

# Poster digest


## Introduction

Once again, the 2018 POGP Annual Conference in Cardiff attracted a fantastic array of posters. We have printed short summaries and thumbnail-sized images of a selection of posters below. The full-sized versions can be viewed on the POGP microsite (<https://pogp.csp.org.uk/>). Congratulations to everyone who presented posters at Conference.


**Gillian Campbell**  
*Clinical Editor*

## A literature review investigating the reliability of digital vaginal palpation scales in the assessment of pelvic floor myalgia in females


The comprehensive assessment of chronic pelvic pain presents a complex clinical challenge. Palpation for pelvic floor myalgia is recommended in the assessment of chronic pelvic pain syndromes. However, further clarity is required regarding the reliability of digital palpation of pelvic floor myalgia to inform evidence-based best practice in clinical examination, documentation and research. The authors' aims were to: (1) to perform a systematic literature search investigating the reliability of proposed pain scales for digital vaginal palpation for pelvic floor myalgia; and (2) interpret these findings to establish the implications for clinical practice and standardize local practice. A systematic literature search was performed according to PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) in order to identify and review studies investigating the intra- and inter-rater reliability of validated pelvic floor myalgia scales in women with chronic pelvic pain. Five studies met the inclusion and exclusion criteria, and these were evaluated for methodological quality and risk of bias using the Critical Appraisal Skills Programme's Diagnostic Test Study and the Quality Appraisal of Diagnostic Reliability checklists. The significant heterogeneity across the studies limited collective data analysis. However, it was demonstrated that digital vaginal assessment of pelvic floor myalgia provided valid and reliable clinical information. A dichotomous scale was shown to provide the greatest intra- and inter-rater reliability. However, narrow



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### A literature review investigating the reliability of digital vaginal palpation scales in the assessment of pelvic floor myalgia in females

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<p><b>Background</b></p> <ul style="list-style-type: none"> <li>- The comprehensive assessment of chronic pelvic pain presents a complex clinical challenge.</li> <li>- Palpation for pelvic floor myalgia (PFM) is recommended in the assessment of chronic pelvic pain syndromes.</li> <li>- However, further clarity is required regarding the reliability and recommended method of digital palpation of PFM to inform evidence based best practice in clinical examination, documentation and research.</li> </ul> <p><b>Aims</b></p> <ul style="list-style-type: none"> <li>- To perform a systematic literature search investigating the reliability of proposed pain scales for digital vaginal palpation of PFM.</li> <li>- Interpret findings to establish implications for clinical practice and standardize local practice.</li> </ul> <p><b>Results</b></p> <ul style="list-style-type: none"> <li>- Five studies met the inclusion and exclusion criteria and were evaluated for methodological quality and risk of bias using the Critical Appraisal Skills Programme's Diagnostic Test Study Checklist and the "QAREL" checklist.</li> <li>- Study characteristics and results are summarised below.</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <thead> <tr> <th></th> <th>Tu et al. 2008*</th> <th>Slooterden Hove et al. 2008*</th> <th>Montenegro et al. 2010*</th> <th>Kavvaidas et al. 2013*</th> <th>Bhido et al. 2015*</th> </tr> </thead> <tbody> <tr> <td><b>Population size:</b></td> <td>N = 39</td> <td>N = 41</td> <td>N = 156</td> <td>N = 17</td> <td>N = 111</td> </tr> <tr> <td><b>Population characteristics:</b></td> <td>19 x chronic pelvic pain &amp; 20 x asymptomatic</td> <td>41 x mixed cohort with both/both asymptomatic</td> <td>108 x chronic pelvic pain &amp; 48 x asymptomatic</td> <td>17 x asymptomatic</td> <td>44 x pelvic floor hypertalgia &amp; 67 asymptomatic</td> </tr> <tr> <td><b>Pain score tested:</b></td> <td>0 = no pain. 1 = verbal report of pain. 2 = verbal report and grimace. 3 = grimace and attempt to withdraw.</td> <td><b>Dichotomous pain score:</b> Yes = any pain reported. 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Intra-rater reliability: ICC = 0.43-0.84 = "moderate to excellent".	<p><b>Method</b></p> <ul style="list-style-type: none"> <li>- A systematic literature search was performed (May 2018), according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA), to identify and review studies investigating intra and inter-rater reliability of validated PFM scales in females with chronic pelvic pain.</li> </ul> <p style="text-align: center;"><b>Search Strategy</b></p> <p><b>Databases:</b> CINAHL, Cochrane Library, MEDLINE and PEDro.</p> <p><b>Search terms:</b> <b>Population:</b> "Pelvic floor muscle"; "pelvic floor muscle disorders"; "pelvic floor muscle tenderness"; "levator ani syndrome"; "pelvic floor myalgia"; "chronic pain" or "pelvic pain"; "inter-rater"; "Physical examination"; "palpation"; "digital examination"; "pain scale"; "pain measurement"; "reliability" or "assessment". <b>Limits:</b> Female population; English language and available in full text.</p> <p><b>Additional search strategies:</b> - A hand search of reference lists for additional relevant articles. - A search of available grey literature.</p> <p><b>Concluding message</b></p> <ul style="list-style-type: none"> <li>- No gold standard currently exists for the assessment or documentation of PFM.</li> <li>- The current review concludes that existing pain scales for the digital vaginal assessment of PFM can provide valid and reliable clinical information.</li> <li>- Selection of the most appropriate PFM palpation scale may include consideration of clinical relevance and breadth of clinical information provided, in addition to demonstrated validity and reliability.</li> <li>- Further research is required to develop a standardised, clinically meaningful, reliable and reproducible examination process for PFM.</li> </ul> <p><b>References:</b></p> <p>1. Tu, H.Y., Pappas, C.B., Anand, T., Patel, T., Frenkel, K.B. (2008) Vaginal Pressure Pain Thresholds, Inter-Rater and Reliability Assessment in Healthy Women. <i>Obstetrical and Gynaecological Survey</i>, 63(1), 18-24.</p> <p>2. Bhido, A.S., B.C.P., Parthasarathy, A.L., Sridharan, K.J.C., Srinivasan, P.R., Raju, C.H. (2015) Pain Validity and Reliability of Digital Vaginal Palpation for Pelvic Floor Myalgia in Women with Chronic Pelvic Pain. <i>Journal of Pelvic, Obstetric and Gynaecological Physiotherapy</i>, 11(2), 10-15.</p> <p>3. Montenegro, L.L.S., Motta-Nascimento, E.L., Silva, J.C.C., Regatta, A.S., Reis, J.C.C., Silva, O.S.R. (2010) Evaluation of pelvic floor tenderness in chronic pelvic pain. <i>Acta Obstet Gynecol Scand</i>, 49(12), 1202-1207.</p> <p>4. Kavvaidas, T., Pappa, M., Pas, A., Pantazis, N., Iliopoulou, S. (2013) Pelvic floor muscle tenderness &amp; hyperalgesia: influence on pain perception and quality of life in patients with chronic pelvic pain. <i>International Urogynecology Journal</i>, 24(10), 1215-1220.</p> <p>5. Bhido, A.S., Pappas, C.B., Anand, T., Patel, T., Frenkel, K.B. (2015) The pelvic floor muscle tenderness (PFMT) scale: a descriptive study to assess inter-rater reliability and validity of the scale. <i>International Journal of Physiotherapy and Occupational Therapy</i>, 10(1), 11-15.</p>
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**Figure 1.** "A literature review investigating the reliability of digital vaginal palpation scales in the assessment of pelvic floor myalgia in females" poster.

