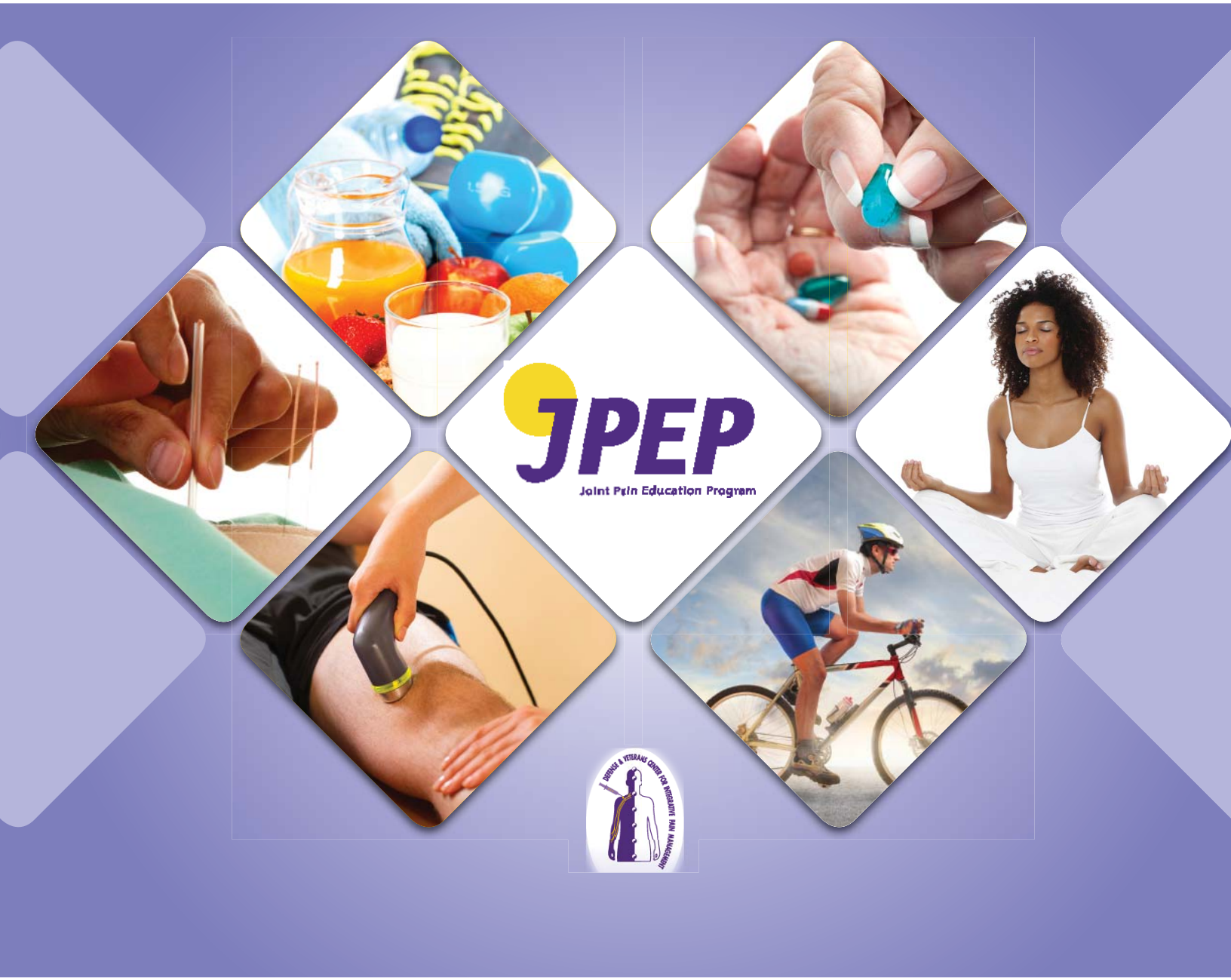
Pain Management for Primary Care

DoD/VHA
JOINT INCENTIVE FUND (JIF)
PROJECT



Series: Seven

Physical Based Therapeutic Approaches to Pain Management

Module 7-1

Physical Based Therapies for Pain Management

Module 7-1

Physical Based Therapies for Pain Management

By the end of the module, you will be able to:

- Understand the role of physical and occupational therapy in the treatment of patients with chronic pain
- Be familiar with the techniques that physical and occupational therapists use to manage patients with chronic pain
- Be aware of the range of physical self-management techniques available to patients to manage pain

We will review:

Topic One: Physical/Occupational Therapy

Topic Two: Functional Rehabilitation Techniques

Topic Three: Self-Management

Lead Authoring Subject Matter Experts

Veterans Health Administration
Dr. Sanjog Pangarkar

Department of Defense
Meredith Schumacher, PT, DPT (CIV)
COL Dean Hommer, M.D., FAAPMR

Topic One

Role of Physical Therapists

What do physical therapists do?

