W3: Pregnancy-Related Musculoskeletal Conditions: The Pelvic Floor and Linea Alba Connection

Workshop Chair: Sinéad Dufour, Canada
28 August 2018 09:00 - 10:30

Start	End	Topic	Speakers
09:00	09:15	Morphology and biomechanics of the lina alba and pelvic floor – connecting the system	Cynthia Chiarello
09:15	09:30	Overview of the scientific literature base	Kari Bø
09:30	09:45	Exploring the ''gaps'': Knowledge users vs scientific literature	Stephanie Bernard
09:45	10:00	Primary care approach to conservative care provision for pregnancy-related DRA: Interprofessional considerations	Sinéad Dufour
10:00	10:30	Discussion: Future research directions & practice implications	Sinéad Dufour Kari Bø Stephanie Bernard Cynthia Chiarello

Aims of Workshop

Pregnancy-related musculoskeletal tissue injury is common and ranges from strain on the pelvic ligaments to injury to the pelvic floor and changes associated with fascial system, including widening of the linea alba, called diastasis rectus abdominis (DRA). Exploring the topic of pregnancy-related musculoskeletal conditions, specifically from the perspective of understanding the potential relationship and relevance of pelvic floor function to the linea alba, is important. In most cases, conservative management strategies are established as first line care. This workshop will overview pregnancy-related musculoskeletal tissue changes and injuries with a focus on the pelvic floor muscle and the linea alba according to our past and evolving understanding of DRA.

Learning Objectives

1. Understand pregnancy-related musculoskeletal tissue changes and associated conditions such as diastasis rectus abdominis and differentiate those that require intervention (conservative management) and those that do not.
2. Identify scientific update on evidence pertaining to various aspects of pregnancy-related diastasis rectus abdominis.
3. Determine the current evidence-informed and integrative conservative care principles for pregnancy-related DRA from a primary health care perspective and with an emphasis on the roles of physiotherapists and primary care providers.

Learning Outcomes

After this workshop, participants will be able to understand the need to mount a cohesive evidence-based approach in the conservative management for pregnancy-related musculoskeletal tissue concerns that involve the pelvic floor and linea alba, such as diastasis rectus abdominis. Furthermore, participants should have a greater understanding of how to determine when pregnancy-related musculoskeletal changes to the linea alba and pelvic floor require conservative intervention, and when they do not impact function. The audience will appreciate the inter-relation of tissue function through the perinatal stage of which the pelvic floor is central. As such, participants will have enhanced clinical reasoning that will lend to both prevention and management of pregnancy-related musculoskeletal conditions like diastasis rectus abdominis.

Target Audience

Primary care practitioners, specifically: physiotherapists, midwives, obstetricians, nurses and other allied healthcare professionals interested in understanding pregnancy-related musculoskeletal tissue changes and associated impairments.

Advanced/Basic

Basic

Conditions for Learning

This is an interactive workshop that does not have a restriction on the number of delegates.

Suggested Learning before Workshop Attendance

This is an entry level workshop and no particular preparation is required.

Suggested Reading

1. Sperstad, Tennfjord, Hilde, Ellstrom-Engh,Bo. Diastasis recti abdominis during pregnancy and 12 months after birth: prevalence, risk factors and report of lumbopelvic pain. British Journal of Sports Medicine. 2016;0:1–6. doi:10.1136/bjsports-2016-096065
2. Lee, Hodges. Behaviour of the linea alba in a curl up task in diastasis rectus abdominis: an observational study. Journal of Orthopaedic & Sports Physical Therapy. 2016; 46(6):580–589 DOI: 10.2519/jospt.2016.6536
3. Spitznagle, Leong. Dillen. Prevalence of diastasis recti abdominis in a urogynecological patient population. International Urogynecology Journal.2007; 18(3):321-328.
4. Chiarello & McAully. Mind the Gap: A comprehensive approach for the evaluation of the intervention of diastasis recti abdominis. Combined Sections Meeting American Physical Therapy Association, Las Vegas Nevada, February, 2014.
5. Keeler J, Albrecht M, Eberhardt L et al. Diastasis recti abdominis: a survey of women's health specialists for current physical therapy clinical practise for postpartum women. J Women's Health Phys Ther. 2012; 36:131-142.
6. Dufour, Bernard, and Murray-Davis. Establishing best practice principles for the conservative management of pregnancy-related diastasis rectus abdominis: results from Phase 1 of a consensus study. International Continence Society Conference, Florence Italy, September, 2107.

Speakers Presentation Summaries

Morphology and biomechanics of the lina alba and pelvic floor – connecting the system
Cynthia Chiarello

Cynthia will begin the workshop by exploring the anatomical and functional interdependence of the muscular and connective tissue components of the trunk. The "pressurized can" concept will be described as a theoretical model for the potential association between diastasis rectus abdominis (DRA) and pelvic floor dysfunction. Several concepts will be introduced and related to explain the integrated function of the anterior abdominal wall and pelvic floor. The morphology and biomechanics of the linea alba will be presented with attention to muscular and fascial connections. Synergistic and feed-forward trunk muscular mechanisms will be presented along with load transfer and support across the pelvis. These foundational concepts will provide a rational for intervention strategies.

