Housekeeping

- Full length mirror
- Piece of theraband (2-3 yards)
- Small ball (5-6 in diameter) or yoga block
- One or two each: Hand towel, bath towel
- Pillows (2 of different thickness, and size)
- Handouts (pdf or printed)
- Selfies
- Snacks
- Questions

Dynamic Core for Kids Part One

- Day One
  - Core Function
  - Core Strategy
  - Typical and Atypical Development
  - Core Optimizing
  - Alignments
- Case Examples
- Group Case Study
- Different Populations
- Q & A

- Day Two
  - Q & A/Review
  - Synergistic Postural Relationships
  - Reactive Core
  - Clinical Applications
  - Antigravity Core Components
- Case Examples
- Group Case Study
- Different Populations
- Q & A

Shelley Mannell, PT, BSc, BHScPT C/NDT www.heartspacept.com
Julie Wiebe, PT, MPT, BSc www.juliewiebept.com
Foundation of Our Physical House

Drafty Windows

Deficits in:
- Postural Control
- Balance
- Gross Motor Skills
- Sensory Processing Skills
- Fine Motor Skills
- Phonation
- Continence

Zoe 101
Anticipatory Core

- Respiratory Diaphragm (D)
- Pelvic Floor (PF)
- Transversus Abdominis (TA)
- Multifidus (M)

Our Paths Cross

Our Paths Cross at the Core
Tug O' War

Integration: TAP

Stability that is responsive to the demands of function (non-uniform response)
- Teamwork
- Alignment
- Preparation

Integration: TAP

Stability that is responsive to the demands of function (non-uniform response)
- Teamwork
Gears in the Core Machine

Teamwork

The Core Machine
- Machine is optimized when all gears work together.
- Gears must move or the machine will fail
- Coordinated interaction will produce central stability

Teamwork

Postural and Respiratory Functions of the PFM
Hodges, Sapsford, Pengel (2007)
- PFM followed respiratory cycle (ant, not post)
- PFM expiratory activity more associated with abs (low-level tonic activity w/bursts at mov’t frequency)
- PISTON
Teamwork

Contraction of the PFM During Abdominal Maneuvers
Sapsford and Hodges (2001)
- 3 levels of Ab contraction
- Consistent inc in PFM before Ab pressure (PF inc w/Ab force)

Teamwork

Changes in IAP during Postural and Respiratory Activation of the Human Diaphragm
Hodges et al (2000):

Teamwork
Teamwork

- Balanced interplay between the diaphragm, pelvic floor and abdominals preserves relative IAP throughout the respiratory cycle.
- A dynamic and coordinated model of core function
- 5th member of our team
- Intersection of multiple systems
- Breath gives us a new gateway

Teamwork

- The Piston, driven by the action of the diaphragm, is a dynamic model for core function.
- Accessing the deep core system through breath provides a gateway for our pediatric clients.

Integration: TAP

Stability that is responsive to the demands of function (non-uniform response)

- Teamwork
- Alignment
- Preparation

Alignment

The Core Machine

Machine works best if all the gears line up

- Muscles are strongest at the midpoint of available ROM
- Muscles are weakest when long or short
- Neutral Pelvis and Ribcage alignment (ribcage over pelvis) puts the Core in midrange positioning.
Different Ways to Balance the Spine

Claus et al (2009):
- Flat, Long Lordosis, Short Lordosis, Slump
- Short Lordosis best activity for TA and Multifidus
- Flat-Least***
Different Ways to Balance the Spine

Claus et al (2009):

- Flat, Long Lordosis, Short Lordosis, Slump
- Short Lordosis best activity for TA and Multifidus
- Flat-Least***

Sitting Postures Affects PFM Activity in Parous Women


- Slump, Upright Unsupported, and Very Tall Unsupported (thoracic)
- Increased resting activation of PFM as alignment improved

Alignment: Sapsford et al
**Alignment**

**Sitting Postures Affects PFM Activity in Parous Women**

- Slump, Upright Unsupported, and Very Tall Unsupported (thoracic)
- Increased resting activation of PFM as alignment improved

**Neutral Rib Cage and Pelvis**

- Position of optimum Core recruitment (range)
- Move toward neutral
- "Sweet Spot": optimized for your patient

**Integration: TAP**

Stability that is responsive to the demands of function (non-uniform response)

- Teamwork
- Alignment
- Preparation
**Preparation**

**Neuromuscular Strategy:**
Preprogrammed motor control system, engaged through nervous system. The sensory system feeds information to create a graded response.

*Anticipatory + Reactive = Fun*
Prepares for task + engaged based on demands of task = Function/movement

---

**Preparation**

**Transverse Abdominis is not Influenced by the Direction of Arm Movement**
Hodges et al (1997)
- TA EMG increased prior to deltoid regardless of UE direction
- EMG of superficial abdominals varied with movement direction

---

**Preparation**

**Contraction of the Human Diaphragm During Rapid Postural Adjustments**
Hodges et al (1997):
- Same result for the Diaphragm
- Anticipatory contraction occurred regardless of phase of respiration
- Same result for elbow motions, not hand or digits
Preparation

Hodges et al (2007)
- Same result for the pelvic floor
- Pelvic floor preceded the abdominals

Sjodhal et al (2009)
- PF precedes supine LE movement

Luginbuehl et al (2013)
- PF precedes heel strike in running

Integration

Build a clinical model that:
- Teamwork: All gears moving
- Alignment: Optimized
- Preparation: Strategy

Core Redefined

CORE STRATEGY: NEUROMUSCULAR
CORE EXERCISE: MUSCULOSKELETAL
Clinical Application

Is Balance Different in Women with and without Stress Urinary Incontinence
- Greater COP displacement in SUI group
- Both groups had greater COP displacement w/full bladder

Core Strategy: Defined

Core Strategy is a system that harnesses the neuromuscular relationship that exists between the Anticipatory Core, Reactive Core, IAP Stability Cycle, Sensory System and the Brain. A cascade of force from the inside-out that provides both the stability and flexibility required to respond to the task at hand. #balance

Questions?
In contrast to the adult literature, very little pediatric research has specifically investigated the inner core musculature.

What do we know about postural control in children with CP?

