionals, at least until the gap is bridged between practice and theory of why it is successful.

JUSTIFICATION and EFFICACY of MT

An assessment of efficacy for MT techniques is essential, if not for the profession itself, for third-party payers. Efficacy may have to be shown on the front line before approval of reimbursement through Medicare/Medicaid or private insurance! There are two ways to justify or explain the rationale for treatments: explanatory research and pragmatic research. Explanatory research addresses questions like, "How does manual therapy relieve pain and improve function?" It is usually answered with the appropriate physiological underlying mechanism. Myofascial release and strain-counterstrain are easily justified this way. Pragmatic research addresses questions such as, "Is manual therapy superior to some other types of treatment or to a control or sham?"[13] This is the type of research most needed to prove efficacy, and this is where scientific inquiry should be made. A controversy currently exists about the efficacy of manipulation vs. mobilization, and Richard Di Fabio[9] has compiled the results of research trials that were determined to be valid demonstrations of treatment efficacy, or demonstrations of non-useful therapy. He also points out that objectifying outcomes or goals is beneficial to establishing efficacy.

The basis for myosfascial release is explained by restricted fascia throughout the body. John F. Barnes, PT, speaks of the fascia as a tough connective tissue enveloping every muscle, bone, nerve, blood vessel, and organ without interruption.[32] The fascia exerts tremendous tensile forces on the neuromuscular skeletal system and other pain sensitive structures. The importance was depicted in one study where a small slit in the epimysium of the fascia resulted in 15% loss in muscle strength.[32] What happens is the fascia tightens when it experiences trauma, poor posture, or inflammation, and we lose flexibility and the spontaneity of motion. The fascial disarrangement is suggested by the

presence of trigger points located with palpation, as they are areas histologically associated with myofibrillar degeneration, accumulation of acid mucopolysaccharides, and metabolic distress. [33-36] More specifically, David Simons, MD, explains that trigger points are self-sustaining malfunctions of muscle contraction initiated by repairable structural injury.[33] So when the body is injured, calcium is released and combines with the ATP, which activates a local contraction. Because of the sustained contraction, metabolic activity produces prostaglandins, which causes local hyperirritability, reflex vasoconstriction, and hence, pain.[33-36] Myofacial release just restores function by stretching locked actin and myosin filaments far enough apart to stop runaway activity. ATP can accumulate to restore the reticulum, and with circulation improved, noxious metabolic products are removed. Prostaglandin has a 1/2 life of seconds or less, and would disappear easily. Simons holds that stretch therapy is the simplest effective therapeutic approach for fascial injuries.[33]

Explanatory research also justifies the new manual technique of strain-counterstrain, a passive positional procedure. The body is put in a position of greatest comfort, thereby relieving pain by reduction and arrest of inappropriate proprioceptor activity. Korr [37] postulated that muscle spindles are the key elements in the neural basis of osteopathic lesions. Why the muscle spindle? They are sensitive to musculoskeletal stress, they are nonadaptive receptors, and they are highly specific to each muscle and the corresponding spinal cord segment. Physiologically, spindles within the muscles, tendons, and ligaments have a primary (sensory) or annulospiral ending that responds to change in muscle length. Additionally, the primary ending's frequency of firing during a stretch is proportional to the rate of change (velocity of stretch). The secondary endings only report length at any moment. Therefore, the annulospiral endings provide predictive or anticipatory input into the nervous system,[37] and their influence is excitatory. That is, when a muscle is stretched, reflexly it is stimulated by its spindles to contract, and resist

stretching. The concept behind strain-counterstrain is that the spindles falsely report, for example, that their muscle, actually shortened, was stretched to nearly it's maximum.[36] This could happen easily when a person suddenly moves and surprises the CNS, as the primary endings could not anticipate the sudden joint motion. Korr then states this causes chronic segmental facilitation, and the spindles need to be reset so the discharge is reduced. Resetting the spindles involves positioning the patient with that muscle shortened, holding that position, and then slowly returning to a resting position. This allows the spindle to report a true rest position.

