Evolution PHYSIOTHERAPY

IMPROVING MUSCULOSKELETAL HEALTH AND FITNESS OUTCOMES
A Systems Approach

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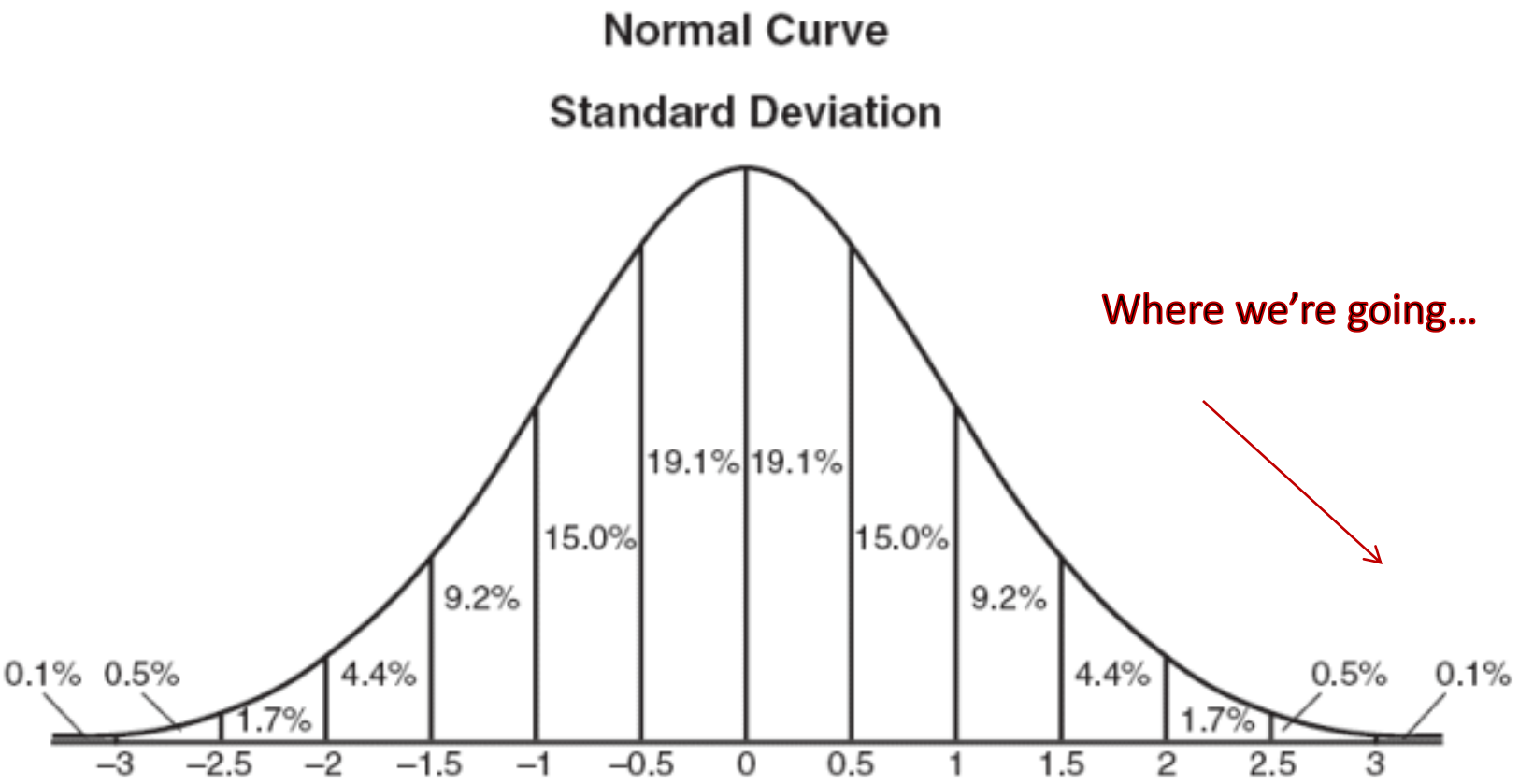
BACKGROUND

- This presentation was designed by Allen Hicks, owner of Evolution Physiotherapy
- Evolution Physiotherapy is committed to incorporating evidence-based and innovative tools into our assessment and treatment systems
- The Optimum Performance Pyramid's were designed by Gray Cook (see reference on each slide)
- Gray Cook is a Senior TPI Medical advisory board member, the founder of the Functional Movement Screen, and contributor to the Titleist Performance Institute physical screens

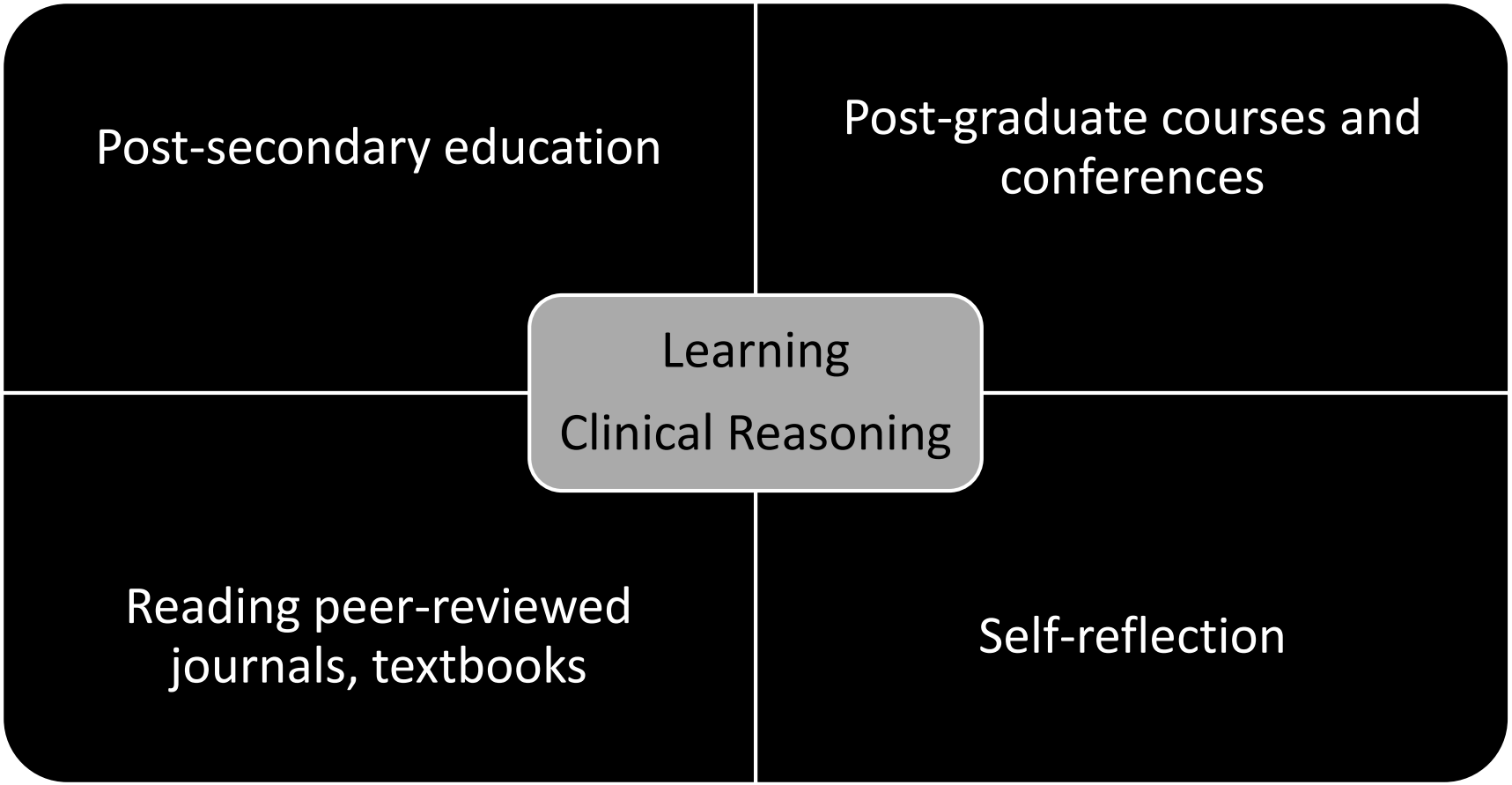


Where we're going…

HOW WE CONTINUE TO IMPROVE

- Commitment to continued learning and improved clinical reasoning
  - Formal
  - Informal
- Continued development and refinement of our systems
- Development of improved intra and inter-professional collaboration and communication amongst medical/rehabilitation professionals, fitness professionals, and sport-specific coaches

IMPROVING OUR CLINICAL REASONING



WHERE TO START

IMPROVING MSK HEALTH AND FITNESS OUTCOMES

- **Goals**
  - ***Better health***
    - MSK Injury prevention
    - Health promotion (physical activity)
    - Optimal rehabilitation of injuries
  - ***Better performance***
    - Optimal rehabilitation of injuries
    - Improved functional movement
- **Problem List**
  - MSK complaints (pain, injury)
  - Lack of physical activity (de-conditioning)
  - Poor functional movement
- **Contributing Factors**
  - Lack of understanding what to do (mobility, stability, motor control deficits)
  - Lack of understanding what not to do (activity, posture modifications)
  - Lack of motivation to perform physical activity, therapeutic ex's, post-op rehab program, etc..