Altered Trunk Movements During Gait in Children with Diplegia: Compensatory or Underlying Trunk Control Deficit? Heyrman L et al. 2014

- Looked at correlation between trunk movement and LE movement
- Provided support for a primary trunk control deficit NOT just as a result of LE impairment
Differences in Respiratory and Pulmonary Function Among Children with Spastic Diplegia and Hemiplegia Cerebral Palsy in Comparison with Normal Controls.
Kwon YH, Lee HY 2015
- Children with spastic diplegic and hemiplegia generate decreased respiratory pressure

Development of Postural Responses During Standing in Healthy Children and Children with Spastic Diplegia
Woollacott et al. 1998
- Group of typical children standing in alignment of child with spastic diplegia, showed similar disordered recruitment pattern during postural adjustments

Anticipatory and Compensatory Postural Adjustments in Sitting in Children with Cerebral Palsy
Bigongiari et al 2011
- Tested in sitting
- Main postural control strategy is compensatory
- Increased levels of co-activation in outer core muscles & others
Pediatric Core Research

Anticipatory Postural Adjustments in Children with Hemiplegia and Diplegia
Girolami G et al 2011
- Tested in standing
- Higher levels of co-activation reported in outer core muscles & others

Pediatric Research

Effects of Seat Surface Inclination on Respiration and Speech Production in Children with Spastic Cerebral Palsy
Shin et al 2015
- FVC was significantly improved with anterior inclination

Pediatric Research

Effect of Seat Surface Inclination on Postural Stability and Forward Reaching Efficiency in Children with Spastic CP
Cherng et al. 2009
- Studied effects of seat angle on postural stability and forward reach
- Forward incline (=anterior inclination) more beneficial for both stability and reach for typical children and those with CP
Pediatric Research

Seat Surface Inclination May Affect Postural Stability During Bocci Ball Throwing in Children with CP
Tsai et al 2014
• GMFCS levels I, II and III
• Anterior inclination associated with better postural stability and improved amplitude of elbow movement

Pediatric Research

Effects of an NDT-Based Trunk Protocol for Infants with Posture and Movement Dysfunction
Arndt et al. 2008
• Protocol for treatment specified alignment prior to activation
• Improved functional outcomes

Pediatric Research

What do we know about children with DCD?
### Pediatric Core Research

#### Differences in Postural Control and Movement Performance During Goal Directed Reaching in Children with DCD

**Johnston et al 2002**
- Studied 9 trunk muscles
- Onset activation of muscles altered for children with DCD

#### Core Stability Group Program for Children with DCD: 3 Case Reports

**Kane K. Bell A. 2009**
- Defined core muscles as superficial and deep intrinsics of lumbopelvic and abdominal regions
- Outcome of study mixed; variable core stability changes
- Noted that alignment changes were clinically significant with regards to impact on core stability (although not measured in study)

#### Contributions of trunk muscles to anticipatory postural control in children with and without DCD

**Kane K, Barden J 2012**
- Measured using surface EMG
- Children with DCD had later onset of TA/IO muscles
What do we know about children with ASD?

Motor control and children with autism: deficit of anticipatory function?

Schmitz et al 2003

- Children with ASD substitute reactive postural control for anticipatory postural control
- This can lead to timing and coordination issues.

Collectively studies suggest that children with ASD have:

- impaired anticipatory postural control
- decreased postural stability
THE ROLE OF CORE FUNCTION IN TYPICAL DEVELOPMENT

Examining details of typical development allows us to infer more about the development of the Core musculature.
## Typical Development

- At birth, there is relatively low tone in the Core musculature
  
  (Hulme J, 2005)

## Implications for Core Activity

- Resting tone of Core gradually increases during the first 2 – 3 years
  
  (Hulme J, 2005)

## Implications for Core Activity

- This occurs as motor tracts form increased number and strength of connections with neurons in spinal cord during early movement
  
Typical Development: Newborn

Physiological Flexion
- High, triangular-shaped rib cage
- Ribs close together

Implications for Anticipatory Core Activity
- Alignment of rib cage allows for inferior excursion of diaphragm only
- Little activity of the PF or TA

Typical Development: Newborn Milestones

Motor Function:
- Belly breathing
- Feeding
- Sleeping
- Uncontrolled elimination
Typical Development: 0-3 Months

Asymmetry
- Expansion of anterior chest with activity of UEs in supine and prone
- Decreased hip flexion with LE activity

Implications for Anticipatory Core Activity
- Some increased excursion of diaphragm contributes to increased activity in PF
- Increased excursion of diaphragm, activity of PF and LEs contributes to activation of TA; the team is developing
### Implications for Reactive Core Activity

- Pushing against surface in prone begins to activate reactive core POS (contralateral latissimus dorsi and glute max) (Lee D, 1999)

### Implications for Reactive Core Activity

- Activation of reactive core AOS (abdominal oblique and contralateral adductor) follows (Lee D, 1999)
- Creates balance of extension and flexion activity

### Typical Development: 0-3 Milestones

**Motor Function:**
- Prone: head lifting
- Supported sitting: head bobbing
- Begins to swipe at objects
- Voiced sounds with movement
Typical Development: 4-6 Months

<table>
<thead>
<tr>
<th>Symmetry</th>
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</thead>
<tbody>
<tr>
<td>- With increased muscle activation and independent movement, general increase in space between ribs occurs</td>
</tr>
</tbody>
</table>

Implications for Anticipatory Core Activity

- Increased space between ribs supports change in rib cage shape allowing:
  - Deeper excursion of diaphragm
  - Improved activity of intercostals
  - Increased activity of PF and TA
Implications for Anticipatory Core Activity

- Increased rotation activity around hip joints contributes to activation of PF

Implications for Reactive Core Activity

- As hip flexion decreases, the POS becomes increasingly active, gains strength within the available range and contributes to anti-gravity function

Typical Development: 4-6 Milestones

- Motor Function:
  - Supine: bridges, rolling
  - Prone: propping on extended arms, superman, rolling
  - Sitting with hands propped/free
  - Beginning to reach forward (humeral flexion)
  - Transfers hand to hand
  - Deeper breaths, longer sounds
### Typical Development: 7-9 Months

**Rotation**
- Shape of rib cage is elongating, changing alignment of shoulder girdle
- Transitional movement creates functional linkage between the shoulder girdle and pelvic girdle
**Implications for Anticipatory Core Activity**

- Increased hip ROM and capacity to maintain midline hip rotation ramps up activation of PF
- Increased differentiation of control of diaphragm for postural stability, air flow and sound for speech (Alexander R, 1991)

**Implications for Reactive Core Activity**

- POS contributes hip extension for active base of support (anti-gravity extension)
- AOS contributes to increased active rotation (protective reactions and transitional movement)