- They preform a comprehensive initial evaluation of the neurological and musculoskeletal systems
- They preform a Functional Movement Screen and a selective Functional Movement Assessment
- They screen and assess psychosocial risk factors that may interfere with treatment success (fear avoidance, kinesiophobia, catastrophizing)
- They set functional goals with the patient and create a functionally-oriented rehabilitation program and collaborate/ communicate this program with the whole care team

Notes

Facilitator may detail:

Therapists conduct a comprehensive exam and history and develop a treatment plan that is functionally oriented.

continued on next page

Notes - Continued

Functional Limitations

Tissue: too long-too short, too weak-too strong
Joints: to stiff or too loose
Postural abnormalities
Neurotension
Neuroplasticy/centralized pain symptoms

Psychosocial factors

Family dynamics
Kinesiophobia (TSK)
Fear-avoidance (FABQ)
Catastrophizing
Life Stressors

In order to help guide the patient to meaningful functional improvement in their life and decrease the pain burden, a Pain PT must understand the role psychosocial factors play in that individual.

1. Do you have any life stressors(divorce, abusive relationship, work issues, caring for parents/children, etc)
2. How is your relationship with your significant other? Do you feel like they are supportive of you?
3. What are 3 values that you hold and how has your pain affected them?
4. What activities do you avoid out of fear of increasing your pain and/or injury?
5. Do you enjoy your job?
6. Do you feel like you are successfully fulfilling all the roles you play in your life, i.e.. spouse, parent, friend, coworker, etc?
7. If not, which ones are affected by your pain and how?
8. Has your sex life been affected by you pain?

Example: A husband may be avoiding helping with housework out of fear of increased pain or catastrophizing. This may make him feel like he is not fulfilling his role in the marriage and has placed stress on his relationship with his spouse. Additionally creating feelings of guilt that have caused him to withdraw further from family life. By helping the patient with lifting/bending mechanics in a progressive way that does not increase his pain will allow him to increase his contribution around the house and most likely decrease stress on his marriage and increase contributions to family life to allow him to feel like he is more successful in fulfilling his role as a husband

Addressing the impact pain has played in a patient's sex life is often ignored by providers but can have one of the biggest impacts on quality of life. Addressing this issue may be as simple as providing the patient with a handout with sexual positions for low back pain. Often times the patient returns the next session expressing what a difference the handout made without much more discussion.

Identifying the patient's psychosocial factors is the key to unlocking the patient's motivation to improve. If you can find what value has been effected due to their pain and make functional goals addressing that value you will have a much more compliant patient!

Physical therapist use the EQUIPT mnemonic :

- Explanation: how does the patient explain their pain and pain fluctuations?
- Quality of Life: How has pain changed the patient's day-to-day activities? How can pain treatment improve their life?
- Unique Goals: What are the patient's own functional goals?
- Identity: How does pain or discomfort affect their self-image? Who is available to support?
- Personal effort: What is the patient doing on their own to relieve pain or get back to desired activities?
- Tailor a Plan Together: What are you and the patient willing to do, independently and jointly?

Notes

Facilitator may detail:

Adapted from Teaching Pain Self Management: Culture Matters

Preventing ChronicityAPTA Clinical Practice Guidelines
Promotion of understanding the anatomical/structural strength of the human spine

- The neuroscience that explains pain perception
- The overall favorable prognosis of low back pain
- The use of active pain coping strategies to decrease fear and catastrophizing
- The early resumption of normal or vocational activities despite pain The importance of improvement in activity level

Treating Chronicity
APTA Guidelines for Chronic LBP

Chronic Low Back Pain with Related Generalized Pain

- Patient education and counseling to address specific classification exhibited by the patient (i.e., depression, fear-avoidance, pain catastrophizing)
- Low-intensity, prolonged (aerobic) exercise activities

Physical therapists play an important role in patient education by focusing on improved function, not pain relief.