PROGRAMS vs. SYSTEMS

- *Program*: a predetermined action plan for achieving a result

- *System*: an organized, purposeful structure that includes procedures and routines created to carry out a specific activity or solve a problem
  - Designed to achieve results; the outcome of one procedure determines the next…and so on….
  - Interrelated and interdependent elements continually influence one another (directly or indirectly) to maintain their activity and the existence of the system and to achieve the desired results
  - All systems should have:
    - Analysis (assessment)
    - Inputs (intervention)
    - Outputs (results)
    - Feedback mechanisms (re-assessment, re-evaluation)

ASSESSMENT SYSTEMS

- "***If you're not assessing, you're just guessing!***"
- We need some form of ax in order to design an appropriate, individualized treatment program
- Assessment (***analysis***) leads to a plan which needs to be implemented (***input***), and the results (***output***) are re-assessed (***feedback***), and the cycle continues…

ASSESSMENT PROCEDURE #1

MEDICAL SCREENING

- Appropriate Subjective History
- Rule out serious, non-MSK pathology
- Neurological scan when indicated
- Refer back to physician if any concerns

ASSESSMENT PROCEDURE #2

STRUCTURAL ASSESSMENT

- Obtain appropriate Subjective History
- Perform detailed Biomechanical Assessment
- Identify tissue injuries that may require surgical intervention, particularly tendon ruptures
- Identify (when possible) the cause of symptoms and the injured tissue
  - Patho-anatomical diagnosis

ASSESSMENT CHALLENGES

STRUCTURAL ASSESSMENT

- ***"The more you know, the more you realize how much you don't know."***

- We don't have enough good clinical tools available to assess all conditions (*evidence-based practice*)
- Diagnostic imaging findings often do not provide us with definitive answers (*evidence-based practice*)
- We all have internal biases that affect our decision making
  - Representative heuristic
  - Availability heuristic
  - Confirmatory bias
  - Illusory correlation
  - Overconfidence

ASSESSMENT PROCEDURE #3

FUNCTIONAL ASSESSMENT

- Perform Movement System Impairment Exam (Mobility, Stability, Motor Control)
- Determine the key factors which contribute to the injury and/or complaint
- Identify the causes is essential with chronic overuse, repetitive microtrauma, degenerative problems
- Determine the appropriate treatment plan

ASSESSMENT PROCEDURE #3

FUNCTIONAL ASSESSMENT

- Movement System Impairment Ax needs to follow principles of movement:
  - Effect of pain on motor control/movement
  - Regional interdependence
  - Mobility/stability continuum
- Functional Movement Evaluation should always be a component of pre-participation physicals and return to play decisions as we know the biggest risk factor of future injury is previous injury

ASSESSMENT CHALLENGES

FUNCTIONAL ASSESSMENT

- Traditionally, not a strength of most clinicians (not emphasized in medical school, physiotherapy programs, etc..)
- Requires post-graduate training/education to effectively incorporate into clinical practice
- Can be time consuming
- Different than traditional performance testing (strength, power, speed, agility, etc..)

MOBILITY – STABILITY CONTINUUM

FUNCTIONAL ASSESSMENT

- Mobility is necessary to:
  - Allow your body to MOVE in all three planes of motion, without having to compensate in the wrong area
  - allow the generation of ELASTIC ENERGY, which establishes a base for efficient power production
  - Allow the adjacent segments to maintain STABILITY!!!!!!!

MOBILITY – STABILITY CONTINUUM

FUNCTIONAL ASSESSMENT

- Stability is defined as the ability of any system to remain unchanged or aligned in the presence of change or outside forces.
- Stability is the combination of:
  - Balance
  - Strength
  - Muscular Endurance

MOBILITY – STABILITY CONTINUUM

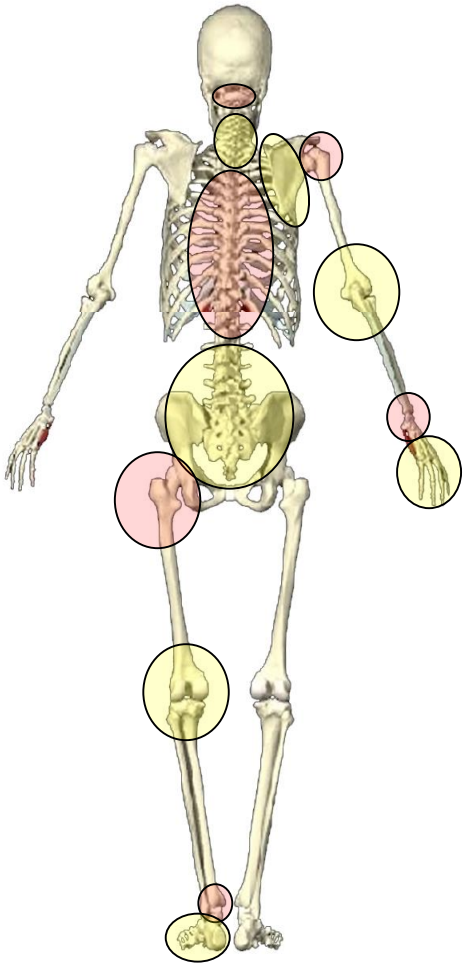
FUNCTIONAL ASSESSMENT

- The body works in an alternating pattern of stable segments connected by mobile joints.
- If this pattern is altered – dysfunction and compensation will occur
- Also referred to as the joint by joint approach or the principles of regional interdependence

MOBILITY – STABILITY CONTINUUM

FUNCTIONAL ASSESSMENT

Foot	Stable
Ankle	Mobile
Knee	Stable
Hip	Mobile
Pelvis/Sacrum/Lumbar Spine	Stable
Thoracic Spine	Mobile
Lower/mid cervical spine	Stable
Upper cervical spine	Mobile
Scapulo-Thoracic	Stable
Gleno-humeral / Shoulder	Mobile
Elbow	Stable
Wrist	Mobile



Mobility

Stability

MOBILITY – STABILITY CONTINUUM

FUNCTIONAL ASSESSMENT

- Testing Mobility can predict Stability
  - Poor mobility can lead to muscle imbalances
  - Poor mobility can force stable segments to become mobile segments (example - limited hip range of motion can cause the lumbar spine to become unstable)

EVIDENCE-BASED EXAMPLES

FUNCTIONAL ASSESSMENT

- Functional Movement Screen (FMS)
- Y Balance Test
- Selective Functional Movement Assessment (SFMA)

