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SPECIAL CONTRIBUTION

An International Urogynecological Association (IUGA)/ International Continence Society (ICS) joint report on the terminology for the conservative and nonpharmacological management of female pelvic floor dysfunction

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Introduction and hypothesis There has been an increasing need for the terminology on the conservative management of female pelvic floor dysfunction to be collated in a clinically based consensus report.

Methods This Report combines the input of members and elected nominees of the Standardization and Terminology Committees of two International Organizations, the International Urogynecological Association (IUGA) and the International Continence Society (ICS), assisted at intervals by many external referees. An extensive process of nine rounds of internal and external review was developed to exhaustively examine each definition, with decision-making by collective opinion (consensus). Before opening up for comments on the webpages of ICS and IUGA, five experts from physiotherapy, neurology, urology, urogynecology, and nursing were invited to comment on the paper.

Results A Terminology Report on the conservative management of female pelvic floor dysfunction, encompassing over 200 separate definitions, has been developed. It is clinically based, with the most common symptoms, signs, assessments, diagnoses, and treatments defined. Clarity and ease of use have been key aims to make it interpretable by practitioners and trainees in all the different specialty groups involved in female pelvic floor dysfunction. Ongoing review is not only anticipated, but will be required to keep the document updated and as widely acceptable as possible.

Conclusion A consensus-based terminology report for the conservative management of female pelvic floor dysfunction has been produced, aimed at being a significant aid to clinical practice and a stimulus for research.

KEYWORDS

consensus, conservative management, female, pelvic floor dysfunction, terminology

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INTRODUCTION

There is currently no single document addressing the conservative management of female pelvic floor dysfunction in a comprehensive way. The report is based on, and follows on from, the terminology proposed by the International Continence Society (ICS) Standardization of Terminology of Lower Urinary Tract Function,[1] the Standardization of Terminology of Pelvic Floor Muscle Function and Dysfunction: Report from the Pelvic Floor Clinical Assessment group of the International Continence Society,[2] and the International Urogynecological Association (IUGA)/International Continence Society (ICS) Joint Report on the Terminology for Female Pelvic Floor Dysfunction.[3]

The terminology in current use related to conservative management generally lacks uniformity, often because different disciplines use their own terminology. The range of terms in use can lead to uncertainty, confusion, and unintended ambiguity. It hampers the ability to build a body of literature concerning conservative interventions, e.g., the terms "behavioral therapy," "lifestyle intervention," "conservative treatment," "nonsurgical treatment," "physiotherapy," "biofeedback," and "pelvic floor muscle exercise" are often used interchangeably and, at times, incorrectly, to describe both the same and different interventions. A more standardized terminology would aid interdisciplinary communication and understanding.

Existing published reports address some of the aspects of this topic, but there are some areas of terminology currently lacking standardization, e.g., Messelink et al.[2] and Haylen et al.[3] refer to evaluation and diagnostic terminology, but not to treatment terminology.

There is a need for a more extensive description of the management of the pelvic floor and pelvic floor muscle (PFM) dysfunction than is currently provided in existing terminology reports. With the development of the evidence base for conservative therapies in the management of pelvic floor dysfunction (PFD), especially treatment of conditions such as incontinence and pelvic organ prolapse (POP), terminology linked with these managements has evolved, but with regional and discipline variations. A consensus on currently accepted terminology is required. Elements in the title of the document need to be defined:

Conservative: restricted to nonsurgical and nonpharmacological approaches.

Management: includes the following aspects:

a) Assessment: including history and physical examination and investigations

b) Diagnosis

c) Prevention

d) Treatment of pelvic floor dysfunction

Pelvic floor: structures located within the bony pelvis, i.e., urogenital and anorectal viscera, PFM and their connective tissues, and nerves and blood vessels.

Pelvic floor dysfunction: following on from Messelink et al.'s report from the Pelvic Floor Clinical Assessment Group of the ICS,[2] this report will focus on the terminology of the management of pelvic floor function and dysfunction, including bladder and bowel dysfunction, pelvic organ prolapse (POP), sexual dysfunction, and pelvic pain.[4] Terminology regarding pelvic pain and anorectal dysfunction related to PFM dysfunction aligns with the current working groups on chronic pelvic pain and anorectal dysfunction. Terminology includes symptoms, signs, and investigations (expanding on Messelink et al.'s paper[2]; diagnoses of PFM-related conditions (avoiding duplication with Haylen et al.[3]); prevention and treatment (including new therapies, e.g., exercise and adjunctive therapies, including equipment, and lifestyle modifications not covered by Messelink et al.[2] or Haylen et al.[3]

Additional descriptions related to the terms used in this manuscript are:

Clinicians/practitioners: conservative management of PFD may be provided by clinicians or practitioners of different disciplines, commonly physiotherapists/physical therapists, nurses, midwifes, and medical doctors. However, other professions, e.g., fitness instructors and personal trainers, may also play a role in education, health promotion, and prevention of PFD. Terminology related to the accepted names of professions and the different types of therapies must be specified and distinguished (e.g., "physiotherapy" as a management provided by a registered physiotherapist, as distinct from "conservative therapy" and "exercises"/"biofeedback," which may be provided by any clinician). The emphasis in this document will be on management commonly undertaken by clinicians practicing conservative management.

Multidisciplinary approach: relating to, or involving, two or more disciplines that are usually considered distinct,[5] e.g., physical therapy, urology, gynecology

Gender: with the increasing specificity and complexity of female diagnosis and management it can be argued that a gender-specific report is needed. However, many of the terms defined in this report are not gender-specific and are the same for males, e.g., PFM training and electrical stimulation. This report does not preclude an additional future report on male pelvic floor dysfunction

METHODOLOGY

All working group members were asked to provide terms that they knew existed in the area. After the first "brainstorming activity," all terms were listed and grouped according to introduction, symptoms, signs, examination methods, investigations, diagnosis, prevention, and treatment. All members were given the text to which to add

more terms. Additional searching for omitted terms in existing terminology papers of the ICS and IUGA, Cochrane reviews, and the 2013 ICI document[6] was undertaken. Existing definitions of established terms from general medicine,[7,8] physiotherapy,[5] and exercise science were used where available. Only in situations where there was no existing terminology were new definitions introduced. We have not referred to or described the responsiveness, reliability, and validity of the measurement methods of symptoms, signs, and evaluations, nor have we acknowledged the evidence for the treatment efficacy of any of the therapies defined.

Agreement on the definitions was reached by consensus. Wherever possible, evidence-based principles were followed. However, this was a challenge in conservative management, as there are many suggested therapies that do not have proven effectiveness.[9,10] Discussion meetings with representatives of the IUGA and ICS were held at the following annual meetings: IUGA Brisbane 2012, ICS Beijing 2012, IUGA Dublin 2013, ICS Barcelona 2013, IUGA-AUGS Washington DC 2014, and IUGA Nice 2015.

It is recommended that acknowledgment of these standards in written publications related to the conservative management of female pelvic floor dysfunction is stated as follows: "Methods, definitions, and units conform to the standards jointly recommended by the IUGA/ICS Joint Report on the Terminology for the Conservative and Nonpharmacological Management of Female Pelvic Floor Dysfunction, except where specifically noted."

ASSESSMENT

Symptoms

Symptom: any morbid phenomenon or departure from the normal in structure, function or sensation, experienced by the woman and indicative of disease or a health problem. Symptoms are either volunteered by, or elicited from the individual, or may be described by the individual's caregiver.[3]

Existing (defined) symptoms

1. Urinary incontinence (UI) symptoms[3]
2. Bladder storage symptoms[3]
3. Sensory symptoms[3]
4. Voiding and postmicturition symptoms[3]
5. POP symptoms[3]
6. Symptoms of sexual dysfunction[3]
7. Symptoms of anorectal dysfunction[3, endnote 1]
8. Lower urinary tract infection UTI[3]

Lower urinary tract pain and/or other pelvic pain[endnote 2]

1. Pain (in general): "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage".[11]
2. Tenderness: sensation of discomfort with or without pain; discomfort elicited through palpation, indicates unusual sensitivity to pressure or touch.[12]
3. Acute pain: pain related to acute trauma, infection or other well-defined disease processes or conditions.
4. Chronic pain: persistent or continuous/recurrent pain for at least 6 months. If non-acute and central sensitization pain mechanisms are well documented, then the pain may be regarded as chronic, irrespective of the time period.[13,14]
5. Myalgia: muscle pain. Pelvic floor myalgia (a symptom) may be present with or without a change in PFM tone (a sign).[endnote 3]
6. Myofascial pain: pain caused by the presence of trigger points within muscles or their fascia.[15, endnote 4]

Signs

Sign: any abnormality indicative of disease or a health problem, discoverable on examination of the patient; an objective indication of disease or a health problem.[1]