numerical scales were also demonstrated to be valid and reliable tools that may additionally offer a greater breadth of information for clinical decision-making. The present authors propose that, in the absence of larger bodies of evidence, such scales may provide clinicians with a pragmatic tool to assess and interpret pelvic floor myalgia. These findings have informed local multidisciplinary team practice, and have implications for upcoming research protocols within the first author's unit. Further research investigating and evaluating the proposed three- to four-point scales in larger chronic pelvic pain study populations is warranted. In conclusion:

- No gold standard currently exists for the assessment or documentation of pelvic floor myalgia.
- Digital vaginal assessment of pelvic floor myalgia can provide valid and reliable clinical information.

- Selection of the most appropriate pelvic floor myalgia palpation scale may include consideration of clinical relevance in addition to demonstrated validity and reliability.
- Further research is required to develop a standardized, clinically meaningful, reliable and reproducible examination process for pelvic floor myalgia.

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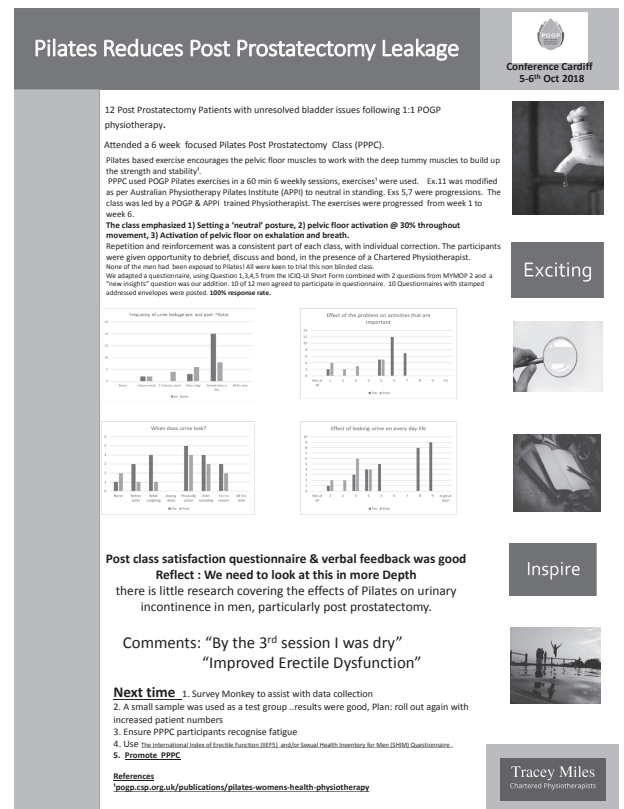
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### **A pilot project investigating the impact of Pilates classes for men with post-prostatectomy urinary incontinence**