Finally, explanatory research has tried to hypothesize how spinal manipulative therapy (SMT) exerts its mechanical effects. This is currently a controversy in the health profession, and needs to be addressed, since chiropractors are the third largest medical profession, [38] and since PTs are using and getting certified precisely in these techniques. Manipulation and mobilization, first of all, are contrasted and defined in many ways. For example, Cyriax defines manipulation as the use of hands to passively move a joint for a therapeutic purpose. More accurately, Grieve defines manipulation as a localized, single, quick and decisive movement of small amplitude.The Orthopaedics Section of the APTA defined mobilization as the act of imparting movement, actively or passively, to a joint or soft tissue, while Maitland talks of mobilization as passive, rhythmic, graded movements, so the patient could prevent the technique from being performed.[1] Paris thinks that the terms mobilization and manipulation are interchangeable. In any effect, manipulation generally implies a skilled, manual procedure used to quickly move a relaxed vertebral segment or peripheral joint , restoring it's integrity by use of normal involuntary ranges of passive movement, and completed before the patient can stop it.

How exactly does SMT exert it's effects? The literature refutes the basic tenet of chiropractic practice, which holds that displacements or subluxations of vertebra disturb

nerve flow.[11,38-40] "Guidelines for Chiropractic Quality Assurance and Practice Parameters," a highly regarded research review in 1993, noted "To be a valid outcome measurement, misalignments should theoretically reduce with therapy [and] there are few experimentally controlled studies indicating that manipulations are the reason for changes in misalignment seen over time."[39] Also, many blinded studies could not find significant differences in vertebral positions in post-manipulation patients with low back pain.[39] In essence, no one really knows how SMT works, although there are many advocates who believe that it reduces subluxations, adjusts nuclear prolapse, or tears joint adhesions. One hypothesis by Cyriax asserted that manipulations reduce nuclear disk herniations, although current literature does not justify this view either. Indeed, recent research shows that nuclear disk pathology is less common than previously thought, and that it is extremely unlikely that SMT could have any positive effect on the reduction of nuclear material.[11] One useful explanation was provided by Zusman,[40] who theorized that manipulations may cause an inhibitory effect on reflex muscle contraction. He also mentioned that after repetitive end-range movements, there could be a delayed effect for neural discharge in joint afferents. There are many complex justifications, but in reality, how SMT exerts its mechanical effects is speculative, and therefore cannot fully be proven physiologically, or by explanatory research.

Consequently, the issue of manipulation needs to be addressed by pragmatic research to establish efficacy. Do patients get better with manipulation treatments, as opposed to other therapies? Are there case studies to support and validate manipulation as an effective treatment? Again, there has been conflicting research regarding the usefulness of SMT, preventing definitive conclusions. In 1991, the British Medical Journal published, "the efficacy of spinal manipulation has not been convincingly shown,"[41] and similarly the *Principles and Practice of Chiropractic* states, "Long-term benefits of spinal manipulative

therapy have not been convincingly demonstrated."[39] Despite this seemingly negative overview, there are numerous studies that advocate SMT for immediate effect, especially in acute, uncomplicated low back pain.[9,11,42,43]

Perhaps the most recent and comprehensive literature analysis on manual therapy was done by Richard Di Fabio. He established objective criteria for judging the validity of MT research (randomization, blind outcome assessment, criteria for selecting subjects, description of intervention, statistical analysis, and statistical power analysis) and determined valid demonstrations of treatment effectiveness with both mobilization and manipulation treatments, particularly for the treatment of low back pain. Out of 146 articles, only 14 studies met criteria for efficacy.[9] Di Fabio separated the results into four basic sections: manipulation compared with mobilization, manipulation compared with a control group, mobilization compared with a control group, and combination manipulation/mobilization compared with control group, some of which should be mentioned.

Manipulation compared with mobilization:

There were three studies in this section. A 1990 low back pain study by Meade et al[44] compared private chiropractic care (n=378) with outpatient public health service hospital treatment (n=339). The subjects had low back pain, no neurological signs, and had not been treated within the month. Hospital treatment generally consisted of mobilization and manipulations to the lumbar spine, education, exercises, and modalities, while chiropractic treatment in 99% of the cases was manipulation. The outcomes were measured by a questionnaire for pain and ability to complete functional activities. Chiropractic treatment was found to be more effective with respect to improving mobility, decreasing pain, and increasing straight leg raise and lumbar flexion. Noteworthy here is the fact that

chiropractic treatment cost 50% more and lasted for 30 weeks, as opposed to 12 weeks of treatment at the hospital. [39,44]