Existing (defined) signs

1. Urinary incontinence signs:[3]
   - **a)** UI[3]
   - **b)** Stress (urinary) incontinence[3]
   - **c)** Urgency (urinary) incontinence[3]
   - **d)** Extraurethral incontinence[3]
   - **e)** Stress incontinence on prolapse reduction (occult or latent stress incontinenc[3]
2. Pelvic organ prolapse signs:[3]
   - **a)** Uterine/cervical prolapse[3]
   - **b)** Vaginal vault (cuff scar) prolapse[3]
   - **c)** Anterior vaginal wall prolapse[3]
   - **d)** Posterior vaginal wall prolapse[3]
3. Other pelvic examinations/signs[3]:
   - **a)** Vulval abnormalities[3]
   - **b)** Urethral mucosal prolapse[3]
   - **c)** Urethral caruncle[3]
   - **d)** Urethral diverticulum[3]
   - **e)** Total vaginal length (TVL): the distance from the posterior fornix to the hymen.[16]
   - **f)** Valsalva maneuver: the action of attempting to exhale with the nostrils and mouth, or glottis closed.[7] Valsalva

is usually performed with digital closure of the nose, as when trying to equalize pressure in an airplane. Straining/bearing down may have a similar meaning to Valsalva; however, in practice, straining/bearing down may be interpreted as meaning pushing downward and trying to relax the pelvic floor, as when defecating.

g) Bimanual pelvic examination[3]

h) Perineal elevation: inward (ventrocephalad) movement of the vulva, perineum, and anus during, for example, PFM contraction.

i) Perineal descent: excessive dorsocaudal movement of the vulva, perineum, and anus, for example, during coughing, Valsalva or straining.[3,17]

j) Trophic: promoting cellular growth, differentiation, and survival.[8] This is the normal status of an organ, tissue or cell with regard to nutrition, size, number, form, and function. A trophic urogenital tract is usually well-estrogenized.

k) Atrophic: decrease from previous normal size of the body or a part, cell, organ, or tissue. An organ or body part's cells may be reduced in number, size or both. Atrophy of some cells and organs is normal at certain points in the life cycle. Other causes include malnutrition, disease, disuse, injury, and hormone over- or underproduction.[8, endnote 5]

4. Anal signs[18]

5. Abdominal signs

a) Bladder fullness/retention: abdominal palpation or suprapubic percussion may indicate a full bladder; however, in overweight patients this may not be easily detected.

b) Pelvic bone irregularities: indication of a previous fracture or sacral agenesis.

6. Neurological signs: abnormalities of the nervous system detected by physical examination that reflect an underlying neurological disease or injury. Examples of abnormal signs may include altered sensation, muscle tone or reflexes. If present, the patient should be referred for a full neurological examination.

Pelvic floor muscle function signs

1. Normal PFM: have a level of constant resting tone (except just before and during voiding and defecation), symmetry, and the ability to voluntarily and involuntarily contract and relax.

2. Normal PFM contractile function: a constriction and inward (ventrocephalad) movement of the pelvic openings. Normal, well-functioning pelvic floor muscles may demonstrate some (controlled or limited) downward dorsal perineal movement in response to increased intra-abdominal pressure in the absence of incontinence or POP.

3. Muscle tone: state of the muscle, usually defined by its resting tension, clinically determined by resistance to passive movement.[19–21] Muscle tone has two components: the contractile component, created by the low-frequency activation of a small number of motor units, and the viscoelastic component, which is independent of neural activity and reflects the passive physical properties of the elastic tension of the muscle fiber elements and the osmotic pressure of the cells.[19, endnote 6]

a) Hypertonicity: an increase in muscle tone related to the contractile or viscoelastic components that can be associated with either elevated contractile activity and/or passive stiffness in the muscle.[20,22] The terms neurogenic hypertonicity and non-neurogenic hypertonicity are recommended to describe the diagnosis and inform management.

b) Hypotonicity: a decrease in muscle tone related to the contractile or viscoelastic components that can be associated with either reduced contractile activity and/or passive stiffness in the muscle. The terms neurogenic hypotonicity and non-neurogenic hypotonicity are recommended to describe the diagnosis and inform management.[endnote 7]

4. Stiffness: resistance to deformation.[23] Passive elastic stiffness is defined as the ratio of the change in the passive resistance or passive force (ΔF) to the change in the length displacement (ΔL) or $\Delta F/\Delta L$.[24] The term should only be used if stiffness is measured quantitatively, such as with the use of instruments such as dynamometry or myotonometry.

5. Tension: may have a similar meaning to tone and stiffness. Muscle tension can be increased or decreased because of exogenous factors such as the amount of pressure applied and endogenous factors such as thickness/cross-sectional area of the muscle itself, fluid present within the muscle (swelling, inflammation), position (e.g., standing versus sitting) or increased neural activity.

6. Spasm: persistent contraction of striated muscle that cannot be released voluntarily. If the contraction is painful, this is usually described as a cramp. Spasms occur at irregular intervals with variable frequency and extent,[25] and over days or weeks may lead to a contracture.

7. Contracture: an involuntary shortening of a muscle. Clinically, a muscle cramp and contracture may appear similar; however, contractures are electrically silent.[26]

8. Cramp: a painful involuntary muscle contraction that occurs suddenly and can be temporarily debilitating. Pain is intense and localized. It tends to occur when the muscle

is in the shortened position and contracting, is generated by motor units, and displays a high firing rate (20–150 Hz).[26, endnote 8]

9. Fasciculation: a single, spontaneous, involuntary discharge of an individual motor unit. The source generator is the motor unit or its axon, before its terminal branches. Fasciculations display an irregular firing pattern of low frequency (0.1–10 Hz).[5,26] Clinically, fasciculations are recognized as individual brief twitches. They may occur at rest or after muscle contraction and may last several minutes.
10. Tender point: tenderness to palpation at soft-tissue body sites.[19]
11. Trigger point (TrP): a tender, taut band of muscle that can be painful spontaneously or when stimulated.[27] The taut band is electrically silent.[endnote 9]
12. Pelvic floor muscle dyssynergia[2]: incoordination of the PFM and another muscle group during a functional activity, for example, the pelvic floor muscles may not relax appropriately during micturition or defecation.
13. Nonfunctioning PFM (modified from Messelink et al.)[2]: a situation in which there is no PFM action measurable either on instruction to contract (inability) or as the absence of an automatic response to an increase in intra-abdominal pressure. This condition can be tbased on any pelvic floor symptom and on the sign of a noncontracting or nonrelaxing pelvic floor.
14. Pelvic floor muscle injury (PFMI): on clinical palpation, PFMI is diagnosed when one or more of the following is present:
    a) A discontinuity of the puborectalis muscle at its attachment to the inferior pubic ramus[28]
    b) A distance of >3.5 finger widths between the two sides of puborectalis muscle insertion[29,30]
    c) A gap in the continuity of the pubovisceral muscle between the pubic rami and the anorectum[31]
15. Muscle action characteristics:
    a) Maximal voluntary contraction (MVC): the attempt to recruit as many fibers in a muscle as possible for the purpose of developing force.[32] MVC of the pelvic floor can be assessed by vaginal palpation, manometers, and dynamometers.[endnote 10]
    b) Muscle strength: force-generating capacity of a muscle.[5] It is generally expressed as maximal voluntary contraction measurements and as the one-repetition maximum (1RM) for dynamic measurements.[32–34]
    c) Local muscle endurance: the ability to sustain near maximal or maximal force, assessed by the time a patient is able to maintain a maximal static or isometric contraction, or the ability to repeatedly develop near maximal or maximal force determined by assessing the maximum number of repetitions the patient can perform at a given percentage of 1RM.[35]
    d) Muscle power: the explosive aspect of strength; the product of strength and speed of movement (force × distance/time).[35]
    e) Co-ordination: property of movement characterized by the smooth and harmonious action of groups of muscles working together to produce a desired motion.[5]
    f) Motor control: the ability of the nervous system to control or direct the muscles in purposeful movements and postural adjustment by selective allocation of muscle tension across appropriate joint segments.[5,36]
    g) Submaximal contraction: all contractions without maximal effort, expressed as a percentage of 1RM.
    h) Synergistic contraction: the combination of several muscle actions that serve to optimally achieve a motor task.[37]
    i) Co-contraction: contraction of two or more muscles at the same time. Co-contraction of muscles can be synergistic (e.g., resulting in an augmentation of motor activity) or it could be counterproductive to normal function (e.g., contraction of antagonistic muscles resulting in abnormal movement or training other muscles instead of the targeted ones, e.g., training of gluteal muscles instead of the PFM).
    j) Antagonistic contraction: contraction of muscle/muscle groups with the opposite action to the desired action (activity that hinders the targeted muscle/muscle group from contracting).
16. Other:
    a) Hypertrophy: the increase in size (volume) of the muscle fibers.[37]
    b) Atrophy: the decrease in size of muscle fibers as a result of inactivity, illness or aging.[38]
    c) Bulk: the absolute volume of a muscle measured using imaging techniques such as anatomical magnetic resonance imaging and ultrasound.[39]
    d) Anatomic cross-sectional area: for an individual muscle, the largest cross-sectional area along the length of that muscle and 90° on the muscle length.[7]
    e) Physiological cross-sectional area: the total area of cross-section perpendicular to the muscle fibers.[7]
    f) Flexibility: the ability of a muscle to lengthen and allow one joint (or more than one joint in a series) to move through a range of motion. Loss of flexibility is defined as a decrease in the ability of a muscle to deform.[40]
    g) Proprioception: sensory information from receptors of muscles, joints, capsules, and ligaments that provides information related to posture and movement.[41]

h) Exteroception: sensory information from receptors in the skin registering touch, vibration, heat, and cold.[41]

