Pelvic Girdle Pain in the Antepartum Population: Physical Therapy Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health From the Section on Women's Health and the Orthopaedic Section of the American Physical Therapy Association

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ABSTRACT

Background: Examination, diagnosis, prognosis, intervention, and the use of outcomes measures by physical therapists in the antepartum population with pelvic girdle pain should be guided by current evidence. The creations of clinical practice guidelines (CPGs) is a crucial process for examining and maintaining the validity of recommendations, as well as provide classification and definition using the International Classification of Functioning, Disability, and Health (ICF) terminology related to impairment of body function, structure, activity limitations, and participation restrictions.

Methods: (1) Using ICF terminology to (*a*) categorize mutually exclusive impairment patterns to base intervention strategies and (*b*) to serve as measures of change in function over course of care. (2) Description of supporting evidence was produced by a systematic searched MEDLINE, CINAHL, and the Cochrane Database of Systematic Reviews (through 2012) for any relevant articles related to prevalence, risk factors, examination, classification, outcome measures, and intervention strategies for pelvic girdle pain in the antepartum population. Each literary article was reviewed by 2 reviewers and required greater than 95% agreement among reviewers via Key Questions from the Evidence Based Physical Therapy for determination of article quality for the appropriate of level of evidence (I-V) established by the Centers for Evidence-Based Medicine and grades of evidence for strength according to the guidelines of Guyatt et al and modified by Law and MacDermid (A-F).

Results: A total of 105 references were included and the following recommendations were found with evidence. The evidence is moderate to strong for identification of risk factors, clinical course, diagnosis/classification, and outcome measures. There is theoretical/foundational evidence for activity/participation levels and expert opinion for imaging. Conflicting evidence was found for interventions including the use of support belts, and exercise. The evidence for manual therapy can best be described as weak/emergent at this time.

Conclusions: This CPG can be used to guide clinicians in their clinical reasoning processes in the examination and intervention of females with prenatal pelvic girdle pain. The organization and classification of the document can guide research to address the paucity of evidence especially in the interventions with this population.

Key Words: antepartum, clinical practice guidelines, pelvic girdle pain, physical therapy

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RECOMMENDATIONS

Risk Factors: A

Clinicians should utilize the following risk factors: prior history of pregnancy, orthopedic dysfunctions,

increased body mass index (BMI), smoking, as well as work dissatisfaction and a lack of belief of improvement in the prognosis of pelvic girdle pain (PGP). (Recommendation is based on strong evidence.)

Postural Changes: B
Clinicians should not consider postural changes as indicative of the development and/or intensity of PGP in the antepartum population. (Recommendation is based on moderate evidence.)

Clinical Course: A/B
Clinicians should (consider) treat patients with early onset, multiple pain locations, a high number of positive pelvic pain provocation tests (PPPTs), work dissatisfaction, and lack of belief of improvement, as these are strong/moderate factors in determining the potential for persisting PGP in late pregnancy and postpartum. (Recommendations are based on strong/moderate evidence.)

Diagnosis/Classification: B
Clinicians may consider the utilization of the classification system for the diagnosis of the type of PGP in antepartum population. (Recommendation is based on moderate evidence.)

Differential Diagnosis: A
PGP, in this population, should be differentiated from signs and symptoms of serious disease and psychological factors when the symptoms are not associated with the described clinical course of PGP, impairments are failing to normalize, and the symptoms are worsening with increased disability. This should include the presence of transient osteoporosis and diastasis rectus abdominis (DRA) as possible comorbidities in this population, as well as the presence of pelvic floor muscle, hip, and lumbar spine dysfunctions. (Recommendations are based on strong evidence.)

Imaging Studies: F
In the absence of good evidence, expert opinion and foundation science may be used to guide examination with the use of imaging studies.

Examination—Outcome Measures: A
Clinicians should administer self-reported outcome questionnaires such as Disability Rating Index (DRI), Oswestry Disability Index (ODI), Pelvic Girdle Questionnaire (PGQ), Fear-Avoidance Beliefs Questionnaire (FABQ), and Pain Catastrophizing Scale (PCS). These scales are practical for the determination of baseline disability, function, and pain belief, as well as change throughout the clinical course. These should be utilized in combination with clinical examination for clinical decision. (Recommendations are based on strong evidence.)