**Implications for Reactive Core Activity**

- Crawling and ½ kneeling positions reflect activity in reactive core
  - Lateral synergist (Contralateral Glute Med/Min and Adductors) and
  - Rotational Synergist (Ipsilateral Hip Lateral Rotators and Adductors) (Lee D, 1999)
Typical Development: 7-9 Milestones

Motor Function:
- Pushing up into sitting, creeping/crawling, kneeling, pulling to stand, cruising
- UEs for play, maturing grasp pattern
- Produces sound independent of movement

Typical Development: 10-12 Months

Gross Motor Independence
- Rib cage becoming more rectangular in shape
- Movement begins in all planes against gravity
Implications for Anticipatory Core Activity

- Trunk movement in all planes increases activation of diaphragm
- Increased demand on mid-range hip control in standing contributes to activation of PF

Implications for Anticipatory Core Activity

- Diaphragm, pelvic floor and TA partnership provides increased stabilization of lumbar spine and pelvis allowing initiation of movement from pelvis rather than upper trunk

Implications for Reactive Core Activity

- Increased activity in all postural synergists in tandem with anticipatory core team
Typical Development: 10-12 Milestones

Motor Function:
- Climbing stairs, taking first steps
- Manipulates and combines fine motor in play, dressing and feeding
- Increased air intake, decreased respiratory rate
- Abdominal-thoracic breathing pattern begins
Typical Development: 12-24 Months

I Can Do It Myself
- effective Core muscle activation now in place for maintenance of stable trunk with simultaneous movement of the body in all planes

Typical Development: 12-24 Milestones

Motor Function:
- continued refinement in all areas of development

Effective Core Strategy

Core Strategy
= stable head
= mobile trunk
= stable pelvis
= dynamic postural control within function
WHAT HAPPENS TO CORE FUNCTION IN ATYPICAL DEVELOPMENT?

Motor development can be impacted by difficulties in either the motor or the sensory systems.

Q and A
Atypical Development

- Disruption of the attachment process can also impact balanced flexion and extension (Barthel K, 2009)

Atypical Development

- Ultimately, lack of physiological flexion at birth fundamentally impacts alignment
- This negatively impacts the development of Core Strategy

Atypical Development

Movement patterns develop to compensate for this inefficient postural control:
- Breath holding
- Head/neck extension
- Stabilization by using end ranges
Atypical Development: Breath holding

**Task:**
Stabilize body against gravity

**Compensation:**
Breath holding

Implications for Anticipatory Core Activity

- Rib cage remains high and compact
- Decreased activation of respiratory diaphragm

Atypical Development: Breath holding

**Functional Consequences:**
- Poor midline head control
- Dislikes prone, unable to push off surface with UEs
- Compromised movement – moving for as long as breath holding
- Decreased sounds
- Monocular fixation retained
### Atypical Development: Neck Hyperextension

**Task:**
Stabilize head to provide stable base for eyes

**Compensation:**
Neck hyperextension possibly combined with active tongue retraction

### Implications for Anticipatory Core Activity

- Rib cage remains high and compact secondary to shoulder elevation
- Decreased activation of respiratory diaphragm

### Functional Consequences:

- Poor midline head control
- Dislikes prone
- Decreased ability to pair UE function or movement with vision
- Belly breathing
- Voiced sounds with movement
- Monocular fixation retained
Atypical Development: Dynamic Holding

**Task:**
Stabilizing the trunk against gravity

**Compensation:**
Active holding with rectus abdominus, iliopsoas and diaphragm

---

Implications for Anticipatory Core Activity

- Muscles used isometrically for stabilizing during movement and against gravity
- Substituting phasic muscle activity for postural muscle activity
- Anticipatory core offline

---

Atypical Development: Dynamic Holding

**Functional Consequences:**
- Supine preferred
- Sitting with posterior pelvic tilt
- Humerus remains internally rotated w/elbow, wrist and hand flexed
- Breath holding with movement
- Difficulty with development of binocular vision
Atypical Development: Dynamic Holding

- Changing alignment and muscle activation alters dynamic holding
- Can improve postural control
Q and A

SENSORY & MOTOR: It's all connected
From the time we take our first breath, sensory and motor processes are connected.

- The diaphragm receives input from the vestibular system (vestibulorespiratory reflexes).
  Mori R, 2001

- This connection intimately links the anticipatory core team to the sensory systems.
One of the first major challenges for babies is self-regulation.

Development of Self-Regulation

**FIRST ORDER**
- Automatic functions: temperature, blood pressure, heart rate, respiration, sleep/wake cycles
- Muscle/cortical tone
- State maintenance
- Monitoring for survival
- Suck/swallow/breathe synchrony
- Selective attention
- Visual searching/monitoring/directing
- Oral: taste, texture, temperature, suck, blow, chew, lick, bite, crunch
- Hands: use of form, size, texture, temperature, movement
- Body/parts use of movement patterns, planes of movement

**SECOND ORDER**
- Sustained attention
- Intention
- Working memory
- Querier of a goal
- Anticipation/planning
- Problem solving
- Organization of space, time, tasks

**THIRD ORDER**

Breathing pattern (optimal activation of diaphragm) modulates the ANS with every breath.

This contributes to self-regulation at the first order level.

Baekley DM, 2012
Longo DJ, 1984
Tong YL, 2009
With development of efficient motor function, self-regulation is supported at the second order level as well.

Anticipatory core creates a stable center, as physiological flexion decreases.
Therefore the anticipatory core also contributes to the development of our perceptual sense of midline.

Sensory & Motor

Sensory & Motor

Sensory & Motor
Many children with movement challenges exhibit low muscle tone in axial muscles. This may indicate involvement of the vestibular system (Shumway Cook A, 2007).

If vestibular system is compromised, then activation of the diaphragm may be compromised. Alterations in alignment occur. Breath holding/inefficient breathing patterns develop. Central stability is compromised.

The same inefficient breathing patterns impacts PNS/SNS balance. These contribute to sympathetic dominance (fright, flight, fight or freeze).
Sensory & Motor

SNS dominance = high arousal

Compromised anticipatory core activation negatively impacts:
- Sensory processing
- Self-regulation
- Postural control
- Efficient movement

Q and A
Muscle Activation Characteristics of Stance Balance Control in Children with Spastic Cerebral Palsy
- Neurologically typical kids in crouch position characteristic of CP.
- Similar recruitment pattern in balance perturbation.
- Balance deficits due to neural and mechanical differences.
- (Noted similar impact in gait in previous studies).