EVIDENCE-BASED EXAMPLES

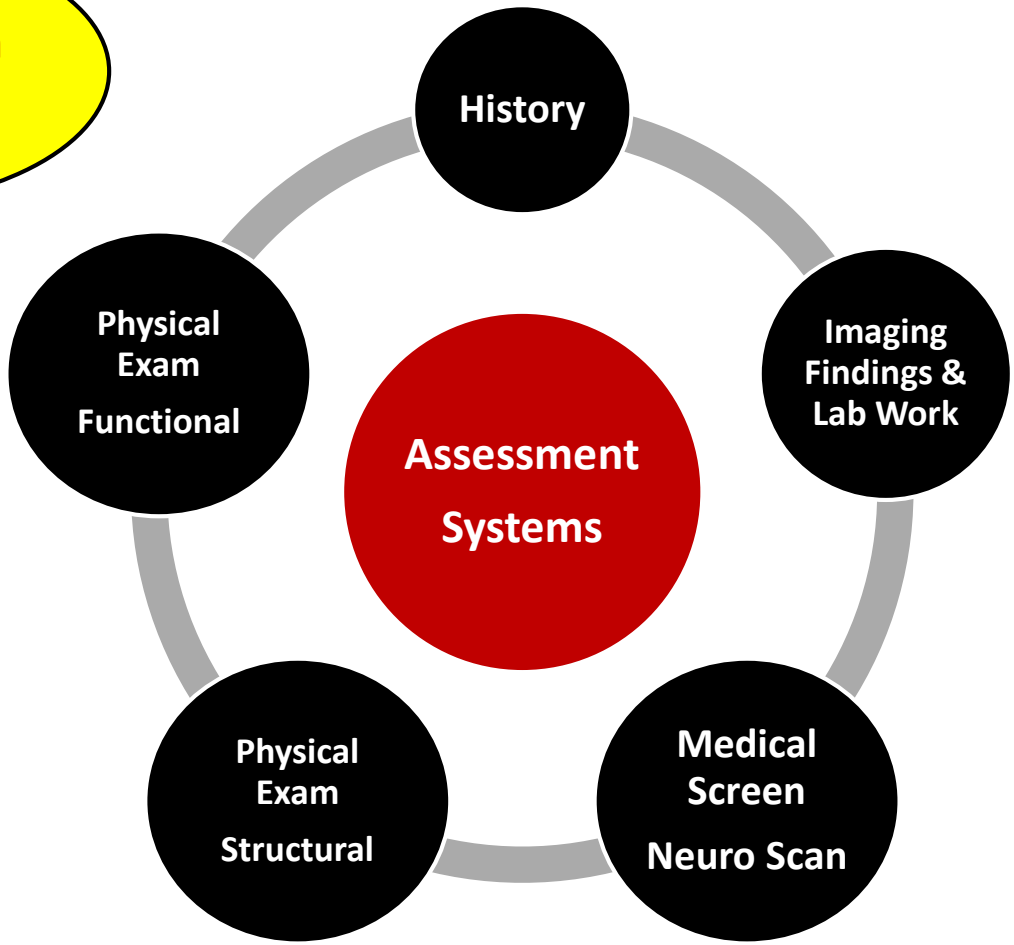
FUNCTIONAL ASSESSMENT

- http://www.move2perform.com/site/index.php?option=com_content&view=article&id=43&Itemid=53
- http://www.functionalmovement.com/

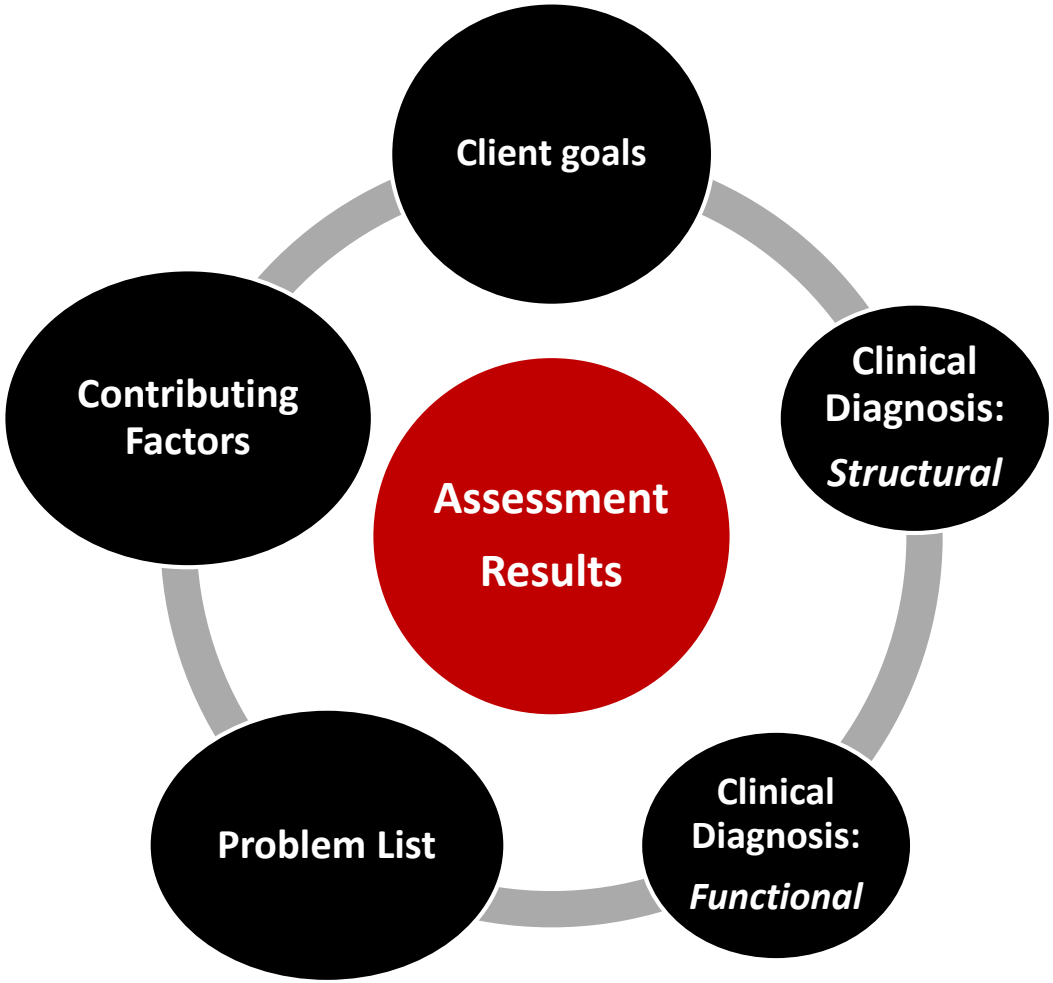
ASSESSMENT SUMMARY

- Assessment determines whether the client requires other medical evaluation (e.g.. family physician, sports medicine physician, ER physician, etc..)
- For clients who would benefit from physiotherapy intervention, the assessment guides the treatment
- Assessment should identify:
  - Client goals
  - Clinical diagnosis/differential diagnoses
    - Structural diagnosis (patho-anatomic)
    - Functional diagnosis (movement system impairment)
  - Problem list
  - Contributing factors
    - Internal
    - external

Communication skills



Bias


Client goals
Clinical Diagnosis: *Structural*
Clinical Diagnosis: *Functional*
Problem List
Contributing Factors
Assessment Results