Examination—Activity Limitation and Participation Restriction Measures: E
While strong evidence exists to support a high risk of falls, no measures have been validated to objectively assess the dynamic balance and fall risk in antepartum population. (Recommendation is based on theoretical/foundational evidence.)

Intervention—Support Belts: D
Clinicians should consider the application of a support belt in the antepartum population with PGP. The 4 studies reviewed investigated different patient populations and had varied intervention groups and controls, different durations of intervention application, and different timing of follow-up. Further research is needed to clarify initial application, duration, and specific antepartum PGP patient classification for support belt intervention. (Recommendation is based on conflicting evidence.)

Intervention—Exercise: D
Clinicians should consider the use of exercise in the antepartum population with PGP. The American College of Obstetrics and Gynecologists (ACOG) and the Canadian Clinical Practice Guidelines (CPGs) have recommended exercise for health benefits because of the low risk and minimal adverse effects for the antepartum population. The 2 systematic reviews as well as the recent randomized controlled trials (RCTs) were nonspecific in the application of exercise to heterogeneous groups of pregnancy low back pain (PLBP) and PGP. The populations varied in early and late pregnancy and demonstrated a variety of exercise interventions. No study based the exercise intervention on the classification of PGP proposed by Albert et al[1] and Cook et al.[2] (Recommendation is based on conflicting evidence.)

Intervention—Manual Therapy: C
Clinicians may or may not utilize manual therapy techniques including high-velocity, low-amplitude manipulations for the treatment of PBLP and PGP. This evidence is emerging and treatment could be considered, as there is little to no reported evidence of adverse effects in the healthy antepartum population. (Recommendations are based on weak evidence.)

INTRODUCTION

Aim of the Guidelines
The Section on Women's Health (SOWH) and the Orthopaedic Section of the American Physical Therapy Association (APTA) have an ongoing effort

to create evidence-based practice guidelines for women's health and orthopedic physical therapy management of patients with musculoskeletal impairments described in the World Health Organization's International Classification of Functioning, Disability, and Health (ICF).[3]

The purposes of these clinical guidelines are to:

- Describe evidence-based physical therapy practice including diagnosis, prognosis, intervention, and assessment of outcome for musculoskeletal disorders commonly managed by women's health and/or orthopedic physical therapists.
- Classify and define common musculoskeletal conditions using the World Health Organization's terminology related to impairments of body function and body structure, activity limitations, and participation restrictions.
- Identify interventions supported by current best evidence to address impairments of body function and structure, activity limitations, and participation restrictions associated with common musculoskeletal conditions.
- Identify appropriate outcome measures to assess changes resulting from physical therapy interventions.
- Provide a description to policy makers, using internationally accepted terminology, of the practice of women's health and/or orthopedic physical therapists.
- Provide information for payers and claims reviewers regarding the practice of women's health and/or orthopedic physical therapy for common musculoskeletal conditions.
- Create a reference publication for women's health and/or orthopedic physical therapy clinicians, academic instructors, clinical instructors, students, interns, residents, and fellows regarding the best current practice regarding women's health and/or orthopedic physical therapy.

Statement of Intent

This guideline is not intended to be construed or to serve as a standard of clinical care. Standards of care are determined on the basis of all clinical data available for an individual patient and are subject to change as scientific knowledge and technology advance and patterns of care evolve. These parameters of practice should be considered only as guidelines. Adherence to them will not ensure a successful outcome in every patient, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgment regarding a particular clinical procedure or treatment plan must be made in light of the clinical data presented by the patient, the diagnostic and treatment options available, and the patient's values, expectations, and preferences. However, we suggest that the rationale for significant departures from accepted guidelines be documented in the patient's medical records at the time the relevant clinical decision is made.