Alignment Impacts...
- Muscular recruitment (midrange optimization)
- Vestibular input, cranial nerves (head position)
- Proprioceptive
- Visual
- Breathing patterns
- Joint centration
- All inputs for brain to evaluate threat for protective output
Alignment

- Enhance or diminish components of the central stability system
- **Alignment based intervention is critical**
- Name that muscle!

Alignment

- Accepted terminology:
  - Hyperlordosis/Ant Tilt
  - Hypolordosis/Post Tilt
  - Neutral Pelvis/L-spine
- What about the position and forces imposed by upper quarter?

Pop Quiz

---

Name that alignment?
**Alignment: Function follows Form**

**Ribcage position dictates:**
- Excursion and contribution of the diaphragm to physiologic priorities, postural control and movement support
- Impacts the capacity of the diaphragm to set up the IAP pressure system

**Pre-Botox**

**8 Weeks Post-Botox**
How Do Anterior/Posterior Translations of the Thoracic Cage Affect Lumbar Spine, Pelvic Tilt, and Thoracic Kyphosis

Harrison et al (2002):
Posterior Thoracic Cage Translation
- Decrease lumbar lordosis (7.4)
- S-curve L-S (T-12-L2 flex) "apex"
- Increase pelvic posterior tilt (15.9)
- Sacral base posterior tilt (13.1), closer to horizontal

Posterior Ribcage Translation
Position of the ribcage relative to the pelvis
- Part 1: Military

Position of the ribcage relative to the pelvis
- Part 2: Slouch
Rib Cage Tip

- Lower Ribcage: Anterior/Superior (Top of the RibCage behind pelvis)
- Lower Ribcage: Post/Inf (Bottom of the Ribcage behind pelvis)

Dixie Cup on a Stick

- Lower Ribcage: Anterior/Superior
- Named by lower rib cage

- Lower Ribcage: Posterior/Inferior
- Named by lower rib cage
Let's play Seated Lab

Make your rib cage tip Ant/Sup

Named by lower ribcage

Make your rib cage tip Post/Inf

Named by lower ribcage
Defining Neutral Alignment

Neutral Ribcage/Pelvis
- Position of optimum recruitment of the Diaphragm/Pelvic Floor Piston
- Balance of flexors and extensors
- “Sweet Spot” within neutral range, balancing their structure, muscular forces, and pressure

Alignment: Clinical Presentation

Hyperlordosis/Anterior Tilt
- Sit in posterior tilt
- Stand in anterior tilt
- Reverse C’s

Hypolordosis/Posterior Tilt
- Sit and stand in posterior tilt
- C’s
Alignment: Today’s Presentation

**Mixed Posture Type**
- Former AT → PT
- Former PT → Kinked
- Somewhere in between

Alignment

How do we distinguish?

**Alignment Screen**
- Apex of the lumbar curve
- Ribcage position
- Gluteal definition
- Pelvic tilt?
How do we distinguish?

Alignment Screen
- Apex of the lumbar curve
- Ribcage position
- Gluteal definition
- Pelvic tilt?

Screen: Apex of the Lumbar Curve

Apex of the lumbar curve
Landmark: L4 at iliac Crest
Alignment Screen

Apex of the lumbar curve
- **AT**: Deep apex at L4/L5
- **PT**: Flat at L4/5; Kink/Apex at T12/L1
- **Mixed**: Shallow at L4/5 (apex shifted superiorly)
- **Elbow Sign**

How do we distinguish?

Alignment Screen
- Apex of the lumbar curve
- Ribcage position
- Gluteal definition
- Pelvic Tilt?

Alignment

**Ribcage Position**

**Visual**: Translation, bell, take a breath

**Palpation**: Landmarks: ribcage and L5/sacral base
Stacy clip: Ribcage position

**Alignment**

<table>
<thead>
<tr>
<th>Ribcage Position</th>
<th>AT</th>
<th>PT</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual Inspection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT: Posterior translation; Top of ribcage posterior to L5 (rung up)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT: Flat/stacked or minimal ribcage translation posterior to L5 (kink at T12/L1); Bottom of ribcage posterior L5 (rung down)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed: Ribcage max posterior translation behind L5 (Can ring up or down)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How do we distinguish?

Alignment Screen
- Apex of the lumbar curve
- Ribcage position
- Gluteal definition
- Pelvic Tilt?

Alignment

Gluteal Definition
Visual Scan!

Screen: Glute definition
**Alignment**

- **Gluteal Definition**
  - **AT:** Present
  - **PT:** Flat Bum
  - **Mixed:** Upper glute flat

**How do we distinguish?**

**Alignment Screen**
- Apex of the lumbar curve
- Ribcage position
- Gluteal definition
- Pelvic tilt?
Screen: Pelvic Tilt

Pelvic Tilt?
Landmarks: Bilateral ilium
- Can you tilt the pelvis?
- Move pelvis to see impact on lordosis
- Pull on your bum string
- Lift your tailbone on inhalation

Alignment

Pelvic Tilt?
**AT:** Very limited anterior, if at all
**PT:** Posterior or limited toward neutral
**Mixed:** Very tilt-able anteriorly
Let's Review

Anterior Tilt
- Deep apex at L4/L5
- Ribcage post shift to pelvis
- Glutes present
- Pelvis will not tilt anteriorly any further

Let's Review

Posterior Tilt
- Flat L4/5; Kink at T12/L1
- Ribcage flat or min post shift
- Glutes flat
- Pelvis will posteriorly tilt more, or can move minimally toward neutral

Let's Review

Mixed Posture Type
- Shallow apex at L4/L5
- Ribcage max post shift
- Glutes flattening (upper glute)
- Pelvis can be tilted anteriorly easily and farther than you expect (try pulling on the bum string)
Screen G

Self-evaluate in Mirror or with smartphone selfie
Where is the apex of your lumbar curve?
Do you have an elbow sign?
Are you: Bell rung up? Bell rung down?
Is your ribcage translated posteriorly or stacked?
Do you have glute bulk? Flat bum? Upper glute atrophy?
Can you tilt your pelvis? Pull on your bum string and/or lift your tailbone?
Where is your weight in your feet?
Let's Review

Demo Neutral
- Ski jump back to middle
- Pull on your bum string
- Lift tailbone on inhale
- Find your breath
- Goals: Quiet bells, even weight distribution, breasts parallel to floor, ease of breath

Neutral Demo
- Ski Jump
- Bum String
- Tailbone
- Where's your weight?
- Find your breath
- Ease of breath

Optimized Alignment
Ski Jump

<table>
<thead>
<tr>
<th>Good</th>
<th>Bad (forgot the ribcage)</th>
</tr>
</thead>
</table>

Alignment Self-Corrections Lab

- **Ski Jump**
  - Let ribcage glide over pelvis (avoid using abs to pull ribcage over pelvis)
  - Observe passive change in pelvic position
  - Shift back to middle and maintain relative position (relax)
  - Feel weight distribution change in feet (goal: even)
- **Pull on bum string**
  - Observe rib cage shift
  - Avoid overcorrection, and/or rib thrust
- **Lift your tailbone** (couple with inhale)
Before and After

Questions?