- Promote Autonomy and develop realistic goals
- Promote the beliefs and expectations about one's capabilities (self-efficacy)
- Promote purpose and satisfaction to be involved with the community
- Downplay test results and discuss the Mind Body Connection
- Discuss overall wellness and the need for lifestyle changes
  - Nutritional Education
  - Sleep Hygiene
  - Avoid tobacco/alcohol use

Notes

Facilitator may detail:

Gansen, J.L. "A Biopsychosocial approach to persistent pain: Physical therapist perspective". Richmond VHA PM&R call. August 13, 2013.

Fundamental Psychological Needs:

1. Autonomy- need to feel self-directed
2. Competence- beliefs and expectations about one's capabilities (self-efficacy).
3. Purpose or Social-relatedness- Need to feel included, accepted, or connected to others, to feel satisfaction in one's involvement with the social world.
4. Exercise affects multiple systems
5. Neuroscience education can address activity tolerance and fear-avoidance.
6. Exercise can promote cortical re-organization.
7. Whole body movements can promote cortical representation (i.e. yoga, Tai Chi) if tolerated with no increase in pain.
8. Use graded exposure and graded exercise to progress movement and function without fear or increase in pain

Education and self- care at home will also help when done within a primary care team setting.

- Self-care/home management training for activities of daily living (ADL) include:
  - Reviewing pain neurophysiology to decrease fear of re-injury.
  - Showing ways to increase function and manage pain like compensatory training, meal preparation, safety procedures, and instructions in how to use of assistive technology devices/adaptive equipment.

Notes

Facilitator may detail:

Gansen, J.L. "A Biopsychosocial approach to persistent pain: Physical therapist perspective". Richmond VHA PM&R call. August 13, 2013.

Meta-Regression analysis (Ferreira 2010) looked at duration, dosage, exercise type, extent of supervision, inclusion of behavior principles, and inclusion of home-based program.
Defined exercise therapy as performance of any physical activity in order to develop the body and improve health. The exercise had to be prescribed by a health care provider.
Conclusion: When all types of exercise are analyzed, small but significant reduction in pain and disability are observed compared with minimal care or no treatment. Only dosage was found to be significantly associated with effect sizes (no specific threshold, just "more is better").

- Cochrane review (Guzman 2002) concluded that intensive (>100 hrs) multi-disciplinary, biopsychosocial rehab with functional restoration improved function and pain compared to inpatient or outpatient non-multidisciplinary rehabilitation or usual care.
- Cochrane review (Hayden 2005) concluded that exercise therapy appears to be slightly effective at decreasing pain and improving function in CLBP relative to "comparisons" at all follow-up periods.

"People tell me my pain is all in my head"

Acknowledge that the pain they are experiencing is real; "thank your brain for that"
The intensity of the pain does not always correlate with the severity of the tissue damage
Pain is an output from the brain 100% of the time
The tissues where you are feeling pain have healed, your nervous system healed improperly sending danger signals to your brain
The brain has created a "pain memory" from the overactive input from the danger signals, just like the muscle memory of riding a bike.

"I'm going to be putting up with this forever and I won't be able to do anything "

We now know that the brain is constantly changing and can be retrained to break this pain memory
This process happens at different speeds for every individual
Your pain is unlikely to resolve completely, but what we can do is work to improve the impact it has on your life by increasing your function
We will be increasing your function in a safe manner through a progressive quota based program to avoid re-injury
Encourage positive outcomes for back pain, majority of back pain patients recover to their prior level of function
Encourage a low level cardio activity that they enjoy
Swimming, hiking, cycling, taking a walk with family, paddleboard,
If patient is having a flare up day, help them reflect on whether emotional stress or excessive physical activity (boom-bust) played a role
Depression and chronic pain go hand in hand; improving their function treats both!
Encourage participating in an activity they enjoy 20-30 min per day for "me time;" does not have to be exercise.
Neuroscience Education to decreased fear avoidance
Systematic review supports intervention for decreasing pain and disability (Louw).
Pain is an output of the brain 100% of the time, no exceptions!
Motivate to facilitate change
Therapeutic alliance
Stress the patient's responsibilities
Adhere to prescribed program
Focus on increasing activity during the day
Regain function despite the pain

Ask Questions!!!

Topic Two

Functional Rehabilitation Techniques

A self-management approach supports the patient in taking a more active role in their health care, and focusing their efforts on improving those areas that are within their control.

In general, active physical therapies are better than passive.

Emphasize: "Motion is Lotion!"