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Profession: Physical Therapist
Experience & Qualifications:
Dr. Chiarello is an Assistant Professor at Columbia University, Department of Rehabilitative and Regenerative Medicine, Doctoral Program in Physical Therapy where she teaches kinesiology, biomechanics and orthopedics. She is the Editor-in-Chief of the Journal of Women's Health Physical Therapy, the peer reviewed publication of the Section on Women's Health of the American Physical Therapy Association. Dr. Chiarello received a BS in Biology and Psychology from SUNY Fredonia, a MS in Physical Therapy from Duke University and a PhD in Pathokinesiology from New York University. Her basic science research has examined the linea alba in cadavers as a foundation for the characteristics of diastasis rectus abdominis. Her clinical research examines the relationship between diastasis rectus abdominis, low back pain, and abdominal muscle function in pregnant and post-partum women. Her current research includes studies investigating exercise for pelvic girdle pain in pregnancy, and ultrasound imaging of inter-recti distance and abdominal muscle contraction in functional positions.

Overview of the scientific literature
Kari Bø

Kari will give an overview on the scientific literature on prevalence and complications of diastasis recti abdominis and the effect of treatment of abdominal and pelvic floor muscle exercises for diastasis. A special emphasis will be on the connection or lack there of non between the pelvic floor muscles and the abdominal muscles from a treatment perspective. To date there are few published studies in this area and newer experimental research raises questions regarding the evidence for the commonly used clinical physiotherapy protocols that emphasize training of the transverse abdominal and pelvic floor muscles to address pregnancy-related DRA.

e-mail: kari.bo@nih.no
Country: Norway
Profession: Physiotherapist and Exercise Scientist
Experience & Qualifications
Professor Kari Bø obtained her PhD on pelvic floor muscle training in 1990 and was appointed professor of Exercise Science and Physiotherapy in 1997. Since then, she has been elected rector (head) of the Norwegian School of Sport Sciences, (specialized university) in Oslo 2013-2017, and was the first vice president of the International Organization of Physical Therapists in Women's Health, WCPT 1999-2007. Further, she has been the vice president of the Norwegian Council for Physical Activity for 8 years, giving direct advice to the Norwegian Minister of Health. Kari has published > 260 scientific papers on pelvic floor

dysfunction, treatment of incontinence and low back- and pelvic girdle pain, exercise during pregnancy and after childbirth, diastasis recti abdominis, measurement methodology, fitness and women's health and has given > 260 invited international keynote presentations. She has been awarded with the most prestige's award from the World Confederation of Physiotherapy and the ICS Lifelong Achievement award for her research and education on the pelvic floor and incontinence.

Exploring the "gaps": knowledge users vs. scientific literature
Stéphanie Bernard

Stephanie Bernard will introduce participants to who are knowledge users, how meaningful it can be to have knowledge users participating in the various steps of research processes, and at the different research methods that have been used in the DRA literature to inform readers of practice-based evidence they have provided. Additionally, she will explore the findings from practice-based inquiry that also integrate principles from basic science research and contrasts them with non-practice-based evidence from the literature, highlighting the areas of coherence and dissemblance between the two. This will lead to a more complete understanding of what we know regarding the conservative management of pregnancy-related DRA, as well as how can further research help fill the identified gaps in evidence.

Email: stephanie.bernard@cirris.ulaval.ca
Country: Canada
Profession: Physiotherapist
Experience & Qualifications:
Ms. Stephanie Bernard is a Physiotherapist with expertise in pelvic floor therapy and a Doctoral candidate at Université Laval in Québec, Canada. She has been a clinician for over 12 years, where she treats various pelvic floor dysfunctions, with a special interest for patients with pregnancy-related musculoskeletal dysfunctions and pelvic floor disorders after cancer. She lectures at both Université Laval and Université de Montréal since 2014. She is the Past Editor-in-Chief of the Women's Health Division of the Canadian Physiotherapy Association, and a member of the ICS Working Group on Terminology of pelvic floor function and dysfunction.

Primary care approach to conservative care provision for pregnancy-related DRA: Interprofessional considerations
Sinéad Dufour

Sinéad will close the workshop with a translation of the collective evidence discussed (basic science, clinical science and practice-based) applied to a clinical vignette. The vignette has been developed by the collaborators to operationalize in a pragmatic way how the state of the evidence related pregnancy-related dysfunction in the linea alba (aka DRA) can be applied. The vignette will be presented to span two different points in time through the perianal care period and will be explored from the perspective of different primary care providers. Aspects or both assessment and management will be discussed. As such, relation patient education, lifestyle counselling and exercise prescription considerations will all considered. Pregnancy-related musculoskeletal conditions are common and can be managed more effectively with conservative approaches by all relevant primary care providers. Many barriers to optimal care exist and lack of clarity of the state of the evidence as well as how to clinically apply the current evidence represent barriers we hope to ameliorate through this workshop.

Email: sdufour@mcmaster.ca
Country: Canada
Profession: Physiotherapist
Experience & Qualifications:
Dr. Sinéad Dufour is Assistant Clinical Professor in the Faculty of Health Science at McMaster University. She teaches and conducts research in both the Schools of Medicine , which houses the Midwifery Education Program and School of Rehabilitation Science. She completed her MScPT at McMaster University (2003), her PhD in Health and Rehabilitation Science at Western (2011), and returned to McMaster to complete a post-doctoral fellowship (2013). Her current research interests include: conservative approaches to manage pelvic floor dysfunction, pregnancy-related pelvic-girdle pain, and interprofessional collaborative practice models of service provision to enhance pelvic health. Sinéad stays currently clinically through her work as the Director of Pelvic Health Services at The World of my Baby (the WOMB) in Ontario Canada and is member of the urogynecology committee of the Society of Obstetricians and Gynecologists of Canada.

Columbia University Irving Medical Center
Program in Physical Therapy

Journal of Women's Health Physical Therapy

Morphology and Biomechanics of the Linea Alba and Pelvic Floor

Cynthia M. Chiarello, PT, PhD

Editor-in-Chief, Journal of Women's Health Physical Therapy

Assistant Professor of Rehabilitation and Regenerative Medicine at CUMC, Program in Physical Therapy, Columbia University, New York, USA

Discover. Educate. Care. Lead.