A 6-week course of Pilates classes was trialled to determine the impact that these had on a group of men presenting with bladder symptoms following prostatectomy. Twelve non-blinded post-prostatectomy patients with unresolved continence issues following physiotherapy (one-to-one appointments, electromyography and digital rectal examination) were included in six, 60-min Pilates classes. The classes were led by a physiotherapist who had been trained by Pelvic, Obstetric and Gynaecological Physiotherapy (POGP), and the Australian Physiotherapy and Pilates Institute. The content consisted of POGP Pilates exercises (POGP 2016). The emphasis was on setting a “neutral” posture, pelvic floor activation at 30%, activation of the pelvic floor with the out breath, and repetition and reinforcement. Taking the opportunity to be debriefed by or discuss things with the physiotherapist was encouraged. Ten of the 12 subjects agreed to complete a questionnaire. Their comments included: “was dry by the [third] session”; “improved erectile dysfunction”; and “wet during the class”. Deeper evaluation was required. The International Consultation on Incontinence Questionnaire Urinary Incontinence – Short Form was adapted, and questions 1, 3, 4 and 5 were combined with two questions from the Measure Yourself Medical Outcome Profile 2. A



**Figure 2.** “A pilot project investigating the impact of Pilates classes for men with post-prostatectomy urinary incontinence” poster.

“new insights” question was the authors’ own addition. The scores for individual questionnaires have not yet been analysed. The primary outcomes were: improvement in everyday life (53%); easier to do important tasks (46%); reduced leakage (23%); and reduction in the number of leaks (20%). The observational outcomes were that men do not debrief or bond in this setting. One subject experienced urinary leakage during the class. The Pilates classes had a positive impact on leakage and activities of daily living. One participant showed signs of fatigue during the period of attendance, as evidenced by an increase in bladder symptoms. A digital rectal examination of this patient revealed no Valsalva, and hence, the increase in symptoms was not believed to be caused by the pelvic floor activation technique used in this case. The increase in symptoms spontaneously resolved at the conclusion of the intervention. Pilates classes appear to have a positive effect on post-prostatectomy pelvic floor symptoms. Using the same methodology, the authors anticipate rolling out these classes with increased patient numbers to fully evaluate the effect of Pilates on pelvic floor symptoms in this population.

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Pelvic, Obstetric and Gynaecological Physiotherapy (POGP) (2015) *Pilates in Women's Health Physiotherapy*. [WWW document.] URL [https://pogp.csp.org.uk/system/files/publication\\_files/POGP-Pilates.pdf](https://pogp.csp.org.uk/system/files/publication_files/POGP-Pilates.pdf)

**Management of recurrent UTIs in females aged 16–45 years**

Recurrent uncomplicated urinary tract infections (UTIs) are common among young, healthy women, even though they generally have anatomically and physiologically normal urinary tracts. In 16–45-year-old women, if normal, the only test that is recommended is an ultrasound scan, following which education and shared decision-making (SDM) is the preferred approach to treatment. Previously, there were no readily available SDM/education tools available in primary care, and often, the only intervention for these women was an acute course of antibiotics. This project aimed to provide accessible education for women aged from 16 to 45 years with frequent UTIs to help them self-manage. The aim was to reduce: UTI recurrence, antibiotic usage and primary care visits; and subsequently, unnecessary referrals to secondary care. For 16–45-year-old women, the new pathway provides a streamlined dipstick protocol for primary care. The patient then receives signposting to an online SDM/education booklet, and an invitation to self-refer to a physiotherapist-led educational session. Feedback from patients and primary care providers is being collected, and secondary care referral rates are being recorded. The length of time that the pathway has been running has meant that not all outcome measures are available yet, but the authors expect a cost saving for secondary care, with a predicted reduction of 250 in new referrals per year locally. So far, patient feedback has included the comment, “I literally cried with relief when I read the UTI booklet.” Early patient and general practitioner feedback suggests that the education provided is both accessible and valuable. After the initial launch in four primary care practices, the authors are now beginning to the roll the project out over the whole

clinical commissioning group. Other providers are also interested in adopting the booklet. This new pathway provides accessible education for women aged between 16 and 45 years who have recurrent UTIs that will help them to self-manage their condition. The pathway redesign has involved joint working between primary and secondary care, and patients.

