Functional Movement and Pelvic Floor Fitness
Welcome

• Bruce Crawford MD, FPMRS
  – Board Certified Urogynecologist
  – Director, Center for Pelvic Floor Medicine
  – CEO, Insight Biodesign LLC
Pelvic Floor Disorders

- Bladder Control Problems
- Bowel Control Problems
- Sexual Dysfunction
- Pelvic Organ Prolapse
Bladder Control Problems

- Stress Urinary Incontinence
  - 20% adult female population
  - 10% risk of surgery

- Overactive Bladder
  - 15 – 25% adult population
  - Same for Men as for Women
  - Huge impact on QOL
Bowel Control Problems

- Anal Incontinence
  - 10% adult female population
Pelvic Organ Prolapse

• POP (cystocele, uterine prolapse, rectocele)
  – 42% of women ages 40 – 60
Evidence Based Medicine

- Individualised pelvic floor muscle training in women with pelvic organ prolapse (POPPY): a multicentre randomised controlled trial.
- Hagen S1, Stark D2, Glazener C3,
- Pelvic organ prolapse is common and is strongly associated with childbirth and increasing age. Women with prolapse are often advised to do pelvic floor muscle exercises, but evidence supporting the benefits of such exercises is scarce. We aimed to establish the effectiveness of one-to-one individualised pelvic floor muscle training for reducing prolapse symptoms.

**METHODS:**
- We did a parallel-group, multicentre, randomised controlled trial at 23 centres in the UK, one in New Zealand, and one in Australia, between June 22, 2007, and April 9, 2010. Female outpatients with newly-diagnosed, symptomatic stage I, II, or III prolapse were randomly assigned (1:1), by remote computer allocation with minimisation, to receive an individualised programme of pelvic floor muscle training or a prolapse lifestyle advice leaflet and no muscle training (control group). Outcome assessors, and investigators who were gynaecologists at trial sites, were masked to group allocation; the statistician was masked until after data analysis. Our primary endpoint was participants' self-report of prolapse symptoms at 12 months. Analysis was by intention-to-treat analysis. This trial is registered, number ISRCTN35911035.

**FINDINGS:**
- 447 eligible patients were randomised to the intervention group (n=225) or the control group (n=222). 377 (84%) participants completed follow-up for questionnaires at 6 months and 295 (66%) for questionnaires at 12 months. Women in the intervention group reported fewer prolapse symptoms (ie, a significantly greater reduction in the pelvic organ prolapse symptom score [POP-SS]) at 12 months than those in the control group (mean reduction in POP-SS from baseline 3.77 [SD 5.62] vs 2.09 [5.39]; adjusted difference 1.52, 95% CI 0.46-2.59; p=0.0053). Findings were robust to missing data. Eight adverse events (six vaginal symptoms, one case of back pain, and one case of abdominal pain) and one unexpected serious adverse event, all in women from the intervention group, were regarded as unrelated to the intervention or to participation in the study.

**INTERPRETATION:** One-to-one pelvic floor muscle training for prolapse is effective for improvement of prolapse symptoms. Long-term benefits should be investigated, as should the effects in specific subgroups.
Pelvic Floor Disorders

- Bladder Control Problems: 25%
- Bowel Control Problems: 10%
- Pelvic Organ Prolapse: 42%

- Total Prevalence May Be 50 – 60% of Adult Female Population
Treatment of Pelvic Floor Disorders

• Bladder Control Problems
  – Kegel’s
  – Medications (anticholinergics, β3 Agonist)
  – PTNS
  – Surgery

• Bowel Control Problems
  – Kegel’s
  – Fiber
  – Solesta
  – Surgery

• Pelvic Organ Prolapse
  – Kegel’s
  – Pessary Device
  – Surgery
Treatment of Pelvic Floor Disorders

• Bladder Control Problems
  – Kegel’s
  – Medications (anticholinergics, β3 Agonist)
  – PTNS
  – Surgery

• Bowel Control Problems
  – Kegel’s
  – Fiber
  – Solesta
  – Surgery

• Pelvic Organ Prolapse
  – Kegel’s
  – Pessary Device
  – Surgery
Bladder Control is a Fitness Issue

- Arnold Kegel
Bladder Control is a Fitness Issue

- Joseph Pilates
Exercise Physiology
Pilates
Video EMG Synchronization – Clinical Instrument
VESy Clip
PFILATES IS RECOVERING OR ENHANCING PELVIC FLOOR STRENGTH.