Cynthia M. Chiarello, PT, PhD

ICS 2018 PHILADELPHIA

Affiliations to disclose†:

† All financial/income the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- [X] Self-funded
- [ ] Institution (non-industry) funded
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Objectives:

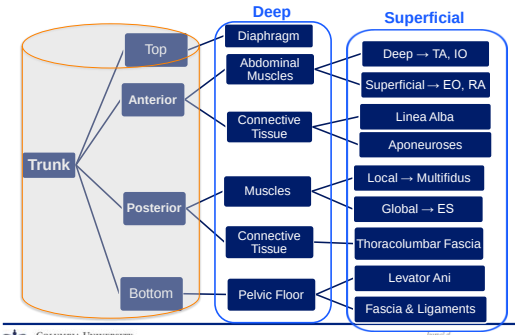
After completing this session, you will be able to:

- Illustrate the integrated function of the musculofascial system in providing support and stability to the trunk and pelvis.
- Explore theoretical models which present the interrelated mechanical function of the trunk.
- Summarize mechanical properties of some trunk structures.

Trunk Function

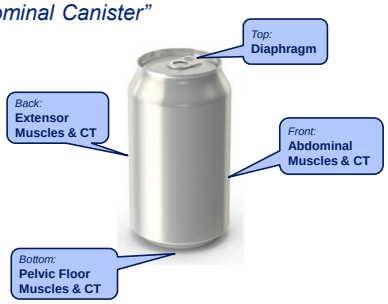
- Contains organs
- Respiration
- The musculoskeletal trunk functions as a **mechanical unit**
  - Supports weight
  - Transmits forces
  - Produces and controls intra-abdominal pressure
  - Maintains stability
    - Form and force closure

Anatomical Trunk Components



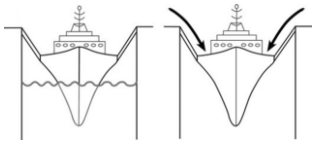
Model for Integrated Function of the Trunk

"Abdominal Canister"



Pelvic floor support

- Pelvic organs (boat) supported by the levator ani muscle (water) and stabilized by the ligaments (cables).
- Levator ani weakness causes increased reliance on supportive connective tissue

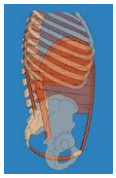


From: Saunders K. Recent Advances in Understanding Pelvic-Floor Tissue of Women With and Without Pelvic Organ Prolapse: Considerations for Physical Therapists Phys Ther. 2017;97(4):455-463. doi:10.1093/ptj/pzx019 Phys Ther | © 2017 American Physical Therapy Association

Model for Integrated Function of the Trunk

"Abdominal Canister" Lee, 2014

- Ideal trunk function requires a balance between movement and stiffness
- Impaired function of one part of the canister can diminish load transfer negatively impacting support mechanisms
- Synergistic muscle activation of pelvic floor musculature, the deep abdominal muscles and diaphragm
  - intra-abdominal pressure
  - Lumbo-pelvic stability
  - Continence
- Muscle forces are transferred through fascial attachments.



Model for Integrated Function of the Trunk

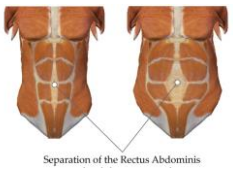
- **General principle:** a disorder in one component of the canister (back pain, incontinence, respiratory problems) is associated with the development of a condition in another component.
  - Longitudinal cohort study identified that the presence and development of a disorder in one system (back pain {BP}, incontinence {UI}, respiratory problems, or GI symptoms) is associated with the development of conditions in other systems (Smith, Russell, Hodges, 2014)
    - pre-existing and newly developed UI was a risk factor for the future development of BP
    - Women with breathing problems were more likely develop BP & women with BP more likely to develop breathing problems

Is there a relationship between Diastasis Rectus Abdominis and Incontinence or Pelvic floor dysfunction?

Diastasis Rectus Abdominis (DRA)

The "*abnormal*" midline separation of the right and left rectus abdominis muscles along the linea alba.

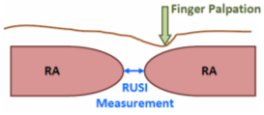
- Appears as a visible increase in the width of the linea alba or **Inter-Recti Distance (IRD)**.
- Connective tissue alterations of the linea alba (Szczesny, 2006)
- Damage of the fixation of the rectus muscles (Axer, 2001)

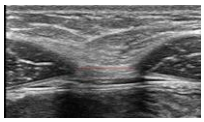


Separation of the Rectus Abdominis

DRA Measurement: Technique
Palpation

- **Palpation & Calipers**
- **Ultrasound**
- **Clinical Relevance**

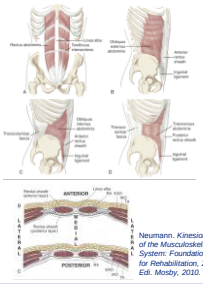




Chiarello, McAuley, 2013

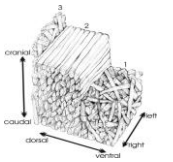
The Abdominal Wall

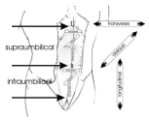
- **Function**
- **Abdominal Muscles**
- **Abdominal wall connective tissue**
  - **Components**
    - **Linea Alba -** tendinous fibers from abdominal muscles
    - **Anterior Rectus Sheath**
    - **Posterior Rectus Sheath**