**Management of recurrent UTIs in females aged 16–45 years**

POGP Conference, 1<sup>st</sup> 4<sup>th</sup> October 2018  
 Service Redesign Project  
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**Background**

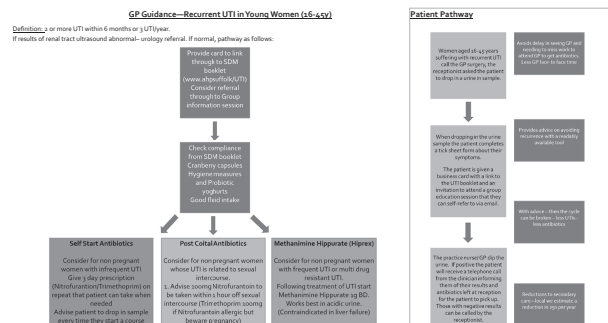
- UTIs are one of the most frequent clinical bacterial infections in women, accounting for nearly 25% of all infections.
- Around 50–60% of women will experience a UTI in their lifetime.
- Recurrent uncomplicated UTIs are common among young, healthy women even though they generally have anatomically and physiologically normal urinary tracts.
- In a study of college women with their first UTI, 27% experienced at least one culture-confirmed recurrence within the six months following the initial infection and 2.7% had a second recurrence during this same time period.
- Antibiotic prescriptions for UTI account for 10–20% of all antibiotic prescriptions in ambulatory care and are second only to antibiotic prescriptions for respiratory tract infections.

In 16–45-year old women the only tests recommended are USS, if normal then we feel education and shared decision making (SDM) is the preferred treatment. Previously, there were no readily available SDM/education tools available in primary care and often the only intervention for these women was an acute course of antibiotics.

The service improvement project aimed to provide accessible education for women aged 16–45 years with recurrent UTIs to help them self-manage, thus reducing recurrence of UTIs and antibiotic usage, whilst cutting primary care visits and subsequently reducing unnecessary secondary care referrals.

**Methods**

For 16–45 year old women the new pathway provides a streamlined dipstick protocol for primary care. The patient then receives signposting to an online SDM/education booklet and an invitation to self-refer to a physiotherapist-led educational session. Feedback from patients and primary care providers is being collected and secondary care referral rates recorded.



**Outcomes/Results**  
 The length of time the pathway has been running has meant that not all outcome measures are available yet, but we expect a cost saving for secondary care, with a predicted reduction in 250 new referrals per year locally. Currently each referral to secondary care costs an average of £220 which means we predict an estimated saving of £55000 per year locally.

**Patient Feedback:**  
 “Thank you for taking my UTI seriously”  
 “Can I have my booklet with my friends?”  
 “At last, something to help me!”  
 “I literally cried with relief when I read the UTI booklet”

**GP Feedback:**  
 “They are proving great use. We wondered if you could send us more please”  
 “The cards and the booklets were useful”  
 “Dip testing worked well and was perceived as positive by patients”  
 “Efficient for patients and staff alike and saved telephone appointments to relay a negative result”

**Conclusion**  
 Early patient and GP feedback suggests that the education provided is both accessible and valuable. After launching initially in a primary care practices we are now beginning to roll out over the whole CCG. There is also interest from other providers to adopt the booklets. This new pathway provides accessible education for women aged 16–45 years with recurrent UTIs to help self-manage their condition. The pathway redesign has involved joint working between primary, secondary care and patients alike.

**References**  
 Al-Sheik, A. and Al-Shah, S. (2015) Recurrent Urinary Tract Infections Management in Women: A Review. *Sultan Qaboos University Medical Journal* 15(3): 350–357.  
 Forman, J. (1992) Recurring urinary tract infection: incidence and risk factors. *American Journal of Public Health* 82:333–3.

**Figure 3.** “Management of recurrent UTIs in females aged 16–45 years” poster.

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**Impact of vesicovaginal fistula on quality of life among postpartum women in Kano State, Nigeria**

Despite its devastating impact on the lives of girls and women, obstetric fistula is still largely neglected in the developing world. It has

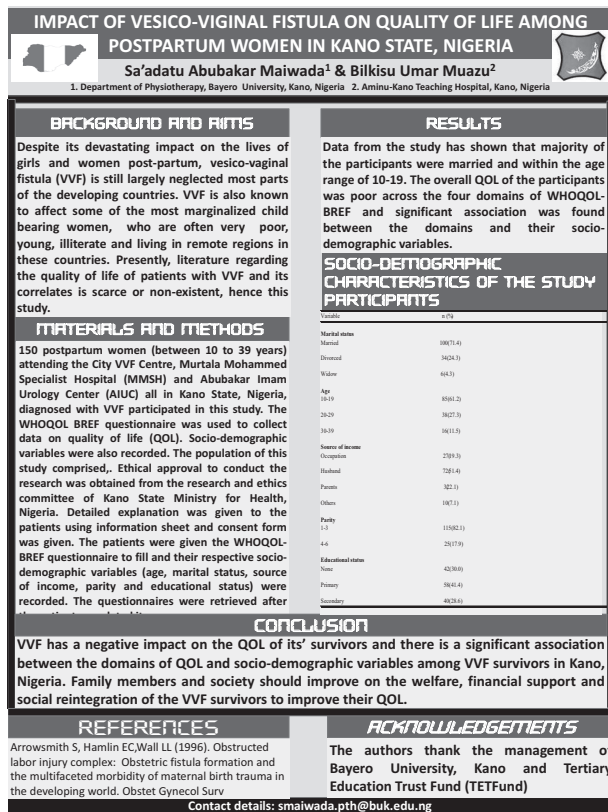


Figure 4. "Impact of vesicovaginal fistula on quality of life among postpartum women in Kano State, Nigeria" poster.