- Diaphragmatic breathing training is one of the first and most important exercises a chronic pain patient must master
- Aerobic training includes walking, cycling, swimming, gait training, Pilates and improves:
  - Flexibility
  - Strength
  - Endurance
- Ergonomic Training avoids repetitive stress injury and may avoid further injury flare ups and improve overall job performance
- For example, Progressive Iso-inertial Lifting Evaluation assesses tolerance to repetitive lifting

Notes

Facilitator may detail:

The first line of treatment in my opinion for any patient with chronic pain should start with teaching diaphragmatic breathing. The patient can perform any time, any place no matter what their level of pain or disability is.

continued on next page

Notes - Continued

Diaphragmatic breathing can have a significant positive influence on the patient's pain experience. If the patient is so kinesiophobic that it is difficult get a thorough physical exam, you can at least start with breathing.

One physical therapists example protocol. Notice, the emphasis on active processes. Passive processes will not sufficiently address the structural derangements in chronic pain patients.

Hommer, D. "VILT Lesson 8: Physical Based Therapeutic Approach to pain management". JPEP Pain Management Curriculum. 2014. Va/DOD Health Executive Committee.

Minimize passive treatment, encourage active treatment

Graded exposure

Teach therapeutic exercise to help the patient return to homeostasis:

- Never more than 5 exercises (activities)
- No set repetitions – exercise during a song or commercial

Aerobic program: walk, bike, pool

Neuromuscular education (O'Sullivan, APTA)
- Calm muscles down or turn them on
- Functional movement patterns
  - Pilates (Lin)
- Postural correction
  - head to toe
- Gait Training
- Aquatic Therapy (Lima)

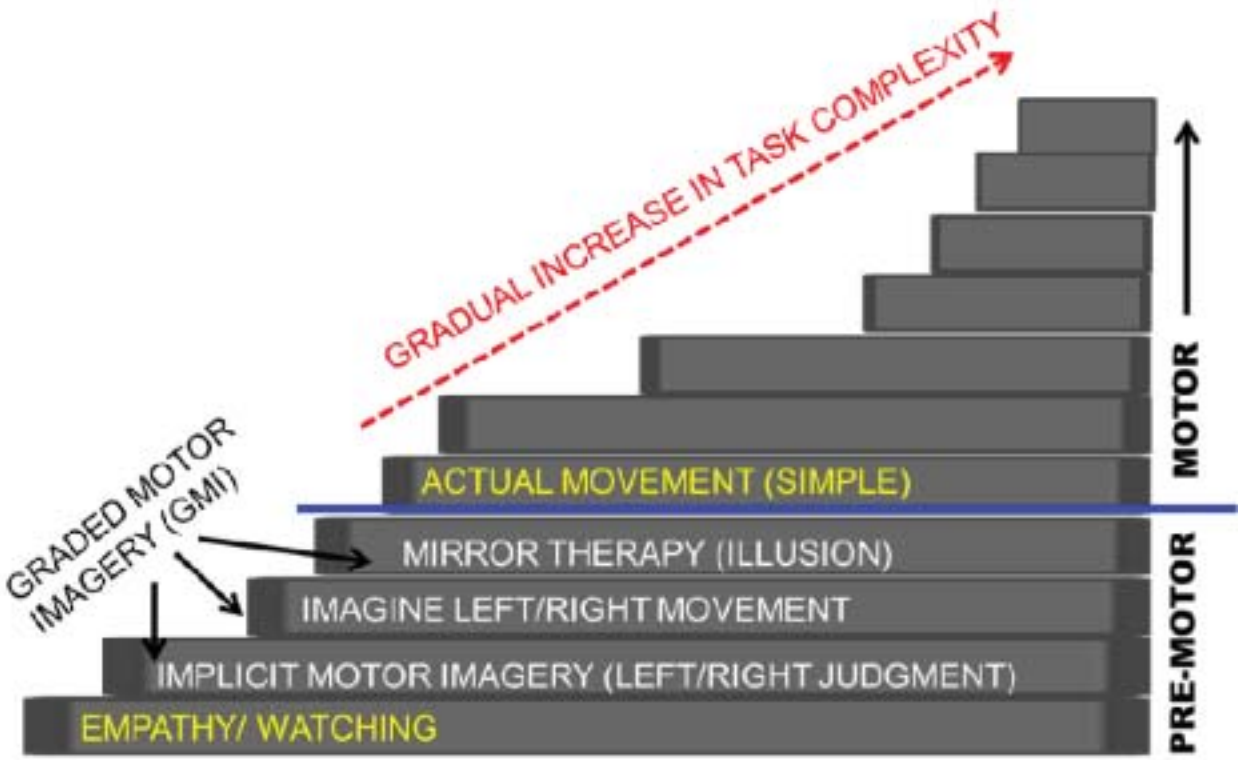
- Exercises tailored to address biomechanical deficits