INVESTIGATIONS AND IMAGING

All methods and devices used for assessments (e.g., palpation, manometers, dynamometers, EMG, urodynamics, ultrasound, and magnetic resonance imaging [MRI]) must be described in detail, and their responsiveness (ability to detect small changes), reliability and validity should be reported.[42]

Existing (defined) investigations

Urodynamics

Urodynamics is the functional study of the lower urinary tract[3]:

1. Uroflowmetry[3]
2. Post-void residual (PVR) urine volume[3]
3. Cystometry[3]
4. Pressure flow study[3]
5. Assessment of urethral function[3]
   a) Urethral pressure measurement[3]
   b) Abdominal leak point pressure (ALPP)[3]

Frequency–volume chart

The frequency–volume chart (FVC) records the time of each micturition and the volume voided for at least 24 h, although 2 or 3 days of recording (not necessarily consecutive) generally provide more useful clinical data.[3]

1. Bladder diary: in addition to the FVC, a bladder diary includes fluid intake, pad usage, number incontinence episodes, and the degree of incontinence.[3]

Pad testing

Quantification of the amount of urine lost over the duration of testing, by measuring the increase in weight of the perineal pads used (weighed pre- and post-testing).[3]

Ultrasound imaging

1. PFMI: PFMI is diagnosed on ultrasound when at least one of the following is present:
   a) Undetected puborectalis-to-ipsilateral sidewall attachment on any of the three central slices (full avulsion)
   b) Undetected puborectalis-to-ipsilateral sidewall attachment on at least one slice (partial avulsion)[43]
   c) A levator–urethra gap (LUG) of greater than 2.5 cm[44]
2. PFM position in the pelvis: can be measured in the sagittal plane in relation to defined landmarks, and may be related to PFM dysfunction (elevated or descended pelvic floor).
3. Hiatal dimension: is the cross-sectional area of the pelvic floor/levator hiatus, including anteroposterior and transverse distances (Fig. 1).

Radiological imaging

Videocystourethrography (VCU); intravenous urography (IVCU); micturating cystography (MCU); defecography; colpocystodefecography.

Magnetic resonance imaging

1. PFM injury: can represent a full spectrum, from disruption of a single fascicle, to complete disruption of the muscle origin. At present, there is no universally accepted system for the diagnosis and evaluation of the extent of the injury. Essentially, abnormalities are judged to have occurred

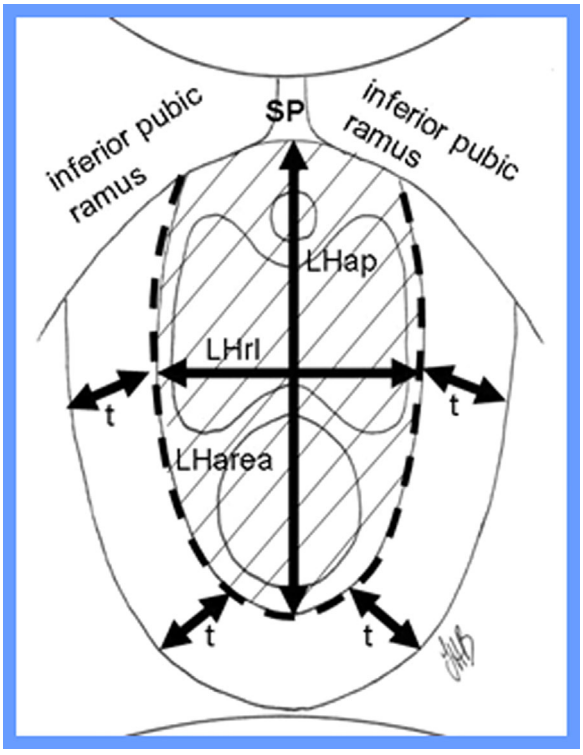

FIG. 1 Levator hiatal dimensions measured using transperineal ultrasound (reproduced with permission from Ingeborg Hoff Braekken). *LHap* levator hiatus antero-posterior, *LHrl* levator hiatus right-left, *LHarea* levator hiatus area, *SP* symphysis pubis, *t* pubovisceral muscle thickness

when the morphology of the pubococcygeal portion of the levator ani muscle deviates from what is seen in normal nulliparous women.[45] Several groups have studied and defined levator damage on MRI when one or more of the following is present: absence of pubococcygeal muscle fibers in at least one 4-mm section, or two or more adjacent 2-mm sections in both the axial and the coronal planes.[46] The degree of injury can be assessed based on the amount of muscle involved in the injury, with reasonable repeatability among different examiners in a single group.[47] More than half the expected muscle bulk is associated with the presence of POP.[48]

2. PFM position in the pelvis: location of the PFM in the sagittal plane in relation to defined landmarks. They may be elevated or descended.

Palpation

The process of using fingers/hands as part of assessment, to gather information about the tissues. Digital palpation of the PFM is described by Messelink et al. (Fig. 2) [2].

FIG. 2 Digital palpation of the pelvic floor muscles (reproduced with permission from subjects in the photo and photographer Andreas Birger Johansen)

Manometer

A manometer is a device for measuring pressure.

Pelvic floor manometry

Measurement of resting pressure or pressure rise generated during contraction of the PFM using a manometer connected to a sensor, which is inserted into the urethra, vagina or rectum. Pelvic floor manometric tools measure pressure in mmHg, hPa or cmH_2O.[42, endnote 11] Conversion of data to the international standard unit of measurement (hPa) is recommended (Figs. 3, 4).

1. Perineometer: the first PFM vaginal pressure device connected to a manometer developed by Kegel.[49, endnote 12]

Dynamometer

A dynamometer is an instrument that measures power or force.[8]

Pelvic floor dynamometry

Measurement of PFM resting and contractile forces using strain gauges mounted on a speculum (a dynamometer), which is inserted into the vagina.[50] Dynamometry measures force in Newton units ($N = 1\ kg \times m/s^2$) (Figs. 5, 6).[endnote 13]

Electromyography

Electromyography (EMG) is the recording of electrical potentials generated by the depolarization of muscle fibers.

Electromyographic diagnosis

Electromyographic diagnosis is made by evaluating the state of the muscle (muscle pathology) by recording and analyzing the electrical activity generated by the muscle.[36, endnote 14]

FIG. 3 Peritron manometer (reproduced with permission from Laborie)

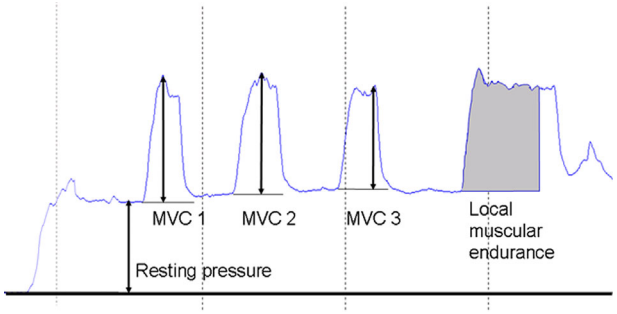

FIG. 4 Graphical illustration of pelvic floor muscle manometry readings (reproduced with permission from illustrator Ingeborg Hoff Braekken). *MVC* maximum voluntary contraction, *1/2/3* repetition 1/2/3

1. Intramuscular EMG: insertion of a wire or needle electrode into the muscle to record motor unit action potentials.[endnote 15]
2. Surface electromyography: electrodes placed on the skin of the perineum or inside the urethra, vaginal or rectum (Fig. 7).[endnote 16]

Pain assessment

Pain evaluation

Pain evaluation consists of baseline and ongoing regular evaluation of severity, quality of life, thoughts, emotions, and behavior associated with the pain (via direct consultation or questionnaires) and investigations to identify well-defined/confusable/non-pain syndromes.

1. Pain measurement: pain can only be measured subjectively. Patient-reported outcome measures include:
   - **a)** Numerical rating scale (NRS), from 0 (no pain) to 10 (extreme pain), with half-points marked.[51,52]

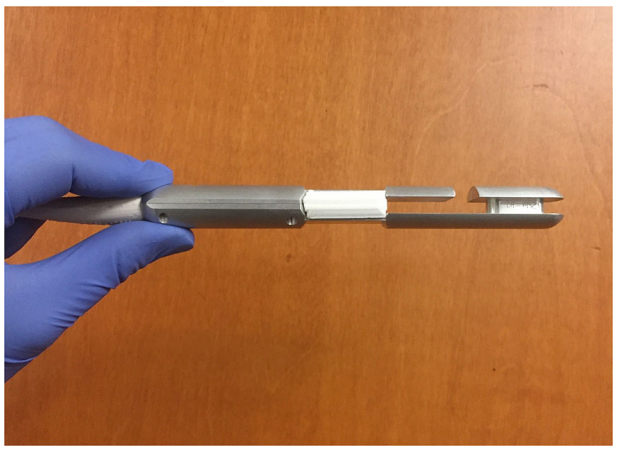

FIG. 5 Ann Arbor, USA, dynamometer speculum. Note that the bills of the speculum are covered by a condom when in use (reproduced with permission from J.A. Ashton-Miller, R. Zielinski, J.O. DeLancey, J.M. Miller)

