Women's Health 101
Foundations in Core & Pelvic Floor Health
Presented by Melissa LaPointe

Learning Objectives

1. Identify the bony landmarks in the pelvic region
2. Name the four layers of abdominal muscles and describe their orientation
3. Summarize core strength in relation to pelvic positioning and rib stability
4. Describe intra-abdominal pressure
5. List two major skeletal displacements the psoas can accomplish

Learning Objectives

1. Describe four types of pelvic floor dysfunction
2. Give examples of when Kegels are contraindicated
3. Justify the role for a biopsychosocial model of health in pelvic floor rehabilitation
4. List three recommendations for Diastasis Rectus Abdominis related to pelvic positioning and functional movement
Definition of a Healthy Muscle

- Be able to concentrically contract
- Be able to eccentrically contract
- Be able to adapt, stabilize and absorb force
- Be able to coordinate with other muscles
- Have proprioceptive feedback between muscle(s) and brain

What is the Core?

- Often referred to as abdominal muscles and lower back in rehab and fitness
- "Everything the arms and legs attach to"
- Inner Core ("The Core 4")
- Soda Can Model
- Balloon Model

Understanding the Inner Core

- Muscles work synergistically
- Muscles work in anticipation of movement
- Muscle activity is tied with respiration and functional movement
- Linked to our thoughts, emotions and beliefs
- Individualistic in nature
Bones of the Pelvis

- Iliac Crest
- Anterior Superior Iliac Spine (ASIS)
- Pubic Tubercle

Anterior View

- Sacrum
- Coccyx

Lateral View

- Ischial Tuberosity

Diaphragm

- Skeletal muscle
- Attaches to 1st, 2nd and 3rd lumbar vertebrea, inner part of the lower 6 ribs and back of sternum at xiphoid process
- Central tendon of the diaphragm then attaches to the 3rd lumbar vertebra
- Separates thoracic cavity from abdominal wall
- Concentrically contracts and moves on inhalation
- Eccentrically contracts and rises on exhalation
- Helps to mobilize the diaphragm and thoracic spine
- Slow breathing with diaphragm can calm down the nervous system
### Multifidus
- Spinal muscles running from cervical spine to sacrum
- Located on both sides of spine, superficial and deep layers
- Support and protect spine and pelvis in anticipation of movement of limbs
- Pain (back or pelvic) inhibits function, creating pain/weakness cycle

### Abdominal Raphe
- **Linea Alba:**
  - Fibrous band that runs vertically along the center of the anterior abdominal wall and receives the attachments of the obliques and transverse abdominal muscles.
  - Connects the xiphoid with the pubic symphysis and crest.

- **Linea Semilunaris (2):**
  - Curved tendinous line placed on either side of the rectus abdominis.
  - Correlates with the lateral border of the rectus, extends from the cartilage of the ninth rib to the pubic tubercle.

### Rectus Abdominis
- Arises from the pubic symphysis, crest and tubercle and runs vertical to the xiphoid and costocartilages of the 5th and 7th ribs.
- Contained within the rectus sheaths which is derived from the aponeuroses of EO, IO and TrA.
- 3 bands of connective tissue traverse the RA dividing the muscle into 4 compartments (the 8 pack).
External Oblique
- 8 digitations from 5th – 12th ribs
- Upper 5 fascicles (5th – 9th ribs) interdigitate with serratus anterior, lowest 3 (10th – 12th ribs) with latissimus dorsi
- Those from lowest ribs run almost vertical to insert into the anterior half of the outer lip of the iliac crest
- Middle and upper fibres pass down and forward and become aponeurotic contributing to the ventral rectus sheaths and the ventral zone of the linea alba
- Aponeurosis of the EO crosses the pubic symphysis
- Together with the anterior pelvic floor muscles, the EOs help to force close/stabilise the pubic symphysis