Neumann. *Kinesiology of the Musculoskeletal System: Foundations for Rehabilitation, 2nd Edi. Mosby, 2010.*

Morphology of Linea Alba and Rectus Sheaths (Axer et al., 2001)





1. Collagen fibers - 3-D highly structured meshwork of collagen
   1. Oblique Fiber Layer
   2. Transverse Fiber Layer
   3. Irregular Fiber Layer

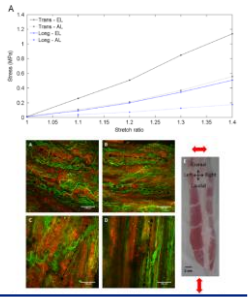
- ❑ Distinct Craniocaudal regions
  - ❑ Supraumbilical
  - ❑ Umbilical
  - ❑ Transition zone
  - ❑ Infra-arcuate
- ❑ LA Gender differences
  - ❑ Thickness ♂ > ♀
  - ❑ Infraumbilical
    - Width ♀ > ♂
    - ♀ more transverse (relative to oblique) bundles

Mechanical Function of Linea Alba

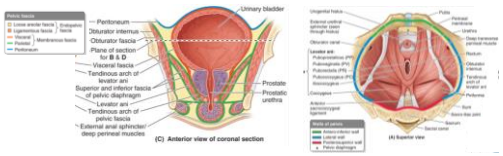
- Withstand abdominal pressure (Konerding et al., 2011)
- Stabilizing the abdominal wall (Gräßel et al, 2005).
- Sustain and transmit muscle contraction forces (Brown & McGill, 2008)
- Stiffest structure, most work (Hernández-Gascón et al., 2013)
- **Most important component for stability of the abdominal wall** (Hernández-Gascón et al, 2013)
- **Sustains the highest stresses under physiological load** (Hernández-Gascón et al, 2013)

Mechanical Behavior of Linea Alba

- Anisotropic & Non-linear
- Transverse direction is stiffer (smaller compliance) than longitudinal (Gräßel et al, 2005; Cooney et al 2016).
  - LA is 3x stiffer for small strains 4x stiffer for large strains (Tran et al, 2016)
- Collagen & elastin adapted to the type of loading. Microstructure strongly affected the mechanical response of the linea alba (Levillain et al 2016)
  - Dorsal layer mechanical resistance to transverse load
  - Ventral layer resists transverse and longitudinal

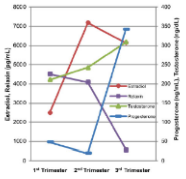


Pelvic Floor



- Pelvic floor muscles
  - Tonic contraction, transverse load bearing, antigravity support
  - Passive support through connections to endopelvic fascia

Pregnancy: Connective Tissue Changes



- Peripheral joint laxity increases during pregnancy
- Hormonally mediated connective tissue changes
- Pregnancy can result in lasting changes in knee joint laxity

Connective Tissue Mechanical Properties

- Both the pelvic floor and the anterior abdominal wall are composed of both muscle and connective tissue.
- CT provides support for the organs
- Muscular components of both the pelvic floor and the abdomen attach to the connective tissue
- A decrease in the stiffness or strength of this connective tissue would predispose an individual to dysfunction as abnormal displacements under normal physiological pressures could occur impairing muscular contraction efficiency.

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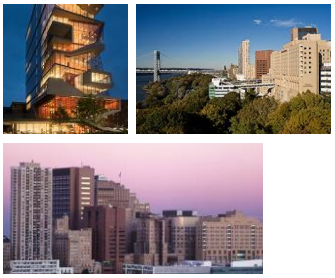
Summary

- Mechanical support for the anterior abdominal wall and the pelvic floor both depend on the precise interplay between muscular contraction and adequate tension of the ligament and fascial connective tissue.
  - Weakened muscles leads to impaired function
  - Lax connective tissue leads to impaired function
- The "Canister" theoretical model presents the potential interdependence between pelvic floor and anterior abdominal function.
- In pregnancy, hormonally mediated changes in connective tissue may lead to decreased support

Thank You!



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The pelvic floor and linea alba connection: Overview of the scientific literature ICS 2018

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Dept of Sports Medicine

Akershus University Hospital
Dept of Obstetrics and Gynecology

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Affiliations to disclose†:

Kari Bo

† All financial ties (over the last year) that you may have with any business organisation with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

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Measurement methods van de Water & Benjamin-16

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- Palpation finger width: K_w 0.7/0.5 Mota et al-13
- Calipers: ICC: 0.9 (intra) Boxer&Jones-97
- Ultrasound: ICC 0.9/0.7-0.9 Mota et a-12

- NO consensus on:
  - where to measure along the linea alba
  - cut off point for diastasis
  - What is NORMAL? Mota et al-17
    - Usually ≥ "two finger widths"

Diastasis and the PFM? Prevalence of diastasis recti in a urogynecological patient population Spiznagle et al -07

- 541 patients seeking help for PFD (myofacial pelvic pain,UI,FI,POP), mean age 52.5 years (SD 16.6)
- Evaluated diastasis with finger width

- Results
  - Prevalence 52% in middle-aged women
  - 35% of nulliparous
  - DRA women were older, reported higher parity, had weaker PFM, Caucasian/African, menopausal, using hormonal replacement therapy, abdominal surgery

PFM function & DRA in 300 first time pregnant women Bø et al-16

- At gestational week 21 women with diastasis had significantly *better* PFM function:
  - VRP: mean diff: 3.06 cm H_2O (95% CI: 0.70;5.42)
  - MVC: mean diff: 5.09 cm H_2O (95% CI: 0.76;9.42)
  - Endu.:mean diff: 47.08 cmH_2Osec (95% CI: 15.18; 78.99)

- However: No statistically sign differences in VRP, PFM strength or endurance between women with and without diastasis at 6 weeks, 6 months or 12 months postpartum

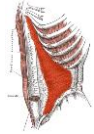
Is there any connection between the TrA and the pelvic floor/pelvic floor muscles?