METHODS

Summary of Literature Search

Content experts within the SOWH, in partnership with the Orthopaedic Section of the APTA, developed a CPG for physical therapists in the examination and intervention of PGP in the antepartum population. Utilizing the ICF terminology, the authors identified impairments of body function and structure, activity limitation, and participation restrictions that could (1) *categorize patients into mutually exclusive impairment patterns upon which to base intervention strategies* and (2) serve as measures of change in function over the course of an episode of care. Second, the authors described the supporting evidence for the identified impairment pattern classification as well as interventions for patients with activity limitations and impairments of body function and structure consistent with the identified impairment pattern classification. It was also acknowledged by the SOWH and the Orthopaedic Section of the APTA that a systematic search and review solely of the evidence related to diagnostic categories based on International Statistical Classification of Diseases and Related Health Problems [ICD]).[4] terminology would not be sufficient for these ICF-based CPGs, as most of the evidence associated with changes in levels of impairment or function in homogeneous populations is not readily searchable using the current terminology. For this reason, the authors also searched the scientific literature related to prevalence, risk factors, examination, classification, outcome measures, and intervention strategies implemented by physical therapists for PGP in the antepartum population. Thus, the authors of this CPG systematically searched MEDLINE, CINAHL, and the Cochrane Database of Systematic Reviews (through 2011) for any relevant articles related to prevalence, risk factors, examination, classification, outcome measures, and intervention strategies for PGP in the antepartum population. In addition, when relevant articles were identified, their reference lists were hand-searched in an attempt to identify other articles that might have contributed to the outcome of this CPG. This guideline was issued in 2015 based on publications in the scientific literature prior to July 2012. This guideline will be considered for review in 2020, or sooner, if new evidence becomes available. Any updates to the guideline

Table 1. Level of Evidence

I	Evidence obtained from high-quality randomized control trials, prospective cohort studies, diagnostic studies, prognostic studies, or meta-analysis and systematic review (of level I studies)
II	Evidence obtained from lesser-quality randomized control trials, retrospective cohort studies, diagnostic studies, or systematic reviews (of level II or better) (ie, weaker diagnostic criteria and reference standards, improper randomization, no blinding, <80% follow-up)
III	Case controlled studies or systematic reviews (of level III studies)
IV	Case series, poor cohort studies, or poor reference standards
V	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"

in the interim period will be noted on the SOWH (www.womenshealthapta.org) and the Orthopaedic Section (www.orthopt.org) of the APTA.

Critical Appraisal Process and Reliability

Each literary article was reviewed by 2 reviewers and required greater than 95% agreement among reviewers via Key Questions from the *Evidence Based Physical Therapy*[5] for determination of article quality for the appropriate of level of evidence established by the Centers for Evidence-Based Medicine. If greater than 95% agreement was not achieved, a third reviewer was utilized for quality determination. Articles were considered "high quality" if they fulfilled greater than 75% of key questions for the specific aim of the articles. Articles of less than 75% were considered "lesser quality" for determination of level of evidence.

Levels of Evidence

The levels of evidence established by the Center for Evidence-Based Medicine, Oxford, United Kingdom, were utilized to grade individual clinical research articles for diagnostic, prospective, and therapeutic studies (Table 1).[6,7]

Grades of Evidence

The overall strength of the evidence supporting recommendations made in this guideline will be graded according to guidelines described by Guyatt et al[8] as modified by Law and MacDermid[9] and adopted by the coordinator and reviewers of this project.[8,9] In this modified system, the typical A, B, C, and D grades of evidence were modified to include the role of consensus expert opinion and basic science research to demonstrate biological or biomechanical plausibility (Table 2).

Review Process

The authors in conjunction with the SOWH APTA selected reviewers from the following areas to serve as reviewers of the first draft of this CPG:

- ACOG guidelines
- Coding
- Manipulative therapy
- Obstetric physical therapy
- Orthopedic physical therapy rehabilitation
- Outcomes research
- Pain science
- PGP rehabilitation
- Physical therapy academic education
- Women's health physical therapy education

Comments from these reviewers were utilized by the authors to edit this CPG prior to submission to the *Journal of Women's Health Physical Therapy* and the *Journal of Orthopaedic & Sports Physical Therapy.* In addition, several physical therapists practicing in antepartum and PGP rehabilitation physical therapy practices were sent initial drafts of this CPG for assessment.