remained a "hidden" condition because it affects some of the most marginalized members of the population: poor, young, often illiterate girls and women in remote regions of the world. This study was carried out to determine the quality of life (QoL) of patients with vesicovaginal fistula (VVF), and its association with their sociodemographic variables. One hundred and fifty patients with VVF participated in this cross-sectional study. The short version of the World Health Organization QoL questionnaire (WHOQOL-BREF) was used to collect data on QoL, and sociodemographic variables were recorded. The population of this study was comprised of postpartum women between 10 and 39 years of age who were attending an urban VVF centre, Murtala Mohammed Specialist Hospital and Abubakar Imam Urology Centre in Kano, Kano State, Nigeria. Ethical approval to conduct the research was obtained from the research and ethics committee of Kano State Ministry of Health. A detailed explanatory information sheet and a consent form were given to the patients. The participants were given the WHOQOL-BREF questionnaire to fill in, and their respective sociodemographic variables (i.e. age, marital status, source of income, parity and

educational status) were recorded. The questionnaire was retrieved after the patient completed it. The majority of the participants were married, and within the age range of 10–19 years. The overall QoL of the participants was poor across the four domains of the WHOQOL-BREF, and a significant association was found between these domains and their sociodemographic variables. Vesicovaginal fistula has a negative impact on the QoL of women, and there is a significant association between the domains of the WHOQOL-BREF and the sociodemographic variables among VVF survivors in Kano, Nigeria. Family members and society at large should address the welfare, and levels of financial support and social reintegration of VVF survivors to improve their QoL.

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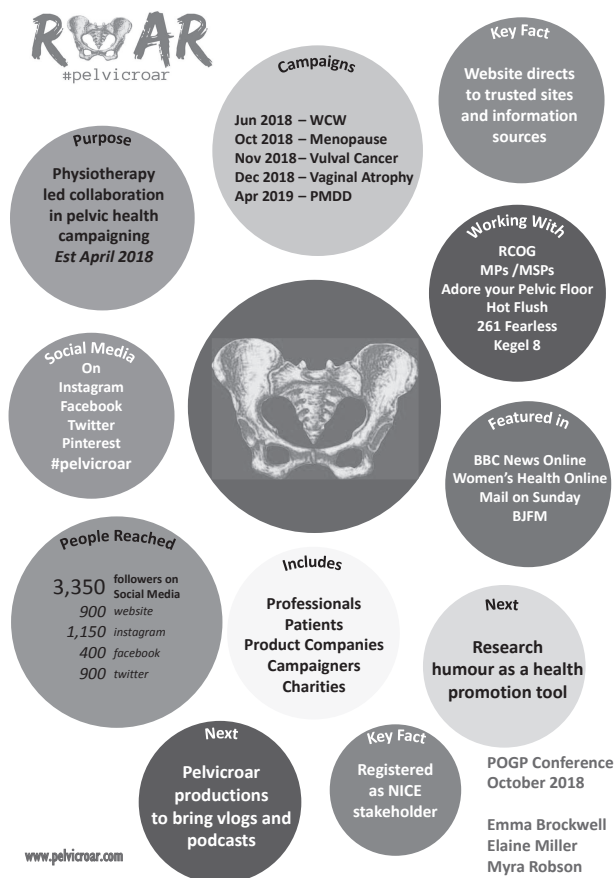
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### Establishing a pelvic health physiotherapy campaign collaboration

The aim of this project was to establish a self-sustaining collaborative campaign group (#pelvic roar). It is led by three pelvic health physiotherapists, who are attempting to bring cohesion to the various campaigns, individuals, professional groups, charities and activists working in the field of pelvic health. The group was launched in April 2018 after it was discovered that the three campaign leaders were attending similar parliamentary meetings, but were unaware of the overlap. It has evolved as the authors have made progress by working together. The group has a presence on all key social media platforms. They ran a successful campaign for World Continence Week 2018, and are currently working with a product company, a public relations company, and a number of health and fitness professionals several projects. The group has considerable support and a growing following. The authors have also made connections with other campaigns (e.g. menopause and premenstrual dysphoric disorder), and fitness professionals with

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**Figure 5.** “Establishing a pelvic health physiotherapy campaign collaboration” poster.