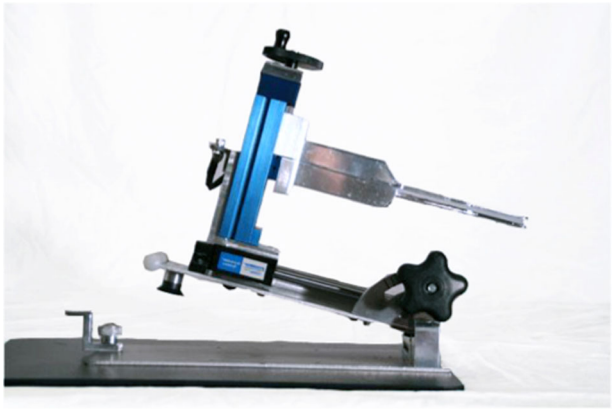

FIG. 6 Montreal, Canada, pelvic floor dynamometer (reproduced with permission from Chantale Dumoulin)

   - **b)** Visual analog scale (VAS), a 10-cm line with the same labels at the ends
   - **c)** A simple verbal rating scale can be used, e.g., "none," "mild," "moderate," "severe."[endnote 17]
2. Pain mapping: identifying pain generators through diagnostic procedures such as questionnaires, digital palpation, EMG, quantitative sensory threshold measurement, trigger point injections, nerve blocks, and imaging.
   - **a)** Questionnaires: several pain questionnaires can be used in the evaluation of musculoskeletal pain in the pelvis; the choice will be determined by which is most appropriate to the presenting pelvic floor dysfunction: McGill Pain Questionnaire,[53] Pelvic Floor Distress Inventory (PFDI),[54] Female Sexual Function Index,[55] Female Sexual Distress Scale,[56] Pelvic Pain and Urgency/Frequency Questionnaire.[57]
   - **b)** Pain chart/body map: a simple line drawing of an outline of the front and back (or relevant body part) of the human body, onto which the patient sketches or ticks or marks areas of bodily pain to demonstrate the site and extent of perceived pain.[58]
   - **c)** Pain checklist: a list of anatomical locations from which the patient selects sites that are relevant to his/her complaint.

FIG. 7 Verity Medical NeuroTrac Myoplus Pro surface electromyography biofeedback apparatus (also incorporating electrical stimulation (reproduced with permission from Quintet, Norway)

d) Measurement of muscle tone: there is no single tool that is able to measure all components of muscle tone. Some tools may be able to measure aspects of tone such as contractility, stiffness or elasticity. Instrumented methods may play a role in the valid and reliable evaluation of muscle tone, e.g., surface electromyography (sEMG), wire and concentric electromyography, dynamometry, real-time ultrasound, elastometry, myotonometry.

e) TrP injection or needling: a diagnostic test to confirm if the identified TrP is a pain generator. The technique is the same as that used in TrP treatment.

f) Imaging: tissue-specific evaluation to identify if morphological trauma or deficit is present, which may relate to the presenting pain. Types of imaging may include X-ray, ultrasound, and MRI.

DIAGNOSES

Diagnosis: the act or process of identifying or determining the nature and cause of a disease or injury through evaluation of patient history, examination, review of laboratory data, and the opinion derived from such an evaluation.[59]

A diagnosis of female PFD is based on the information obtained from the patient's symptoms, signs, and any relevant diagnostic investigations. For the terminology of the six most common PFD diagnoses—urodynamic stress urinary incontinence, detrusor overactivity (DO), POP, voiding dysfunction, bladder oversensitivity, and recurrent UTI—the reader is directed to Haylen et al.[3]

Additional anorectal diagnosis

1. Local (fissures, hemorrhoids)[18]
2. Fecal incontinence[18]
3. Obstructed defecation syndrome[18]
4. Rectocele[18]
5. Enterocele/sigmoidocele[18]
6. Intussusception[18]
7. Internal mucosal prolapse[18]
8. Abscess/fistula[18]

Pain syndromes

1. Chronic pelvic pain syndrome (CPPS): persistent pain perceived in structures related to the pelvis, in the absence of proven infection or other obvious local pathology that may account for the pain. It is often associated with negative cognitive, behavioral, sexual or emotional consequences, and with symptoms suggestive of lower urinary tract, sexual, bowel or gynecological dysfunction.[14]
2. Chronic PFM pain syndrome: the occurrence of persistent or recurrent, episodic, pain in the PFM, in the absence of a proven or well-defined local pathological condition. It is often associated with negative cognitive, behavioral, sexual or emotional consequences, and with symptoms suggestive of lower urinary tract, sexual, bowel or gynecological dysfunction.[14, endnote 18]

Female sexual dysfunction

Any departure from normal sensation and/or function expressed by a woman during sexual activity.[3]

1. Dyspareunia[3]
2. Obstructed intercourse[3]
3. Vaginal laxity[3]

TREATMENTS

General terms

Behavioral

The way someone behaves, especially toward other people, and behavioral science is the study of human behavior.[60]

1. Behavior therapy: a type of psychotherapy that attempts to modify observable maladjusted patterns of behavior by substituting a new response or set of responses to a given stimulus. The treatment techniques involve the methods, concepts, and procedures derived from experimental psychology; they include assertiveness training, aversion therapy, contingency management, flooding, modeling, operant conditioning, and systematic desensitization. It is also called behavior modification.[12, endnote 19]
2. Cognitive therapy: any of the various methods of treating mental and emotional disorders that help a person to change their attitudes, perceptions, and patterns of thinking, from rational to realistic thoughts about the self and situations. The technique is often used in association with behavior therapy principles.[12]
3. Cognitive behavior therapy (CBT): Cognitive techniques are often used in association with behavior therapy principles; this is called cognitive behavior therapy (CBT).

Physiotherapy

Physiotherapy involves "using knowledge and skills unique to physiotherapists" and "is the service only provided

by, or under the direction and supervision of, a physiotherapist".[61, endnote 20]

Adherence

Adherence is the extent to which a client/patient's behavior corresponds to the agreed treatment protocol and/or regime as recommended by their healthcare provider.[62] It does not refer to the intervention itself; rather, the patient's commitment to undertaking the behavioral change to adhere to the intervention.[endnote 21]

Compliance

Compliance is the extent to which a client/patient's behavior matches, or complies with, their healthcare provider's recommended treatment protocol and/or regime.[63, endnote 22]

Combination therapy (also known as polytherapy, multimodal therapy or combined modality therapy)

Combination therapy is the use of more than one intervention concurrently to treat a single condition with one or multiple symptoms, for example, a combination of medication with PFM training (PFMT).

1. Adjunctive therapies: any treatment or modality used to augment or assist the main treatment. In conservative treatments, adjunctive therapies often refer to equipment or a secondary therapy used to supplement the effect of the primary therapy, e.g., biofeedback-assisted PFMT or neuromuscular electrical stimulation to augment PFMT.

Prevention

Prevention is the act of preventing or decreasing the risk of disease or disability. Activities that are directed toward slowing or stopping the occurrence of both mental and physical illness and disease, minimizing the effects of a disease or impairment on disability, or reducing the severity or duration of an illness.[5]

1. Primary prevention: prevention of the development of disease in a susceptible or potentially susceptible population through such specific measures as general health promotion efforts.[5]
2. Secondary prevention: efforts to decrease the duration of illness, reduce the severity of diseases, and limit the sequelae through early diagnosis and prompt intervention.[5]
3. Tertiary prevention: efforts to limit the degree of disability and promote rehabilitation and restoration of function in patients/clients with chronic and irreversible diseases).[5]

Lifestyle

Lifestyle modification

Lifestyle modification is the application of interventions in the management of lifestyle-related health problems, e.g., change to a healthy diet and regular participation in physical activity and smoking cessation. The following lifestyle modifications may be applied to treat pelvic floor dysfunctions, either in combination with other therapies or as "stand-alone" treatments.

1. Fluid consumption/restriction: fluid consumption is the intake of fluid over 24 h. Fluid restriction is the limitation of fluid to a prescribed amount over a period of 24 h. These measures are often undertaken as part of a bladder training process.
2. Dietary modification: an alteration or adjustment of food to treat bowel disorders (e.g., constipation and fecal incontinence) or urinary disorders (e.g., incontinence or urgency), for example, increasing fiber to treat constipation. The specifics of the dietary changes should be described.
3. Elimination diet: a form of dietary modification. A diet designed to detect what ingredient in the food causes symptoms in the patient, food items to which the patient may be sensitive are withdrawn separately and successfully from the diet until the item that causes the symptoms is discovered. This is used frequently in patients with fecal incontinence, urinary urgency and urinary urgency incontinence (bladder diet).[64,65]
4. Physical activity: any body movement produced by the skeletal muscles that results in a substantial increase above resting energy expenditure. Physical activity can be done at work, as transportation, as household and other chores, and as leisure time/sport and fitness activities.[66, endnote 23]

Counseling

Counseling is the provision of professional assistance and guidance in resolving personal or psychological problems,[7] and may be part of any clinician's management.