Reviewers

Joseph J. Godges, DPT, MA—Orthopedic Section, CPG Director (Review of outline/format/permission of the Orthopaedic Section use of format)

Anita Bemis-Doughty (coding) (Review of ICF language)—APTA

Table 2. Grading Scale of Evidence

A	Strong evidence	A preponderance of level I and/or II studies support the recommendation. This must include at least 1 level I study
B	Moderate evidence	A single, high-quality RCT or a preponderance of level II studies support the recommendation
C	Weak evidence	A single level II study or a preponderance of level III and IV studies including statements of consensus by content experts support the recommendation
D	Conflicting evidence	Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies.
E	Theoretical/foundational evidence	A preponderance of evidence from animal or cadaver studies, from conceptual models/principles or from basic sciences/bench research, supports this conclusion.
F	Expert opinion	Best practice based on the clinical experience of the guidelines development team.
Abbreviation: RCT, randomized controlled trial.		

Nancy Donovan, PT, PhD—*Journal of Women's Health* Editor (Review of guideline intent and content outline—for the *Journal on Women's Health*)

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Classification

The primary ICD-10 codes and conditions associated with PGP during pregnancy are as follows: **R10.2, pelvic pain; M54.5, low back pain (LBP); M53.3, sacrococcygeal disorders not elsewhere classified; O26.9, pregnancy-related condition, unspecified; R29.3, abnormal posture; M48.48, fatigue (stress) fracture of vertebra, sacral and sacrococcygeal region; M99.04/.05, segmental and somatic dysfunction of sacral region/pelvic region; S33.2, dislocation of sacroiliac (SI) and sacrococcygeal joints; M46.1, sacroiliitis, not elsewhere specified; M46.98, unspecified inflammatory spondylopathy, sacral and sacrococcygeal region; M53.2×8, spinal instabilities of sacral and sacrococcygeal region; S33.6, sprain and strain of sacroiliac (SI) joint; M99.14/.15, subluxation complex of the sacral region/pelvic region; O26.7, subluxation of symphysis (pubis) in pregnancy, childbirth, and the puerperium; M24.2, disorder of ligament; M24.4, recurrent dislocation and subluxation of joint; G96.8, disorder of central nervous system specified as central nervous system sensitivity to pain; and F45.4, pain disorders related to psychological factors.**[10] The corresponding ICD-9 codes and conditions associated used in the United States are as follows: **724.2, lumbago; 724.6, disorders of sacrum; 739.4, nonallopathic lesion of the sacral region, not elsewhere specified; 846.70, pregnancy backache; 848.5, pubic symphysis sprain/strain; 847.3, SI joint pain; 839.42, subluxation of the SI joint**; and **349.89, other specified disorders of the nervous system.**

The primary ICF body function codes associated with the previously stated ICD-10 conditions are as follows: **b1520, appropriateness of motion; b1602, content of thought; b2800, generalized pain; b2801, pain in body part; b28013, pain in back; b6601, functions related to pregnancy; b7100, mobility of a single joint; b7101, mobility of several joints; b715, stability of joint functions; b7201, mobility of the pelvis; b7300, power of isolated muscle and muscle groups; b735, muscle tone functions; b7601, control of complex voluntary movements; b770, gait pattern functions; b7800, sensation of muscle stiffness; and b7801, sensation of muscle spasm.**[11]

The primary ICF body structure codes associated with PGP during pregnancy include the following: **s1100, structure of cortical lobes; s1101, structure of midbrain; s1102, structure of diencephalon; s1103, basal ganglia and related structures; s1104, structure of brainstem; s1200, structure of spinal cord; s620, structure of pelvic floor; s7401, joints of the pelvic region; s7402, muscles of the pelvic region; s7403, ligaments of fasciae of the pelvic region; s7409, structure of the pelvic region, unspecified; and s770, additional musculoskeletal structure related to movement.**[11]

The primary ICF activity and participation codes associated with the aforementioned ICD-10 conditions are as follows: **d129, purposeful sensory experiences, specified and unspecified; d230, carrying out daily routine; d410, changing basic body position; d415, maintaining a body position; d430, lifting and carrying objects; d455, moving around; d460, moving around in different locations; d475, driving; d640, doing housework; d660, assisting others; d7203, interacting according to social rules; d770, intimate relationships; and d8451 maintaining a job.**[11]