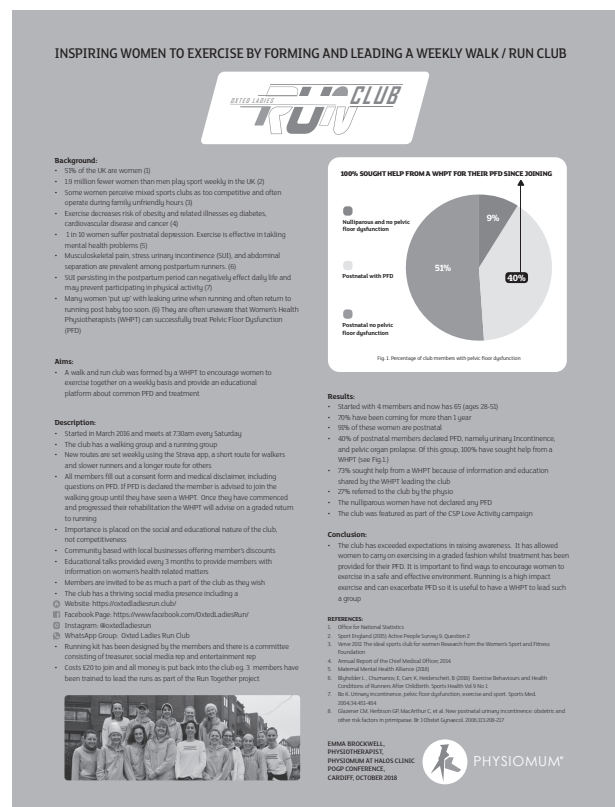
an interest in the pelvic floor. A number of future campaigns are being planned. The group also has a website that features guest blogs, and listings of evidence and experience-based sources of advice, help and information ([www.pelvicroar.org](http://www.pelvicroar.org)). It is becoming known as the public voice of pelvic health issues. The group is well-liked and respected. The authors have recently been contacted by members of parliament who would like to work with them to promote pelvic health issues across the age groups, and a meeting is planned for the autumn. The Internet provides us all with an overwhelming amount of information, but people are often poorly informed – or misinformed – about their pelvic health conditions. There is a need for curated, accessible ways to identify good-quality information, and it is worth keeping specialist pelvic health physiotherapy at the centre. This platform is doing just that.

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## Inspiring women to return to and maintain an exercise routine by establishing and leading a weekly running club

A walking and running club was set up by a women’s health physiotherapist. The group was created to encourage women to exercise together on a weekly basis, and provide a platform to educate women about common forms of pelvic floor dysfunctions (PFD) and effective treatment. It was launched in March 2016 after the physiotherapist who set it up realized that women are often put off joining mixed-sex running clubs because of the unintentionally competitive nature of these groups. Furthermore, many women are “putting up” with leaking urine when running, and they often return to running too soon



**Figure 6.** “Inspiring women to return to and maintain an exercise routine by establishing and leading a weekly running club” poster.

after giving birth. Furthermore, they often are unaware that women's health physiotherapists can treat PFD, and teach them to live with the symptoms. Conversely, many women avoid exercise because they leak urine, and therefore, are embarrassed. The club was created to encourage women to exercise together while being educated about PFD and treatment using various mediums (e.g. free evening talks). It caters for all abilities, and also has a walking group to accommodate those who cannot or do not want to run. The club started with four members, and over 65 women have now registered. The majority of members are postnatal, and many of them have declared that they have PFD and have sought help via a women's health physiotherapist since joining the group. The club was part of the Chartered Society of Physiotherapy's "Love Activity, Hate Exercise?" campaign, and is a good model of a community-based group run by a physiotherapist that improves women's QoL. It is important that physiotherapists find ways to encourage women to exercise in a safe and effective environment. High-impact exercise can exacerbate PFD, and therefore, it is useful to have a women's health physiotherapist lead such a group.

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### Translating a pelvic floor muscle exercise app into a different language: process and outcomes

The aim of this project was to translate the market-leading, physiotherapy-led pelvic floor muscle (PFM) exercise app into a different language in order to reach a non-English-speaking audience. It was initiated by a physiotherapist from Saudi Arabia who had often recommended the app, but wanted it to be available in Arabic to meet the needs of non-English-speaking men and women. This project had been considered by the technology team before, but the costs and time involved had been prohibitive. The Arabic-speaking physiotherapist offered a robust plan for the translation process, and a decision was made by the technology company to invest in the project and go ahead. The project involved translation, checking and a final formal double-checking process by a paid translation agency. It

## squeezy عربي



ترجمة "Squeezy" إلى العربية وبعد هذا التطبيق الأول من نوعه باللغة العربية

- تم ترجمة هذا النص بواسطة اخصائيون سعوديون في العلاج الطبيعي
- تم فحص هذا النص بواسطة اخصائيين سعوديين في القانون
- تم فحص هذا النص من قبل وكالة ترجمة بريطانية
- للحصول على التوازن بين الدقة وسهولة الاستخدام
- كل لغة لها تحدياتها الخاصة - على سبيل المثال، من المين الى اليسار
- ليس فقط التطبيق - ولكن أيضا المنشورات، الموقع على الإنترنت وما إلى ذلك

قد يبدو الأمر بسيطاً ، ولكنه معقد بشكل خادع - ومن المستحيل على فريق المملكة المتحدة التحقق من ذلك

عملية ترجمة كل تطبيق الي كل لغة عملية مكلفة للغاية

مؤتمر POGP تشرين الأول ٢٠١٨  
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## squeezy Arabic



Translating Squeezy to Arabic - first app of its kind in Arabic

- Saudi physios translated the text
- Checked by Saudi specialist and legal team
- Final check by UK translation agency
- Balance between tone, accuracy and usability
- Each language has its own challenges - e.g. right to left!
- Not just the App - consider leaflets, website, social media...