Dynamic Core for Kids

Day One: Core Function

Core Strategy
TAP

Typical and Atypical Development

Clinical Application

Anticipatory Core Components

Core Optimizing Alignment
Core Components

- TA
- Pelvic Floor
- Diaphragm
- Multifidus

Diaphragm

**Anatomy 101**

**Origin:**
- Vertebral-bodies L1-2 (L), L1-3 (R)
- Costal-inner aspect lower 6 ribs
- Sternal-posterior xiphoid

**Insertion:**
- Central tendon inserts at L3
Diaphragm

Anatomy 101: Action
- Diaphragm is cross section of multiple systems: respiration, aids circulation, lymphatics, GI motility, continence, postural stabilization, movement control, limbic system, ANS down regulation
- Mobilizes rib, thoracic, and lumbar segments
- Contributes to the elasticity of the pelvic floor

Function:
- Utilize A-P, Lateral, and Vertical components
- IAP on inhale stabilizes trunk as abdomen and pelvic floor undergo eccentric lengthening
- Exhale will engage Core trunk stabilizers (Piston)
- Diaphragm is gateway to the rest of Core ("Blow Before You Go")

Chest Breathers:
- Causes thoracic extension
- Sustained inspiratory position
- Decrease inferior excursion of diaphragm (decrease IAP gradient potential)
- High, flared ribcage
### Diaphragm: Dysfunction

#### Belly Breathers:
- Rigid, compressed ribcage
- Sustained expiratory position
- Reduced abdominal tone (decrease IAP gradient potential)
- Decreased intercostal contribution to a balanced breath

#### Breath Holding:
- Valsalva: large loads
- Substitution for the Core in postural control, movement strategies, transitions and prepping for small exertions
- Repeated high intra-thoracic (ITP) and IAP can contribute to incontinence and constipation

#### Chest and Belly Breathers:
- Lateral component dysfunction (lower 6 ribs)
- Keeps ribs high and flared or fixed
- Core disconnected/IAP potential is reduced
- Both use breath holding as a stability strategy
Diaphragm: Intervention

Umbrella Inhale

Close the Umbrella Around the Handle

Umbrella Breath Demo

Shelley’s Cues for Umbrella Breathing

• Alignment is the key!
• Teach using an actual umbrella
• Use visual of diaphragm action
Shelley’s Cues for Umbrella Breathing

- Place your hands around ribs 8-10 and provide gentle resistance throughout breath:
  - “Breathe into my hands”
  - “Make my hands move out”
- Use Theraband around ribs 8-10 and provide resistance (home program)
- Emphasize gentle breath in
- Breathe out “through a straw”; some children may need a straw to work with
- Some children may have increased difficulty with lip pursing (orbicularis oris = flexion activity)

Cueing in Supine
Chest Breathers Intervention

Belly Breathers Intervention
Alignment is the key!

Independent Diaphragm Standing Lab

- Re-assess breath pattern in mirror and in pre-taped video (standing)
- Use preferred alignment cue (ski jump, bum string, tailbone lift) and re-assess breath (see and feel for change)
- Try a 360° umbrella inhale (ribcage opens to side, front and back)
- Try umbrella breath in new alignment, and old alignment which is easier?
- Shift back to middle and see if you maintain the breath
- Relax abdomen and observe for change in pattern
- Relax pelvic floor and observe for change in pattern
Independent Diaphragm Supine Lab

- **Chest Breather**: Pillow under head, shoulders and top of rib cage
  - Play with pillow height, number (less ribcage protrusion)
  - Observe changes in breath pattern with pillow transitions
  - Use hand on chest to remind, hand on ribcage to encourage direction of inhale
  - Align pelvis with hand triangle, or middle of extremes (feel how this changes breath)
  - 360° umbrella inhale, allow gentle belly rise with abdomen open
  - Gentle exhale through a straw (blowing petals off a flower)
  - Use an extended exhale to help close the ribs, so that you experience a fuller lateral excursion on inhale
  - Note abdomen follows breath (rise on inhale, fall on exhale), do not force the exhale

- **Belly Breather**: Pillow under head to maintain airway, align spine
  - Play with pillow height
  - Observe changes in breath pattern with pillow transitions
  - Use hand on belly to remind, hand on ribcage or sternum to encourage direction of inhale
  - Align pelvis with hand triangle, or middle of extremes (feel how this changes breath)
  - 360° Umbrella inhale, draw air in to open the ribcage to the front, back and sides
  - Start with small breaths that don’t create a large belly rise
  - Gentle exhale through a straw (blowing petals off a flower)
  - Note abdomen follows breath (rise on inhale, fall on exhale), do not force exhale

Independent Diaphragm Lab

- **Goal**: 360° umbrella breath (front, back and sides), gentle belly rise (be sure you relax your abdomen)
- Think through props, assists, and modifications for clients
Questions?