Internal Oblique
- Arises from the thoracolumbar fascia posteriorly via the common TrA tendon, the anterior 2/3 of the iliac crest and the lateral ½ of the inguinal ligament
- Posterior fibres run superomedially to the 11th and 10th ribs, others become aponeurotic
- The aponeurosis fuses with the aponeurosis of the EO to form the ventral zone of the linea alba and variably splits to form both the ventral and dorsal rectus sheaths

Transversus Abdominis
- Deepest abdominal muscle
- Movement is inwards and outwards
- Arises from the thoracolumbar fascia posteriorly via the common TrA tendon, the anterior 2/3 of the inner lip of the iliac crest, costocartilages of the lower 6 ribs (interdigitating with the diaphragm) and the lateral third of the inguinal ligament
- Inserts to linea alba at midline through aponeurosis
- Middle and inferior fibres curve inferomedially together with the IO to form the inguinal ligament
- Thin layer of loose connective tissue between IO, EO and TrA allow gliding between muscles
Three Distinct Regions of TriA

1. Upper thoracic region
   - 6th costal cartilage to inferior border of rib cage
   - Interdigitates with diaphragm and forms dome of rectus sheath
2. Middle lumbar region
   - Inferior border of 6th c. to the superior borders of the iliac crest
3. Lower pelvic region
   - Superior border of the iliac crest to the pubic symphysis
   - This lower region isn't present in significant number of people

Transversus Abdominis

- Must maintain a varying amount of tone throughout the day to help support the spine and the internal organs
- Tone is affected by posture, alignment, pregnancy, obesity, abdominal exercises and digestion
  - Too much tone creates a downward pressure on the pelvic floor
  - Too little tone creates a lack of support for the spine and abdominal contents
- Increases IAP and tenses the thoracolumbar fascia (Bo, 2009)
- Modulates IAP with other trunk muscles including the diaphragm (Hodges and Gandevia, 2000)
- Forced expiratory muscle (Lee, The Pelvic Girdle, 2011)

Multiple Functions of the Abdominal Wall

- Abdominals work synergistically with all other muscles of the trunk for optimal:
  - Abdominal and pelvic organ support
  - Office support
  - Breathing
  - Elimination: Voiding, defecation, vaginal delivery, vomiting, coughing
  - Movement control & mobility, trunk, head/neck, upper and lower extremities

Optimal Function Requires:
- Intact anatomy to facilitate:
  - Sliding mobility between the abdominal muscle layers
  - Transmission of force via their aponeuroses and the linea alba
- Optimal activation and relaxation of all 4 groups appropriate to the task
- Adequate strength and endurance appropriate to the task
**Psoas**

- Deepest muscle of human body, aka “muscle of the soul”
- The psoas has two layers:
  - **DEEP**: Attaches to the costal processes of lumbar vertebrae I-V (each side of body)
  - **SUPERFICIAL**: Attaches on the lateral surfaces of T-12, L1-L4, and from the neighboring intervertebral discs
- Both layers blend with the iliac and all attach at the lesser trochanter of the femur
- Stress response shortens the psoas
- Big rib thrusts and pelvic forward would indicate a very tight psoas

*Crucial for proper body movement - affects structural balance, muscular integrity, flexibility, strength, ROM, joint stability and organ functioning

**What is the Pelvic Floor?**

- Muscular sheet curved upwards, closing the pelvic cavity and pelvic organs from below
- Muscles stretch from pubic bone at the front, back to the sacrum and coccyx, and on the sides to ischial tuberosities
- Openings for the rectum, urethra and vagina lead through the muscular sheet
- Includes perineum (located between scrotum and anus in men, between vagina and anus in women)
- During respiration, rises and lowers in synergy with the diaphragm
- Works with other core muscle groups to stabilize and control the spine and pelvis

**What does the pelvic floor do?**

- Offers support for the abdominal and pelvic organs
- Supports the sphincter in the urethra and anus
- Mitigates the high intra-abdominal pressure that results from things such as coughing, sneezing, lifting a heavy object, bowel movement