Table 3. ICD-10 Codes

Acute, subacute, and chronic pelvic girdle pain with or without pregnancy low back pain	R10.2	Pelvic pain
	M54.5	Low back pain
	M53.3	Sacrococcygeal disorders, not elsewhere classified
	O26.9	Pregnancy-related condition, unspecified
	R29.3	Abnormal posture
	M48.48	Fatigue (stress) fracture of vertebra, sacral and sacrococcygeal region
Acute, subacute, and chronic pelvic girdle pain with mobility deficits during pregnancy	M99.04/.05	Segmental and somatic dysfunction of sacral region/pelvic region
	S33.2	Dislocation of sacroiliac and sacrococcygeal joint
	M46.1	Sacroiliitis, not elsewhere specified
	M46.98	Unspecified inflammatory spondylopathy, sacral and sacrococcygeal region
Acute, subacute, and chronic pelvic girdle pain with movement coordination impairments during pregnancy	M53.2×8	Spinal instabilities of sacral and sacrococcygeal region
	S33.6	Sprain and strain of sacroiliac joint
	M99.14/.15	Subluxation complex of the sacral region/pelvic region
	O26.7	Subluxation of symphysis (pubis) in pregnancy, childbirth, and the puerperium
	M24.2	Disorder of ligament
Chronic—recurrent pelvic girdle pain during pregnancy	M24.4	Recurrent dislocation and subluxation of joint
Chronic pelvic girdle pain with related generalized pain during pregnancy	G96.8	Disorder of the central nervous system specified as central nervous system sensitivity to pain
	F45.4	Pain disorders related to psychological factors

ICD-10 Codes

See Table 3.

ICF Codes

See Table 4.

CLINICAL GUIDELINES: *IMPAIRMENT/ FUNCTION-BASED DIAGNOSIS*

Prevalence

I. The prevalence of PLBP and PGP is estimated to occur in 56% to 72% of the antepartum population, with 20% reporting severe symptoms during 20 to 30 weeks of gestation.[12–15] In total, 33% to 50% of pregnant females report PGP before 20 weeks of gestation and the prevalence may reach 60% to 70% in late pregnancy.[16–18]

Risk Factors

I. Risk factors for the development of PGP in this population include a history of multiparity, joint hypermobility, periods of amenorrhea, increased BMI, and hip and/or lower extremity dysfunction including the presence of gluteus medius and pelvic floor muscle dysfunction.[19–21] There is an association of the development of PGP with a history of trauma to the pelvis and a history of LBP and/or PGP, especially in a previous pregnancy.[22–29] Finally, an association also exists with work dissatisfaction and lack of belief in improvement.[30–33]

I. Smoking during the antepartum period as well as cessation of smoking in the first trimester had an increased odds ratio for the development of PGP compared with nonsmokers.[34]

A. Clinicians should utilize the following risk factors: prior history of pregnancy, orthopedic dysfunctions, increased BMI, smoking, as well as work dissatisfaction and a lack of belief of improvement in the prognosis of PGP. (Recommendation is based on strong evidence.)

Pathoanatomical Features

Definition of Pelvic Girdle Pain

I. European guidelines[29]:

> Pelvic girdle pain arises in relation to pregnancy, trauma, arthritis and osteoarthritis. Pain is experienced between the posterior iliac crest and the gluteals fold, particularly in the vicinity of the sacroiliac joint. The pain may radiate in the posterior thigh and can also occur in conjunction with/or separately in the symphysis.

Postural Changes

I. Franklin and Conner-Kerr[35] measured antepartum postural changes resulting in a significant increase in lumbar lordosis, sagittal anterior pelvic tilt, and posterior head position from the first to third trimester. The magnitude of postural changes during pregnancy was not indicative of the intensity of PLBP and PGP in the antepartum population.[35]