Another valid study of efficacy involved sclerosing injections (dextrose, glycerine, phenol, and pyrogen-free water), exercise, and manipulation combined to treat patients with chronic low back pain (greater than one year duration).[45] Subjects (n=40) were between 20 and 70 years old, and were not overweight or diabetic. On the first visit, these subjects were given a single forceful manipulation of the spine, combined with a sclerosing injection. Then for a period of 6 weeks they were given a weekly injection and lumbar flexion exercises. The control group (n=41) received mobilization (non-forceful) of the lumbar spine with placebo injection. Based on the patients' response to a disability questionnaire, the experimental group had greater improvement in disability and pain scores compared with the controls.[45]

The last pragmatic comparative article under this section used 54 subjects from 18-40 years old who had low back symptoms less than one month, and who had no previous SMT. For five sessions, 26 people received manipulation, and the 28 people received mobilization (without a thrust) to the lumbar spine. Based on their responses to a questionnaire, subjects receiving manipulation reported quicker and greater improvement as regards to pain and mobility.[46]

Manipulation vs control:

Hoehler et al [43] demonstrated the immediate reduction in the pain patients often feel with manipulation. Ninety-five patients who had no previous experience with STM, who were not overweight, were not involved in litigation, and who had restricted or painful vertebral ROM participated. The experimental group received rotational manipulation of the lumbosacral spine, while the placebo group received massage with the thrust omitted. Data collected were both subjective (questionnaires) and objective (height of straight leg raise

without pain, height of straight leg raise until pelvic rotation occurred, and height of fingertips from floor with maximal forward trunk flexion.) The experimental group was alleviated of low back pain immediately, but at three weeks following treatment, no difference was found between groups.

Mobilization vs control:

With respect to lumbar mobilization, Nwuga [47] carried out a study with 51 patients who had disk protrusions, as determined by electrodiagnostic tests, as well as unilateral nerve root compression, as determined by reflex changes. A control group received short wave diathermy and exercises, while the experimental group received education in posture and lumbar rotary oscillations to reach each subject's painful end-range limit.[47] The results were promising; the mobilization group had significantly more lumbar motion and straight leg raise than the control. Di Fabio notes here that the functional significance of improvement in the straight leg raise was not described,[9] but this article does advocate MT over more conservative methods.

Combination Manipulation/Mobilization compared with a control:

Finally, it may be beneficial to mention the results of Farrell and Twomey, who studied 48 patients with low back pain symptoms for less than three weeks.[48] One group (n=24) utilized passive mobilization and manipulation, while the control group had diathermy, exercises, and education. The MT group recovered (symptom-free) one week sooner than the control group. Unfortunately, 91% of all the patients recovered within four weeks anyway.

These are the highlights of Di Fabio's literature review, and it is his conclusions that need emphasizing. Out of the 14 valid efficacy studies, 11 involved some sort of manipulation as the primary intervention,[9] and 91% (10/11) of these studies statistically supported manipulation over mobilization (4 studies) or a control group (7 studies). Only

7% (1/14) of the valid studies examined mobilization as the primary intervention against a control group with favorable results. This meta-analysis not only provided clear evidence that manual therapy, especially manipulation, can be an effective modality when used to treat patients who have low back pain, but it also indicated that there is a paucity of well-designed studies that critically examine mobilization as a primary intervention.

It is promising to see literature reviews and case studies that advocate manual therapy as not only beneficial, but also more effective than other treatments or a control group. Regarding the efficacy of manual therapy, however, a related issue should be considered--the potential role of the placebo effect. As previously pointed out in Twomey and Farrell's study, low back pain is a self-limited disorder that resolves itself in 90% of people within two months, regardless of therapeutic intervention.[9,39] Therefore, improvement of a condition after MT does not necessarily prove the efficacy of manual techniques. Gielen[49] points out that the therapist-patient relationship contributes to the placebo effect and is influenced by the patient's perceptions of the therapist's expertise, trustworthiness, optimism, and enthusiasm. Undoubtedly, the human interaction and the "laying on of hands" enhance the placebo effect. Also, the sound produced by manipulation (the popping) can convince a patient that a bone has been put back in place, although it is attributable to the sudden separation of the joint surfaces which are held together by pressure and fluid attraction in a vacuum.[39] Consequently, this human behavioral aspect should be kept in mind.