1. Patient education: providing patients with knowledge and understanding of their condition, thereby empowering them to play an active role in its management (Fig. 8).[67]
2. Motivational interviewing: a directive, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence. Compared with nondirective counseling, it is more focused and

FIG. 8 Patient education of pelvic floor muscle function (reproduced with permission from *Women's and Men's Health Physiotherapy*)

goal-directed. The examination and resolution of ambivalence is its central purpose, and the counselor/clinician is intentionally directive in pursuing this goal.[68]

3. Coping strategies: intervention aimed at helping patients to live with the condition in the best way possible under the circumstances, to regain a feeling of being in control, to adjust their lifestyle where necessary, and to take a positive rather than a negative approach.[67]
4. Self-care: the set of activities that comprise daily living, such as bed mobility, transfers, ambulation, dressing, grooming, bathing, eating, and toileting.[5]
5. Self-help: various methods by which individuals attempt to remedy their difficulties without making use of formal care providers.[5]
6. Self-efficacy: an individual's belief that he or she is capable of successfully performing a certain set of behaviors.[69]

Scheduled voiding regimes

Toileting on a fixed schedule around the patient's normal voiding pattern, which includes a progressive voiding schedule using relaxation and distraction techniques for urgency suppression.[70] Scheduled voiding regimes have been categorized as: bladder training, timed voiding, habit training, and prompted voiding.[71]

Bladder training

In the past, bladder training has also been referred to as bladder drill, bladder discipline, bladder re-education, and bladder retraining. It consists of a program of patient education, along with a scheduled voiding regimen with gradually adjusted voiding intervals. Specific goals are to correct faulty habit patterns of frequent urination, improve control over bladder urgency, prolong voiding intervals, increase bladder capacity, reduce incontinent episodes, and restore patient confidence in controlling bladder function (modified from Moore et al.[71]).[endnote 24]

Timed voiding

Timed voiding is a passive toileting assistance program, initiated and maintained by caregivers for patients who cannot participate in independent toileting. It is a fixed voiding schedule.[71]

Habit training

Habit training consists of a toileting schedule matched to the individual's voiding patterns based on their voiding diary. The toileting schedule is assigned to fit a time interval that is shorter than the person's normal voiding pattern and precedes the time period when incontinent episodes are expected.[71]

Prompted voiding

Prompted voiding is used to teach people to initiate their own toileting through requests for help and positive reinforcement from caregivers, often done in combination with a scheduled voiding regimen, typically every 2 h.[71]

Other techniques for bladder and bowel control

Other techniques consist of doing something that takes the patient's mind off the condition. Distraction techniques utilized in urgency may include (but are not limited to) counting backward from 100 in 7 s, reciting a poem, doing breathing exercises, reading or working.

Urgency suppression techniques

Urgency suppression techniques are methods/maneuvers that are used to decrease the feeling of urgency, which may include, but are not limited to: distraction, PFM contraction, perineal pressure such as sitting on a hard chair, relaxation and breathing, toe curling or plantar flexion of the ankle.

Double voiding

In double voiding, the patient is taught to urinate, relax, and attempt to urinate again.[59]

Defecatory dynamics

Defecatory dynamics is a postural and respiratory technique to aid defecation. The mechanics involves co-ordination of the diaphragm, abdominal and PFM, with the intent to maintain rectal support whilst releasing the anal outlet with sufficient expulsion to be effective.[72,73]

Bowel habit training

Bowel habit training is aimed at establishing a regular, predictable pattern of bowel evacuation by patient teaching and adherence to a routine to achieve a controlled response to bowel urgency (modified from NICE guideline).[74, endnote 25]

Exercise/exercise training

Exercise is a form of leisure time activity that is usually performed on a repeated basis over an extended period of time (exercise training) with specific external objectives, such as improvement of fitness, physical performance, or health.[66] Exercise training includes: endurance training, strength training, flexibility training, and motor control (including balance), all of which may apply to the PFM.

Therapeutic exercise/exercise therapy

Therapeutic exercise consists of interventions directed toward maximizing functional capabilities. It includes a broad range of activities intended to improve strength, range of motion (including muscle length), cardiovascular fitness, flexibility, or to otherwise increase a person's functional capacity.[5]

1. Rehabilitation/re-education: help individuals to regain skills and abilities that have been lost as a result of illness, injury or disease, or incarceration, restoring a disabled individual to maximum independence commensurate with his or her limitations.

Mode of exercise training

The mode of exercise training is not only the type of activity to be performed (for instance, fast walking, jogging, or swimming, strength training), but also the temporal pattern of activity that is recommended (that is, continuous or intermittent activity), with a detailed specification of the duration of exercise and rest periods in the case of intermittent activity bouts.[66] Authors are encouraged to specifically describe all components of the mode of exercise and the dose provided.

1. Muscle training: exercise to increase muscle strength, endurance, power, flexibility or relaxation.
   - **a)** Strength training: training with high resistance (close to maximal contractions) and few repetitions with the aim of increasing muscle volume and neural adaptations.
   - **b)** Resistance: the amount of force opposing a movement.[39]
   - **c)** Resistance devices: any object used to increase resistance to contraction, e.g., hand weights.
   - **d)** Vaginal resistance device: objects inserted into the vagina or rectum that are inflated or spring-loaded devices to increase resistance to contraction.
   - **e)** Local muscle endurance training: training with a low load and a high number of repetitions or holding the contraction over time.
   - **f)** Muscle power training: all training with the aim of generating power; can be close to maximal contraction training and/or rapid contractions.[endnote 26]
   - **g)** Overload: a situation in which the body is required to perform exercise beyond that to which the neuromuscular system is accustomed during routine activities. Training adaptation occurs in response to a progressive "overload".[75]
   - **h)** Progressive overload: the gradual increase in stress placed upon the body during exercise training.[76]
   - **i)** Detraining: cessation of training, but also planned or unplanned reduced volume or intensity of training.[77]
   - **j)** Maintenance training: a program designed to prevent loss of the previous level of functioning.
   - **k)** Isometric/static contraction: a muscular action during which no change in the length of the total muscle or joint angle takes place.[77]
   - **l)** Isotonic contraction: a muscular action during which the tension developed by the muscle remains almost constant while the muscle shortens.[78]
   - **m)** Eccentric contraction: a muscular action in which the muscle lengthens in a controlled manner.[77, endnote 27]
   - **n)** Repetition: the completion of a whole cycle from the starting position, through the end of the movement, and back to the start,[75] e.g., one PFM contraction with relaxation.
   - **o)** Set: the number of times the desired number of repetitions is performed,[33] e.g., three sets of 12 PFM contractions.
   - **p)** PFMT: exercise to improve PFM strength, endurance, power, relaxation or a combination of these parameters.
   - **q)** Kegels: a PFM contraction or PFM exercise. This term is named after Arnold Kegel, an American gynecologist who first described the clinical effect of PFMT in the late 1940s.[49] We recommend the use of the term PFMT (not the word Kegels) to refer to exercises that specifically target the PFM.
   - **r)** Individualized PFMT: an individual PFM program aimed at improving the specific deficiencies in PFM structure or function based on assessment of the woman's ability to contract the PFM.
   - **s)** Supervised PFMT: a PFMT program taught and monitored by a health professional/clinician/instructor.
   - **t)** Group PFMT: PFMT conducted in an exercise class.[79] Class participation may occur with or without previous individualized PFM instruction.[endnote 28]

u) Home training/home PFM exercise program: an unsupervised PFMT program, which the individual performs at home.

v) Weighted vaginal cones: objects of different shapes, sizes, and weights, which are inserted into the vagina above the level of the PFM with the aim of providing sensory biofeedback and load on the PFM to increase muscle recruitment and strength.[80, endnote 29]

3. Facilitation technique: any method of increasing recruitment/response of a nonresponding muscle. In the case of noncontractile or very weak PFMs, this may include a quick stretch of the PFM, with tapping or stretching the PFM digitally. An overflow effect from a strong contraction of a nearby synergistic muscle (e.g., external rotators) may also assist facilitation or recruitment of PFMs.

Dose–response issues related to exercise training

1. Dose–response: amount/volume of training and its effect on the speed and degree of the effect of the training program.

2. Frequency of exercise: the number of activity sessions per day, week, or month.[33]

3. Duration of exercise: the unit of time (number of seconds/minutes) of activity in each repetition or session, e.g., a 10-s PFM contraction.[33] It also refers to the length of the whole training period (intervention), e.g., 3/6 months.

4. Intensity: the amount of resistance used or the effort associated with the physical activity.[33] For strength training, it is often expressed as a percentage of one repetition maximum: 1RM (the maximum load a person can lift once), e.g., 70 % of maximum.[75]

5. Session/bout: the block of time devoted to the training, e.g., a 1-h session.[75]

Relaxation training

1. Relaxation: the ability to control muscle activity such that muscles not specifically required for a task are quiet, and those that are required are fired at the minimal level needed to achieve the desired results.[81] Relaxation "can be considered a motor skill in itself because the ability to reduce muscle firing is as important to control as the generation of firing".[40]

a) General relaxation technique: a technique that involves the whole body, with the aim of effecting a global relaxation, including a decrease in the skeletal and smooth muscles, a decrease in the heart rate and respiration rate, and an increase in parasympathetic activity. General relaxation techniques can also be used aimed at relaxing local muscles.

b) Progressive muscular relaxation (also known as Jacobsen's technique): monitoring tension in each specific muscle group, by contracting, then relaxing the tension, with attention paid to the contrast between tension and relaxation.[82] This type of relaxation is also termed "contract–relax."

c) Meditation: a practice of concentrated focus upon a sound, object, visualization, the breath, movement, or attention itself to increase awareness of the present moment, reduce stress, promote relaxation, and enhance personal and spiritual growth.[83]

d) Mindfulness: intentionally bringing one's attention to the internal and external experiences occurring in the present moment. Mindfulness is often taught through a variety of meditation exercises.[84]

e) EMG relaxation techniques: techniques to decrease EMG muscle activity or activation through a variety of methods, including a conscious effort to relax.