Seems simple, but deceptively complex to create - and a challenge to check

Expensive to do for every app and each language

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Figure 7. "Translating a pelvic floor muscle exercise app into a different language: process and outcomes" poster.

also involved some difficult technical work, and a variety of marketing challenges. The app went live after 6 months of work, and was launched at a conference on men's health that was being held in the Middle East by UK pelvic health physiotherapists. It has been well received, and we are now looking at an effective marketing strategy to promote it further. Translation into a foreign language is a complicated and time-consuming process. There are particular challenges involved in translating medical terms into words that are not only accurate, but also in common use in another language. Trained interpreters do not fully understand the topic and may misinterpret English medical terms, whereas professional staff may not have such accurate language skills. The translation of a healthcare app benefits from input by both healthcare professionals who specialize in the field and also translation experts. It takes time and considerable effort to ensure that the quality of the initial product is not lost in the translation process.

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**Pelvic floor muscle activation during contractions of the muscles surrounding the Pelvic Floor**

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**Introduction**

Electromyography (EMG) using intra-vaginal and/or intra-anal probes is widely used and considered a reliable method of assessing the activity of the pelvic floor musculature (PFM). The activation of muscles surrounding the pelvic floor, such as abdominal or hip musculature, during a PFM contraction has been described before. In literature, it has been emphasized that co-activation of the PFM should be performed in isolation without abdominal or hip muscle activity. Contractions of the adductors and gluteal muscles during PFM exercises is considered incorrect as these actions may occur without concurrent PFM muscle activity. Some authors found that it was not possible for continent women to fully contract their PFM without also contracting the transversus abdominis and the internal obliques. Furthermore they were not able to perform a maximal voluntary contraction (MVC) with their PFM without a rise in EMG activity in the lower portion of rectus abdominis. The aim of this study was: To describe the EMG activity of the pelvic floor muscles (PFM) with a bipolar EMG probe and the MAPLe (a reliable and valid 24 electrode probe, capable of registering nearest to the individual PFM) and the effect of the contractions of the muscles surrounding the pelvic floor (Figure 1).

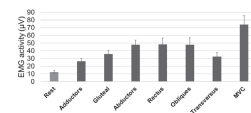


Figure 3: Intravaginal EMG for bipolar probe. On the left Rest (light blue), on the right MVC (dark red) and in between the intravaginal EMG during contraction of Adductors, Gluteal, Abductors, Rectus, Oblique and transversus (dark blue).

**Pelvic floor muscle activation during contractions of the muscles surrounding the pelvic floor**

The literature emphasizes that PFM exercise should be performed in isolation without abdominal or hip muscle activity. The MAPLe (Novuqare Pelvic Health B.V., Rosmalen, the Netherlands) is a reliable and valid 24-electrode electromyography (EMG) probe that is capable of registering individual PFMs. The aim of this study was to use the MAPLe to describe the activity of the PFMs, and the effect of the contractions of the muscles surrounding the pelvic floor. Healthy pelvic floor physiotherapists without a history of complaints of micturition, defecation, sexual dysfunction and/or pain, and pelvic surgery participated. The tasks performed included 1-min rest, 10 maximal voluntary contractions (MVCs), and three provoked contractions of the adductor, gluteal, abductor, rectus abdominis, oblique and transversus abdominis muscles. Some EMG results were recorded with surface electrodes. For the PFMs, the EMG findings were recorded intravaginally with the MAPLe. The activation of the PFMs during provoked contractions was compared to rest and MVCs with paired *t*-tests. Fifteen volunteers were included (mean age = 45.5 years; range = 28–63 years). The EMG activity recorded by the MAPLe for all contractions of the PFMs and surrounding muscles was significantly higher than rest, and lower than MVCs, except the rectus abdominis. Contractions of the muscles surrounding the pelvic floor result in co-activation of the PFMs rather than crosstalk from the surrounding muscles, i.e. an involuntary reflex contraction. These results

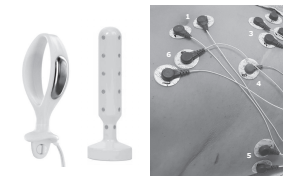
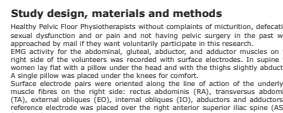


Figure 1: Bipolar probe (Periform, left) and unipolar probe (MAPLe, right).  
 Figure 2: Location of electrodes for the MAPLe. The four components represent the anterior (12 o'clock), left (9 o'clock), posterior (6 o'clock) and right side (3 o'clock) of the PFM. The most outer ring (nearest to the center) is located at the most cranial or deeper parts of the PFM. Light blue = compared to Rest EMG, White = significantly higher than Rest & lower than MVC for all segments.