Both pragmatic and explanatory research are important in solidifying the rationales for manual therapy, but clinicians are still faced with justification issues on a day to day basis. In this respect, it is important not to be too hard on ourselves as a profession. In Di Fabio's work, he only found 14 of the 146 titles that met the inclusion criteria for valid

studies! Therapists should realize that not everything in clinical practice is supported by research; however, unsupported does not infer ineffective. Grieve describes this well:

> *We continue to sound as though we know so much, when we know comparatively little. It might be a good thing to admit this. We make much of clinical science, enthusiastically referring to this or that part of the massive mountain of literature which best serves our particular interest...Much of what we do is simply what has been proven on the clinical shop floor to be effective in getting our patients better- we do not always know why.*[50]

Actually, even standard medicine isn't as scientifically researched as many would believe. For instance, U.S. surgeons have performed hundreds of thousands of carotid endarterectomies in the untested theory that it might help prevent strokes.[38] So although the efficacy/ reliability still needs to be demonstrated in future research, how do we objectify our results in the meantime? There is one very practical way therapists can allow for a more meaningful description of the efficacy of manual therapy (and other interventions)-- by paying attention to outcome measures.

OBJECTIFYING OUTCOME MEASURES

Treatments based on outcome data can establish MT as a primary tool to return a patient to improved functional status, and using repeatable, quantifiable measures is of paramount importance.[7,9,13] Steven A Stratton, PhD, PT, ATC, President of Alamo Physical Therapy Resources Inc and Associate Professor at University of Texas Health Science Center, states, "We need to justify what we do and prove that a patient has become more functional."[7] Many experts in the field of manual therapy that were interviewed in *PT Magazine* gave excellent suggestions for objectifying tests, and the Orthopaedic Section of the APTA (actually started by the Academy of Manual Therapy with Stanley Paris) has been leading the evolution of MT, providing specialized proficiency tests, roundtable and residency educational opportunities, and a new academy devoted to competency standards. All of these influence the physical therapy profession and will help manual therapy achieve greater respect.

What types of outcomes are we looking for? How are we objectifying our tests and measures? First of all, the use of valid technological tools always increases objectivity. Algometers, goniometers, and radiographic assessment are the more commonly used measures, and even expensive, high-tech machines are being used for testing in some research clinics: force detectors that measure the amount of pressure being applied in any direction, high-resolution cameras to track how much a person's body moves when it absorbs a chiropractic thrust, and EMGs to monitor contractions in a patients' muscles before, during, and after a manipulation.[38] Secondly, at the clinical level, any measurement used should really meet the requirements identified in the *Standards for Tests and Measurements in Physical Therapy Practice.*[51] Currently, therapists often utilize

muscle strength tests and active/passive range of motion measurements. Of course, changes in range of motion can be monitored from treatment to treatment, but that doesn't necessarily translate into functional gains. Several articles in the July 1989 issue of *Physical Therapy* focus on discussion and improvement of clinical measures, [52,53] with an increasing emphasis on functional activities and recorded pain measurements on a repeated basis.

Wayne Rath, Dip MDT, PT, Co-Director at the Center for Spine and Orthopedic Therapy, and senior lecturer for the McKenzie Institute International, has an interest in the analysis of day-to-day clinical effectiveness. At his practice, they developed a computer-based outcome assessment program where patients complete pain drawings, visual analog scales for intensity and frequency of pain, and functional questionnaires.[7] An assessment and reassessment form measures movement loss, the effects of repeated movements on pain, and neurologic symptoms, then outcomes are defined objectively using the following scale: Excellent: no pain and complete recovery of function.

Good: partial pain relief and full recovery.

Fair: partial pain relief and partial recovery of function.

Poor: no relief of pain or functional improvement.

Stanley Paris adds such tools as the Beck's Linear Pain Scale and McGill Pain Questionnaire as adjunctive data to improve effectiveness and efficiency.