Ergonomic Training (Andersson, APTA)
- Provided depending on the patient's job requirements to avoid further injury and flare ups.
- Tolerance to repetitive motion will be stressed as diminishing control and coordination of the neuromuscular system often occurs with repetitive motion and poor form.

Progressive Isoinertial Lifting Evaluation
- Evaluates tolerance to repetitive lifting
- Lift box floor to waist height 4x/20sec
- Begins with 10# male/5# female, increase in same increments per set until unable or safety end point

- "Issues with the Tissues" are still addressed.
- Exercise affects multiple systems including autonomic, endocrine, and immune systems.
- All of these systems can affect the nervous system.
- All of these systems are influenced by the nervous system.
- Nerves need blood, space, and movement to stay healthy.
- Abnormal impulse generating sites (AIGS) can contribute to persistent pain and central sensitization. This is one mechanism that can contribute to peripheral sensitization and central sensitization.

Graded exercises improve performance and reverse changes to the brain due to chronic pain.



Notes

Facilitator may detail:

Changes in the brain may include:

1. Decreased body perception
2. "Smudging" of cortical representation
3. Decreased ability to correctly identify direction of trunk rotation
4. Decreased ability to identify letter traced on back
5. Feeling that the back isn't a part of the individual
6. Altered trunk muscle recruitment patterns.
7. Enhanced response to noxious stimuli: people with CLBP rated sour taste stimuli as significantly more intense than normal controls.

Graded motor imagery (mirror therapy) is now the standard to threat severe neuropathic pain, like phantom pain or complex regional pain syndrome.

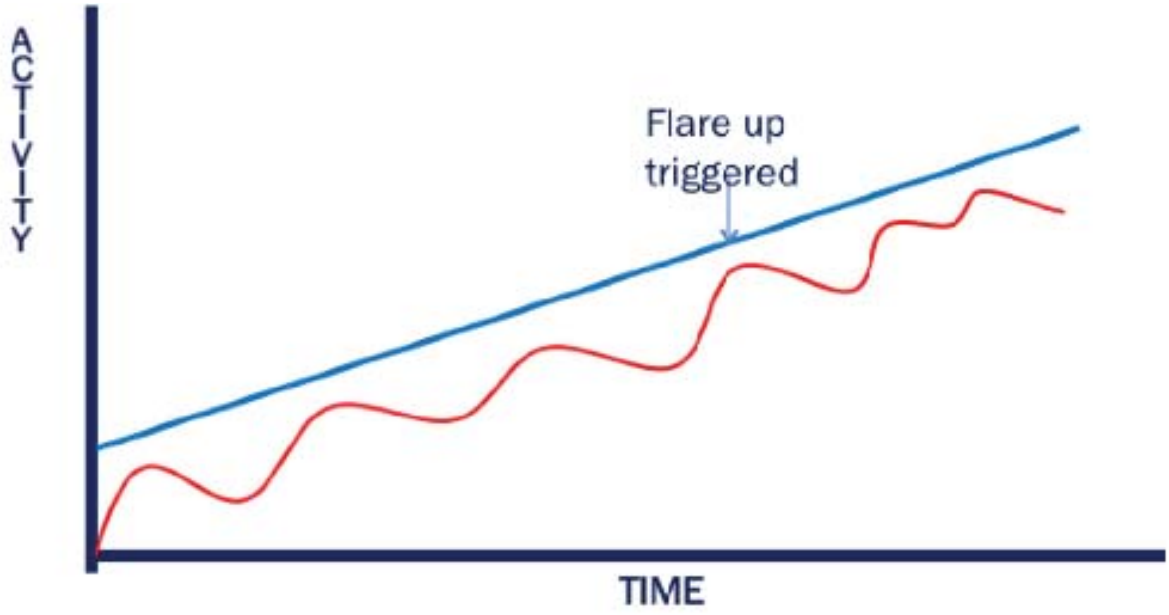
Notes

Facilitator may detail:

Systematic review (Daly, A.E. 2008) recommends Graded Motor Imagery (GMI) should be used to reduce pain in adult CRPS and that clinical guidelines be updated to include GMI. GMI is Brain-based rehabilitation. Also used for phantom limb pain.