**Study design, materials and methods**  
 Healthy Pelvic Floor Physiotherapists without complaints of micturition, defecation, sexual dysfunction and/or pain and not having pelvic surgery in the past were approached by mail if they want voluntarily participate in this research. EMG activity for the abdominal, gluteal, abductor and adductor muscles on the right side of the volunteers was recorded with surface electrodes. In supine the women lay flat with a pillow under the head and with the thighs slightly abducted. A single pillow was placed under the knees for comfort. Surface electrode pairs were oriented along the line of action of the underlying muscle fibres on the right side: rectus abdominis (RA), transversus abdominis (TA), external oblique (EO), internal oblique (IO), adductors and abductors. A reference electrode was placed over the right anterior superior iliac spine (ASIS) (Figure 2).  
 The volunteers were asked to perform the following activities: one minute of rest, 10 maximal voluntary contractions and three (selectively) provoked contractions of the Adductors, Gluteal, Abductors, Rectus Abdominis, Obliques and Transversus Abdominis were performed. Furthermore, EMG was recorded with a bipolar probe (Periform) and repeated with the MAPLe, a monopolar probe, both placed intravaginally. During the provoked contractions of the muscles surrounding the Pelvic Floor a MicroFT 200 Handheld Dynamometer was used to record resistance force to ensure similar effort during the provoked activation.  
 For the bipolar probe and the muscles surrounding the pelvic floor, raw EMG signals were acquired at a sample rate of 2,048 Hz. For each bipolar signal, the root mean square was calculated using a window of 200 samples (0.1 sec). For the MAPLe, the raw EMG signals were acquired at a sample rate of 1,000 Hz, the root mean square was calculated using a window of 100 samples (0.1 sec). An average EMG of all 24 electrodes was taken for the analysis in this abstract. For tone at rest, MVC and the activity on the probes during a provoked contraction an average was calculated for both probes. The activation of the PFM was compared to tone at rest and MVC with paired *t*-tests to find significant differences.

**Results**  
 Fifteen volunteers were included in this study with a mean age of 45, 7 years (range: 28-63). Seven women were premenopausal and 8 postmenopausal with a mean of Gravida 1, 2 (range 0-3) and delivery of 1,3 (range 0-3). For the Bipolar probe intravaginal EMG was significantly higher than Rest and Lower than MVC during a contraction of any of the muscles surrounding the pelvic floor (Figure 3).  
 The MAPLe showed no significant increase in PFM contraction compared to rest at the left and right side of the middle segment during a contraction of the adductors, Obliques or Transversus Abdominis (Figure 4a). For a contraction of the Abductors the superficial and deep parts of the PFM showed a contraction similar to MVC, the middle parts are significantly lower than MVC (Figure 4b). For a contraction of the Rectus Abdominis the middle and deep parts of the PFM showed a contraction similar to MVC, the superficial parts are significantly lower than MVC (Figure 4c). For a contraction of the Gluteal muscles the PFM activity was significantly higher than rest and lower than MVC for all segments.

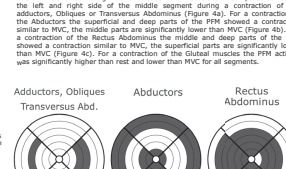


Figure 4: Pelvic floor muscle activity during contraction of muscles surrounding the pelvic floor. The four components represent the anterior (12 o'clock), left (9 o'clock), posterior (6 o'clock) and right side (3 o'clock) of the PFM. The most outer ring (nearest to the center) is located at the most cranial or deeper parts of the PFM. Light blue = compared to Rest EMG, White = significantly higher than Rest & lower than MVC for all segments.

**Interpretation of the Results**  
 Bipolar EMG shows general intravaginal activity that was significantly higher than Rest and significantly lower than MVC for all contractions of surrounding muscles. MAPLe shows selective co-activation of the PFM when contracting the muscles surrounding the pelvic floor.  
 This indicates that there is a selective co-activation of the PFM depending on which muscles surrounding the pelvic floor is contracted and rest, as some described in literature, crosstalk from the surrounding muscles. Perhaps the recorded co-activation is an involuntary reflex contraction to counteract the sudden increase in pressure or it could be that there is in fact 'crosstalk' across different nerves or nerve branches during these types of contractions. The findings of this study are in line with findings regarding lower back pain and the high incidence of incontinence (some report up to 70%) which indicates there is a direct link between the musculature of the lower back and the constitution of the PFM.  
**Concluding message**  
 The MAPLe provides the possibility to identify the specific PFM involved in co-activation by contractions of muscles surrounding the pelvic floor. This could benefit patients and therapists in finding ways to personalize therapy.



**Figure 8.** “Pelvic floor muscle activation during contractions of the muscles surrounding the pelvic floor” poster.

are in line with those for low back pain and the high incidence of incontinence. This study shows that contractions of the muscles surrounding the pelvic floor may result in coactivation of the PFMs. This phenomenon could offer the possibility of a new treatment method and benefit patient outcomes.

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