W20: From pelvic floor muscle training to functional training in women with urinary incontinence; bottom line solution for adherence?  
Workshop Chair: Bary Berghmans, Netherlands  
15 September 2016 09:40 - 12:30

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**Aims of course/workshop**
Results of new pelvic floor muscle exercises (PFME) or training programs with focus on motor control and pre-contraction will be presented. How to assess the patient, what parameters are important for the PFMT training session in patients with (predominant) stress urinary incontinence or with urgency/frequency syndromes. Performance of PFM assessment will also be demonstrated. Training strategies based on the evaluation of findings during the assessment will be shown. How to proceed from mono task exercises to fully functional activities. Using biofeedback, interpreting the signal as an adjunct to PFME or training new biofeedback strategies, procedures and equipment will be presented, including videos.

**Learning Objectives**
After this workshop participants should be able to:
1. Understand the rationale and perform a structured pelvic floor muscle functional assessment
2. Based on the assessment how to select and construct a pelvic floor muscle training program
3. How to perform a functional training, importance for adherence

**Learning Outcomes**
To be able to:
1. Understand and perform a structured pelvic floor muscle functional assessment
2. Based on the assessment how to select and construct a pelvic floor muscle training program
3. How to perform a functional training also stimulating adherence

**Target Audience**
Gynecologists, Urologists, Nurses and Physiotherapists

**Advanced/Basic**
Advanced

**Conditions for learning**
Hands on course, interactive debate, practical videos no restriction in participation

**Suggested Learning before workshop attendance**

**Suggested Reading**
- Dumoulin C, Alewijnse D, Bo K, Hagen S, Stark D, Van Kampen M, Herbert J, Hay-Smith J, Frawley H, McClurg D, Dean S.

Bary Berghmans

PFMT aims to restore the muscular strength, coordination and timing of contractions. Other parameters important in relation to the pelvic floor are timely relaxation, endurance, repeatability and fast feed forward loop contractions.

Timing might be one of the most important elements; in healthy continent women, activation of the PFM before or during physical exertion seems to be an automatic anatomic response, so an unconscious contraction. This PFM ‘reflex’ contraction is a fast feed-forward loop and might precede bladder pressure rise by 200-240 milliseconds, something that might have been lost in women with urinary incontinence. Also, it has been suggested that a well-timed, fast and strong pelvic floor muscles contraction may prevent urethral descent during intra-abdominal pressure rise.

To ensure an adequate sequence in pelvic floor muscle training the concept of the 4 Fs, i.e., Find-Feel-Force-Follow-through of pelvic floor muscles was introduced. Awareness (Find and Feel) of the different muscles involved in maintaining continence is necessary to be sure of avoidance of co-contractions of surrounding muscles (abdominals, buttocks, thighs and back) and activation of the relevant muscles. Sometimes, when patients find and use the relevant muscles at the appropriate time, symptoms can reduce at once.

Basic physiological muscle training principles teach us that pelvic floor muscle exercise programs must consist of selective MAXIMAL voluntary contractions with a repetitive character (Force) and sufficient time of relaxation between consecutive pelvic floor muscle contractions. Exercises can activate latent motor units to the point that the muscle becomes functional again, in stress urinary incontinence the indirect support of the bladder neck.

The principle of overload is based on stimulation of the muscle beyond its normal level of performance. Important parameters are quality (inward/upward movement of the pelvic floor muscles while maximal squeezing) and number of MAXIMAL conscious and unconscious contractions, number of contractions, duration of contractions and relaxation. For the training program also the number of series, number and duration of sessions and total training program are important.

The principle of selectivity cq. specificity refers to train a muscle in the way the muscle needs to be used. Exercises are adapted to slow-twitch fibers (endurance exercises) and fast-twitch fibres (strength and speed exercises).

Pelvic floor exercises should be practised in different starting positions; from lying, sitting to standing and resulting in as much as possible simulating everyday situations.