Table 4. ICF Codes

Acute, subacute, and chronic pelvic girdle pain with or without with pregnancy low back pain		
Body function	b2801	Pain in body part
	b28013	Pain in back
	b6601	Functions related to pregnancy
Body structure	s7401	Joints of the pelvic region
	s7402	Muscles of the pelvic region
	s7409	Structure of pelvic region, unspecified
	s770	Additional musculoskeletal structures related to movement
Activities and participation	d230	Carrying out daily routine
	d410	Changing basic body position
	d415	Maintaining a body position
	d460	Moving around in different locations
	d475	Driving
	d640	Doing housework
	d660	Assisting others
	d770	Intimate relationships
	d8451	Maintaining a job
Acute, subacute, and chronic pelvic girdle pain with mobility deficits during pregnancy		
Body function	b2801	Pain in body part
	b7100	Mobility of a single joint
	b7101	Mobility of several joints
	b715	Stability of joint functions
	b7201	Mobility of pelvis
	b7300	Power of isolated muscles and muscle groups
	b735	Muscle tone functions
	b770	Gait pattern functions
	b7800	Sensation of muscle stiffness
	b7801	Sensation of muscle spasm
Body structure	s7401	Joints of the pelvic region
	s7402	Muscles of the pelvic region
	s7403	Ligaments of fasciae of the pelvic region
Activities and participation	d410	Changing basic body position
	d415	Maintaining a body position
	d430	Lifting and carrying objects
	d455	Moving around
	d460	Moving around in different locations
	d640	Doing housework
	d8451	Maintaining a job
Acute, subacute, and chronic pelvic girdle pain with movement coordination impairments during pregnancy		
Body function	b2801	Pain in body part
	b715	Stability of joint functions
	b735	Muscle tone functions
	b7601	Control of complex voluntary movements
Body structure	s7401	Joints of the pelvic region
	s7402	Muscles of the pelvic region
	s7403	Ligaments of fasciae of the pelvic region

(continues)

Table 4. ICF Codes (*Continued*)

Activities and participation	d410	Changing basic body position
	d415	Maintaining a body position
	d430	Lifting and carrying objects
	d455	Moving around
	d640	Doing housework
	d660	Assisting others
	d770	Intimate relationships
	d8451	Maintaining a job
Chronic—recurrent pelvic girdle pain during pregnancy		
Body function	b2801	Pain in body part
	b735	Muscle tone functions
	b7800	Sensation of muscle stiffness
	b7801	Sensation of muscle spasm
Body structure	s620	Structure of pelvic floor
	s7401	Joints of the pelvic region
	s7402	Muscles of the pelvic region
	s7403	Ligaments of fasciae of the pelvic region
	s7409	Structure of pelvic region, unspecified
	s770	Additional musculoskeletal structures related to movement
Activities and participation	d410	Changing basic body position
	d415	Maintaining a body position
	d430	Lifting and carrying objects
	d455	Moving around
	d460	Moving around in different locations
	d640	Doing housework
	d660	Assisting others
	d770	Intimate relationships
	d8451	Maintaining a job
Chronic pelvic girdle pain with related generalized pain during pregnancy		
Body function	b134	Sleep functions
	b1520	Appropriateness of emotion
	b1602	Content of thought
	b2800	Generalized pain
Body structure	s1100	Structure of cortical lobes
	s1101	Structure of midbrain
	s1102	Structure of diencephalon
	s1103	Basal ganglia and related structures
	s1104	Structure of brainstem
	s1200	Structure of spinal cord
Activities and participation	d129	Purposeful sensory experiences, specified and unspecified
	d230	Carrying out daily routine
	d640	Doing housework
	d710	Intimate relationships
	d7203	Interacting according to social rules
	d8451	Maintaining a job

B. Clinicians should not consider postural changes as indicative of the development and/or intensity of PGP in the antepartum population. (Recommendation is based on moderate evidence.)

Pathophysiology

Vleeming et al[29,36] developed the hypothesis of hormonal and biomechanical factors as potential contributors to PGP. Stabilization of the pelvis during load transfer is achieved by the 2 mechanisms of "form closure" and "force closure." "Form closure" is achieved when the wedge-shaped sacrum fits tightly between the ilia. This process is maximized by the "force closure" of the muscles, fascia, and ligaments to provide the joint stability.[29,36] Changes in the ability to manage load transfers due to joint laxity may account for the development of PGP in this population. A change in adequate force and/or form closure of the pelvic girdle was previously postulated to occur by the presence of the hormone relaxin; however, current studies suggest no correlation between relaxin and PGP.[37,38] Postmortem studies completed in 1924 have provided some minimal evidence that the SI joint in pregnant women demonstrated increased laxity and greater synovial fluid volume.[39] Finally, Mens et al[21] reported an increased motion in the pelvic joints in pregnant females with PGP compared with healthy nonpainful pregnant controls.[21]