Pfilates is a program of functional movement proven to produce better activation of the pelvic floor than traditional kegel exercises. The 10 Pfilates movements done as a routine provides 35% greater pelvic floor activation than Kegels. When the VESy Lab is used to identify a clients “best 3 movements” the advantage over Kegels goes up to 75%.
Our New Model: Mobile VESy Pfilates

- Centralization of VESy Pfilates Services
- Frictionless Introduction of VESy Pfilates

Drivers
- Clinical Need
- Surgical Liability
- Passive Income for Host Practices
Balance Sheet

<table>
<thead>
<tr>
<th>Description</th>
<th>Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Revenue (8 patients/week)</td>
<td>$10,080.00</td>
</tr>
<tr>
<td>Expenses</td>
<td>(4,704)</td>
</tr>
<tr>
<td>Net Revenue</td>
<td>$ 5,376.00</td>
</tr>
</tbody>
</table>

$ 64,512.00 Income Annually
Mobile VESy Pfilates

• The Science
• The Mechanics
• The Administration
VESy Pfilates

The Science

• The Pfilates Data
• VESy Lab Data
• Clinical Data
Podium 25
LOWER BODY PYLOMETRIC EXERCISE AND PELVIC FLOOR MUSCULAR ENGAGEMENT

Bruce Crawford, MD
University of Nevada, Reno, NV
(Presented by: Bruce Crawford)

Introduction: Pelvic floor muscle exercises have long been considered the first line therapy for stress urinary incontinence in women. Pelvic floor muscle deconditioning (weakness, poor endurance, poor coordination) has been associated with stress urinary incontinence, overactive bladder, pelvic organ prolapse, anal incontinence, and sexual dysfunction. It is known that patients are poorly compliant with physician recommended programs of isometric exercises. Poor long-term compliance with Kegel exercise programs illustrates this fact. Better compliance has been found for plyometric exercise programs. It may be the case that a plyometric program of pelvic floor exercise would be of better practiced and more effective in restoring and maintaining pelvic floor fitness.

Objective: To determine what plyometric movements induce the greatest degree of pelvic floor muscular engagement in women.

Methods: Between September 2008 and September 2009 real time surface EMG data was collected from the pelvic floor of 6 multiparous women ages (40-47) during performance of 100 different mat Pilates, Yoga, and personal training movements. All movements were simultaneously videotaped and synchronized to EMG recordings so as to identify the point of peak pelvic floor engagement. Movements were rated based on multiples of baseline resting EMG at the point of peak engagement of the pelvic floor.

Results:

<table>
<thead>
<tr>
<th>Mean multiples of baseline EMG</th>
<th>Point of peak engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Side laying straight leg circles</td>
<td>21.6 Forward sweep 45° above horizontal</td>
</tr>
<tr>
<td>2. Side laying bent knee lifts</td>
<td>20.1 Top of leg lift</td>
</tr>
<tr>
<td>3. Bridging</td>
<td>25.1 Top of bridge Gluteals engaged</td>
</tr>
<tr>
<td>4. Corkscrew</td>
<td>15.7 Hips flexed legs over body</td>
</tr>
<tr>
<td>5. Lunges</td>
<td>42.4 Deepest point in the lunge</td>
</tr>
<tr>
<td>6. Squats</td>
<td>18 Deepest point in the squat</td>
</tr>
<tr>
<td>7. Cat into row</td>
<td>15.7 Full cat pose</td>
</tr>
<tr>
<td>8. Butterfly</td>
<td>24.9 Knees together feet pressed together</td>
</tr>
<tr>
<td>9. All 4s side leg lift</td>
<td>21.3 Top of the lift</td>
</tr>
<tr>
<td>10. Flowering</td>
<td>28 Top of the movement during pelvic curl</td>
</tr>
</tbody>
</table>

Conclusions: Certain plyometric movements induce effective co-recruitment of the pelvic floor musculature. These 10 movements are considered to be the most effective pelvic floor engagers from the large number of movements studied. These movements may provide an effective plyometric pelvic floor conditioning program.
Average Difference From Isolated Pelvic Floor Contraction
## Ranking of Pfilates Movements