The principles Maintenance and Reversibility (follow-trough) alert the patient to train regularly, sometimes lifelong, but the challenge for the pelvic physiotherapist is to incorporate functional training in such a way that patients will experience progress of their symptoms as soon as possible. Functional training of pelvic floor muscles means that the pelvic physiotherapist needs to mimic daily life activities and situations in which the patient used to experience incontinence and now – automatically – is capable to avoid this. In case of success, patients will be highly motivated to adhere to and continue their pelvic floor muscle training program.
Take home message
Timing of active PFM contraction and relaxation may be the most important element of training

Alex Digesu
The use of pelvic floor muscle training (PFMT) in the prevention and treatment of urinary incontinence, fecal incontinence and pelvic organ prolapse is based on two functions of the pelvic floor muscles, support of the pelvic organs and a contribution to the sphincteric closure mechanism of the urethra and anus.

PFMT can be used to reduce the prevalence of incontinence during pregnancy and up to 1 year after birth. Beyond this point, the little evidence available suggested that the effect did not persist.

There is very little evidence on the effectiveness of PFMT for prevention or treatment of fecal incontinence.

In conclusion based on the scientific literature it can be concluded that although it has been showed that PFMT is effective for prevention and for treatment of pelvic floor dysfunctions, there is still insufficient evidence to say whether or not PFMT is effective in the long term.

However several explanations can be given to justify this equivocal and confusing poor outcome of PFMT. It could be hypothesized that the published data from RCTs have included either women have had more babies or they have stopped doing PFMT or that have poorly selected the right patients such as those with denervation in whom PFMT is unlikely to be effective.

Therefore larger and better designed RCTs are still needed before we draw any conclusion on the role of PFMT in the long term as treatment and prevention of pelvic floor dysfunctions.

Till then it is important that strategies are developed to encourage women to continue PFMT during and after every pregnancy, and indeed once their families are complete as well as during menopause.

Nucelio Lemos
Pelvic floor muscle exercises have long been used to treat urinary incontinence and other symptoms, although its working mechanisms could only recently be understood, in the light of current anatomical knowledge brought up by frozen section techniques and functional pelvic floor muscle ultrasound and dynamic MRI.

In this lecture, detailed anatomy of the pelvic floor muscles and its relation to the endopelvic fascia will be reviewed, as well as the strength vectors produced by each pelvic floor muscle bundles contraction and relaxation, and its consequences.

Finally, a functional anatomy-based rationale will be developed on what kinds of symptoms would loosening or tone unbalances of each of these muscles would produce.

Take home message
Pelvic floor muscles act by tensioning and loosening the pelvic floor fascias and ligaments, therefore producing strength vectors; any unbalances on these vectors can potentially produce voiding, storage or sexual symptoms.

Maura Seleme
How to improve adherence? Innovative strategies
Pelvic Floor Muscle Training (PFMT) has been proven to be effective in treating female PFM dysfunctions such as stress-, urgency- or mixed urinary incontinence (UI), pelvic organ prolapse (POP) and lower bowel dysfunctions. Most studies support PFMT to cure UI or reduce UI incidence and severity. Motivation, compliance with a home maintenance program, and continuous adherence are key-factors for maintenance of PFMT results. Poor adherence is reported to be a main factor of declined effect on the long term. PFMT adherence is complex and necessitates patient’s active behavioral change, motivation, discipline and participation. Stimulation of short-term adherence (in most cases PFMT is supervised) and long-term adherence (in most cases the patient continues training on her own at home, often after supervised therapy) need different strategies and planning. Up to now, relevant literature shows that 64% of patients adhere to PFMT and health advice short term, but only 23% long term. Thus, planning and implementing PFMT programs informed by adherence theory and evidence are potentially critical to achieving and maintaining (long-term) treatment effect. Exercise adherence has been identified as an important predictor of overall PFMT effectiveness and cost-effectiveness is dependent upon whether short-term outcomes can be maintained long term. Adherence and its determinants, from initial uptake to longer-term maintenance, need to be understood, measured, and harnessed to maximize PFMT effectiveness.