Farrell, Di Fabio, and Paris all strongly advocate functional questionnaires to measure gains.[7,9,13] Farrell points out that therapists shouldn't get caught up in measuring joint mobility to the nth degree and base outcomes on that, because functional assessments are more relevant.[7] When a patient's straight leg raise improves from 20-50 degrees, what does that say about their capacity to function? Completion of tasks and gait are meaningful data, and goals such as return to work, cost-effectiveness, or decreased sick

leave are classic examples of functional outcomes. Can the patient function better at work and at play? Has the quality of life and movement improved?[13] Tests that can quantify this data are of great value, and Paris suggests the Oswestry and the Dallas, a functional outcome assessment for the spine that the North American Spine Society will publish; both allow measurements on a repeated basis. Di Fabio also recommends the use of operational definitions when looking at quantifying outcomes, because terminology based on anatomical pathology does not directly relate to the patient's problems. For instance, terms based on MRI scans may be degenerative disk disease, or herniated nucleus, but there may be only a weak relationship between the organic findings and the patient's functional limitations. Therefore, setting goals specific to the individual patient and using standard repeatable measures of pain and/or function will enhance our credibility.

The clinic is the place to establish effectiveness, but most therapists don't have time to do research, to print and write up studies of reliability, or even to run patients through these studies. Somehow researchers and clinicians need to cooperate, since the academic environment has the time and resources, and the therapists have the patients! In the workforce there is pressure to work quickly, as well as a staff shortage. So the best model would be to integrate students, graduate or undergraduate, into the clinic during their education, and let there be a "marriage" between the researcher and experienced PTs. Students could be helped tremendously in large-scale randomized studies, or even single-subject design, which is relatively painless. The APTA should play a role in fostering this relationship.

HERE AND NOW

Helping the profession achieve greater respect and credibility is the largest and probably the most complex component of the APTA, the Orthopaedic Section, started in 1974 and now more than 11,000 members strong. It advocates research, develops clinical competency examinations, and holds educational forums, providing organization and an accessibility to the knowledge we need to expand the scientific basis of clinical practice.

In the striving to achieve clinical specialization, Paris pushed for a board that would develop policies and procedures for a certification. Hence, the Board for Certification of Advanced Clinical Competence (now the American Board of Physical Therapy Specialties--ABPTS) was formed, and the other three sections developed their respective exams. However, there was much debate in the Orthopaedic section about how to standardize the exam, making it objective, valid, and reliable. Some members wanted it to test written and practical skills, while others thought this to be financially and legally impossible. After many years, in 1989 the first orthopedic specialty examination took place (written) and 26 therapists became Orthopaedic Certified Specialists. The contents of the examination is still being debated.[54] Paris asks,"How can you call it clinical specialization when the exam is purely a written exam?"

If a practical exam was given, questions still arise. Demonstrating clinical skills on patients poses serious medical and legal issues. Can clinical competence be determined when the therapist is performing on a nonpatient population outside the clinic? Practical exams are harder to objectify, time-consuming, and costly. Finally, who would be qualified to pass judgment on another person's clinical skills? The ABPTS, in response to these concerns, established guidelines for Councils that wanted practical tests, but to date,

no APTA section has developed such an examination.[54]

"There's no doubt we need a standardized vehicle to test what comes out of our hands," says Annette Iglarsh, PhD, PT, current President of the Orthopaedic Section, referring to the less-quantifiable aspect of a therapist's skills.[54] But she feels clinical competence is achieved through experience and training, and consequently likes the idea of a residency program where instructors can supervise and test the resident consistently--at the end of which a valid, reliable written test is given. The Kaiser Hayward Physical Therapy Residency Program in Advanced Orthopedic Manual Therapy in California is just one model that is instructing manual skills in this format. Carol-Jo Tichenor, MA,PT, Director of the Kaiser Hayward program predicts that using residency programs versus practical exams to establish clinical standards will become an issue for many APTA sections.[54]

A big advocate of residencies is the American Academy of Orthopaedic Manual Physical Therapist (AAOMPT), formed in 1991. This academy was initiated by eight primarily foreign-educated practitioners, and among the reasons for it's formation was the need for a practical and written examination so manual therapists could become members of the International Federation of Manipulative Therapists (IFOMT). President of the AAOMPT, Joe Farrell, explains that the academy will develop a certification process through manual therapy residency programs and apprenticeships with experts, as well as provide national accreditation of manual therapy programs. Also through residency, students and therapists applying for specialization may do independent research, as well as cooperate with their mentors in designing studies or projects that address efficacy issues. Although the APTA doesn't formally recognize academies yet, Paris sees them as the wave of the future because they "follow the medical model and establish clinical competence that the profession needs to compete against infringement and cost containment."[54]