Basic concept is that cortical representations of the body can become "smudged". Pain can result if the brain determines a threat exists.

Pacing is also very important when treating the deconditioning caused by chronic pain.



Notes

Acceptance of Pain State is Essential
Small Percentage Increase in Activity is Essential
Types of pacing activities
- General movement dysfunctions ie. Sit to stand
- Activities of Daily Living (ADLs)
- Feared movements
- Stabilizing exercises
- Neurodynamic movements
- Activities the patient once enjoyed

This is a common boom-bust cycle where the patient pushes activity to the point of triggering a flare up, followed by a period of low activity level for recovery. This is reinforcing the neurosignature or "pain memory" in the brain that activity is "dangerous."

Goal is to maintain activity level below flare up line to progressively increase tolerance so activity is no longer a trigger for a flare up

Flare ups
- Activities that increase pain, depression, medication use, triggers other symptoms
- Triggers decreased activity in days following

Baseline
- Level/type of activity they can do without a flare up
- Determine by discussing with patient

Education and self- care at home will also help when done within a primary care team setting.

Week 1	Repetitions/Time	Perform as many reps until pain/fatigue stops you, you make take rests between repetitions						
Exercise	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Average
sit to stand	5	25	2	10	12	11	15	11

Notes

This is an example of a treatment plan

Passive physical treatments have a role ONLY if they facilitate function.

- Therapeutic Dry Needling may help in localized pain relief of palpable trigger points to improve patient's tolerance to exercise and range of motion. It works best for acute flare ups due to increased activity
- Transcutaneous Electrical Nerve Stimulation (TENS) are more effective when used with activity during an exercise session to improve patient's tolerance to activity.
- Joint Mobilization should be done only to improve patient tolerance to active interventions.

Notes

Facilitator may detail:

Based on Melzack and Wall's Gate Theory. Much like rubbing the knee after banging it into a table corner.

Adjunctive therapy that would be used in conjunction with other modalities.

TENS with activity is helpful for the kinesiophobic patient to assist in return to activity.

A TENS unit uses 2 channels with 2 leads to bracket the area of pain, the patient then turns up the intensity to a strong but tolerable level without causing muscle fasciculations. Can be worn for 20min to a few hours depending on the unit.

- Based on the gate control theory
  - Activation of large sensory afferent, A-delta, fibers
  - Inhibit (close gate) ascending C fibers
  - Inhibit pain perception (descending)
- Conventional stimulation is generally high frequency and low intensity

Topic Three

Interventions for Self-management

For the most part, every chronic pain patient can benefit from being exposed to Yoga, Mindfulness and Stretching.

There are many physical modalities that can be self administered.

- Self applied hot/cold packs
- TENS with activity
- Self Myofascial Release using a Foam Roller:
  - Improves gliding
  - Relieves tension
- Self Trigger Point Release (with a Lacrosse ball)
- Stretching
- Yoga
- Mindful meditation

Notes

Read list

Passive physical treatments have a role ONLY if they facilitate function.

- Healthy Nutrition like an anti-inflammatory diet
- Encourage an enjoyable low impact cardio activity
- Do core strength options: Pilates, Yoga, Tai Chi
- Emphasize Sleep Hygiene:
  - Select a bedtime and "wind down"
  - Create a restful cool, dark room
  - Use bed only for sleep and sexual activity
  - Have a hot shower, warm bath, read, listen to quiet music, meditate or deep-breathe
  - Get up if you can't sleep after 20 or 30 minutes
  - Avoid TV, electronics
  - Stop watching the clock
  - Don't exercise close to bed time
  - Do not drink alcohol close to bed time
  - Avoid caffeine, nicotine after 12 pm.

Notes

This is an example of how to suggest a list of life style changes.

Summary

Physical therapists play an important role in the care team, by helping toidentify barriers to recovery and educate patients to focus on betterfunction, not pain relief. Consult their reports on each patient visit.

Remember the many active modalities like breathing, exercise, mirror therapy and pacing. Use passive modalities like TENS and dry needling only as part of an active program. "Motion is Lotion!"

Recall that most active modalities are self-managed like stretching, icing,and foam rolling, and are best combined with healthy nutrition and sleep hygiene.