Core Components

Diaphragm

Pelvic Floor

Pelvic Floor: Anatomy 101

Ischiococcygeus
O: Ischial spine
I: Coccyx

Levator Ani:
- Pubococcygeus
  O: Pubic ramus
  I: Lower sacrum/coccyx
- Iliococcygeus
  O: Reinforced fascial band
  I: Interdigitates with Pubococcygeus
- Puborectalis
  O: Pubic symphysis
  I: Sling behind rectum

Urogenital Diaphragm

**Anatomy 101:**
- Two muscular and connective tissue layers inferior to Pelvic Floor
- Origin/Insertion: Pubic Symphysis (PS), Pubic Rams, Perineal Body, ischial Tuberosity (IT), (Coccyx)
- Perineal Body
  - Interdigitates with urethral and anal sphincters thru Transverse Perineal Muscles (Deep and Superficial)
  - Anal sphincter interdigitates with Pubococcygeus

Continence

- Continence Review: Anatomy Pre-Reading
- Add incontinence to intake questionnaires

Pelvic Floor

**Anatomy 101: Action**
- Anticipatory contraction to stabilize lumbo-sacral, SI, pelvic-hip, and PS joints
- Force couple with multifidus to control the sacrum
- Synergist with TA (1˚ Anterior)
- Ebbs and flows with the Diaphragm (1-7 mm)
- Supports pelvic viscera
- Pelvic floor (slow twitch) and urogenital diaphragm (fast twitch)
- S2,3 nerve roots for PF and foot intrinsics
Pelvic Floor: Function

Function:
- Needs to be integrated into Core recruitment, and functional patterns
- Anticipatory, balanced contraction between:
  - anterior/posterior
  - Right (R)/Left (L)
- Spine length remains the same; No pelvic movement
- Concentric/Eccentric
- Creating a motor program, strategy, and resting tone

Pelvic Floor: Dysfunction

Dysfunction:
- Bum gripping
- No link to the rest of Core
  - No TA
  - Breath holding
- Movement
  - Hollowing
  - Pelvic rocking
  - Ribcage elevation/depression
  - Teeth gritting

Pelvic Floor: Tricks

Tricks:
- Ski Jump
- Pursed lips/open mouth
- Turn feet in/out
- Lift your arches
Pelvic Floor Demo

Pelvic Floor: Assessment

Pelvic Floor Demo

Pelvic Floor Demo

Palpation:
- Posterior Pelvic Floor Palpation with TA
- Landmark this on your self:
  - PF: West of IT, East of anus
  - TA: Bulge/Brace vs TA tensioning on exhale
- Qualitative assessment: does it lift? Does it lower? Does it follow diaphragm
- L vs. R

Observation:
- Looking for appropriate motor strategies and dysfunctional patterns
- Pelvic stability in function (single leg squat)
Functional Tests
Independent Pelvic Floor Standing Lab

- Play with the ski jump to feel how an alignment shift will elicit a response from the back half vs. front half of the pelvic floor
- Shift back to the middle to see if you can still maintain your connection with both halves
- Goal is access to both halves, use in a balance way
- Self-palpation
- Self-assess functional testing (SLR, Single Leg Squat)

Independent Pelvic Floor Side Lying Lab

- Check in with alignment: Feet, Fanny and back of head aligned. Pillow between knees, and under head
- Gently open/melt anus to close on a red kidney bean, lift it 1 cm into your body (back bean)
- Connect with breath cycle: Umbrella inhale, gentle belly rise, open anus, drop the bean
- Begin exhale through a straw: close on the bean and lift up & in 1 cm
- Follow this pattern as you add a 2nd bean lower and lift with vaginal opening (front bean)
- Inhale open, exhale close and lift = PISTONS

- Observe/feel for substitutions (bum grip, breath hold, abdominals)
- Ball squeeze to enhance closing on the beans (optional)
- Seated vs Side Lying may create added proprioception
Pelvic Floor and Kids

Primarily look at PF in function - pelvic stability in:
- Crawling
- Standing
- Moving from bilateral to unilateral stance
- Unilateral stance
Palpation

• Generally don’t palpate for motor function – observation!
• Dealing with continence, always palpate

Permission

• Ask permission of child and/or adult
• Explain why
• “I need to put my hand here (demonstrate on yourself) to feel what your PF is doing. Is that OK with you?”
• Document, have another person present, use TA
Pelvic Floor Cues

- Alignment is key!
- Gently “stop a toot”
  Break sequence down:
- Practice PF
- Inhale, extend the exhale
- Blow before you go
- Then practice movement
- “Beans” for teens

Questions?

Core Components

Diaphragm

Pelvic Floor

TA

CORE
Transversus Abdominis

Anatomy 101:

Origin:
- Thoracodorsal fascia
- Lower 6 ribs
- Interdigitates with costal fibers of the diaphragm

Insertion:
- Upper and middle fibers blend with RA sheath reaching linea alba in midline
- Inferior fibers blends with insertion of IO at pubic crest

Action
- Anticipatory contraction to stabilize the spine
- Expiratory muscle at the end of an extended exhale
- Synergist with PF (anterior)
- Physical link between thoracic cage-spine-pelvis
- Deepest abdominal: leverage
- Control fxn, not movement fxn
- Flattens abdomen
- Cinches waist
- Slow twitch, becomes fast twitch in presence of dysfunction

Function
- Preparatory contraction
- Slow tensioning
- Abdomen will flatten or descend
- Concentric with expiration
- Eccentric with inspiration

Dysfunction
- Quick bulge or bracing
- Breath holding
Independent Transversus Abdominis Lab

- Repeat brace vs. tension
- Supine, Standing or All-Fours
- Palpate medial to ASIS or superior to PS
- Monitor response of the TA on umbrella inhale
- Monitor response of the TA to extended exhale alone
- Monitor response to TA with Piston cycle
- Play with bean lifts (full, back, front, R and L) monitor TA response, asymmetries
- Observe for compensation

PF/TA Self-Palpation

Questions?
Dynamic Core for Kids

Day One: Core Function
Core Strategy TAP
Typical and Atypical Development
Clinical Application
Anticipatory Core Components
Core Optimizing Alignment

CLINICAL PROBLEM SOLVING

ASSESSMENT

Clinical Problem Solving: Assessment

What do you see?
Clinical Problem Solving: Assessment

What do you see?

Clinical Problem Solving: Assessment

What do you see now?

Clinical Problem Solving: Assessment

What do you see now?
Clinical Problem Solving: Assessment

What do you see?
DYNAMIC CORE FOR KIDS: ONLINE DAY TWO

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Homework

Q and A
Concepts Review

What have we learned so far?

Concepts Review

TEAMWORK

Concepts Review

ALIGNMENT
Concepts Review

PREPARATION

Concepts Review

BLOW BEFORE YOU GO!