The Orthopaedic Section does allow for special interest groups and roundtables, providing meeting times, funding, and organizational sessions at the Combined Sections Meetings. The educational benefits are limitless, as the published literature emphasizes evaluation and treatment techniques, tells what needs to be investigated, and gives examples of how to investigate. These are helpful initial steps, and ultimately, such investigations will help develop theories of practice for the profession of physical therapy.

CONCLUSION

This project has provided an overview of some key issues in manual therapy and has touched on the critical topics that envelop discussions about manual therapy. This evolving subspecialty area has emerged as a hot topic in the profession, perhaps because it cuts to the heart of the debate about efficacy and portrays the dichotomy between the "art" and "science" of physical therapy.

Manual therapy includes a broad set of evaluation and treatment procedures and is only one component of the total treatment package used to increase function and to decrease pain. The scientific basis for manual therapy is strongly tied to philosophical approaches from several clinicians, and to knowledge from other disciplines (anatomy, neurophysiology). The patients that generally benefit from MT are middle aged, have acute symptoms, and are not receiving payments involved in litigation. Palpation plays a central role in the application of many techniques and apparently requires years of training and practice to master; however, even with experienced and competent therapists, current studies showed that the interrater reliability of palpation for bony landmarks, trigger points, range of motion tests, and AMTs is poor. Additionally, there is a lack of well designed studies that examine mobilization as an adjunct treatment tool, which brings into question it's usefulness. In general, there is a lack of both valid explanatory and pragmatic research in all areas, particularly an absence of controlled trials involving MT to peripheral joints.

Although physical forces can and do alter connective tissue, as yet there is no foundation of research to delineate the range or distribution of manually applied forces. Because there is no clear evidence put forth by reliability or efficacy studies to justify the use of manual therapy, it is not altogether unrelated to fraud: services in absence of an

adequate clinical assurance of efficacy. Consequently, as testing and inquiry in clinical practice is stimulated, commitment to objective measures and documentation with functional outcome data is critical for the profession. Also important will be the APTA's role in the organization and accessibility of our knowledge as new information and studies are completed.

As the state of the art of MT continues to develop, future researchers have much to accomplish. One of the biggest needs in MT research is replicable and thorough descriptions of treatment interventions and the methods manual therapists use to make clinical decisions. Although some research has addressed the reliability of selected clinical tests, in reality therapists make decisions based on a battery of tests, rather than in isolation. So studies examining MT in a more relevant clinical context would be useful. In addition, the construct validity for AMTs needs developing, especially in view of their constant use in practice. The predictive values of positive and negative tests, the sensitivity, and the specificity of many AMTs should receive more attention because they are essential prerequisites to meaningful MT effectiveness studies that use them. Other suggestions, of course, are for efficacy studies identifying mobilization and manipulation as primary interventions, since this area has been largely ignored. Finally, outcome measures such as return-to-work rate or use of sick leave is recommended in future studies because they also provide a functional basis as to the effectiveness of MT.

Research, discussion, and refinement can bridge the gap between practice and the theories of how, when, why and what treatments should be administered. Without data, without testing, without critical dialogue, treatments can pass as easily from fad as into popular opinion. As MT moves closer to the realm of replicable method, healthy skepticism should be maintained, while keeping in mind the reality of clinical practice. Also, inherent in any MT technique will forever be the aspect of human behavior , the

interaction and touch between human beings. MT will always be the most scientific art and the most humanistic science because our hands are our tools. But there is room to grow, and taking steps toward the quantitative side and advancing what the founders of MT first developed can only lead to a more efficacious practice.

The questions are timeless-- how does the body heal after an injury? Can the mind help or hinder? What is the role of the healer? And most relevant, what are the health benefits of physical contact? Of plain and simple touch? It is the oldest and most powerful remedy known to man, yet it happens every day. Moms and dads instinctively put their hands on little Johnny's skinned knees or Susie's scratched elbows and say, "You'll be okay." And the use of manual therapy will undoubtedly continue to evolve.

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