**Pelvic Floor Muscles**

- **Superficial perineal layer**: Innervated by the pudendal nerve
  - Bulbocavernosus
  - Ischiocavernosus
  - Superficial transverse perineal
  - External anal sphincter (EAS)
- **Deep perineal diaphragm layer**: Innervated by pudendal nerve
  - Deep transverse perineal
Pelvic Floor Muscles

- Pelvic diaphragm: innervated by sacral nerve roots S3-S5
  - Levator ani: pubococcygeus, iliococcygeus, coccygeus
  - Obturator internus

Levator Ani:
- Anterior attachment on posterior surface of pubis, attaches along fascia of obturator internus muscle
- At back, attaches to coccyx, meets in midline to form midline raphe (posterior to anus)
- Anteriorly, has a U-shaped defect called urogenital hiatus through which a Septum vagina passes through to perineum below

Function of Levator Ani to support pelvic viscera, keep rectum and vagina closed and resist rise in intra-abdominal pressure when straining.

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Defining Postural Control

Julie Wiebe, Women’s Health & Sports Medicine Physiotherapist

- TAP (Teamwork, Alignment, Preparation)
- Anticipatory & Reactive Core
  - Anticipatory Core: local stabilizers that, prior to any movement, fire out of person’s conscious control in anticipation of movement
  - Reactive Core: all muscles that surround the anticipatory core muscles

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Defining Postural Control

Jenny Burrell, Intrinsic Core Synergy

The capacity of the client to perform the natural chain reaction of expansion and compression of the constituents of the Core, driven by the breath

**Expansion** - the inhale - Diaphragm descends, PF relaxes, rib cage expands, abdominal wall relaxes and expands. The Core is being LOADED through eccentric phase.

**Compression** - the exhale - Diaphragm ascends, PF tensers, rib cage contracts, abdominal wall contracts, lumbar and thoracic muscles and soft tissue contract to support. The core is being UN-LOADED through concentric phase.
Chronic and Recurrent Problems?

- Recurrent overuse with certain muscles
- Are there issues with motor planning?
- Compensatory or non-optimal movement patterns
- Failed load transfer

Load Transfer:
1. Structural – bony anatomy, joints, ligamentous structures
2. Muscular Systems – local and global stabilizers
3. Neural Control – ability to have coordination with movement patterns and motor planning

Pelvic Floor Risk Factors

- Immobility, sedentary lifestyle
- Anteriorly or posteriorly tilted pelvis
- Overactive psoas
- Pregnancy and childbirth
- Cognitive impairment
- Persistent coughing without mindful control of IAP
- Obesity – causes chronic increases of IAP
- Menopause – causes a fall in estrogen production
- Aging
- Injury
- High intensity activities and repetitive abdominal training

What is Pelvic Floor Dysfunction?

Dysfunction of the pelvic floor is complex:
- Inability to contract fully (hypotonicity/underactivation)
- Inability to release fully (hypertonicity/overactivation)
- 23-40% of women vasaena instead of a proper contraction (Bump et al 1986)

Types of Dysfunction (most common):
- Urinary incontinence
- Pelvic Organ Prolapse (POP)
- Diastasis Recti
- Dyspareunia (painful intercourse)
- Pelvic Girdle Pain
- Hypotonic Pelvic Floor
Low Back & Pelvic Girdle Pain

- Deep muscles are often compromised, recruitment is absent, reduced and/or delayed
- Superficial muscles are often augmented, recruitment is dominant, excessive, and/or early
- Pelvic floor muscles can be reduced, delayed, dominant or excessive
- The specific pattern of altered recruitment strategies is generally unique to the individual patient or client, and within the individual they may be unique to the movement, posture or task that is assessed
- Clients and patients with back pain, pelvic girdle pain and pelvic pain present with a redistribution of activity within and between muscles rather than inhibition or excitation of muscle in stereotypical manner
- Motor control is influenced by thoughts, beliefs, emotions, and experiences that are both task and individual specific

Hodges, Van Dillen, McGill, Brumagne, Hides, Moseley 2013

Urinary Incontinence

- Urinary incontinence is defined as the involuntary leakage of urine
- Most common type of incontinence is stress incontinence (SUI) which is leakage that occurs during physical activity
- Garden hose analogy and the importance of a functional pelvic floor (DeLancey 1994)