The pubic symphysis undergoes anatomical changes during the antepartum period. Symphysis widening occurs as early as 8 to 10 weeks of gestation and continues to increase to an average width of 7 mm (3-20 mm) at full-term. Symptoms of pain are more likely to be present if there is a greater than 10-mm horizontal or 5-mm vertical separation. However, these findings are not representative of a linear correlation.[40]

Clinical Course

I. The development and progression of PGP in the antepartum population have been demonstrated to include an increase in intensity and disability by the end of the antepartum period and persistence into the postpartum period. The most common time period for PGP to occur is between 14 and 30 weeks of gestation. The development of PGP in the first trimester, increasing number of pain locations within the pelvis (SI joints, pubic symphysis), and the presence of LBP are indicative of a higher intensity of symptoms in the last trimester. Other factors that also have a high predictive value include a positive posterior PPPT in the first trimester, an increase in the sum scores of compression, distraction, Flexion Abduction External Rotation (FABER) test, and provocative palpation, along with an increase in distress and disability ratings.[30,31,41–43]

I. Persistent pain into the postpartum period has been estimated at 7% to 25%, with one/fifth of these subjects assumed to have serious problems.[23,41,44–48] Of the serious cases, 8% to 10% continue to have pain for 1 to 2 years.[25,44,46] Risk factors for persistent pain include all of the factors listed earlier, as well as some additional reports. Albert et al[44] demonstrated that subjects with a higher number of positive PPPTs in the last trimester correlated with subjects more likely to have pelvic pain 2 years after delivery. This group also found that a slower postpartum recovery was seen in subjects with a greater number of pelvic pain locations.[44] Robinson et al[18] also found that subjects were most likely to have problems at 12 weeks post-delivery with a higher number of pain sites and a history of LBP (preantepartum).[18] Work dissatisfaction and lack of belief in improvement were also highly predictive of persistent pain.[30,31]

Clinical Course: A/B

Clinicians should (consider) treat patients with early onset, multiple pain locations, a high number of positive PPPTs, work dissatisfaction, and lack of belief of improvement, as these are strong/moderate factors in determining the potential for persisting PGP in late pregnancy and postpartum. (Recommendations are based on strong/moderate evidence.)

Diagnosis/Classification

II. In 2002, Albert et al[12] reported on a prospective, epidemiological cohort study in Denmark conducted over a 1-year period. During this time, 293 patients (20.1%) of the total sample size were found to have pelvic joint pain. The authors, through the use of patient reports and a physical examination, were able to define 4 classification groups: pelvic girdle syndrome (PGS) (6%), defined as daily pain in both SI joints and the pubic symphysis, symphysiolysis (2.3%), defined as daily pain only in the pubic symphysis, one-sided SI syndrome (5.5%), and double-sided SI syndrome (6.3%). All of these classifications were confirmed by physical examination. One final category was the miscellaneous category (1.6%), defined as inconsistent objective findings when compared with the patient report.[12] Cook et al[2] in 2007 supported the findings of Albert et al.[1]

B. Clinicians may consider the utilization of the classification system for the diagnosis of the type of PGP in antepartum population. (Recommendation is based on moderate evidence.)

Differential Diagnosis (Red Flags)

V. PGP in the antepartum population can be associated with signs and symptoms of inflammatory, infective, traumatic, neoplastic, degenerative, or metabolic disorders. The physical therapist should proceed with caution or consider a medical referral for any history of trauma, unexplained weight loss, history of

cancer, steroid use, drug abuse, human immunodeficiency virus or immunosuppressed state, neurological symptoms/signs, fever, and/or systemically unwell.[49] Special considerations for PGP should include symptoms due to uterine abruption or referred pain due to urinary tract infection to the lower abdomen/pelvic or sacral region.[50] Failure to achieve functional improvement, pain that does not reduce with rest, and/or severe, disabling pain would require a medical specialist referral.