ASSESSMENT AND TREATMENT SYSTEMS

SUMMARY OF OUR LIMITATIONS

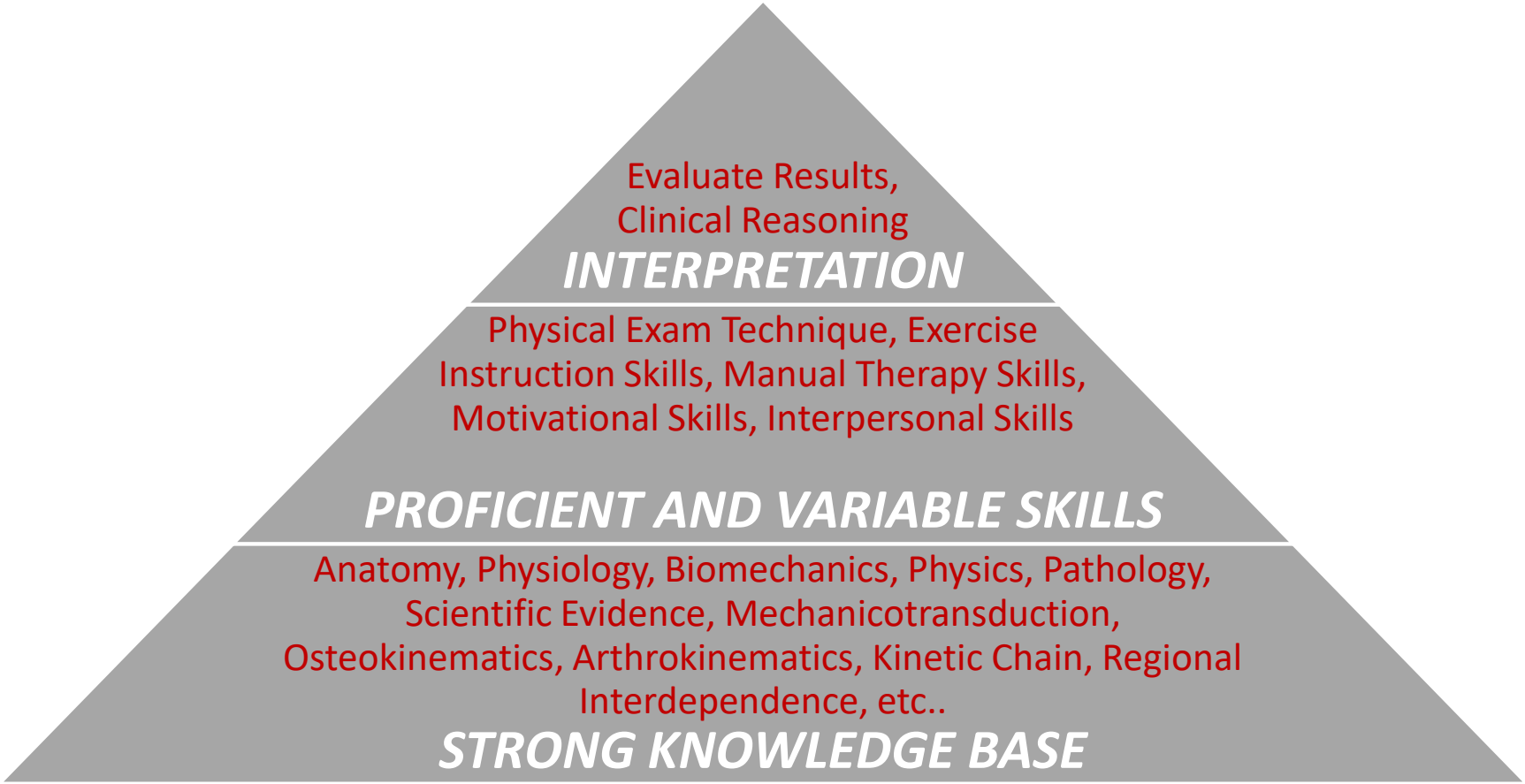
- *"We work in an environment that is not black and white…grey is challenging!"*
  - We often function with some element of doubt in our examination/assessment, treatment selection and evaluation
  - A multi-disciplinary environment and improved communication amongst health care providers can improve client outcomes
  - We can embrace evidence-based practice, but we also need to rely on sound scientific principles since the available evidence is still lacking

PRINCIPLES ARE THE KEY

- *"As to methods there may be a million and then some, but principles are few. The individual who grasps principles can successfully select his own methods. The individual who tries methods, ignoring principles, is sure to have trouble."*
  - Ralph Waldo Emerson

ASSESSMENT AND TREATMENT SYSTEMS

STRONG PRINCIPLES LEAD TO BETTER RESULTS



TREATMENT

PRINCIPLES VS METHODS

- Principles are necessary to guide the selection of methods
- Treatment decisions need to follow sound principles, not methods

TREATMENT

PRACTICING WITH METHODS

- Examples of practicing with methods, not principles:
  - Physiotherapists who only treat the painful area/tissue, ignoring the causes of stress to that area (ie. ‘modality jockeys’)
  - Chiropractors who only manipulate
  - Physicians who prescribe NSAID’s for all problems, including chronic tendinopathies
  - Surgeons who believe that repairing the structural lesion (hip labrum, ACL, lumbar disc) will result in restoration of optimal movement (mobility, stability, motor control) without appropriate, functional rehabilitation
  - Pedorthists, Pediatrists, orthotists, chiropodists who believe everyone needs an orthotic

TREATMENT

PRACTICING WITH METHODS

- *"Anyone can prescribe stabilization exercises or CORE exercises that cause substantial muscle challenge and the illusion that they are beneficial. Poor exercise prescription results in no improvement in painful unstable back patients, or they create NEW back patients."*
  - Stuart McGill

TREATMENT EXAMPLE

PRACTICING WITH PRINCIPLES

- The Ultimate Back Approach: Stuart McGill
- 5 stage process that ensures a foundation for eventual strength, speed and power training. The stages are:
  - Stage 1. Groove motion patterns, motor patterns with corrective exercise
  - Stage 2. Build whole body and joint stability
  - Stage 3. Increase endurance
  - Stage 4. Build strength
  - Stage 5. Develop power, agility

TREATMENT EXAMPLE

PRACTICING WITH PRINCIPLES

- Selective Functional Movement Assessment
  - Treatment is based on the results of the assessment, which classifies movement into one of four categories:
    - Dysfunctional and non-painful
    - Dysfunctional and painful
    - Functional and painful
    - Functional and non-painful
  - Treatment is based on the cause of the dysfunctional movement, including:
    - Stability and/or motor control deficit
    - Mobility deficit
      - Tissue extensibility dysfunction
      - Joint mobility dysfunction

EVOLUTION PHYSIOTHERAPY

TREATMENT PRINCIPLES

- Build a strong FUNCTIONAL MOVEMENT base by addressing Functional Movement Deficiencies related to the following components:
  - Pain
  - Tissue healing
  - Movement System Impairments
    - Mobility
    - Stability/Strength
    - Motor Control

OPTIMUM PERFORMANCE PYRAMID

2010; Movement; Gray Cook; Adapted by Allen Hicks, 2012.

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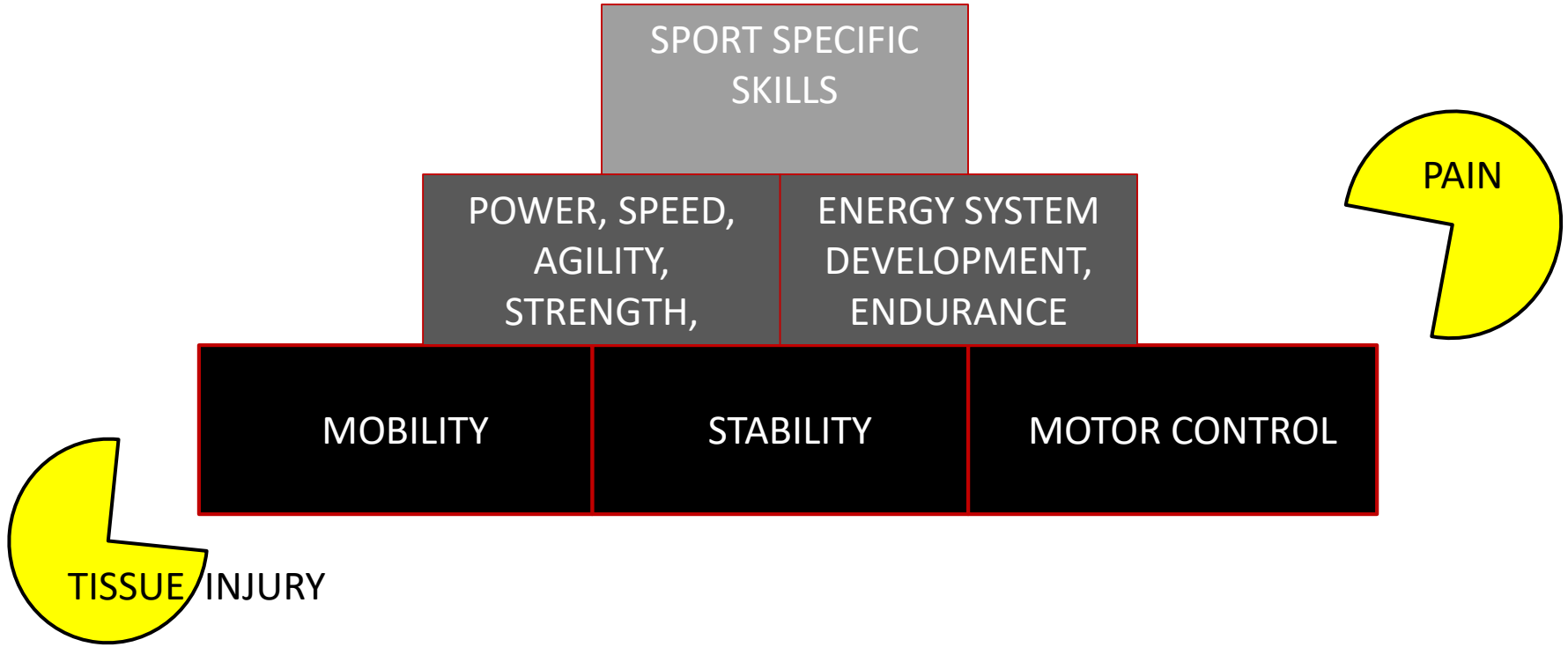