To maintain optimal training results, or cure from the pelvic floor dysfunction, it is obvious that the patient needs to train regularly, sometimes lifelong. But, the challenge for the pelvic physiotherapist is to incorporate functional training in such a way that patients will experience continuous progress, and really feel and understand that incorporation of PFM activity in daily life
activities during sport, at home of at work, in the beginning from conscious mono-tasking, later to double- and multi-tasking exercises, ending up with fully automatic functional activities is the way to long-lasting success.

This presentation will highlight and discuss issues related to evidence-based clinical practice of pelvic physiotherapy, how to improve adherence to training and, how to use innovative strategies to realize long-term effect of pelvic physiotherapy.

**Take home message**
No success of pelvic floor muscle training in treating pelvic floor dysfunctions in case patients do not adhere to their training. Challenge for the pelvic physiotherapist is to use functional training as a strategy to realize this
how to perform a pelvic floor muscle training and strategies for urinary incontinence?

15 September 2016

Bary Bergmans PhD MSc RPT associate professor
clinical epidemiologist, health scientist, pelvic physiotherapist
Pelvic care Center Maastricht
Maastricht University Medical Center
The Netherlands

content lecture

- motor learning
- strength training
- parameters pelvic floor muscle training
- dose-response issues
- clinical recommendations

structures of urethral support


key-word timing

working mechanisms PT

key-word strength

adequate PFM contraction

motor learning

before start PFM training

ability to contract correctly
- squeeze
- inward lifting

- 30% not able to contract at first session
- other synergists
- stop breathing
- forced inhalation
- straining instead of contracting/lifting

- conscious contraction before & during abdominal pressure & continuation contractions as behavior modification to prevent descent PF, the KNACK !!!
- fast feed forward loop!!!!!! Pre-contraction!!!!
- functional training!!!!!!!
- building up “stiffness” & structural support PF !!!
- dose-respons, dosage exercises i.e., frequency, intensity, duration, kind of exercise, motivation, adherence, protocol

- 30% not able to contract at first session
- other synergists
- stop breathing
- forced inhalation
- straining instead of contracting/lifting

- compression (M. levatores ani)
- support (Fasciae & Ligaments)
- coaptation (intrinsic sphincter)

- squeeze and inward lift
- urethral closure
- resistance to downward movement
- inhibition of detrusor contraction

- women with SUI worse performance during an endurance test than continent women. It suggests that women have different capacity to perform PFM training

- Burti 2014
- Ashton-Miller 2001; Be 2004
motor learning

why correct PFM contraction difficult?

• hidden muscles
• unawareness of PFM contraction
• relatively small muscles
• awareness related to voiding/defecation, straining at toilet
  common

motor learning

motor learning depends on sensory feedback Trees 1990

learning ↔ feedback → knowledge of results compensates for loss of internal feedback (after injury for instance because of vaginal delivery, helps in learning correct PFM contraction again)

motor learning

5 steps to learn correct PFM contraction

• understand (location, working mechanism)
• search (where to find)
• find (feedback PT)
• learn (performance of correct PFM contraction)
• control (recruiting as many motor units as possible)
how to teach this contraction

4 teaching tools to facilitate learning correct PFM contraction

• verbal instruction, indicating most important elements

• visual instruction

• direct contact PT (digital vaginal/rectal palpation)

• construction of daily activities

motor learning

in patients with low awareness:

• demonstration PFM contraction in standing position, no movement pelvis or tights visible outside

• patient palpation buttocks

• use metaphors ('closing the door') ('elevator-lifting') ('eating spaghetti') ('vacuum cleaner')

strength training (ST)

objective ST:
change muscle morphology by

↑ cross-sectional area

↑ neurological factors by ↑ n activated motor neurons and frequency excitation

↑ muscle tone & stiffness
depends on

type exercises, training programme, genetic & hereditary factors

parameters PFMT

consistency of program?