<table>
<thead>
<tr>
<th>Rank</th>
<th>Movement</th>
<th>Average Difference From Isolated CTN</th>
<th>Range (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lunges</td>
<td>81.1%</td>
<td>-5.6 – 350</td>
</tr>
<tr>
<td>2</td>
<td>Bridge</td>
<td>66.2%</td>
<td>-33 – 247</td>
</tr>
<tr>
<td>3</td>
<td>Squat</td>
<td>50.9%</td>
<td>-14 – 185</td>
</tr>
<tr>
<td>4</td>
<td>Hovering</td>
<td>49.0%</td>
<td>-28 – 175</td>
</tr>
<tr>
<td>5</td>
<td>Butterfly</td>
<td>24.1%</td>
<td>-16 – 123</td>
</tr>
<tr>
<td>6</td>
<td>Side Laying Straight Leg Circle</td>
<td>21.1%</td>
<td>-29 – 116</td>
</tr>
<tr>
<td>7</td>
<td>Corkscrew</td>
<td>17.7%</td>
<td>-38 – 116</td>
</tr>
<tr>
<td>8</td>
<td>Cat into Cow</td>
<td>12.2%</td>
<td>-34 - 97</td>
</tr>
<tr>
<td>9</td>
<td>Side Laying bent knee lift</td>
<td>7.9%</td>
<td>-35 – 118</td>
</tr>
<tr>
<td>10</td>
<td>All 4’s bent knee lift</td>
<td>2.9%</td>
<td>-39 – 77</td>
</tr>
<tr>
<td>Position</td>
<td>Movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing</td>
<td>2 (strong)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side Laying</td>
<td>2 (weak)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supine</td>
<td>3 (mixed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kneeling</td>
<td>1 (Strong)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All 4s</td>
<td>2 (weak)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Essential Pfilates Concept

![Bar Chart]

Series 1

The Essential Pfilates
The Essential Pfilates

• Lunge
• Squat
• Bridge
• Hovering
Application of the VESy Data

• Decision Making Regarding Assignment of Movements
• Time/Effort Spent on a Given Movement
Probability In Top 3

- Series1

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76.92%</td>
<td>46.15%</td>
<td>11.54%</td>
<td>7.69%</td>
<td>3.85%</td>
<td>7.69%</td>
</tr>
<tr>
<td>2</td>
<td>76.92%</td>
<td>84.62%</td>
<td>11.54%</td>
<td>3.85%</td>
<td>10.00%</td>
<td>20.00%</td>
</tr>
<tr>
<td>3</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>4</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>6</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>7</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>8</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>9</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>10</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30.00%</td>
<td>40.00%</td>
<td>50.00%</td>
</tr>
</tbody>
</table>
Optimization Using VESy
Clinical Data

The Video-EMG Synchronization Method of Pelvic Floor Rehabilitation is Associated with Improvement in Lower Urinary Tract Symptoms and Pelvic Floor Strength

Crawford, Bruce MD., Noia, Carol RMA.

Objective: To assess clinical response to a 4 week program of pelvic floor rehabilitation using the Pfilates Method in combination with Video-EMG Synchronization (VESy) for optimization of each patients home exercise program.

Methods: Retrospective chart review of patients participating in pelvic floor rehabilitation through the Center for Pelvic Floor Medicine between 2012 and 2013.

The VESy/Pfilates Method

Each patient received the Pfilates DVD at least 1 week prior to the start of the program. Patients underwent an initial, seated, two channel, pelvic floor biofeedback session to determine their ability to perform a voluntary pelvic floor contraction. Subsequently patients underwent baseline pelvic floor manometry using a vaginal balloon probe. Each subject then participated in a VESy session consisting of 4 channel wireless EMG (pelvic floor, gluteals, abdominals, lower extremity adductors) synchronized to video. Ten video-EMG clips were recorded (one for each of the 10 Pfilates movements) and analyzed to determine the three movements that provided the greatest pelvic floor engagement and coordination. These three clips were made available to patients online and “reminder” emails were sent on days 1,3,5,10, and 18. Patients followed up after 4 weeks for a final manometry and questioner assessment.

Results: 38 charts were selected for review. 100% of patients completed the first three visits and 69% returned at the end of 4 weeks for a final assessment. Twenty-five patients completed pre and post pelvic floor manometry. Eighteen patients completed pre and post bladder symptom questioners (UDI-6). Twelve patients provided an estimate of global improvement in lower urinary tract function. The mean improvement in pelvic floor strength, as estimated using vaginal balloon manometry, was 33% (13.2 – 16.9 cm H2O, p=.006). The mean improvement in UDI-6 score was 33% (9.3 – 6.3, p=.001). Among patients with a score greater than 0 on pre UDI-6 (n=10) the average improvement in overall bladder symptoms was 74% at the 4 week follow up visit.

Conclusions: Completion of the VESy/Pfilates program of pelvic floor rehabilitation is associated with short term improvement in pelvic floor strength and bladder symptoms.
Clinical Data

• 25 Subjects
• Pelvic Floor Strength: 33% improvement (p=.006)
• UDI-6 Score: 33% improvement (p=.001)
• Global Assessment Score: 74% Improvement at week 6
## Mobile VESy Pfilates The Mechanics