SUI can result when there are problems with:
- The anatomy of the pelvic floor (stretched fascia, unhealthy muscles)
- The motor control of the pelvic floor (absent, delayed or asymmetrical contraction)
- Strength and/or endurance of the pelvic floor muscles

Urge Incontinence:
- The sudden urge to urinate and the involuntary loss of urine at inappropriate times
- Often associated with hypertonicity in the pelvis

Urinary Incontinence Prevalence

Pregnancy Related
- Last trimester: 45% (primiparous, 65% multiparous; Motived & B 2003)
- Nulliparous:
  - 60% of those still incontinent at 12 weeks will still be incontinent at 5 years (Viktor et al 2002)
  - After delivery 44.6% of women have some degree of incontinence (Hilken et al 2002)
- Nulliparous elite athletes: 28% (Hoppe et al 1994)
- Ovarian ops 67%, tennies 50%, basketball 85%

Age Related (Hermann et al 2003)
- 18-64: 10%
- 65-74: 33%
- Over 75: 50%

Incontinence is the second most common reason (after dementia) for admission into assisted living (Hesken et al 2003)
Pelvic Organ Prolapse

- A prolapse occurs when a pelvic organ begins to descend through its own canal and orifice
- A rectocele occurs when a pelvic organ bulges into a weakened part of the vagina

Types of Pelvic Organ Prolapse:
- Cystocele: the bladder pushes against the front wall of the vagina
- Urethrocele: the urethra pushes against the front wall of the vagina
- Urethrocystocele: the urethra and bladder are both pushing against the front wall of the vagina
- Rectocele: the rectum pushes against the back wall of the vagina
- Enterocele: the small intestines push against the wall of the vagina through the top front or top back
- Uterine: the uterus comes down into the vagina (the cervix sits much lower than normal)
- Vaginal vault: the top of the vagina comes down (like a sock that turned inside out) after a hysterectomy

**There is not a universal, clear and reliable staging method for POP**

Pelvic Organ Prolapse

Common Symptoms:
- pelvic, vaginal or rectal pressure
- tampon slipping out
- feeling a bulge at the opening of the vagina
- urinary incontinence (stress or urgency)
- difficulty emptying bladder
- urine retention
- fecal incontinence
- difficulty emptying bowel
- constipation
- pelvic girdle pain
- abdominal pain
- back pain
- painful intercourse
- lack of sexual sensation
- pressure/pain that increases with long periods of standing

Pelvic Organ Prolapse

Prevalence & Risk Factors

- 50% of parous women have some degree of symptomatic or asymptomatic loss of POP (Hagen & Stark, 2011)
- Age Related
  - Ovarian suppression
  - Menopause
  - 50% of women who have a surgical repair will experience a recurrence (Whiteside et al, 2004)
- Risk Factors
  - 1 vaginal delivery increases risk x4
  - 2 or more vaginal deliveries increases risk x8.4 (Mant et al, 1997)
  - Forceps delivery -> 53% have major defects in PFM (Ashton-Miller & Delancey, 2009)
  - Denervation of the levator ani
  - Hysterectomy (Altman et al, 2008)
  - Excessive thoracic kyphosis (Mattox et al, 2000)
Diastasis Rectus Abdominis

- DRA is the separation of the outermost abdominals from the midline where they are connected via the linea alba.
- Traditionally, anything less than or equal to 20mm has been considered an acceptable gap width.
- A common condition after some pregnancies, or many years of abdominal loading with poor technique.
- Other influences that can contribute to DRA include changes in intra-abdominal pressure, posture, forward flexion movements, and pushing during labour.
- It is typically never just one thing but rather a combination of influences that contribute to DRA.

DRA – What the Research Shows

Coldron Y et al 2008:
- Spontaneous healing of the inter-recti distance at the linea alba only occurs in the first eight weeks postpartum.
- No further improvements were noted without intervention.
- Inter-recti distance remains unchanged at one year postpartum.