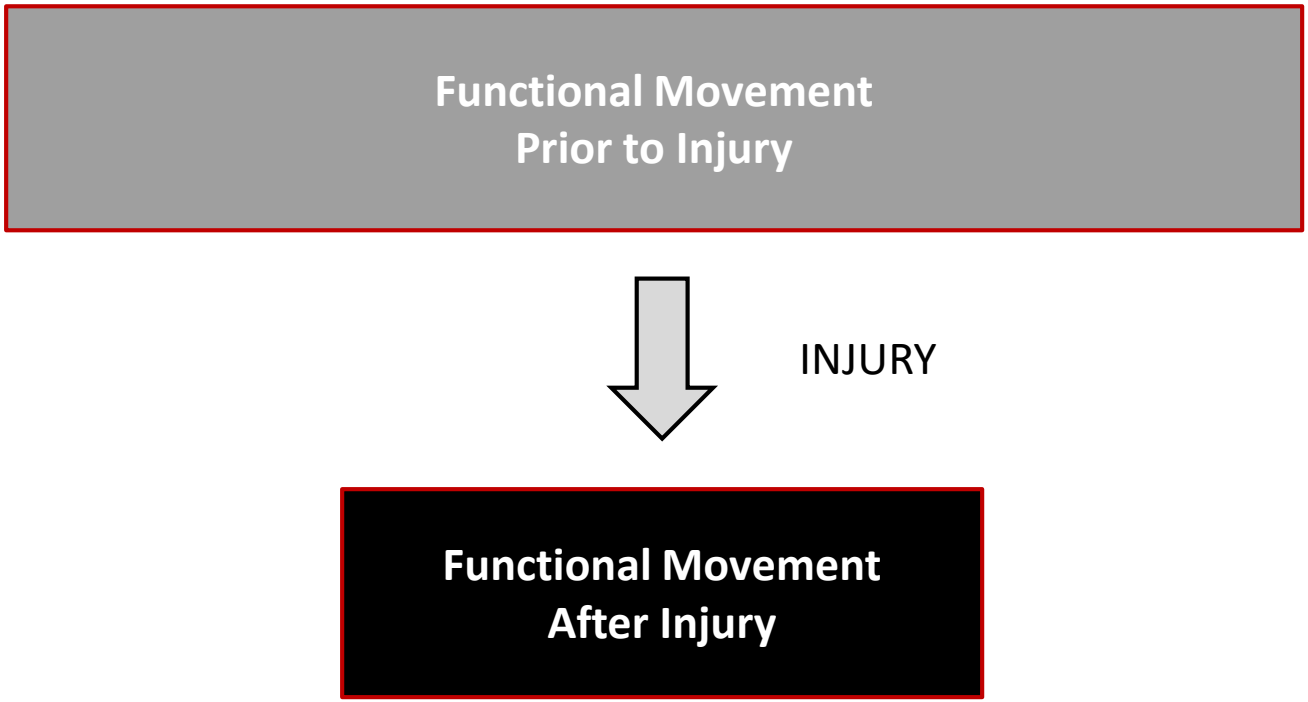
OVER-POWERED PERFORMANCE PYRAMID

FOUNDATION LAYER ERODED BY PAIN AND/OR TISSUE INJURY

2010; Movement; Gray Cook

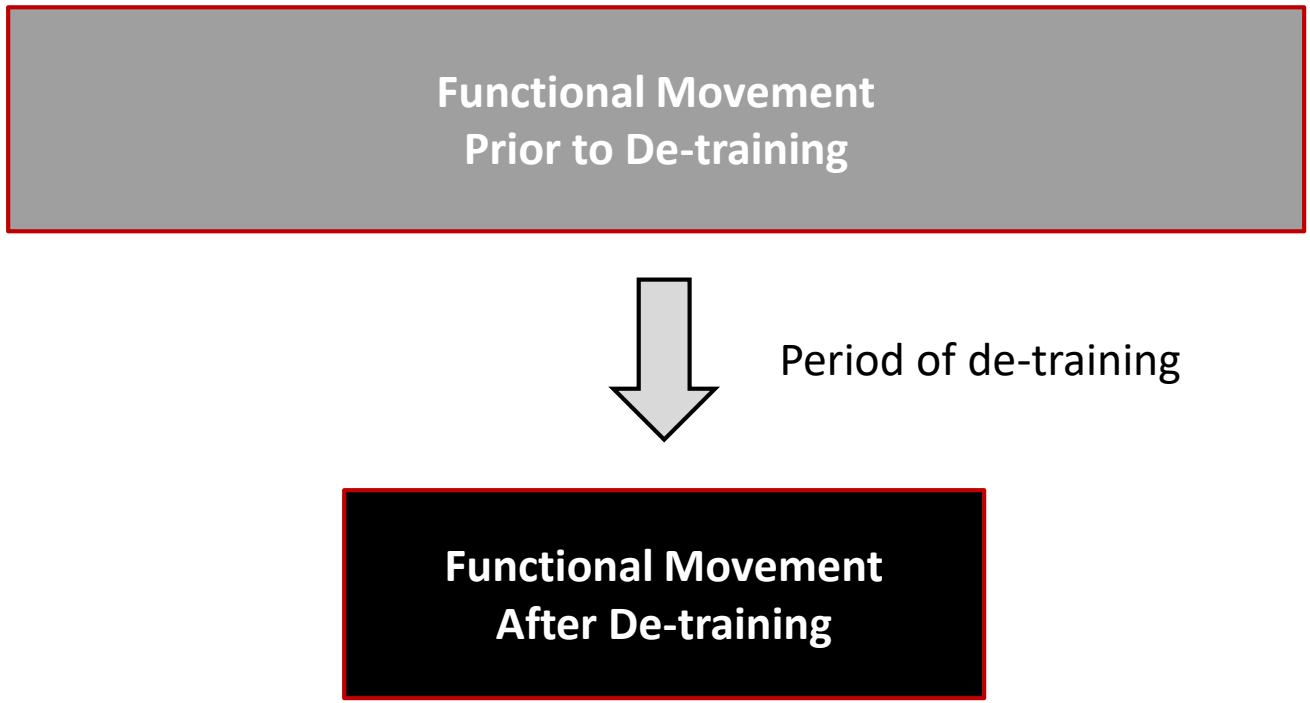
THE OVER-POWERED PERFORMANCE PYRAMID

CAUSE #1: INJURY



THE OVER-POWERED PERFORMANCE PYRAMID

CAUSE #2: DE-TRAINING



PHYSIOTHERAPY FOLLOWING INJURY

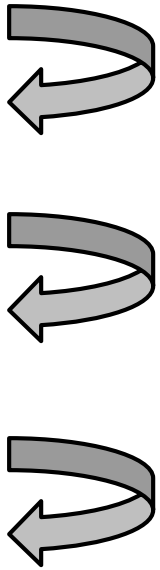
INCOMPLETE AND COMPLETE REHABILITATION

Functional Movement Prior to Injury

Functional Movement after Injury

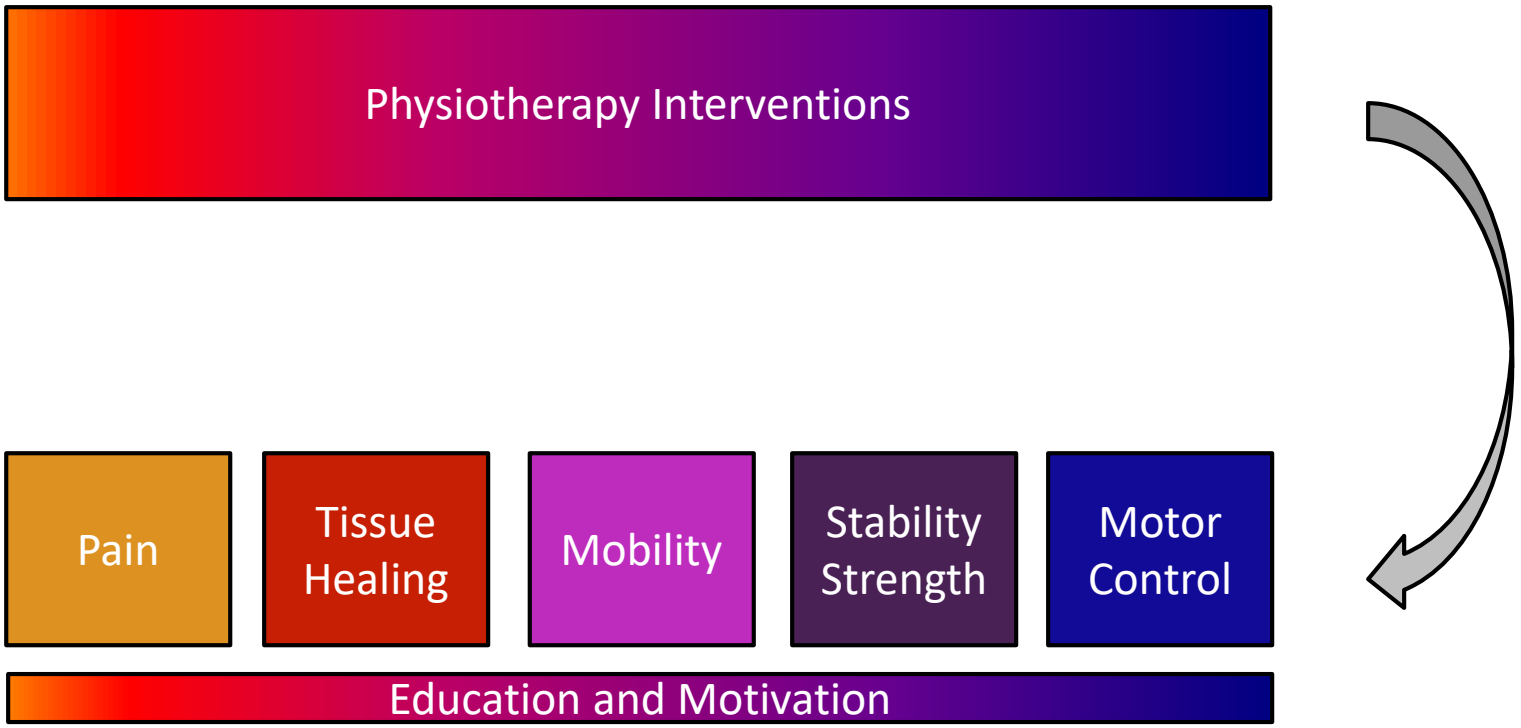
Functional Movement after Incomplete Rehabilitation

Functional Movement After Complete Rehabilitation



PHYSIOTHERAPY

TREATMENT PRINCIPLES



INCOMPLETE TREATMENT FOLLOWING INJURY

EXAMPLE #1: MEDICATIONS (EG. NSAID'S)