• all kinds of programs Hay-Smith 2001, ICI 2013

• evidence based program > 11 RCTs prove!!!
  - Individual PT program Hay 2009
  - 8-12 VPFMC, 1-3 s, 6-8 s hold/relax
  - 3 x/day
  - home exercises daily
  - 45 min weekly classes for 6 mts Bo 1990, Morkved 2003, Bo 2004

PFMT for UI grade B, for SUI grade A ICI 2013
PFMT + BF vs NT, OR 12.3, 95% CI 5.4-12.3 Imamura 2010

strength training (ST)

• two loading strategies in PFM training Bo 1990

  • moderate to high training loads → recruitment high-threshold fast twitch motor units for strength

  BUT

  contractions moderate to slow velocity

  • light to moderate loads performed at explosive lifting velocity

  • ask contractions as close to maximum as possible

  • hold contraction

  • add 3-4 fast contractions on top
dose-response issues

- mode of exercise: strength - flexibility training, cardiovascular, PFM conducted in upward, isometric, concentric, eccentric
- frequency exercises: n training sessions/week, heavy loads > rest
- intensity: strength training 60-65% of 1 RM young; 50-60% older
- duration: 6 months intensive training; 15-20 weeks absolute minimum standard; training volume, variation, systematically altered

muscle strength issues

- specificity: exactly PFM, not synergists, small increase abs pressure adequate stimulus for co-contraction → training effect; big increase not ok
- overload: progressive; sustain contraction, shorten rest periods between contractions, increase speed contraction, increase n contractions, frequency and duration work-outs, alternate form exercise, range to which PFM is being worked

PFMT → mono/multi tasks

objective
increasing skills & experience
velocity/speed vs increasing maximal strength
fast feed forward loop = pre-contraction ≠ reaction
preparation for functional training

Berghmans et al 2010

dose-response issues

- adherence: extent to which the individual follows the exercise prescription, compliance

muscle strength issues

- variation
- progression: continually increasing stress on PFM as capable producing ↑ force or endurance, very difficult in PFM (use of BF??) max/3-4 adds, lying to standing position, withdrawing intravaginal-rectal device
- maintenance: current level PFM fitness (cessation = detraining) Type II>I

functional training

Berghmans et al 2010
wireless biofeedback

new technology in functional training

clinical recommendations

• make sure patient able to perform correct contraction
• contraction as 'hard' as possible
• progress with sustained contractions, higher velocity
• holding time 3-10 s
• PFMT every day towards FUNCTIONAL TRAINING
• encourage/motivate close to maximal contractions, verbal strong
• eccentric contractions
• information & education strength training develops in steps, largest progress in first period of training; after that train even harder!!!

Questions?
Belief and disbelief related to evidence of PFME and training programs

Alex Digesu MD, PhD
St. Mary’s Hospital, Queen Charlotte’s & Chelsea Hospital
Imperial College Healthcare NHS Trust

A good apology has three parts:
1. I’m sorry
2. It’s my fault
3. What can I do to make it right?

*Urinary incontinence
*Prolonged defecation (over 5 mins)
*Excessive strain
*Incomplete emptying
*Abnormal frequency
*Incontinence
*Faecal Urgency
*Flatal incontinence
*Urogenital Prolapse

*Signs and symptoms of dysfunction

Postnatal stress urinary incontinence is a common problem affecting up to 34% of women, while 3–5% have faecal incontinence.


If Physical Therapy for the pelvic floor (PF) is able to improve women pelvic floor dysfunction, should women train their PF all their life, if yes, how?
The National Institute of Clinical Excellence (NICE) and ICI recommend PFMT for all women in a first pregnancy for prevention of SUI based upon data from two RCTs.


**Objective:** To determine the long-term effectiveness of antenatal pelvic floor muscle training (PFMT) on SUI

**Design:** Eight-year follow up of a RCT

*The significant improvement in postnatal SUI shown in PFMT group compared with controls (19.2 vs 32.7%, P = 0.02) at 3 months was not evident 8 years later (35.4 vs 38.8%, P = 0.7).
Pelvic Floor Muscle Training for Prevention and Treatment of Urinary and Fecal Incontinence in Antenatal and Postnatal Women: A Short Version Cochrane Review

Boyle 2014

Twenty-two trials involving 8,485 women.

PFMT compared with or no PFMT for antenatal and postnatal women.

The primary analysis investigated the prevalence of UI and fecal incontinence.