References

Arizona Pain Doctors. "Anti-inflammatory Foods" http://www.thepaincenter.com/anti-inflammatory-foods.html. Accessed January 3, 2014

Andersson, G. B. (1999). Epidemiological features of chronic low-back pain. The lancet, 354(9178), 581-585.

Bendix, T., Bendix, A., Labriola, M., Hæstrup, C., & Ebbehøj, N. (2000). Functional restoration versus outpatient physical training in chronic low back pain: a randomized comparative study. Spine, 25(19), 2494-2500.

Brouha, L. (1943). The step test: A simple method of measuring physical fitness for muscular work in young men. Research Quarterly. American Association for Health, Physical Education and Recreation, 14(1), 31-37.

Butler, D. S., Moseley, G. L., & Sunyata. (2003). Explain pain (p. 19). Adelaide: Noigroup Publications.

Cagnie, B., Dewitte, V., Barbe, T., Timmermans, F., Delrue, N., & Meeus, M. (2013). Physiologic effects of dry needling. Current pain and headache reports, 17(8), 1-8.

Cluett, J. "Joint Pain and Obesity". http://orthopedics.about.com/od/arthritisresearch/p/obesity.htm. Accessed January 3, 2013

Daly, A. E., & Bialocerkowski, A. E. (2009). Does evidence support physiotherapy management of adult Complex Regional Pain Syndrome Type One? A systematic review. European Journal of Pain, 13(4), 339-353.

Cibulka, M. T., White, D. M., Woehrle, J., Harris-Hayes, M., Enseki, K., Fagerson, T. L., ... & Godges, J. J. (2009). Hip Pain and Mobility Deficits—Hip Osteoarthritis: Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Healthfrom the Orthopaedic Section of the American Physical Therapy Association. Journal of Orthopaedic & Sports Physical Therapy, 39(4), A1-A25.

Dundar, U., Solak, O., Yigit, I., Evcik, D., & Kavuncu, V. (2009). Clinical effectiveness of aquatic exercise to treat chronic low back pain: a randomized controlled trial. Spine, 34(14), 1436-1440.

JCTDJ, F., Couper, J., & O'Brien, J. P. (1980). The Oswestry low back pain disability questionaire. Physiotherapy, 66, 271-273.

Ferreira, M. L., Smeets, R. J., Kamper, S. J., Ferreira, P. H., & Machado, L. A. (2010). Can we explain heterogeneity among randomized clinical trials of exercise for chronic back pain? A meta-regression analysis of randomized controlled trials. Physical therapy.

Fuentes, J., Armijo-Olivo, S., Funabashi, M., Miciak, M., Dick, B., Warren, S., ... & Gross, D. P. (2014). Enhanced therapeutic alliance modulates pain intensity and muscle pain sensitivity in patients with chronic low back pain: an experimental controlled study. Physical therapy, 94(4), 477-489.

Hommer, D. "VILT Lesson 8: Physical Based Therapeutic Approach to pain management". JPEP Pain Management Curriculum. 2014. Va/DOD Health Executive Committee.

Gansen, J.L. "A Biopsychosocial approach to persistent pain: Physical therapist perspective". Richmond VHA PM&R call. August 13, 2013.

Gansen, J.L. (2011). Systematic review of the effect of multi-modal intervention on fear-avoidance beliefs and report of pain and disability in adults with chronic non-specific low back pain. Unpublished.

Guzmán, J., Esmail, R., Karjalainen, K., Malmivaara, A., Irvin, E., & Bombardier, C. (2001). Multidisciplinary rehabilitation for chronic low back pain: systematic review. Bmj, 322(7301), 1511-1516.

Harman, K., MacRae, M., Vallis, M., & Bassett, R. (2014). Working with people to make changes: a behavioural change approach used in chronic low back pain rehabilitation. Physiotherapy Canada, 66(1), 82-90.

Hayden, J., Van Tulder, M. W., Malmivaara, A., & Koes, B. W. (2005). Exercise therapy for treatment of non-specific low back pain. The Cochrane Library.

Jette, A. M., Smith, K., Haley, S. M., & Davis, K. D. (1994). Physical therapy episodes of care for patients with low back pain. Physical Therapy, 74(2), 101-110.

Kääpä, E. H., Frantsi, K., Sarna, S., & Malmivaara, A. (2006). Multidisciplinary group rehabilitation versus individual physiotherapy for chronic nonspecific low back pain: a randomized trial. Spine, 31(4), 371-376.