Functional Movement Prior to Injury

Functional Movement after Injury

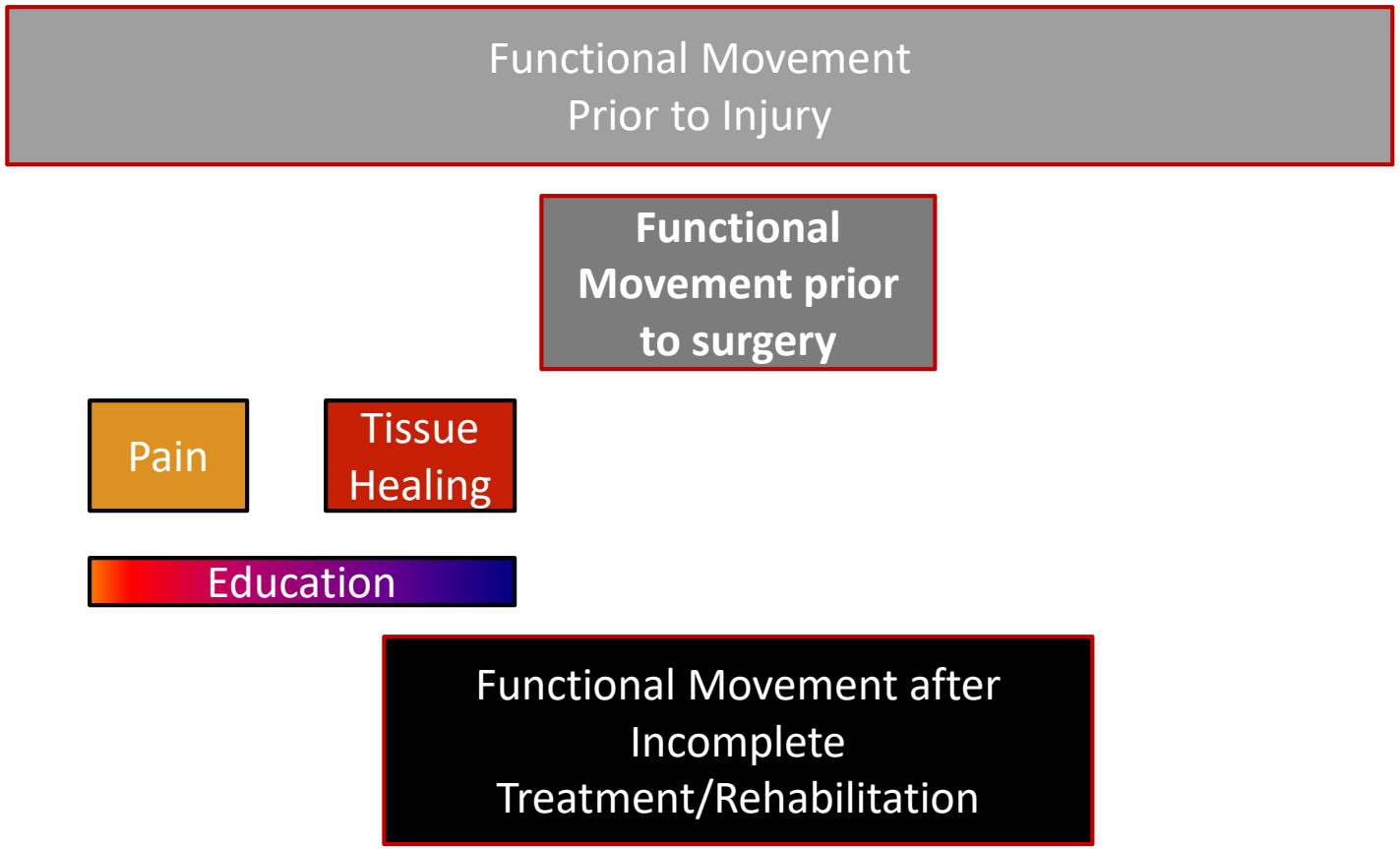
Pain

Education

Functional Movement after Incomplete Treatment/Rehabilitation

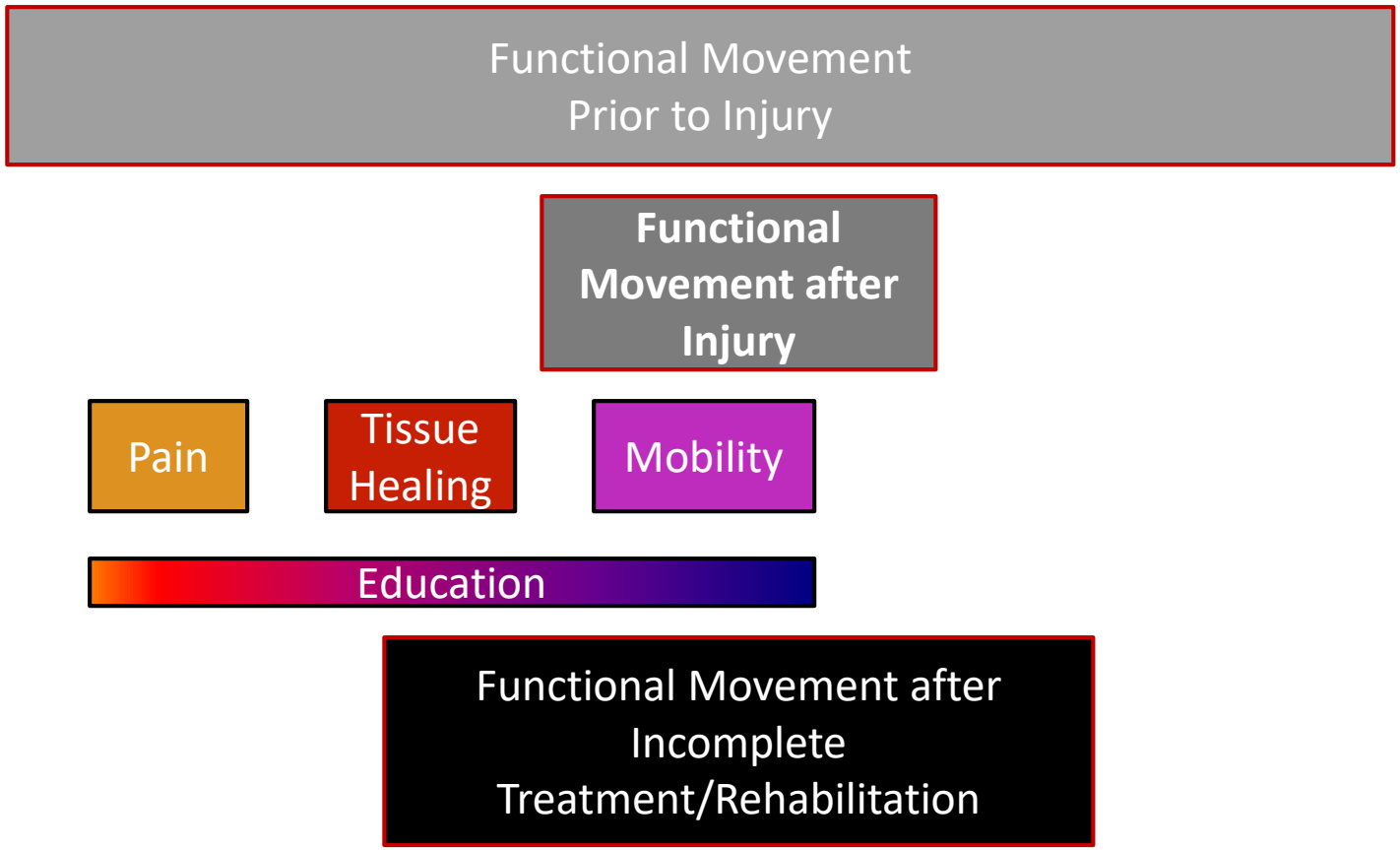
INCOMPLETE TREATMENT FOLLOWING INJURY

EXAMPLE #2: ORTHOPAEDIC SURGERY



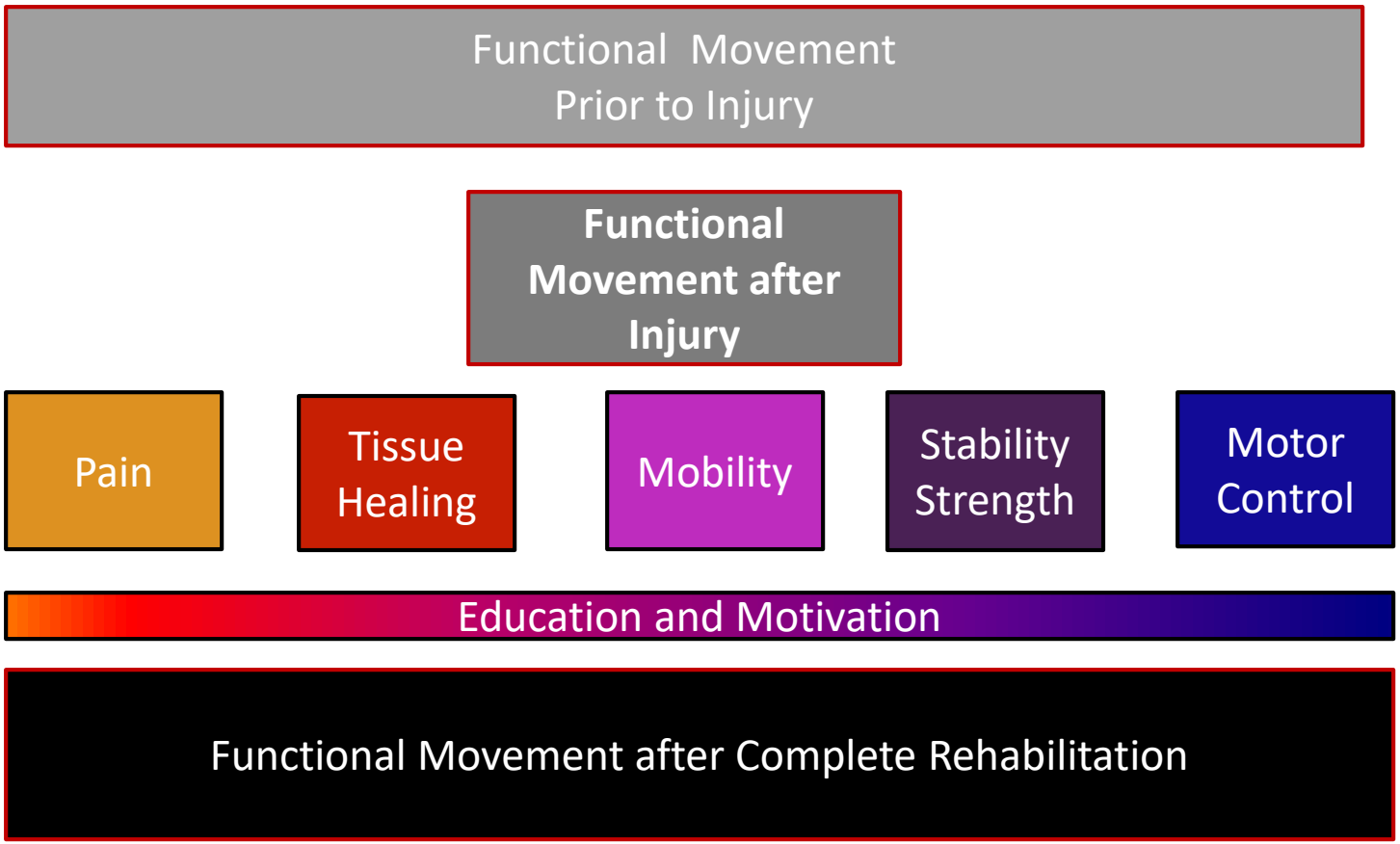
INCOMPLETE TREATMENT FOLLOWING INJURY

EXAMPLE #3: ROM, MOBILIZATION, MANIPULATION, MASSAGE



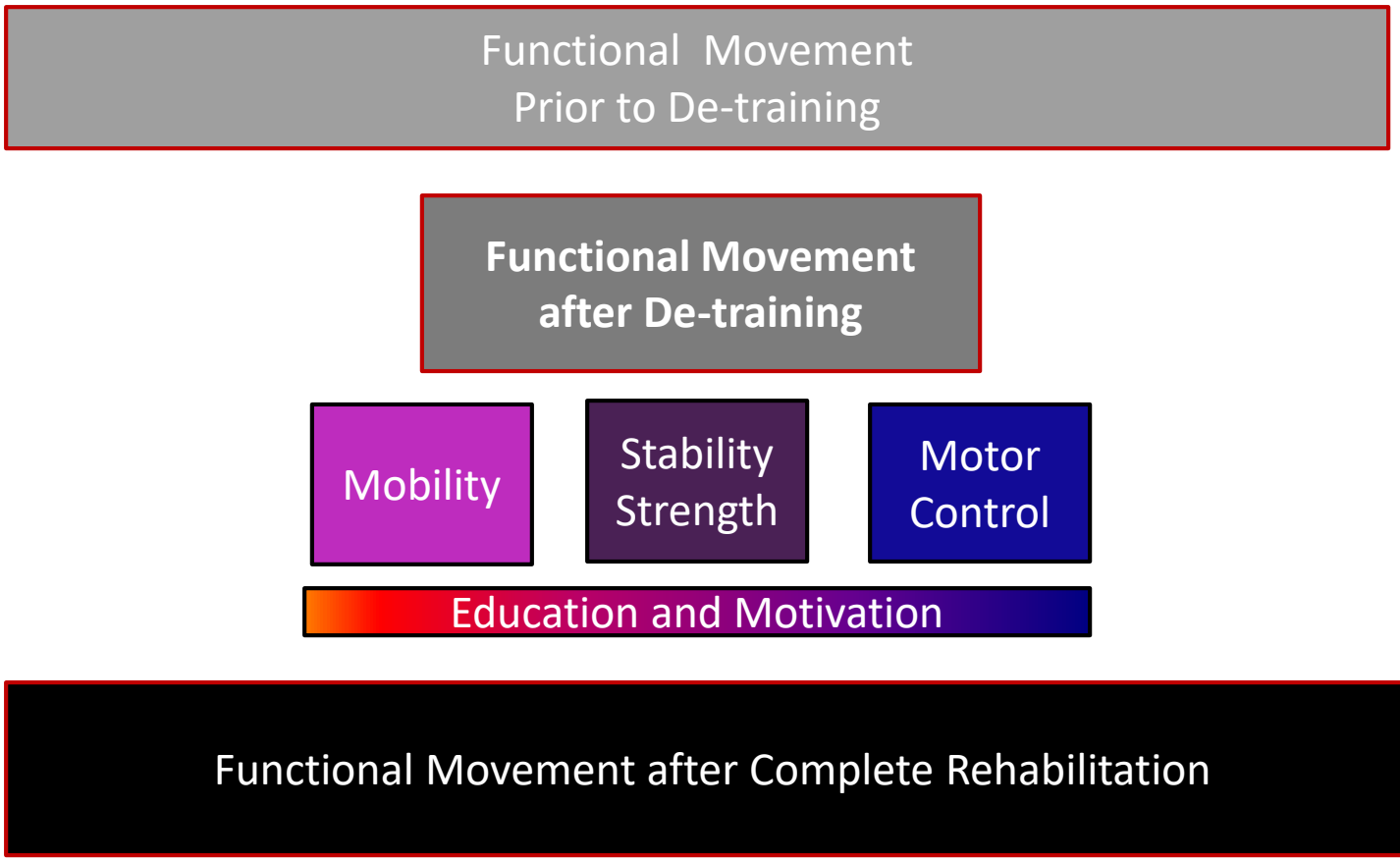
COMPLETE REHABILITATION FOLLOWING INJURY

ALL FACTORS ARE ADDRESSED APPROPRIATELY



DE-TRAINING

LACK OF ACTIVITY AND/OR AGING



TREATMENT PRINCIPLES

SELECTION OF METHODS: PAIN

- Primary nociceptive
- Nerve root (dorsal root ganglion-evoked nociceptive discharge)
- Peripheral neuropathic
  - Reduced stress/strain on painful tissue:
    - Improved movement (mobility, stability, motor control)
    - Activity modification, posture correction, ergonomics
    - Optimize tolerance and capacity of tissue
- Modulation of neural input
    - Dry needling (IMS, acupuncture)
    - Mobilization, manipulation, deep tissue work
    - Heat, ice, TENS
- Tissue Healing
    - RICE
    - Protection/external support (taping, bracing, crutches, orthotics, etc..)
    - Surgical Intervention
- Tissue Tolerance, Capacity, and Homeostasis
  - Progressive tissue loading exercise program
  - Comprehensive Kinetic Chain exercise program
- Pharmacological
    - Medication
    - Cortisone
    - Hyaluronic acid
    - PRP
- Central nervous system (CNS) adaptation
  - Therapeutic Neuroscience Education
  - Graded Motor Imagery approach (3 phases)
- Psycho-Social
  - Multi-Disciplinary approach (GP, PT, OT, psychiatry, psychology, social work, etc.)
- Other efferent systems (immune, autonomic, endocrine contributions)
  - Referral to physician for further evaluation

TREATMENT PRINCIPLES

SELECTION OF METHODS: TISSUE HEALING

- Internal Healing
  - Rest, Ice, Compression, Elevation
  - Protection/External Support (taping, bracing, crutches, orthotics, etc.)
  - Activity modifications; pre-cautions, contra-indications
  - Active Rehabilitation
    - Appropriate stress/strain to promote optimal scar formation (decreased adhesions, improved collagen alignment and strength)