Boyle 2014

Prevention of Incontinence

- Not enough evidence to say whether PFMT was effective in the prevention of urinary incontinence in late pregnancy.
- PFMT women were about 50% less likely to report urinary incontinence, compared to controls, in the early postpartum period.
- PFMT women were still significantly less likely than controls to have urinary incontinence in the mid postnatal period (3–6 months), although the difference in risk had reduced to 29%.

Boyle 2014

Comparison 1: Prevention of Incontinence

- Two trials measured urinary incontinence at greater than 5 years (6 and 8 years, respectively).
- The earlier effectiveness of PFMT did not persist in the long term!

Boyle 2014

**Imperial College London**

PFMT has a good short term efficacy on UI

The available evidence suggests a lack of long-term efficacy of peripartum PFMT

While further studies looking at the long term efficacy are needed, based on the available evidence, a critical reappraisal of PFMT may be needed.
1.4.1
People who continue to have episodes of faecal incontinence after initial management should be considered for specialised management. This may involve referral to a specialist continence service, which may include:

- pelvic floor muscle training
- bowel retraining
- specialist dietary assessment and management
- biofeedback
- electrical stimulation
- rectal irrigation.

Theoretically, the external anal sphincter muscle (which is continuous with the puborectalis muscle component of the pelvic floor muscles) could be trained in a similar way to other pelvic floor muscle.

Fewer studies of its effectiveness than for urinary incontinence.

Norton 2012

1. PFMT versus usual antenatal or postnatal care/ no PFMT for the prevention of incontinence.

2. PFMT versus usual antenatal or postnatal care / no PFMT for the treatment of incontinence.
Results

- Twenty-two trials involving 8,485 women.
- PFMT compared with or no PFMT for antenatal and postnatal women.
- The primary analysis investigated the prevalence of UI and fecal incontinence.

Boyle 2014

Comparison 1: Prevention of Incontinence

None of the seven trials reported data on the prevalence of postpartum fecal incontinence.

Boyle 2014

Comparison 2: Treatment of Incontinence

The prevalence of both UI and fecal incontinence at 1, 6 and 12 years was not statistically significant between the two groups.

Boyle 2014

Biofeedback

It utilizes electronically amplified recordings of pelvic floor muscle contraction to teach patients how to relax and contract the pelvic floor muscles.

Biofeedback vs. electrostimulation in the treatment of postdelivery anal incontinence: a randomized, clinical trial (OASIS).

- 49 women who sustained third-degree or fourth-degree perineal rupture.
- Randomized to biofeedback (19) or electrostimulation (21) treatment.
- Biofeedback or electrostimulation sessions were performed two times daily for eight weeks in each group.
- Neither biofeedback nor electrostimulation treatments improved:
  - Wexner incontinence score
  - Reduced fecal incontinence QOL scores

Naimy 2007
120 women sustaining a third-degree tear.

30 to early postpartum home intra-anal biofeedback physiotherapy and 90 to PFEs alone (5mins twice daily for 3/12)

<table>
<thead>
<tr>
<th>3 months post partum</th>
<th>EARLY BF</th>
<th>PFEs</th>
<th>PVALUE</th>
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<tr>
<td>Anal resting pressure</td>
<td>39 ± 13 mmHg</td>
<td>43 ± 17 mmHg</td>
<td>NS</td>
</tr>
<tr>
<td>Anal squeeze pressure</td>
<td>64 ± 17 mmHg</td>
<td>62 ± 23 mmHg</td>
<td>NS</td>
</tr>
<tr>
<td>Cleveland Clinic continence score</td>
<td>No difference</td>
<td>No difference</td>
<td>NS</td>
</tr>
<tr>
<td>Rockwood faecal incontinence QOL scores</td>
<td>No difference</td>
<td>No difference</td>
<td>NS</td>
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Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults (Review)

Norton C, Codd JD

21 studies and 1525 patients

Conclusions

- No enough evidence to support the role of anal sphincter exercises and biofeedback therapy in the management of faecal incontinence.