Stretching

1. Stretching (also referred to as flexibility training when the method is used on skeletal muscles where increased range of motion over the joints is the aim): the application of an external force to muscle and connective tissue to elongate it in the direction opposite to its shortened position. This can be done parallel or perpendicular to the muscle fiber direction. For the PFM this can be applied as a widening of the levator hiatus in the axial plane (laterolaterally) via a digit or use of a dilator, or a caudal movement (via a straining/bearing down maneuver) in the sagittal plane.

a) Dilator therapy: a conical or cylindrically shaped device (made of an inert material) inserted intravaginally or intra-anally, with the aim of increasing the flexibility or elasticity of the soft tissues via application of a prolonged elongation or stretch. Dilators may also be used as a desensitizer device, to reduce fear, anxiety or pain associated with vaginal touch and in conjunction with vaginismus or sexual pain. When combined with EMG, dilators can be used to train PFM relaxation during penetration. Dilators may also be used to increase the tolerance of skin to sliding when the dilator is moved in and out.

Functional training

Functional training consists of training for tasks of daily living and self-care activities, e.g., squatting to train quadriceps and gluteal muscles.

1. Functional PFM training: training and exercises that incorporate a correct PFM contraction into activities of

daily living such as lifting, transferring out of bed, or sneezing. A PFM contraction before a rise in intra-abdominal pressure, e.g., a cough ("the Knack") is part of functional PFM training.

2. Coordination training: the ability to use different parts of the body together smoothly and efficiently.[7] Related to PFM training, coordination training means PFM contraction with other muscles or other muscle groups, e.g., respiratory muscles.
3. Functional mobility training: an intervention directed at improving the physical ability to perform a daily task. For voiding/defecation, this may include: gait training, transfer training, stair training, and other mobility training to improve speed and safety in reaching the toilet.

Biofeedback training

Feedback

Feedback is sensory information that is available as the result of an activity that a person has performed. It can be provided by an intrinsic source (from within the individual), or an extrinsic source (from the clinician), and can occur concurrently with the activity or post-activity, e.g., verbal information from the clinician to the patient during or following PFM assessment.[85, endnote 30]

Biofeedback

Biofeedback is the use of an external sensor to give an indication with regard to bodily processes, usually with the purpose of changing the measured quality.[86] It is an adjunctive therapy.[endnote 31]

EMG biofeedback unit instrumentation

1. EMG signal amplitude: number of microvolts (μV) a muscle is generating.[87] EMG biofeedback units can deliver either the actual amount of EMG activity in μV or an average μV value.[endnote 32]
2. Artifact: extraneous information nonrecognizable in the EMG signal from sources other than the target muscle such as the environment or other body functions.[87, endnote 33]
3. Cross talk: muscle activity from nearby muscles that can artificially increase EMG amplitude; a type of artifact.[87, endnote 34]
4. Dual-channel EMG: use of two channels to monitor two separate muscles or muscle groups at the same time, such as the PFM and abdominal muscles, with the goal of either promoting synergist activity or reducing EMG activity of one muscle while increasing the other.
5. Band pass: limits muscle fiber frequencies that are monitored and displayed in the EMG tracing.[87, endnote 35]

EMG assessment of PFM

Electromyography assessment of PFM consists of the use and interpretation of the surface EMG recording of a muscle for rehabilitation purposes should be done cautiously, recognizing that the main goal is the qualitative description of the muscle activation pattern, and not a qualitative diagnosis.

1. Baseline muscle activity: amount of microvolts generated by the target muscle during rest.[endnote 36]
2. Peak microvolts: the highest EMG amplitude achieved.
3. Slow recruitment: slow initiation of muscle activation contraction.[endnote 37]
4. Slow de-recruitment or slow latency to return to baseline: slow relaxation of the muscle contraction.[88, endnote 38]
5. Inconsistent resting baseline: variation of baseline between contractions, between sets, or between days may be related to a change in patient symptoms, e.g., hypertonic PFM.
6. Excessive accessory muscle contraction: increased amplitude in accessory muscles often resulting in cross talk and is indicative of poor isolation of target muscle contraction.

EMG training of PFM

1. Up-training: EMG biofeedback training to increase the EMG activity of a hypotonic muscle with low EMG activity.[87, endnote 39]
2. Down-training: EMG biofeedback training to decrease EMG activity and relax muscles.[87, endnote 40]

Manual therapy

Manual therapy is a clinical approach utilizing skilled, specific hands-on techniques, including but not limited to, massage, manipulation or mobilization.[endnote 41]

Joint therapies

1. Mobilization: skilled passive movement of a skeletal joint including graded passive oscillations at the joint to improve joint mobility, e.g., movement of the coccyx.
2. Manipulation: a passive (for the patient) therapeutic movement, usually of small amplitude and high velocity, at the end of the available joint range.[5] Manipulation is a sudden small thrust that is controlled by the clinician.[endnote 42]

Soft-tissue therapies

1. Touch desensitization: use of finger/hand, vibration or device to reduce hypersensitivity of soft tissues to touch/contact.

2. Massage: the manipulation of the soft tissues of the body for the purpose of affecting the nervous, muscular, respiratory, and circulatory systems.[5]
3. Abdominal massage: therapist or self-directed massage of the abdominal wall with the aim of stimulating peristalsis and relieving the symptoms of constipation. Generally, the technique follows the ascending, transverse, and descending colon to aid emptying. The effect may be mechanical or sensory.[89]
4. Myofascial release techniques: the use of deep friction and stroking of the fascia of the body to improve the ability of the fascia to deform and move within the body.[5]
5. Skin rolling: a manual technique in which skin is pulled away from the underlying structures and elongated in various directions.
6. Scar massage: a specific application of soft-tissue mobilization to an adherent scar.
7. Perineal massage: intravaginal massage by the woman, her partner or the clinician. Technique includes alternating downward and sideward pressure, using thumb and forefinger and a natural oil, with the aim of stretching and elongating the tissue in preparation for vaginal childbirth, or for treatment of adherent scarring in the perineum.[90]
8. Transverse friction: the operator's fingertip is placed on the exact site of the lesion and rubbed firmly across the direction of the fibers of the affected tissue.[91]
9. Thiele's massage: per rectal digital massage of the levator ani, sweeping lengthwise along the muscle fibers. Massage is begun lightly, and pressure is increased as tenderness decreases.[92]
10. TrP treatment: (sometimes called myofascial trigger point treatment): soft-tissue mobilization specifically targeting trigger points and may include ischemic pressure, massage, myofascial release, electrotherapy, ultrasound, laser, spray-and-stretch, injection (a variety of chemicals including local anesthetic, botox or steroids), dry needling (insertion of a solid needle into the TrP), and stretching.[endnote 43]

Thermal modalities

Cold treatment/cryotherapy

Cold treatment is the application of ice for therapeutic purposes. It is used in the initial management of acute musculoskeletal injuries, to decrease edema through vasoconstriction and to reduce secondary hypoxic injury by lowering the metabolic demand of injured tissues.[93]

Heat treatment (moist or dry)

Heat treatment consists of the application of heat to a body part, with the aim of relieving pain and/or stiffness. It is usually applied when an injury is older than 48 h.

Electrical therapy

Electrical therapy is the use of electric potential or currents to elicit therapeutic responses. Current may be directed at motor or sensory functions. It is not within the scope of this document to define all electrical stimulation terms. Readers are referred to more complete text books.[94]

Electrical muscle stimulation (also known as neuromuscular electrical stimulation or electromyo stimulation)

Electrical muscle stimulation (EMS) is the application of electric impulses directly to striated PFM (end-plate) to facilitate contraction. EMS is often referred to as "pelvic floor muscle electrical stimulation" (PFES) or "functional electrical stimulation." PFES is the application of electrical current to the PFM.[95] All of these stimulations may (indirectly) cause inhibition of the detrusor contraction (Fig. 9).