Concepts Review

AD
7 years old with CP,
?brachial plexus injury
Concepts Review

1 month later

Seated Posture Demo

Seated Posture Self-Lab

- Use a hard chair
- Sit in your typical posture, and take a breath (use mirror). Can you find your Breath? Can you find your Piston?
- Use towels or a wedge to lift hips higher than knees, with IT’s just at the edge (note un-tucked pelvic position and rib cage shift in mirror). Take a breath. Can you find your Breath? Can you find your Piston?
- Use a small ball between your knees and practice Pistons. Time the ball squeeze with closing on your beans, then lift beans up and in.
Dynamic Core for Kids Part One

Day Two: Q & A/Review

Synergistic Postural Relationships/Reactive Core

Case Examples

Q & A

Different Populations

Group Case Study

Postural Synergists

Maintenance of Neutral Reactive Core Recruitment Order

Postural Synergists

- Reactive Core element activation is enhanced by pairing them in synergistic, diagonal relationships.
- Maintain optimized alignment
- Reinforce the Piston system that regulates postural control and pressure
It Takes a Village

Postural Synergists
• Reconnect anticipatory and reactive (cascade of force from the inside-out)
• Focus on recruitment order
• Every exercise is a “Core” exercise; every exercise integrates pelvic floor (no need for Kegels, let’s do Pistons)

It Takes a Village

Strategy before strength!
• Strategy checklist:
  • Teamwork: All components engaged?
  • Alignment: Optimized for Core function?
  • Preparation: Blow before you go!
  • YES! Now add the next layer!

Next Layer: Blow Before You Go

Ensure Recruitment Order
• Alignment optimized?
• Umbrella inhale, open, exhale, close and lift beans, feel deep abs respond (engage Piston)
• Now move as maintain exhale and deep connection
• Try a Squat
Posterior Oblique Synergist (POS)

- Contralateral Lats and Glute Max [thru Thoracodorsal Fascia] (Lee, 1999)

Rooted in Core Strategy
- TA-pretenses the Thoracodorsal Fascia
- Levator Ani-moves superiorly with Glute Max contraction (Palme, 2003)
- Diagonal force transects the pelvic floor
- Recruitment order: anticipatory to reactive

Posterior Oblique Synergist (POS)

- Transfers loads in rotation and in gait
- Stabilizes SI joint
Posterior Oblique Synergist (POS)

Which alignment needs this synergist most?

C, Reverse C, Mixed?

POS: Child’s Pose

Posterior Oblique Synergist:

- Child’s Pose with umbrella breaths

1. POS: Pull Down in Supine with Bridge
2. POS- Letter X

3. POS- Pull Down in Sitting

4. POS-Four-Point Forward Weight Shift
5. POS: Snow Angel Squats

CRITICAL: Focus on the recruitment order of anticipatory to reactive (TAP)
- Umbrella inhale, open, exhale, close and lift beams, feel deep abdominals respond (engage Piston)
- Now move as you continue with exhale and deep connection (move only as far as you can maintain alignment)
- Blow Before You Go!
- Reset between each repetition—Aligned! Umbrella inhale, open……
- Kid friendly adaptations
- Create your own

POS Lab List

- Childs Pose
  1. Pull Down in Supine with a Bridge
  2. Letter X
  3. Pull Down in Sitting
  4. Four Point Forward Weight Shift
  5. Snow Angel Squats
Q and A

POS: Modified Supine

POS: Modified Standing
Anterior Oblique Synergist (AOS)

Postural Synergists

Anterior Oblique Synergist (AOS)
- Contralateral Obliques and Adductors (thru Abdominal Fascia) (Lee, 1999)

Rooted in Core Strategy
- TA pretenses the abdominal fascia
- TA-interdigitates with IO at pubic crest
- Adductor overflow to pelvic floor through common insertion at PS
- Diagonal force transect the pelvic floor
- Recruitment order: anticipatory to reactive

Anterior Oblique Synergist
- Obliques involved in all trunk, UE, and LE movements (Rooted in Core)
- Adductors active in all segments of gait cycle
- Stabilizes the Pubic Symphysis
- Goal: Balanced with POS

Recruitment order: anticipatory to reactive
Postural Synergists

| Anterior Oblique Synergist |
| Which alignment needs this synergist? |
| C, Reverse C, Mixed? |

6. AOS: Diagonal in Supine (Modified)

7. AOS: Supine Resisted Flexion
8. AOS: Diagonal in Sitting

9. AOS: Diagonal in Standing

10. AOS: Diagonal in Stride Standing
11. AOS: Moonwalk

CRITICAL: Focus on the recruitment order of anticipatory to reactive (TAP)
- Aligned?
- Umbrella inhale, open, exhale, close and lift beans, feel deep abs respond (engage Piston)
- Now move as you continue with exhale and deep connection (move only as far as you can maintain alignment)
- Blow Before You Go!
- Reset between each repetition- Aligned? Umbrella inhale, open,....
- Kid friendly adaptions
- Create your own

6. AOS diagonal in supine modified
7. Supine resisted flexion
8. AOS diagonal in sitting
9. AOS diagonal in standing
10. AOS diagonal in stride standing
11. AOS in goth moonwalk
AOS: Modification in standing

Lateral Synergist (LS)

Glute Med/Min and Contralateral Adductors (Lee, 1999)

Rooted in Core Strategy
- Adductor overflow to pelvic floor through common insertion at PS
- Diagonal force transects the pelvic floor
- Recruitment order: anticipatory to reactive

Postural Synergists
<table>
<thead>
<tr>
<th>Postural Synergists</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lateral Synergist</strong></td>
</tr>
<tr>
<td>- Glute Medius (left) active to support pelvis from foot flat to end of midstance</td>
</tr>
<tr>
<td>- Adductor (right) active in swing</td>
</tr>
</tbody>
</table>

Which alignment needs this synergist?
C, Reverse C, Mixed?

12. LS: Side prop
13. LS: Half Kneeling to Stand

14. LS: Clock

15. LS: Walking
16. LS: Monster Walk

17. LS: Monster Walk with Theraband

LS: Self-Lab

- CRITICAL: Focus on the recruitment order of anticipatory to reactive (TAP)
  - Aligned?
  - Umbrella inhale, open, exhale, close and lift beans, feel deep abs respond (engage Piston)
  - Now move as you continue with exhale and deep connection (move only as far as you can maintain alignment)
  - Blow Before You Go!
  - Reset between each repetition-Aligned? Umbrella inhale, open…….
  - Kid friendly adaptions
  - Create your own
LS Lab List

1. LS side prop
2. LS 1/2 kneeling to stand
3. LS clock
4. LS walking
5. LS Monster walks
6. LS Monster walks with Theraband

Q and A

LS: A Squat with resistance
LS: A Monster Walks with Theraband

Pull it all together

18. Crawling
19. Squats

20. Vaulting

Self-lab: Pull it all together

- CRITICAL: Focus on the recruitment order of anticipatory to reactive (TAP)
  - Umbrella inhale, open, exhale, close and lift beans, feel deep abs respond (engage Piston)
  - Now move as you continue with exhale and deep connection (move only as far as you can maintain alignment)
  - Blow Before You Go!
  - Reset between each repetition- Aligned? Umbrella inhale, open……
  - Kid friendly adaptions
  - Create your own
Pull It All Together Lab List (10 min)

