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The Relevance of Load and Load-Tolerance

There is a distinctive need for outcome studies and research in physical therapy. The outcome studies need to involve all possible relevant information to make the procedure more reliable. Currently, subjective and objective information is integrated in our physical therapy outcome studies. Patient satisfaction and functional outcome questionnaires are used for the subjective information and functional progress parameters, measurements of ROM, strength and neural/dural mobility are used for objective findings.

Many predisposing factors are not being considered in the outcome potential of the patient and this may cause false statistics. Furthermore, some clinics who are conducting pilot studies or research screen and refuse some categories of patients before they are allowed to enter research and outcome projects.

Patients who are poor candidates for research and pilot studies might have the following characteristics:

- *high stress level*
- *depression*
- *poor nutrition*
- *drug; alcohol and medication abuse*
- *malnutrition*

It is my clinical experience that many of the aforementioned patients present themselves as chronic pain patients. Due to this research / outcome study trend and pressure from the insurance companies, we end up with outcome studies that predict false low outcomes. The insurance companies will counteract with lower reimbursement fees and less visits allowed per case. We are now at a point that clinicians claim that they can solve all referred problems in 4-6 visits. We all know that if we are considered specialists, we get the more difficult patients and this statistic is unreachable.

Physical therapists concern themselves with optimizing the conditions for tissue regeneration. As moderator of this process, the physical therapist needs to assess all aspects of the condition of the patient, both physically and emotionally.

To address these issues properly and effectively, the physical therapist needs to be aware of the balance between load and load-tolerance. A disturbed balance between load and load-tolerance will lead to injury and decreased conditions for tissue repair. This balance incorporates: smoking, diet, stress-level, alcohol, medication etc. and we know instinctively that these factors are decisive factors in the outcome of our rehabilitation and that most of these patients will be refused in pilot studies, because of these predisposing factors. The balance between load and load-tolerance is an important factor in determining the strategy and predicting the outcome for recovery. The load and the load-tolerance can be divided in general and local components as outlined in table 1.

The patient and the health care professional can often control the local load imposed on the patient

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Notes from the Editor

Welcome to the first issue of the NAIOMT 2000 newsletter. There are a number of changes in the works for NAIOMT this year, one of which is the move to placing this newsletter on line by the summer. Look for one more copy in the mail this spring, after which the newsletter will go directly on to our web page www.naiomt.com.

In this edition, NAIOMT faculty Kent Keyser and Bill O'Grady present "clinical pearls". Their many years of experience as manual therapists' will provide you with some unique approaches to treatment of cervical spine and patello-femoral problems. Chris Schmidt presents an insightful perspective on outcome studies and research in physical therapy.

The NAIOMT faculty looks forward to providing its students with additional courses and technologically up to date services. Feel free to send your ideas and let us know how we're doing.

BILL TEMES

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and thus control a significant part of the rehabilitation. The general load is often overlooked and is possibly needing a multi-disciplinary approach. The outcome of the rehabilitation is altered significantly if the load can not be controlled due to exceptional circumstances such as: being a mother of seven, having to return to heavy physical labor without proper return to work transition or return prematurely to the work/sports arena. The load-tolerance —of the neuro-musculoskeletal system is often neglected and many health care professionals assume that the status of every musculoskeletal system is the same at time of injury / recovery phase.

Many predisposing factors influence the load-tolerance of the neuro-musculoskeletal system, including but not limited to: cultural background, general health, age, physical condition, smoking, use of alcohol, vitamin deficiency, medications, prior injuries, facilitated segments, work load, work environment and last but not least stress.

Stress, as most health care professionals instinctively know, will alter the balance between the orthosympathetic and the parasympathetic nervous system by releasing the stress hormone Cortisol. Many publications describe that an increased activity of the orthosympathetic nervous system will decrease the activity of the parasympathetic nervous system and thus will cause decreased tissue regeneration and alter tissue dynamics/coordination predisposing for injury/overuse syndrome.

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Physical Therapy approaches in general are denying this "State of Mind" factor and subsequently deny the sympathetic nervous system involvement in tis
sue regeneration. In order to make our rehabilitation and outcome studies more reliable, we need to integrate the factors that determine the balance between load and load-tolerance, including the balance of the Sympathetic Nervous System.

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Table 1: Balance between Load and Load-Tolerance:

Local Load	*General Load*
Forces on structure	General Health issues
Repetitive movements	Age
Work load	Smoking, medications, drugs
Ergonomic factors	Diet
	Vitamin Deficiency
Local Load Tolerance	Stress
Strength tissues	*General Load Tolerance*
Flexibility tissues	General Health
Facilitated segment	General condition
Vascularization tissues	Proper ergonomics
Prior injuries	

Clinical Pearl: Cervical Stabilization

Some number of years ago I became very interested in alternative equipment to help patients ach goals for strength, range of motion, coordination, neuromuscular control, etc. At that time an advantageous relationship with my now close friend, Brian Hauswirth PT, CFP, lead us to explore ethafoam cylinders in all aspects of patient care and developed one of the earliest nationally presented courses for this mode of care in **PT**

In my continuing search of foam usage I was fortunate to site in on an impromptu idea sharing session presented by Peter Edgelow, **PT,** FAAOMPT. This was some years ago, as it was his early first approximations to his now well known Thoracic Outlet Syndrome (TOS) protocol. Within that session Peter showed the use of soft foam wedges as a prop for rhythmic oscillatory cervico-thoracic rotations. This neurodynamic, lymphatic drainage, and low level strengthening technique with the many other spe- cific ideas for TOS has proven to be very effective for Complex Regional Pain Syndrome patients, as well.