Mode of application

1. Surface electrodes: non-invasive placement of electrodes, including intravaginal and intra-anal electrodes, in contrast to electrodes that pierce the skin, i.e., needle stimulation.
   a) Non-invasive electrical nerve stimulation[96,97] or transcutaneous electrical nerve stimulation (TENS): the application of electrical energy to stimulate cutaneous nerve and peripheral motor nerves, via suprapubic, perineal or sacral placement of electrodes, or other external sites, or intravaginal or intra-anal plug electrodes. Tibial nerve stimulation (TNS) is a form of peripheral neuromodulation targeting symptom relief of overactive bladder (OAB) and urinary urge incontinence. Indirect access to the sacral plexus is achieved by

FIG. 9 Enraf-Nonius Myomed pelvic floor machine, including electrical stimulation (reproduced with permission from Enraf-Nonius)

intermittent, electrical stimulation of the tibial nerve, which lies behind the medial malleolus, using skin surface electrodes applied to the medial malleolar area (transcutaneous TNS).[98] There are two main types of electrical stimulation with surface electrodes:

i) Long-term or chronic electrical stimulation: is delivered below the sensory threshold. It is aimed at inhibiting detrusor activity by afferent pudendal nerve stimulation. The device is used 6–12 h per day for several months.[99]

ii) Maximal neuromuscular electrical stimulation: applies a high-intensity stimulus, set just below the pain threshold. It is aimed at improving urethral closure, via striated muscle recruitment. Detrusor inhibition by afferent pudendal nerve stimulation has also been suggested as a mechanism of effect.[96] Maximal electrical stimulation (35–70 Hz) is applied over short period (15 to 30 min), is used several times per week (and up to 1–2 times daily), and may be provided via in-clinic application or via portable devices at home).[100–102]

2. Percutaneous electrical nerve stimulation: a therapeutic modality that stimulates peripheral sensory nerves performed with a (few) needle electrode(s) that are placed in close proximity to the area to stimulate. Percutaneous neuromuscular electrical stimulation (e.g., posterior TNS) is a peripheral neuromodulation technique, in which the posterior tibial nerve is electrically stimulated three fingerbreadths above the medial malleolus, via insertion of a percutaneous needle electrode. This is coupled with an adhesive reference surface electrode placed near to the needle. This intervention is offered to patients with OAB.[103–105]

Electrophysiological parameters

1. Electrical current: the flow (current) of electrons (electricity) from an electron source (stimulator) the wires and electrodes used to deliver such an electrical current to soft tissues.[106]

   There are three types of current: direct, alternating, and pulsed. –

a) Direct: the continuous, unidirectional flow of charged particles for 1 s or longer, the direction of which is determined by the polarity selected. Polarity refers to two oppositely charged poles, one positive and one negative. Polarity determines the direction in which current flows.[106]

b) Alternating: the continuous, bidirectional flow of charged particles, for 1 s or longer, relative to the isoelectric baseline.[106]

c) Pulsed: the noncontinuous, interrupted, and periodic flow of direct (DC) or alternating (AC) currents.[106]

Currents used in therapy:

a) Faradic current: an alternating and interrupted low-frequency current capable of stimulating (depolarizing) nerve fibers through the skin using surface-stimulating electrodes. It is used to stimulate innervated muscles, causing them to contract.[107]

b) TENS: an alternating and interrupted low-frequency current capable of stimulating (depolarizing) nerve fibers through the skin using surface-stimulating electrodes for pain modulation or pain relief.[106]

c) Interferential current: a medium frequency, amplitude-modulated electrical current that results from the interference (hence the word interferential) caused by crossing two or more medium-frequency alternating sine wave currents with different carrier frequencies. The carrier frequency of these medium, alternating sine wave currents ranges between 2,000 and 5,000 cycles per second.[106]

Neuromuscular electrical stimulation parameters[endnote 44]

1. Pulse frequency (or rate): the number of pulse cycles that are generated per unit of time (seconds). This is reported in hertz (Hz).[106]
2. Pulse width: the determined period of time elapsing from the beginning to the end of one pulse cycle, usually expressed in microseconds or milliseconds.[106]
3. Current amplitude: the magnitude of current relative to the isoelectric baseline, expressed in amperes (A). The current amplitude of therapeutic electrical stimulators ranges from micro- to milliamps.[106]
4. Train: the continuous series of pulse cycles over time, usually lasting seconds. For example, a train of impulses may be the results of successive pulse cycles delivered at 50 Hz for a duration of 5 s.[106]
5. Train ramp-up time and ramp-down time: ramp-up time is the time elapsed from the onset (or baseline) to the plateau current amplitude (or maximum) of the train, whereas ramp-down time is the time elapsed from the plateau current amplitude to zero baseline.[106, endnote 45]
6. Duty cycle (D): the ratio of ON time to the summation of ON time + OFF time, expressed as a percentage (duty cycle = (ON)/(ON + OFF time) x 100, e.g., a duty cycle of 20 % is calculated when the ON and OFF times equal 10 and 40 s respectively.[106]
7. Impedance (electric resistance): the opposition of our biological tissues to the flow of an electrical current. Measured in ohms and designated as Z.[106]
8. Evoked potentials: electrical potentials recorded from the nervous system following a delivered stimulus.

Magnetic stimulation

Magnetic stimulation (or extracorporeal magnetic innervation: a pulsed magnetic technology developed for the transmission of nerve impulses that is aimed at causing PFM contraction. Patients receive therapy by sitting in a chair, which contains the device that produces the pulsing magnetic fields.

Mechanical devices

Intravaginal devices

Intravaginal devices are intended to provide some support to the bladder neck and possibly some compression to the urethra, to correct urinary stress incontinence. These can be traditional tampons, pessaries, and contraceptive diaphragms and devices designed specifically to support the bladder neck (removable, reusable intravaginal ring or single-use disposable devices.[108]

Anal plugs

Anal plugs are containment devices aimed at blocking the loss of stool to control fecal incontinence. Plugs come in different designs, sizes, and compositions, such as polyurethane and polyvinyl-alcohol.[109, endnote 46]

Rectal irrigation

Rectal irrigation is the use of liquid solutions given by enema to remove material from the rectum.[110]

Urethral plugs

Urethral plugs are containment products aimed at blocking urine leakage.[111]

Pessaries

Pessaries are intravaginal devices used to try to restore the prolapsed organs to their normal position and hence to relieve symptoms. Vaginal pessaries can be broadly divided into two types: support pessaries (ring, ring with support, Gehrung, Hodge, shelf) and space-filling pessaries (donut, Gellhorn, cube, inflatable).[111–113]

Hygiene

Bladder hygiene

Bladder hygiene prevents UTI by using techniques such as wiping the urethral meatus with clean wipes in an anterior-to-posterior direction after voiding, wearing clean underwear, keeping the genital area clean, and emptying the bladder before and after sexual intercourse.[114,115]

Vulval hygiene

Vulval hygiene involves maintaining a clean perineum by means of washing the area on a regular basis, and wearing cotton underwear. To avoid vulval irritation, shampoo, perfumed creams or soap should be avoided.[116]

Anal hygiene

Anal hygiene involves keeping the perianal region clean, which is especially important when fecal seepage is present. Advice includes using soft toilet paper or moist wipes (avoiding any with an alcohol base), always wiping from front to back, washing after a bowel movement, then gently patting dry.[89] To avoid irritation from products, the vulval hygiene advice above should be followed.

Vaginal lubricants

Vaginal lubricants are pharmacological preparations aimed at reducing friction during coital or any other sexual activity and thereby alleviating dyspareunia,[117] or at reducing discomfort associated with a clinical (per vaginum or per rectum) examination. Pharmacological preparations and natural plant-based oils may be used.

Aids and appliances

Absorbent products

Absorbent products are those that have been specifically developed to help manage leakage or soiling, such as absorbent pads and pants, absorbent bed sheets and chair covers.[108,118]

Catheters

Urinary catheters are small tubes inserted via the urethra or into the bladder suprapubically, to allow the drainage of urine. Catheters are made of plastic, latex, teflon or silicone, and may be impregnated with antiseptic or antibiotic solution.[119]

1. Self-catheterization: a procedure performed intermittently to empty the bladder by inserting a catheter into the urethra when normal voiding is not possible or if the bladder cannot be emptied completely. If a caregiver undertakes this procedure it is usually a sterile procedure; if a patient undertakes it, it is termed

"self-catheterization" and is generally a clean rather than a sterile procedure.[120–122]

CONCLUSION

We trust that this consensus-based terminology report for the conservative management of female pelvic floor dysfunction will be a significant aid to clinical practice and a stimulus for research. Future updates will be required to reflect evolving knowledge and applications in this field.

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COMPLIANCE WITH ETHICAL STANDARDS

Disclaimer Any products/companies referred to in this document are not necessarily recommended or endorsed by the ICS.

CONFLICTS OF INTEREST

Elizabeth Shelly is a consultant to Analytica and Amanda Wells is a consultant to ARC Health Services. None of the other authors have any conflicts of interest.