18. Crawling
19. Squats
20. Vaulting

Dynamic Core for Kids Part One

- Day Two: Q & A/Review
- Synergistic Postural Relationships/ Reactive Core
- Case Examples

- Q & A
- Different Populations
- Group Case Study

Client Scenario

CP Hemiplegia
Client Scenario: CP Hemiplegia

- MD born at 25 weeks, 971 grams
- Dx R hemiplegia CP

Client Scenario: CP Hemiplegia

At 12 years old:
- Decreased range and strength
- Difficulties with visual scanning, attention
- Altered sitting and standing posture
- Altered gait pattern

Client Scenario: CP Hemiplegia

Functional limitations:
- Sit to stand transition with UE support
- Decreased sitting tolerance
- Decreased standing balance
Client Scenario: CP Hemiplegia

Anticipatory Core Deficit:
- Breath holding for transitional movement or challenging tasks
- Indicated poor diaphragm function

Anticipatory Core Deficit:
- Inability to hold midrange posture in any position, stabilizing in end range
- Indicated deficit in all four anticipatory core elements

Anticipatory Core Deficit:
- Pelvic retraction and poor hip control in midstance gait
- Indicated poor pelvic floor integration to stabilize pelvis and anchor hip
Client Scenario: CP Hemiplegia

Anticipatory and Reactive Core Integration:
- Poor anticipatory postural control in sitting, standing and gait
- Indicated poor timing of both anticipatory and reactive core recruitment

First Intervention Block:
1 hr/week x 8 weeks
- Taught neutral alignment of rib cage and pelvis in supine
- Taught full utilization of diaphragm in supine “umbrella breathing”
- Progressed to sitting with postural supports (wedge) and standing

Pre-Treatment Sitting
Pre-Treatment Standing
Client Scenario: CP Hemiplegia

- Taught proper diaphragm engagement before transitional movement
- "Blow before you go"

Supine:
- Posterior oblique pull downs with breathing
- Posterior oblique pull downs with bridge, modified
- Anterior oblique diagonal in supine modified with breathing

Sitting:
- TAP with alignment support (wedge)
- Posterior oblique pull downs with breathing
- Anterior oblique pull downs with breathing
- Anterior and posterior oblique pull downs with breathing and ball between knees
- Sit to stand with blow toy; sit to stand with blow toy and ball between knees
Client Scenario: CP Hemiplegia

- Supine: hip flexor with resistance
- Standing: awareness and correction of rib cage position
- Pushing through the gait cycle
Client Scenario: CP Hemiplegia

Hydropcephalus w/ cognitive challenges
Client Scenario: Hydrocephalus

PP
13 year old
Hydrocephalus
Cognitive challenges

Functional limitations:
• Decreased standing balance
• Decreased distance in independent walking
• Decreased stability when walking outdoors

Anticipatory Core Deficit:
• Breath holding for transitional movement or challenging tasks
• Indicated poor diaphragm function
### Client Scenario: Hydrocephalus

**Anticipatory Core Deficit:**
- Poor pelvic control in standing and gait
- Indicated poor pelvic floor integration to stabilize pelvis and hip

### Supine:
- Blowing with whistles/toys with increasing difficulty in force and length
- Knees to chest with breathing
- Knees to chest with ball between knees with breathing

### Supine:
- POS Theraband pull down
- POS Theraband pull down with bridge
- AOS diagonal with Theraband
Client Scenario: Hydrocephalus

Sitting:
(with alignment correction):
- POS pull down with Theraband with blowing
- AOS diagonal with Theraband
- Repeat above with ball between knees

Client Scenario: Hydrocephalus

- Side lying with alignment correction by PT
- Sit to stand with ball between knees
- Pushing through the gait cycle
Client Scenario: HFA

SS
8 year old girl with
High functioning Autism
Anxiety disorder
Neuromuscular disorder

Functional limitations:
- Frequent c/o low back pain, neck pain, headaches
- Frequent ankle sprains
- Decreased endurance for walking, stairs, recreational activity
Client Scenario: HFA

Build A Treatment Program

- Alignment-based intervention
- Beginning
- Middle
- Advanced
Alternative Model

• “Meet them where they are”

Alternative Model

A model that utilizes the diaphragm as the gateway to the anticipatory core – the common denominator

Alternative Model

• Everybody breathes!
Alternative Model

An alternative clinical model must emerge that is reflective of:

- Teamwork
- Alignment
- Preparation

Teamwork + Alignment

Piston Posture

- Neutral rib cage and pelvis alignment optimizes Piston recruitment
- Piston linked to all the postural synergists will optimize and maintain neutral
- Ideal vs Real: Move toward neutral

Preparation

Piston prior to movement:

- Anchors the reactive postural synergists
- Mimic recruitment order noted in the literature
- Tug o’ War: Inside-out recruitment
Alternative Model: TAP

**Teamwork:**
Maximize diaphragm excursion on inhale and balance with intercostals

**Alignment:**
Optimize alignment of ribcage and pelvis

**Preparation:**
Access system prior to each repetition or movement

---

Alternative Model: TAP

**Teamwork:**
Maximize diaphragm excursion on inhale and balance with intercostals

**Teach:** “Umbrella Breath”
- Focus is on lateral ribcage excursion
- 360°

---

Alternative Model: TAP

**Alignment:**
Teach: Piston Posture
Optimize ribcage and pelvis (Sweet Spot)

**Use** towels, wedges, pillows, seating, handling and cueing for active adjustments
Alternative Model: TAP

**Preparation:**
Teach: "Blow Before You Go"
Accessing the IAP system through breath, provides a gateway to this powerful stabilizing system.

Alternative Model: Inside-Out

- Restore the relationship between anticipatory and reactive core muscles
- Cascade of force from the inside-out

Alternative Model

Core Strategy applies to all our clients, regardless of their level of function.
## Treatment in Different Populations

- Developmental Coordination Disorder
- Autism Spectrum Disorder
- Cerebral Palsy
- Down Syndrome
- Chromosomal Anomalies
- Organ Transplant
- Sensory Processing Disorder
- Anxiety Disorder
- Speech Dyspraxia
- Custom Postural Seating

## Q and A

- Thank You
Connect

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