But if we have to do it

1. Biofeedback plus exercises was better than exercises alone
2. Biofeedback plus electrical stimulation was better than electrical stimulation alone
3. Exercises and electrical stimulation used in the anus may be more helpful than vaginal exercises or vaginal biofeedback for women with faecal incontinence after childbirth

Biofeedback – ES - PFMT

1. Prevention (OASIS)
2. Treatment (FI)

Constipation

1. Slow transit constipation
   - delayed movement of stool throughout the colon

2. Pelvic floor dyssynergia
   - paradoxical contraction or failure to relax the pelvic floor during attempts to defecate.

Pelvic floor dyssynergia is believed to be responsible for up to 50% of constipation.
Guidance for constipation

* Good fluid intake and dietary advice
* Regular bowel scheduling
* Medications (laxatives or diazepam)

Biofeedback

- When patients with pelvic floor dyssynergia do not respond to conservative interventions biofeedback is frequently recommended.

Biofeedback utilizes electronically amplified recordings of pelvic floor muscle contraction to teach patients how to relax pelvic floor muscles and to strain more effectively when they defecate.

Is Biofeedback effective?

SELECTED REFERENCES

Randomized Controlled Trial Shows Biofeedback to be Superior to Alternative Treatments for Patients with Pelvic Floor Dyssynergia-type Constipation


1. UVA Center for Functional GI and Motility Disorders, University of North Carolina at Chapel Hill, USA, 7530, Chapel Hill, NC 27599-7530.

**Figure 1: Primary Outcome Measure using a Chi Squared analysis comparing the proportion of subjects reporting adequate relief of constipation followed up in the biofeedback group compared to the placebo and to the plastic groups.
1. PFMT started in early pregnancy is effective in reducing urinary incontinence in late pregnancy and up to 6 months after delivery.

2. Not enough evidence to say whether or not PFMT was effective for the prevention of incontinence in the long term.

<table>
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<th>Incontinence</th>
<th>PFMT</th>
<th>No PFMT</th>
<th>pvalue</th>
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<tr>
<td>Reilly @ 6 years</td>
<td>35.4%</td>
<td>38.8%</td>
<td>NS</td>
</tr>
<tr>
<td>Morkved @ 8 years</td>
<td>23%</td>
<td>17%</td>
<td>NS</td>
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3. No data on the prevention of FI

- There is evidence that PFMT is effective to treat antenatal or postnatal urinary incontinence up to 1 year after delivery regardless of whether PFMT was commenced in the antenatal or postnatal period.

- There was not a significant difference in the prevalence of urinary incontinence between the control and PFMT groups at 6 or 12 years postpartum.

- PFMT is not effective in the treatment of fecal incontinence at 12 months, 6 and 12 years after delivery.


1. Have women stopped exercising?
2. Subsequent pregnancies?
CONCLUSIONS

- Pregnancy and birth appear to be the most consistent and important factors associated with the development of urinary and fecal incontinence in women.

- Therefore, all women who choose to have a child, or children, might be considered to be at risk of later incontinence.

- Some women (e.g., connective tissue disorders, who are obese, or have forceps deliveries) might be at even greater risk.

- Continent antenatal women benefit from more “intensive” PFMT programs (5-12 contacts) than the usual care that may incorporate some PFMT advice or teaching.
From Pelvic Floor Muscle Training to Functional Training in Woman with Urinary Incontinence; Bottom Line Solution for Adherence

How to improve adherence? Innovative strategies
Practice of PFME
PhD PT Maura Seleme

Maura Seleme
Affiliations to disclose:

No disclosure

Funding for speaker to attend:
- Self-funded
- Institution (non-industry) funded
- Sponsored by:

Magic

Beauty
Faster than blinking an eye

Perfection

Accuracy

Determination

Milliseconds can make you loose urine...

Milliseconds that can make you cry...

Pre-contraction
200-240 milliseconds
Thind 1990, Thompson 2003
Perfection and accuracy give you more than a gold medal, give you quality of life and continence.

Treatment of Urinary Incontinence depends on precision, accuracy, knowledge, willpower, overcome barriers and gain milliseconds in muscle contraction.

Pre-contraction
200-240 milliseconds
Third 1990, Thompson 2003

Guidelines on Stress Urinary Incontinence - Royal Dutch Society for Physiotherapy (KNGF) – 2011