    - Optimize tolerance and capacity of tissue
    - Optimize mobility, stability, and motor control of entire body (regional interdependence)
  - Recovery (nutrition, sleep, mental imagery, mediation, decreased stress, etc.)
  - Modalities
    - Laser
    - Ultrasound
    - Electrotherapy (IFC, TENS)
    - Extracorpeal Shockwave Therapy (ECSW)

- Internal Healing (continued)
  - Pharmacologic
    - Medications, cortisone
    - PRP, hyaluronic acid

- External Healing
  - Surgical Repair/Reconstruction
    - Debridement (meniscectomy, tendon debridement, microdiscectomy)
    - Repair/reconstruction (ORIF, ACL, tendon repair, labral repair, HTO, fusion, etc.)
    - Replacement (TKA, THA, TSA, hip re-surfacing, etc.)

- The correct treatment solutions will be determined based on: the stage of healing (acute, subacute/fibroblastic, maturation/remodeling) and the type of tissue damage (ligament, tendon, bone, nerve, meniscus, labrum, etc..

TREATMENT PRINCIPLES

SELECTION OF METHODS: MOBILITY

- Joint stiffness and dysfunction
  - Manipulation
  - Mobilization
  - Mulligan techniques
- Range of motion
  - McKenzie repeated movements
  - Active range of motion exercises (AROM)
  - Passive range of motion (PROM)
  - Active assisted range of motion (AAROM)
- Flexibility exercises
  - Self ex's
  - Assisted/PNF ex's
  - Partner/therapist assisted
  - Yoga, other exercise classes
- Neurodynamic exercises
  - Self ex's
  - Therapist performed
- Deep tissue work , myofascial, muscle tone
  - Dry Needling (IMS, Acupuncture)
    - IMS
    - Acupuncture
  - ART
  - Massage Therapy
  - Soft tissue massage
  - Graston
  - Foam rolling/massage stick
  - Deep transverse frictions
  - Trigger point work
  - Rolfing

TREATMENT PRINCIPLES

SELECTION OF METHODS: STABILITY

- Individual program based on detailed assessment
- Different goals:
  - Hypertrophy
  - Endurance
  - Stability
  - Strength
  - Power
  - Speed
- Different movements and planes
  - Concentric, eccentric, isometric
  - 3 planes of motion + combinations
  - Speed/tempo of movement
- Exercise instruction
  - Appropriate exercise
  - Proper form/technique