<table>
<thead>
<tr>
<th>Week</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Pelvic Floor EMG (Initial Assessment)</td>
</tr>
<tr>
<td></td>
<td>assessment of endurance and coordination</td>
</tr>
<tr>
<td>Week 2</td>
<td>Pelvic Floor Manometry</td>
</tr>
<tr>
<td></td>
<td>baseline strength assessment</td>
</tr>
<tr>
<td>Week 3</td>
<td>VESy Optimization</td>
</tr>
<tr>
<td></td>
<td>modified gait analysis to identify “best movements”</td>
</tr>
<tr>
<td></td>
<td>introduction of vesylab.com</td>
</tr>
<tr>
<td>Week 7</td>
<td>Pelvic Floor Manometry (Reassessment)</td>
</tr>
<tr>
<td></td>
<td>3d bladder diary UDI-6, IIQ 7</td>
</tr>
</tbody>
</table>
Mobile VESy Pfilates  The Mechanics

- **Week 1**  
  Pelvic Floor EMG (Initial Assessment)  
  assessment of endurance and coordination

- **Week 2**  
  Pelvic Floor Manometry  
  baseline strength assessment

- **Week 3**  
  VESy Optimization  
  modified gait analysis to identify “best movements”  
  introduction of vesylab.com

- **Week 7**  
  Pelvic Floor Manometry (Reassessment)  
  3d bladder diary UDI-6, IIQ 7
Pelvic Floor EMG
Mobile VESy Pfilates  The Mechanics

Week 1  Pelvic Floor EMG (Initial Assessment)
assessment of endurance and coordination

Week 2  Pelvic Floor Manometry
baseline strength assessment

Week 3  VESy Optimization
modified gait analysis to identify “best movements”
introduction of vesylab.com

Week 7  Pelvic Floor Manometry  (Reassessment)
3d bladder diary UDI-6, IIQ 7
Pelvic Floor Manometry
Mobile VESy Pfilates  The Mechanics

Week 1  Pelvic Floor EMG (Initial Assessment)
assessment of endurance and coordination

Week 2  Pelvic Floor Manometry
baseline strength assessment

Week 3  VESy Optimization
modified gait analysis to identify “best movements”
introduction of vesylab.com

Week 7  Pelvic Floor Manometry (Reassessment)
3d bladder diary UDI-6, IIQ 7
Mobile VESy Pfilates

The Mechanics

Week 1  Pelvic Floor EMG (Initial Assessment)
assessment of endurance and coordination

Week 2  Pelvic Floor Manometry
baseline strength assessment

Week 3  VESy Optimization
modified gait analysis to identify “best movements”
introduction of vesylab.com

➤ Week 7  Pelvic Floor Manometry (Reassessment)
3d bladder diary UDI-6, IIQ 7
### Bladder Diary

**Bladder Diary Instructions**

**Clients:** Your diary is intended to be used for three consecutive days. Please write your name on the diary and record on the date at the top of each of the three weeks long. Along the left of the diary are two hour time intervals beginning at 5 AM. Here is what you do...

1. Record each time you urinate at the appropriate time intervals by making a check mark in the far left column labeled "Time Of Day." 
2. Record each time you void a leak in the next column labeled "Voiding.
3. Record each pad change in the next column labeled "Pad.

**Client Name:**

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>2 of Urine</th>
<th>2 of Voiding</th>
<th>Pad Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>5am - 7am</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7pm - 9pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9pm - 11pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11pm - 1pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1pm - 3pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3pm - 5pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5pm - 7pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7pm - 9pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9pm - 11pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11pm - 1pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1pm - 3pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3pm - 5pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5pm - 7pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© Insight Design, LLC 2014

### Fecal Incontinence Severity Index (FISI)

For each of the following, please indicate on average how often in the past month you have experienced any amount of accidental bowel leakage. (Check only one box per item)

<table>
<thead>
<tr>
<th>Type of Fecal Incontinence</th>
<th>Occurs 1/day</th>
<th>Occurs more than once a day</th>
<th>Occurs once a week or less</th>
<th>Occurs more than once a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid Stool</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid Stool</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Urinary Distress Inventory & Incontinence Impact Questionnaire

1. Do you experience, and if so, how often do you experience urine leakage?
2. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
3. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
4. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
5. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
6. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
7. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
8. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
9. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?
10. Do you experience, and if so, how often do you experience urine leakage related to physical activity, coughing, or sneezing?

**Score**

© Insight Design, LLC 2014
Mobile VESy Pfilates: Administration

- We Provide
  - Contracting with Providers and PTs
  - Billing and Collections Support (coding, prior authorization)
  - Pfilates Kits, Folders, Questionnaires
  - Access to vesylab.com (19.99/mo)
  - All Clinical Documentation
  - Appointment Confirmation
Mobile VESy Pfilates: Administration

- You Provide:
  - Scheduling
  - Billing, Prior Authorization (if needed)
  - Facility (minimum 10 x 10 room, exam table)
Getting Going

1. Contracting with Insight Biodesign LLC
2. Join vesylab.com
3. Select Start Date