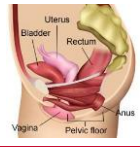
NO muscular or facial connection between the two muscle groups

Part of same canister – what does it mean?

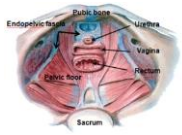
Weak connective tissue my be the common link between prevalence of PFD (urinary incontinence and pelvic organ prolapse) and diastesis recti abdominis

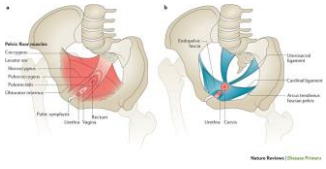
Cause effect relationship?





Any connection between PFM and abdominals via endopelvic fascia?



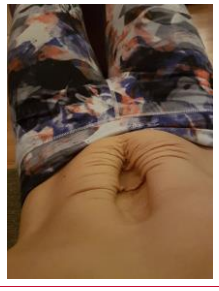


Does diastasis cause LBP or PGP?

- Women with DRA had more abdominal and pelvic pain, but not LBP, than women without DRA Parker et al-09
- No diff in LBP/PGP at 6 months postpartum Mota -15
- No diff in LBP/PGP at 12 months postpartum Sperstad et al -15
- No diff between women with BP or PGP in IRD Chiarello-17
- No corr IRD and LBP/Pelvic pain 3 weeks pp. Keshwani et al-17
- 69% of 16 with DRA had LBP vs 47% of 93 without DRA had LBP Dubkova et al-18
- No studies on elite athletes Bø et al-17

Is this a diastasis? Does it cause any problems?

"Only cosmetic" or are there consequences of *severe* diastasis?



Prevention and treatment? www....

Physiotherapy for DRA? Keeler et al-12

- Questionnaire to 2200 members of APTA Women's health (13.5% response rate)
- Treatment
  - Average visits/week: 1.6
  - Duration: 4-6 weeks
  - Reported success rate: 41-100%
- Intervention
  - 89% TrA training
  - 83% TrA + functional
  - 63% "Noble technique"
  - 87% pelvic floor muscle training
  - 81% therapeutic modalities
  - 59% manual therapy

"Manual therapy":59% Keeler et al 2012

- Myofascial release: 46%
- Triggerpoint release: 36%
- Muscle energy technique:33%
- Visceral manipulation: 21%
- Other: "Joint mobilization":
  - Sacrum
  - Innominate
  - Lumbar spine
  - Coccyx
  - Pelvic symphysis
- *Theory/mechanism???*

Prevention and treatment of DRA during pregnancy?

- No RCTs in the general pregnant population or in athletes
- One retrospective study Chiarello et al-05
- Can stretched abdominals be trained?
  - At GW 36 length of abdominal muscles ↑ with mean 115%. Change in angle of insertion, reducing ability to generate torque Gilleard & Brown -96
- Which exercises?

Drawing in vs sit up/abdominal crunch?

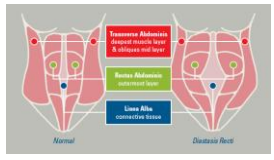
- "Drawing in" widens the IRD Mota et al-12, Sancho et al -15, Mota et al 15, Lee & Hodges – 17, Theodorsen et al-17
- PFM contraction widens the IRD Theodorsen et al-17, Lee & Hodges -17
- Sit up/curl up narrows the IRD Mota et al-12, Sancho et al-15, Pascoal et al-14, Chiarello et al-16, Lee & Hodges-17

RCT DRA Mesquita et al-99

- Published in Portuguise in BJPT
- 50 women after vaginal delivery, age: 18-40 years old
- Intervention
  - Two sessions 6 (10 repetitions) and 18 hours (20 repetitions) after birth
  - Basal respiration, pelvic tilt with isometric contraction of TrA, exercises for abdominal obliques, PFM contractions
- Results (caliper)
  - Intervention: from 3.45 (± 0.43) cm to 2.64 (± 0.45) cm
  - Control: from 3.16 (± 0.26) cm to 2.99 (± 0.28) cm
  - P < 0.05 *between groups at 18 hours*

RCT DRA Walton et al-16

- 9 women with either vaginal birth or CS
- Randomized to 3 visits/week for 6 weeks (3x10 reps + progression during period)
  - Plank OR
  - Modified sit up
  - In addition; Both groups had pelvic tilt, PFMT, obliques, external support
- Results (ultrasound and caliper)
  - Sign reduction in both groups (only at navel)
  - No diff between groups



RCT DRA Emanuelson et al-16

- 89 participants (2 men) 18-40 years old
- Randomized to
  - Surgery with mesh
  - Surgery with Quill
  - Exercise: 3 times/week for 3 months with physical therapist: rectus abdominis, obliques, TrA
- Results (ruler, SF-36,pain,abdominal strength (VAS, Biodex system)
  - Surgery better than exercise

RCT DRA Kamel & Yousif -17

- 60 women (25-35 years) at 2 months pp after normal vaginal delivery and DRA >2.5 cm
- Randomized to physical therapy 3 times/wk for 8 wk
  - A. Abdominal exercise + Neuromuscular el stim (frequency 80 pulses/min, pulse width 0.1–0.5 ms, on:off ratio of 5s:10s, 30 minutes)
  - B. Abdominal exercise (20 reps (+ increased by 4 reps /wk) of sit-ups, reverse sit-ups, reverse trunk twists, and U-seat) + 5 times respiration + TrA (increased per/wk)
- Results (ultrasound)
  - IRD: 50% vs 26% reduction in A vs B
  - Sign intra-group improvement in other measures, strength sign better improvement in A