  - Exercise progression and regressions (re-ax)
  - Exercise education (red light exercises)
- Exercise Equipment
  - Functional Trainers
  - Free weights (vertical vectors only)
  - Kettlebells, Medballs, BOSU, Swiss Balls
  - Nautilus machines (e.g.. GoodLife Fitness)
  - Air/fluid resistance machines (e.g.. Curves)
  - Bands
  - Body Weight
- Environments
  - Group Ex Class (e.g.. Yoga, Pilates, Pump, Flow, Lean and Fit, etc.)
  - Individual or semi-private instruction
- Motivation is required for stability/strength training
- External Stability
  - Taping
  - Bracing
  - Orthotics

TREATMENT PRINCIPLES

SELECTION OF METHODS: MOTOR CONTROL

- Dependent on pain, mobility, and stability

- Correct the most fundamental limitation or asymmetry first
- Many people can perform adequately in one movement pattern and poorly in another – the solution can only be found by addressing the pattern, not by attempting to create isolated strength or performance in a faulty muscle group
- Build motor programs that include synergistic muscle activation (stabilizers)
- Focus on technical quality – creates a greater neurological demand, forcing better and faster connections
- Adaptations are built on repeated positive responses
- Progressions should be based on response
  - Not too easy
  - Challenging, but possible
  - Not too difficult
- Increase difficulty by moving to:
  - a more advanced posture
  - a smaller base of support
  - a more complex or involved movement pattern

- Basic Mobility and Stability Corrections must occur prior to Movement Pattern Retraining
  - Passive Mobility Corrections
  - Active Mobility Corrections
  - Assistive Mobility Corrections
  - Assisted Stability Exercises
  - Active Stability Exercises
  - RNT Stability Exercises
- Advanced Corrective Strategies (for individuals with appropriate mobility and stability)
  - Movement Pattern Retraining
  - Reverse Patterning (RP)
  - Reactive Neuromuscular Training (RNT)
  - Conscious Loading (CL)
  - Resisted Exercise (RE)

SUMMARY

- Continuing education helps build strong principles
- Incorporating strong principles into a logical, organized system improves our assessments, clinical reasoning, interventions, outcomes, and evaluations