ENDNOTES

endnote [1] Terminology for Female Anorectal Dysfunction.[18]

endnote [2] A comprehensive definition of these terms is covered by Doggweiler et al.[123]

endnote [3] Symptoms of pelvic floor myalgia should be described in terms of location, quality, intensity, pattern, duration, frequency, moderating factors, and associated symptoms. Pain details may include: (a) Whether pain is present at rest or mechanical in nature (related to muscle contraction or relaxation or body posture) and/or altered with a change of posture (lying to sitting, sitting to standing) or movement (bending, walking, sexual activity (b) Whether uni- or bilateral in nature (c) Whether accompanied by bladder or bowel dysfunction, vulvodynia or dyspareunia (superficial/deep)

endnote [4] The evidence for the existence of trigger points is debated.[124]

endnote [5] Atrophy of the urogenital tract is normal at certain points in the life cycle, mainly caused by aging and hypoestrogenism.[8,125]

endnote [6] Muscle tone is evaluated clinically as the resistance provided by a muscle when a pressure/deformation or a stretch is applied to it.[19–21] Muscle tone may be altered in the presence or absence of pain. There is no single accepted or standardized way of measuring muscle tone, and there are no normative values.

endnote [7] The terms hyper- and hypotonicity are commonly used in neurology and muscle physiology. Messelink et al.[2] introduced the terms overactivity and underactivity related to PFM. These terms are not defined with cut-off points, nor are they based on comparison with normal populations. As activity can only relate to the active (i.e., contractile) portion of muscle tone, activity cannot be used interchangeably with muscle tone, unless it can be shown that the active component of the muscle is altered. If increased (over-) or decreased (under-) activity in the PFM can be demonstrated using electromyography (EMG) or another measure, then these terms may be used appropriately.

endnote [8] Muscle cramp either during or immediately after exercise is commonly referred to as "exercise-associated muscle cramping"[93]; however, cramps are not specific to exercise.

endnote [9] Local or referred pain may be reproduced. An active TrP is said to have a characteristic "twitch" response when stimulated; however, the twitch response to palpation has been shown to be unreliable.[126] The most reliable sign of a TrP is sensitivity to applied pressure. Trigger points are implicated in myofascial pain; however, the validity of this theory is controversial and has recently been refuted.[124]

endnote [10] Palpation is less reliable and responsive than manometers and dynamometers.[42]

endnote [11] The pressure measured does not confirm its origin, and pressure measurement is only valid when used in combination with other methods, e.g., simultaneous observation of the inward movement of the perineum or device during PFM contraction.

endnote [12] The term perineometer is somewhat misleading as the pressure-sensitive region of the manometer probe is not placed at the perineum, but inside the vagina at the level of the levator ani. Vaginal pressure devices should be referred to as PFM manometers.[42,49]

endnote [13] Today's dynamometers for the pelvic floor also detect resting and contractile contributions from muscles other than the PFM, contributing to the force recordings. As dynamometers can be opened at different muscle lengths to measure PFM force, the process of measurement should respect the maximum achievable vaginal aperture without inducing discomfort, so as not to influence the validity of the measurement.

endnote [14] EMG in this case usually means "concentric needle EMG," but other EMG methods exist. EMG is typically distinguished as either intramuscular or surface. EMG diagnosis is often used as a synonym for "neurophysiological diagnosis of the peripheral neuromuscular system," and that would also include the measurement of motor and sensory conduction, the recording of reflex responses, etc.[36] EMG does not directly measure muscle strength. The type of electrode being used should be specified.

endnote [15] This is not typically used in clinical assessment, but may be included in research or advanced examinations, for example, to diagnose striated muscle denervation/re-innervation.[36]

endnote [16] Surface EMG is considered to be less specific than intramuscular EMG. The large surface area of the electrodes

may result in cross-talk from adjacent muscles and other artifacts; therefore, technical expertise is required. EMG can reveal the pattern of activity of a particular muscle, as in the diagnosis of detrusor sphincter dyssynergia during urodynamics.[2,36]

endnote [17] Because pain is multidimensional, a single rating scale combines these dimensions in unknown quantities. One may separately assess pain intensity, pain distress, and interference of pain with activities of daily life.

endnote [18] Other urological, gynecological, gastrointestinal and colorectal pain conditions without related PFM dysfunction, are well described in standard texts. Many pelvic floor pain-related conditions or syndromes (e.g., vulvodynia, interstitial cystitis/bladder pain syndrome, irritable bowel syndrome) are described in the Standard for Terminology in Chronic Pelvic Pain Syndromes (CPPS): A Report from the Ad Hoc Working Group of the International Continence Society Standardization Steering Committee (ICS-SSC) on Chronic Pelvic Pain, ICS Standardization of Terminology document on Chronic Pelvic Pain.[123] Several other systemic disorders (e.g., chronic fatigue syndrome, diabetes) may have an impact on the pelvic floor; however, PFD is not part of their recognized etiology.

endnote [19] We recommend that "behavioral" be limited to studies that evaluate how people do or do not behave as desired, e.g., commencement or cessation of PFM training or change of a diet.

endnote [20] We recommend that the specific treatment is described, e.g., PFM training, electrical stimulation, rather than the unspecific term physiotherapy, the latter also referring to a specific profession. Publications should report the actual professional who provided the intervention (e.g., physiotherapist, general practitioner, urogynecologist, urologist, midwife, nurse, fitness instructor), rather than using the vague term, "therapist"/"clinician"/"researcher."

endnote [21] Adherence is usually reported as the number or percentage of clinical visits attended and home exercises or regimen components followed or completed by the client/patient.

endnote [22] The term "adherence" is generally preferred within healthcare, as it acknowledges client/patient autonomy and implies a willingness on their part to participate and cooperate rather than the traditional view, inherent in "compliance," of an expert clinician dictating to a naive patient.[62,63] Simply, adherence is agreeing what to do; compliance is being told what to do.

endnote [23] An increase in the physical activity level may affect UI positively via weight reduction in obese persons. Conversely, several studies have shown that there is a high prevalence of UI in physically active women during exercise (especially during high impact activity, defined as running and jumping). Strenuous exercise/work has been suggested to be a risk factor for the development of PFD.[71] A well-functioning pelvic floor responds before and during an increase in intra-abdominal pressure.

endnote [24] Ideally, the voiding intervals should be increased by 15–30 min each week, according to the patient's tolerance to the schedule, until a voiding interval of 3–4 h is achieved. Use of a bladder diary is recommended for self-monitoring of progress.[70]

endnote [25] A bowel habit intervention may: encourage bowel emptying at a specific time of day, mainly after a meal (to utilize the gastrocolic response), encourage patients to adopt a sitting or squatting position where possible while emptying the bowel, teach patients techniques to facilitate bowel evacuation and stress the importance of avoiding straining.[74,127,128]

endnote [26] Speed changes little with training. Thus, power is increased almost exclusively by gaining strength.[35]

endnote [27] PFM training can be isometric, concentric or eccentric or a combination of any of these.

endnote [28] Whether PFMT is performed with or without previous assessment of the ability to contract should be reported.

endnote [29] The original shape was conical; however, different shapes are currently available. Maintenance of the weight in position can be challenged via different body positions and activities.

endnote [30] PFM feedback can be provided by the therapist or patient during manual palpation internally or externally, or with a mirror. The purpose of feedback is to increase accuracy of contraction for maximum benefit.

endnote [31] Biofeedback can be visual, auditory or both. Biofeedback is not a treatment on its own. It is an adjunct to training and can be used to help the patient be more aware of muscle function, and to enhance and motivate patient effort during training.[129] The correct terminology should be PFM strength training with biofeedback or relaxation training with biofeedback. Types of PFM biofeedback include: perianal, vaginal, and anal surface EMG, urethral, vaginal or anal manometry, vaginal dynamometry, real-time ultrasound.[129]

endnote [32] Clinicians are to be cautious with regard to the interpretation of the information, as many factors influence amplitude, including muscle activity, skin conductance, and artifact. "EMG amplitude does not equal force".[87] More microvolt activity means more muscle activity, but does not always mean more strength.

endnote [33] Artifact examples include movement or contact quality artifact, cross talk, heart rate, skin electrode shear, and electrode bridging.

endnote [34] Minimizing cross talk is essential in research into quality EMG tracings.

endnote [35] Recording with surface electrodes is prone to artifact and cross talk. The user should be trained appropriately and understand the limits of the EMG instrument and of the methodology. It is not within the scope of this document to define all EMG terms. Readers are referred to other texts for further terminology.[87,88]

endnote [36] Baseline EMG reading can be influenced by many factors and therapists must take into account the patient's symptoms, digital palpation results, overall tension of the patient, the possibility of artifacts, and other factors in determining the meaning of the baseline muscle activity.

endnote [37] Slow recruitment can be symptomatic of leakage during coughing and sneezing when a quick muscle contraction is needed to counteract increased intra-abdominal pressure.

endnote [38] Slow de-recruitment can be indicative of a hypertonic PFM.

endnote [39] The general principles of strength training are the same with and without biofeedback. (See the sections "Mode of exercise training" and "Dose–response issues related to exercise training")

endnote [40] The general principles of relaxation training are the same with and without biofeedback.

endnote [41] Manual therapy is used to treat soft tissues and joint structures for the purpose of modulating pain; increasing the range of motion; reducing soft tissue edema; inducing relaxation; improving contractile and noncontractile tissue extensibility, and/or stability; facilitating movement; and improving function. This broad group of skilled hands-on treatments can be divided into two groups: joint therapies and soft-tissue therapies.

endnote [42] Neither mobilization nor manipulation should be used when referring to muscle.

endnote [43] The notion of trigger points causing myofascial pain is controversial.[124]

endnote [44] Depending on the particular device being used, the type of electrical current, the specific health problem and condition being treated, and the individual's needs and circumstances, many electrical stimulation parameters may be adjusted by the therapist administering the treatment.

endnote [45] The slower the current intensity rises to the preset amplitude or threshold level, the more comfortable the stimulation may feel. Conversely, the faster the ramp, or the more vertical the ramping up signal, the more discomfort may be felt.

endnote [46] Terminology for female anorectal dysfunction.[18]

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