Norwegian single blind RCT Gluppe et al, Phys Ther -18

- Control: usual care
- 4 month group training once a week
  - Strength training:
    - 5 sets of PFM exercises in different positions
    - 3 sets of abdominal exercises
    - 3 sets of back exercises
    - Strength training of arms and legs
  - Ergonomics: lifting technique
  - Posture, breathing and body awareness
  - Stretching of shoulder and neck
  - Total body relaxation
  - Home PFMT: 3 sets of 8-12 contractions/ day

	6 weeks pp	6 months pp	12 months pp	
Training group	48 (55.2%)	38 (43.7%)	36 (41.4%)	p<.01
Control group	48 (54.5%)	39 (44.3%)	35 (39.8%)	p<.01

No statistically significant difference between groups at any time

Pilot RCT on TrA and kinesiotape Tuttle et al-18

- 30 women 6-12 weeks postpartum with 2 finger palpable diastasis
- Randomized to 12 weeks of
  - TrA training n=10 (4-5 x 10 in 4 positions)
  - Kinesiotape n=8
  - TrA + kinesiotape n=5
  - Control n=7
- Primary outcome: IRD assessed with ultrasound
- Secondary outcome: LBP (Roland Morris) & PFD (PDFI-20)
- Results
  - Statistical significant better results of TrA and TrA + kinesiotape compared to kinesiotape alone and control
  - No diff in LBP or PFD

Evidence for PP abdominal training for DRA:

Benjamin et al 2014

- 8 studies; 1 RCT (Mesquita et al-99)
- Poor quality
- «Based on the available evidence and quality of this evidence, non-specific exercise may or may not help to prevent or reduce diastasis of the rectus abdominal muscle during the ante- and postnatal periods»
- 5 new RCTs did not change this statement (Walton et al-16, Emanuelson et al-16, Kamel &Yousif et al -17, Gluppe et al-18, Tuttle et al-18)
- No studies on elite athletes
- Dangerous exercises?
- Urgent need for high quality RCTs
- INTERVENTION???

Thank you for your attention!

The ''gaps'' between evidence from knowledge users and evidence-based literature

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Funding for speaker to attend:

- [ ] Self-funded
- [x] Institution (non-industry) funded : (FRQS – Repar)
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DRA and physiotherapy

Objectives

1. Understanding the advantages of integrating knowledge users in the DRA-related research ;
2. Understanding agreement and disagreement between evidence from knowledge users and evidence-based literature ;
3. Determine the current evidence-informed and integrative conservative care principles for pregnancy-related DRA from a primary health care perspective ;
4. Recognize future directions for research and clinical practice.

Who are knowledge users?

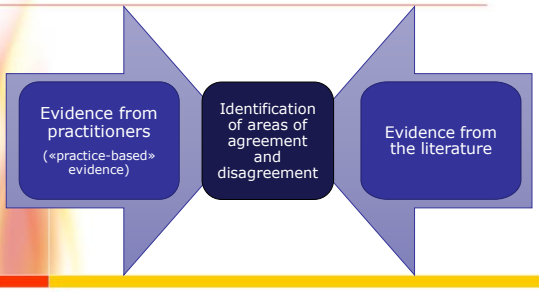
«(…) an individual who is likely to be able to use research results to make informed decisions about health policies, programs and/or practice.»[1]

Canadian Institutes of Health Research, 2016

Taking knowledge users' knowledge

Participation of knowledge users in research presents many benefits:[2]

- Bidirectional knowledge exchange
- Increased quality of research output
- Enhanced utilization of results in clinical practice



Taking knowledge users' knowledge

Scientific research methods can be used to report on knowledge from knowledge users:

1. **Delphi Consensus[3] study (Dufour et al 2018)**

2. **Survey[4] (Keeler et al 2012)**

During pregnancy…

What can we do during pregnancy to prevent persistant post-partum DRA?

Dufour

- Postures and activity patterns that ↓ IAP
- Inner unit x's
- Tension-free diaphragmatic breathing
- Avoid concentric abdominal x's

Keeler

- Posture training
- Isolated, and functional abdominal x's

IAP: Intra-abdominal pressure

What can we do during pregnancy to prevent persistant post-partum DRA?

Agreement with literature ?

Yes :

- Heavy lifting >20x/wk possibly ↑ risk to develop DRA[5] (LoE: 2b)
- Abdominal x's during pregnancy reduces presence of DRA by 35%[7] (LoE:3)

What can we do during pregnancy to prevent persistant post-partum DRA?

Agreement with literature ?

No :

- Curl-up exercise (concentric x's) produces a narrowing of IRD in pregnant women.[8] (LoE =2b)

Reducing IRD during pregnancy?[17, 24]
Posture ?
Breathing ?

LA: Linea alba

During pregnancy…

- ✓ Encourage physical activity and movement patterns that do not excessively maintain high IAP to avoid persistent postpartum DRA
- ✓ Encourage inner unit exercises to favorize postpartum recovery for DRA

Intrapartum phase…

What can we do during delivery to prevent persistant post-partum DRA?

Dufour

- Advocate mobility during labour
- Avoid directed pushing techniques that ↑ IAP for sustained periods
- Advocate for sacrum freeing rather than recumbent birth positions

Keeler

- Not assessed

What can we do during delivery to prevent persistant post-partum DRA?

Agreement with literature ?