Boissonnault & Blaschak (1988) found that 27% of women have a DRA in the second trimester and 66% in the third trimester of pregnancy. 53% of these women continued to have a DRA immediately postpartum and 36% remained abnormally wide at 5-7 weeks postpartum.

Coldron et al (2008) measured the inter-recti distance from day 1 to 1 year postpartum and noted that the distance decreased markedly from day 1 to 8 weeks, and that without any intervention (e.g., exercise training or other physiotherapy) there was no further closure at the end of the first year.

Treatment Approaches for DRA

- Treatment focuses less on width of gap and more on density of fascia in between gap and restoration of abdominal function.
- Eliminate exercises that target flexion of the rectus abdominis (sit-ups, crunches, the hundred, bicycle kicks).
- Participate in exercise program specifically designed for DRA (there are a growing number of such programs available online).
- Be aware of blanket recommendations that include bracing and binding.
- Challenge the abdomen on exhale ONLY as you begin your exercise program.
- Be aware the cue "BLOW BEFORE YOU GO" that is meant to encourage exhaling before exertion begins (engaging the deep fascia musculature).
- Surgical abdominoplasty to repair the midline abdominal fascia (the linea alba).
When Should Surgery Be Considered?

Current clinical hypothesis:
- The woman should be at least 1 year postpartum (Coldron et al 2007).
- A proper non-surgical program for restoration of effective load transfer through the lumbopelvis (Lee 2004, Lee & Lee 2004a) has failed to restore optimal strategies for function, resolve lumbar-pelvic pain and/or UI.
- The inter-recti distance is greater than mean values (Beer et al 1996) and the abdominal contents are easily palpated through the midline fascia.
- Multiple vertical loading tasks reveal failed load transfer through the lumbopelvis.
- The articular system tests for passive integrity of the joint of the low back and/or pelvis (mobility and stability) are normal.
- The active straight leg raise test is positive (Mens et al 1999) and the effort to lift the leg improves with both approximation of the pelvis anteriorly as well as approximation of the lateral/facial edges of rectus abdominis (Lee 2007).
- The neural system tests are normal. The individual is able to perform a co-contraction of transversus abdominis, multifidus and the pelvic floor yet this co-contraction does not control neutral zone motion of the joints of the lumbopelvis which demonstrated failed load transfer on loading (Lee 2004, Lee & Lee 2004a).

Hypertonic Pelvic Floor

A "too tight" muscle is still a weak muscle, living in a state of contraction. It’s not good at stretching, releasing or softening. It’s considered dysfunctional!

**Signs & Symptoms:**
- Urges incontinence
- Trouble beginning stream of urine
- Irritable Bowel Syndrome, constipation
- Pelvic pain
- History of childbirth trauma
- History of sexual trauma
- Inflammatory pelvic & bowel conditions

**When is it important to relax the pelvic floor muscles?**
- During bowel movements and when unloading
- During sexual intercourse
- When giving birth

Trauma-Informed Care

- Statistics for women experiencing some form of sexual trauma range between 1/3 – 1/4.
- We also know that there are issues in terms of under-reporting.
- For patients and clients with a history of sexual trauma, pelvic exams may trigger PTSD symptoms and they may avoid them unless absolutely necessary.
- A reminder of the importance of respecting their journey, using proper terminology, holding space asking permission prior to instigating any form of physical contact.
The Integrated Systems Model
With Diane Lee

Release the Suboptimal Strategy & Restore Alignment
- Cognitive
- Emotional
- Physical

Teach a New Strategy for Function & Performance
- Based on Meaningful Task
- Re-wire a new neural network for better strategies for posture & movement pertaining to the meaningful tasks