The soft foam was sometimes unwieldy. I investigated high-density foam. I played with different slopes and angles and became excited by the fact that segmentally in the cervical spine a focal point could be precisely differentiated. By placement of the caudal point/0 slope at the segment that was of particular interest it acted like a fulcrum point where maximum muscular effort would occur. (One of physics experts correct me if I am incorrect in thinking this a third class lever?)

Over the last few years I have used this with many patients, more then one hundred fifty I would suspect. I have found that initiating with rotation, then a combined motion of flexion /rotation/ sidebending when adequate endurance of twenty five repetitions at one or more segments was first possible in rotation. Cautiously at the end of care I might work into extension/rotation/sidebending. This was excellent for the generally stiff jointed and especially the ERS/FRS dysfunctions I encounter daily. The possibilities are endless, but I will leave some of the other subtitles to you the therapist to discover on your own or for another Clinical Pearl entry in a future newsletter.

As I shared my successes with simple, cheap tool to my local peers and maybe even a few of you readers when taking a class, I received tremendous empirical support of wedge's usefulness.

This positive support plus popularity of the topic area of Clinical Instability caused me to be less cautious in approaching cervical patients with significant arthrosis and/or poor prognosis instability The results have been as dramatic, if not optimal, in the improvement of strength, range of motion, coordination, and neuromuscular control in these difficult cases. Yes, manual therapy applications are part of this picture. However, those patients where the wedge had been used with manual therapy versus those that had not been given the wedge, regularly demonstrated greater goal achievement and better maintenance with compliant regular long term use of this simple-for-patient-to-understand protocol.

Figure 1 shows a mid-position, short arc set up A)Rotation emphasis, B) flex/rot/sb- "look to armpit", and C) ext/rot/sb- "look up and away. For both B) and C) the wedge is angled at approximately 45 degrees. The key is to have the patient rotate slowly, emphasis on eccentric control on returning to the start position, and keeping their nose perpendicular to the lateral edge of the wedge, usually 2-4" thick. Remember that the precise location of the caudal medial point of the wedge is the fulcrum point.

A clinical study within NAIOMT utilizing data from many of you reading this would be a hope of mine. Any willing individuals can contact me by email through our web page/naiomt.com

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Clinical Pearl: Knee Pain

Many times you will get patients with knee pain who have been diagnosed as patello-femoral syndrome. This is a garbage term. Often the knee problem is misdiagnosed. Pain can arise from almost anywhere in the knee anteriorly to give the untrained clinician the impression of the former diagnosis. One must look at what the symptoms are. In the absence of trauma you can have CMP, plica, retinacular irritation, fat pad inflammation, irritation of the patellar facets from tracking problems, and patellar tendonitis to mention a few. The root of the cause usually is a biomechanical problem. We are all trained to look above and below the affective joint when we evaluate. We can always assume that there could be problems in the chain above the knee. However, I will assume for purpose of this discussion that this has been ruled out. That leaves the knee and below.

I will typically rule out all of the more common ligamentous and cartilaginous problems and any other serious maladies. In the absence of these, I immediately look at the patient's gait and bony alignment starting at the feet and working up. Invariably, I find that there are significant "foot faults", hypermobilities, hypermobilities and gait patterns that point to the cause. These problems are transferred up the chain and reek havoc on the tissues above the ankle. It is obvious that you cannot "cure" the patient in one visit. However, if you can give some biomechanical "advantage" you can reduce the abnormal stress on the knees. I have found the following taping to help about 90% plus the patients that I see with knee pain.

I have them stand with the affected knee in extension. The patient is then asked to internally rotate the tibia by turning the foot inward. The patient is full weight bearing on that foot. From above, you have the patient externally rotate the femur. I know! This goes opposite to the screw home mechanism. Then with the McConnell white underwrap tape you start just behind the fibular head and bring it medially, anteriorly, and diagonally around the knee inferior to the patella and stop it at the medial hamstring area. Here is the tricky part. Take the brown McConnell tape over it starting again at the fibular head. In the meantime, you need to manually pull the leg into more internal rotation and pull the fibular head anteriorly with it. You pull the overwrap tight and cinch it to the hamstring over the existing under wrap. Meanwhile, you have your patient continue to internally rotate as you apply the tape. If you have medial or lateral knee pain or genu valgus/varus problems you need to add an additional force vector. As you do the above maneuvers, you can apply valgus or varus force to the knee to unload the medial or lateral side of the joint.

If the patient continues to have problems in the patello-femoral joint, I add McConnell taping to the patella in addition to what I have done. I hope you give this a try it really works. There are more things you can do with taping to give your patients instant relief and to reduce their symptoms so more easily work with them.

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