Undemonstrated

- ↓ # episiotomies with sacrum-free birthing positions[9, 10] (LoE: 1b)
- ↓ severe perineal tear with sacrum-free position[10] (LoE: 2b)
- Co-activation patterns exist between the abdominals and the PFM[21, 22]

Intrapartum recommendations

? Advocate for sacrum-free birthing to decrease risk for severe perineal trauma

➢ Document birthing positions in future DRA research

Early postpartum…

What can we do during early post-partum phase (< 3 months) ?

Dufour

- Encourage optimal posture and body mechanics (↓ IAP)
- Avoid exercises in which continence mechanism is not maintained
- Inner unit x's, leading to more functional x's
- Avoid concentric abdominal x'
- Tension-free diaphragmatic breathing

What can we do during early post-partum phase (< 3 months)?

Agreement with literature ?

Yes :

- Inner unit x's immediately after delivery and during early postpartum phase ↓ IRD[11, 12] (LoE: 2b)
- Trunk flexors and rotators' strength and endurance are ↓ at 7 wks postpartum, and is negatively correlated with IRD[13] (LoE: 2b)
- Isometric hold (in curl-up position) ↓ IRD during early (and late) postpartum[14] (LoE:3b)

What can we do during early post-partum phase (< 3 months)?

Agreement with literature ?

No:

- A 16-wk x's program (starting at 6 wks post partum) for PFM and abdominals strengthening did not ↓ prevalence of DRA[15] (LoE: 1b)

?

Keshwani, 2018

Early postpartum…

- ✓ Encourage inner unit exercises very early after delivery (within 24h).
- ✓ Encourage abdominal exercises to enhance trunk flexor and rotator muscles strength (may not directly affect DRA, but important for trunk function)

Late postpartum…

What can we do during late post-partum phase (> 3 months) ?

Dufour

- Advocate optimal posture (neutral spine)
- Encourage optimal body mechanics
- Correct or modify exercises that cause doming or invagination of linea alba
- Address contributing thoracic and pelvic movement impairments

What can we do during late post-partum phase (> 3 months) ?

Keeler

- General inner unit training
- Inner unit x's during functional activities
- Noble technique
- PFM x's
- Manual release of restricted myofascial tissue
- Use of abdominal binders

What can we do during late post-partum phase (> 3 months) ?

Agreement with literature ?

Yes :

- ↓ Trunk flexors and rotators' strength and endurance at 6 months, and trunk rotation torque at 12-month[13, 19]
- Negatively correlated with IRD[13] (LoE: 2b)
- Correlation b/w distortion of LA and IRD[19]
- A global-approach (movement impairment system) can reduce IRD[20] (LoE: 4)

What can we do during late post-partum phase (> 3 months) ?

Agreement with literature ?

No:

- Physiotherapy exercise programs can be successful at reducing IRD during a contraction, but not at rest. May play a role in the laxity of the ventral musculature.[23]

Late postpartum…

- ✓ Encourage abdominal exercises to enhance trunk flexor and rotator muscles strength.
- ✓ Avoid invagination or doming of the linea alba during exercises.

Moving knowledge into action

Engaging knowledge users in the elaboration, the completion and dissemination of the results processes of research will be helpful for:

1. Evidence-informed practice
2. Research relevant to the needs of both providers and patients
3. Documenting the effects of interventions that reflect the practices of clinicians
4. Increase our understanding of what we are actually doing

Thank you!

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Practical Application: Research to Practice

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Funding for speaker to attend:

- [X] Self-funded
- [ ] Institution (non-industry) funded
- [ ] Sponsored by:

Objectives

- **Apply the presented research to a clinical case**
- **Two points in time**
  - **Pregnancy**
  - **Post-partum**
- **Two provider perspectives**
  - **Family Physician (General Practitioner)**
  - **Pelvic Health Physiotherapist**

Pregnancy – Family Physician

Saphia is a 36 year old women in her second trimester of her third pregnancy. She has a three-year old son and had a miscarriage (8 weeks gestation) approximately 1 year ago. She presents with pain that she describes as being close to her groin that moves from one side to the other and is most irritable when she is getting dressed or changing positions at night. She also mentions that she is really worried about her "core" as she states she had DRA after the birth of her first child which never "got better". Saphia wants to know if there is anything she can do now to prevent worsening of the DRA as well as address the pain she is having in her pelvis.

Evidence-informed approach?

- We treat people, not conditions
  - Saphia presents with both pregnancy-related PGP and DRA
- We need an evidence-informed, tailored approach that engages Saphia's preferences
  - What assessment strategies are appropriate for pregnancy-related PGP and DRA?
  - What treatment strategies are appropriate for pregnancy-related PGP and DRA?

Pregnancy-related PGP

(Clinton et al, 2017)

Assessment Strategies

- Physical orthopedic tests
  - Pain provocation tests
  - Functional tests (stroke test and active straight leg raise)
- Self-report measures
  - Pelvic Girdle Questionnaire
  - Fear Avoidance Belief Questionnaire
  - Pain Catastrophizing Scale

Pregnancy-related PGP
(Clinton et al, 2017)

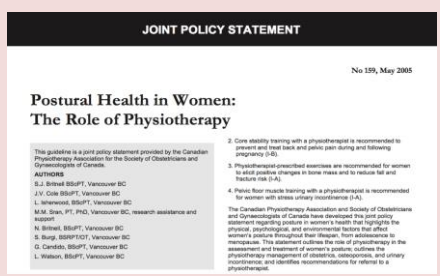
Treatment Strategies
- Promotion of general exercise (level C)*
- Manual therapy (level C)
- Use of pelvic belt (level D)

Pregnancy-related DRA

- Assessment Strategies
  - Assess IRD
    - Assess other functional parameters
- Treatment Strategies
  - Limit heavy lifting (less than 20x/week)
    - Attention to sustained/repetitive increases in IAP
  - Abdominal exercises inclusive of inner unit activation

Pre-Natal Pelvic Health

THE SOCIETY OF OBSTETRICIANS AND GYNAECOLOGISTS OF CANADA



JOINT POLICY STATEMENT

No 159, May 2005

Postural Health in Women: The Role of Physiotherapy

This guideline is a joint policy statement provided by the Canadian Physiotherapy Association for the Society of Obstetricians and Gynaecologists of Canada.