Lang, E., Liebig, K., Kastner, S., Neundörfer, B., & Heuschmann, P. (2003). Multidisciplinary rehabilitation versus usual care for

References

chronic low back pain in the community: effects on quality of life. The Spine Journal, 3(4), 270-276.

Lima, T. B., Dias, J. M., Mazuquin, B. F., da Silva, C. T., Nogueira, R. M. P., Marques, A. P., ... & Cardoso, J. R. (2013). The effectiveness of aquatic physical therapy in the treatment of fibromyalgia: a systematic review with meta-analysis. Clinical rehabilitation, 27(10), 892-908.

Lim, E. C. W., Poh, R. L. C., Low, A. Y., & Wong, W. P. (2011). Effects of Pilates-based exercises on pain and disability in individuals with persistent nonspecific low back pain: a systematic review with meta-analysis. journal of orthopaedic & sports physical therapy, 41(2), 70-80.

Louw, A., Diener, I., Butler, D. S., & Puentedura, E. J. (2011). The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. Archives of physical medicine and rehabilitation, 92(12), 2041-2056.

Maher, C. G. (2004). Effective physical treatment for chronic low back pain. Orthopedic Clinics of North America, 35(1), 57-64.

MAYER, T. G., BARNES, D., NICHOLS, G., KISHINO, N. D., COVAL, K., PIEL, B., ... & GATCHEL, R. J. (1988). Progressive Isoinertial Lifting Evaluation: II. A Comparison with Isokinetic Lifting in a Disabled Chronic Low-Back Pain Industrial Population. Spine, 13(9), 998-1002.

Millegan, J., Morrison, T., Bhakta, J., & Ram, V. (2014). Mind body medicine in the care of a US marine with chronic pain: A case report. Military Medicine, 179(9), E1065-E1068. doi:10.7205/MILMED-D-14-00130

Murtezani, A., Hundozi, H., Orovcanec, N., Sllamniku, S., & Osmani, T. (2011). A comparison of high intensity aerobic exercise and passive modalities for the treatment of workers with chronic low back pain: a randomized, controlled trial. European journal of physical and rehabilitation medicine, 47(3), 359-366.

Niebuhr, D. W., Scott, C. T., Powers, T. E., Li, Y., Han, W., Millikan, A. M., & Krauss, M. R. (2008). Assessment of recruit motivation and strength study: preaccession physical fitness assessment predicts early attrition. Military medicine, 173(6), 555-562.

O'Sullivan, P. B., Phyty, G. D. M., Twomey, L. T., & Allison, G. T. (1997). Evaluation of specific stabilizing exercise in the treatment of chronic low back pain with radiologic diagnosis of spondylolysis or spondylolisthesis. Spine, 22(24), 2959-2967.

Sluka, K. A., Bjordal, J. M., Marchand, S., & Rakel, B. A. (2013). What makes transcutaneous electrical nerve stimulation work? Making sense of the mixed results in the clinical literature. Physical therapy, 93(10), 1397-1402.

Steenstra, I. A., Verbeek, J. H., Heymans, M. W., & Bongers, P. M. (2005). Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: a systematic review of the literature. Occupational and environmental medicine, 62(12), 851-860.

Swinkels, I. C., Wimmers, R. H., Groenewegen, P. P., van den Bosch, W. J., Dekker, J., & van den Ende, C. H. (2005). What factors explain the number of physical therapy treatment sessions in patients referred with low back pain; a multilevel analysis. BMC health services research, 5(1), 74.

Tekin, L., Akarsu, S., Durmuş, O., Çakar, E., Dinçer, Ü., & Kıralp, M. Z. (2013). The effect of dry needling in the treatment of myofascial pain syndrome: a randomized double-blinded placebo-controlled trial. Clinical rheumatology, 32(3), 309-315.

Tilbrook, H. E., Cox, H., Hewitt, C. E., Kang'ombe, A. R., Chuang, L. H., Jayakody, S., ... & Torgerson, D. J. (2011). Yoga for chronic low back pain: a randomized trial. Annals of internal medicine, 155(9), 569-578.

Wittink, H., Cohen, L. J., & Michel, T. H. (2002). Pain rehabilitation: Physical therapy treatment. Chronic Pain Management for Physical Therapists. Second Edition. Boston: Butterworth and Heinemann.

Wittink, H., & Michel, T. H. (Eds.). (2002). Chronic pain management for physical therapists. Butterworth-Heinemann Medical.

JPEP

Joint Pain Education Program