Principles for Treatment
Treatment - every treatment has components of RACM:
- Release - applied to cognitive, emotional, social and physical barriers, using a variety of techniques - release overactive muscles and adhesions
- Align - cues/corrections to align the body both within and between regions
- Connect/control - cues for activation and co-ordination of the deep and superficial muscle systems
- Move - use the principles of neuroplasticity to rewire (reset) brain maps and create more efficient strategies for function and performance
- Consider all treatment priorities such as tissue specific requirements (e.g. stage of healing & loading needs for muscle strains, tendinopathy, ligament sprains)

Release and Align
- Ingesting neurotoxins such as excessive alcohol, sugar, hydrogenated oils and aspartame can impact the ease with which new motor pathways are built
- Cognitive barriers (thoughts and beliefs) are addressed through education. A powerful way to change thoughts/beliefs is to have a hypothesis from the Ax that explains the pain experience and the problem in understandable and non-threatening language
- Emotional barriers (fear, threat, sadness, depression) can be addressed by changing the body’s reaction through techniques used to dampen the SNS reaction and augment the PNS, including craniosacral therapy, acupuncture, salt float tanks, meditation, conscious breathing. For all techniques/practices, creating a safe environment to practice is critical for success.
- Sensorial barriers are those created by the various system impairments underlying the suboptimal alignment and biomechanics.
When to Belt the Pelvis or Bind the Abdomen

- A well-designed pelvic girdle belt can use a useful adjunct for external support of the pelvis as improved recruitment strategies for motion control are learned.
- Stiffness of the sacroiliac joint is enhanced when a belt is worn just below the ASIS (Damen et al 2002a,b).
- Patients or clients often require more compression than a general belt can supply and it is difficult to specify the location of the compression (bilateral anterior, bilateral posterior) with a simple compression belt.
- A pelvic belt should be used in conjunction with training the deep muscle system.
- Binding the abdomen could contribute to increased intra-abdominal pressure, putting the client or patient at risk for other pelvic floor/deep core issues.
- Ultimately, they should be able to eliminate the need for any external support as stabilization strategies become more effective.

Key Factors Required for Neuroplastic Change

- Focused attention
- Training tasks that have meaning
- Massed practice - high quality
  - Goal: 3 sets of 10 10-second holds (Tsao et al 2007), maintaining breathing
  - At least twice (Tsao et al 2010), preferably 3-4 times per day over period of two weeks.
- Sensory input - normalize
- Positive feedback
- Importance of specificity principle

Biopsychosocial Model

- Health is shaped by biological, social, psychological, and cultural processes.
- Pelvic health is COMPLEX.
- Must take into consideration disconnect.
- Meet your clients and patients where they are.
- Provide information to educate and empower.
- Use proper terminology like you would any other body part.
- Take into consideration important concepts in trauma-informed care.
Needing More Than Kegels

- Invented in 1948 by Dr. Arnold Kegel through the use of perinometer
- Are women ever trained to do them properly?
- It’s not that Kegels are bad, it’s that they’re misunderstood!
- Contraindicated for pelvic pain, hypertonic pelvic floor, posteriorly tilted pelvis

Traditional Kegel Cueing:
- "Pelvic Floor Exercises"
- Tighten the flow of urine
- Stop fart muscles
- Find it, tighten
- Slow vs fast twitch
- Working in isolation, not addressing alignment or deep core system as a whole

Which of Our Clients and Patients Would Benefit From a Better Understanding of This Information?

General Public:
- Weak bladder
- Weak bowel muscles
- Overweight
- Problems with their posture

Women:
- Before and after giving birth
- Weak connective tissue caused by hormonal changes during menopause
- Pelvic floor dysfunction
- Surgery in pubic area

Men:
- After surgery on the prostate
- Potency problems

Children:
- Experiencing motor challenges, regardless of diagnosis (ASD, DCD, CP, Hypotonia)

In Conclusion

- Moving beyond Kegels
- Tight doesn’t equal strong
- Alignment matters
- Movement matters
- Go beyond spot treatment
- Consider role of diet and emotional health
- Consider role of nutrition
- Expand your referral network

"Your perspective is always limited by how much you know. Expand your knowledge and you will transform your mind."
- Dr. Bruce Lipton