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2. Core stability training with a physiotherapist is recommended to prevent and treat back and pelvic pain during and following pregnancy (I-B).
3. Physiotherapist-prescribed exercises are recommended for women to elicit positive changes in bone mass and to reduce fall and fracture risk (I-A).
4. Pelvic floor muscle training with a physiotherapist is recommended for women with stress urinary incontinence (I-A).

The Canadian Physiotherapy Association and Society of Obstetricians and Gynaecologists of Canada have developed this joint policy statement regarding posture in women's health that highlights the physical, psychological, and environmental factors that affect women's posture throughout their lifespan, from adolescence to menopause. This statement outlines the role of physiotherapy in the assessment and treatment of women's posture; outlines the physiotherapy management of obstetrics, osteoporosis, and urinary incontinence; and identifies recommendations for referral to a physiotherapist.

Pre-natal Pelvic Health

THE SOCIETY OF OBSTETRICIANS AND GYNAECOLOGISTS OF CANADA

Recommendations

1. Pelvic floor muscle training with a physiotherapist is recommended to prevent urinary incontinence during pregnancy and after delivery (I-A)

2. Core muscle training with a physiotherapist is recommended to prevent and treat back and pelvic pain during and following pregnancy (I-B)

Evidence-informed approach?

- Assessment DRA:
  - Measure IRD using finger width in a curl up task

Evidence-informed approach?

- Assessment PGP:
  - Stoke Test
  - Administer Fear Avoidance Belief Questionnaire

	COMPLETELY DISAGREE			UNSURE			COMPLETELY AGREE
1. My pain was caused by physical activity	0	1	2	3	4	5	6
2. Physical activity makes my pain worse	0	1	2	3	4	5	6
3. Physical activity might harm my back	0	1	2	3	4	5	6
4. I should not do physical activities which (might) make my pain worse	0	1	2	3	4	5	6
5. I cannot do physical activities which (might) make my pain worse	0	1	2	3	4	5	6

Evidence Informed Approach Family Physician

Assessment Findings

- IRD = 4 finger widths
- Stoke Test = positive
- Fear Avoidance Belief Score = 13

Findings consistent with pregnancy-related PGP and pre-existing DRA

Evidence Informed Approach Family Physician

Management

- Counselling related to
  - General movement (not fearing movement)
  - Avoiding sustained or repeated strain through the abdominal wall such as straining on the toilet, heavy lifting or other similar activities that increase IAP.
- Refer to pelvic health physiotherapist for further Ax and Rx
  - PGP, global pelvic health promotion, prevention of UI

Post-Partum – Pelvic Health PT

Saphia is a 36 year old women who has been referred to you from her family doctor. She is 16 weeks post-partum with her second child. She had DRA after the birth of her first child and feels is it worse now after having another baby. She was referred during her pregnancy but never came. She denies having any issues with bladder control although when probed does indicate she leaks a small amount of urine when she sneezes. She indicates that she feels like she would probably have bladder control issues with exercise but that she has not returned to any exercise (other than walking) as she has researched about DRA on line is scared to exercise – she doesn't want to make her DRA worse.

Evidence-informed approach?

- We treat people, not conditions
  - Saphia presents with both stress UI and DRA
- We need an evidence-informed, tailored approach that engages Saphia's preferences
  - What assessment are the appropriate assessment strategies for SUI and DRA?
  - What are the appropriate treatment strategies for SUI and DRA?

Stress Urinary Incontinence

- Assessment Strategies
  - Pelvic Floor Muscle Strength (oxford scale)
  - Presence of pre-contraction pelvic floor muscle reflex (the knack)
  - Self-report measures
- Treatment Strategies
  - Pelvic floor muscle training represents the first line intervention for stress, urge or mixed urinary incontinence (Doumalin et al, 2014).
    - Level 1A evidence!

Cochrane

Pregnancy-related DRA

- Assessment Strategies
  - Assess IRD
    - Assess other functional parameters
- Treatment Strategies
  - Encourage abdominal exercises to enhance trunk flexor and rotator muscles strength
    - Inner unit exercise
  - Apply a global movement approach
    - Inclusive of self-monitoring

Evidence Informed Approach Pelvic Health Physiotherapist

Assessment Findings
- Oxford score = 2/5 (squeeze no lift)
- No presence of pre-contraction of pelvic floor contraction with cough
- IRD = 3 finger widths
- Doming noted through abdominal wall during curl up task

Presentation consistent with pelvic floor dysfunction and pregnancy-related DRA

Evidence Informed Approach Pelvic Health Physiotherapist

Management
- Counselling related to
  - General movement (not fearing movement)
  - Self-monitoring of LA and IAP
- Abdominal exercises inclusive of inner unit work following established PFMT protocol
  - individually tailored

Closing Remarks

- Evidence guiding practice for pregnancy-related DRA is lacking.
- Women with DRA will often present with other pelvic health concerns which are not necessarily correlated but need to be addressed in a concordant manner.
- Practice-based research has the potential to inform future RCTs to clarify what treatment interventions are the most effective.