II. Pelvic floor muscle weakness, a risk factor for PGP,[30] is associated with weakness of the abdominal wall in DRA.[51] The incidence of DRA in the antepartum population in the third trimester is 66%, with the occurrence in the postpartum population at 39% after 7 weeks to several years.[52,53]

I. Differential diagnosis of PGP should consider the presence of hip dysfunction including the possibility of a femoral neck stress fracture due to transient osteoporosis. Studies have demonstrated that average bone mineral density decreases with loss of trabecular bone of 1.8% to 3.4% in the lumbar spine, 3.2% ± 0.5% at the entire hip, 4.3% in the femoral neck, 4.2% ± 0.7% at the distal forearm, and 6% at the calcaneus across trimesters in the antepartum period.[54–57]

II. Additional hip dysfunctions can include bursitis/tendonitis, chondral damage/loose bodies, capsular laxity, femoral acetabular impingement, labral irritations/tears, muscle strains, referred pain from L2,3 radiculopathy, osteonecrosis of the femoral head, Paget's disease, rheumatoid, and psoriatic and septic arthritis.[58] Physical examination measures that may be helpful in the diagnostic process can be confusing, as a positive test can implicate either the hip joint or the pubic symphysis.[1,2] Ensure that proper test interpretation is based on the location of the pain.

I. The physical therapist should rule out the presence of lumbar spine dysfunctions such as spondylolisthesis, discal patterns of symptoms that fail to centralize, and neurological screenings that may reveal the presence of lower motor neuron or upper motor neuron signs. Bowel/bladder dysfunction should also be considered in combination with multiple sensory, motor, and diminished reflexes that could indicate cauda equina syndrome, large lumbar disc, or other space-occupying lesions around the spinal cord or nerve roots.

I. A patient pain distribution diagram is most useful for differentiation between PGP and PLBP. By definition, PGP is located under the PSIS (posterior superior iliac spine), in the gluteals area, the posterior thigh, and the groin (specifically located over the pubic symphysis).[29] PLBP appears to be concentrated in the lumbar region above the sacrum.

A. PGP, in this population, should be differentiated from signs and symptoms of serious disease and psychological factors when the symptoms are not associated with the described clinical course of PGP, impairments are failing to normalize, and the symptoms are worsening with increased disability. This should include the presence of transient osteoporosis and DRA as possible comorbidities in this population, as well as the presence of pelvic floor muscle, hip, and lumbar spine dysfunction. (Recommendations are based on strong evidence.)

Imaging Studies

V. During pregnancy, imaging studies are kept to a minimum to decrease the exposure of the fetus to radiation or radiopaque and paramagnetic contrast agents. The preferred methods of imaging, ultrasonography or magnetic resonance, have no known association with adverse fetal effects. Imagining may be necessary for interventional and/or surgical planning, as well as to determine the presence of serious medical conditions.[59]

F. In the absence of good evidence, expert opinion and foundation science may be used to guide examination with the use of imaging studies.

CLINICAL GUIDELINES: *EXAMINATIONS*

This CPG will provide clinicians with a core set of examination tests and measures, with the best available evidence, that enables a clinician to determine (1) the presence of clinical findings associated with an impairment/pelvic joint pain classification, and (2) changes in impairments of body function, activity limitations, and participation restrictions over the course of the patient's episode of care. Clinicians are expected to choose the most relevant outcome, activity limitation, and/or impairment measures to utilize based on the patient's presentation, needs, and goals. This is especially true for measures based on patient's presentation of catastrophization and/or fear.

Outcomes Measures

Patient-reported outcomes have been well established in the orthopedic population. A variety of domains should be captured in outcome assessment of PGP including pain, generalized disability, pelvic girdle activity-specific function, work and physical activity limitations, and mental processing beliefs and perceptions.

I. A common generalized disability outcome measure is the DRI. The DRI was developed to assess physical disability in patients with disability resulting in common motor functions including arthritis, neck, shoulder, and LBP.[60] In the antepartum population,

those with PGP have higher DRI scores than those with LBP.[42]

I. The ODI is a well-established functional outcome measure in the LBP population.[61,62] The ODI, along with the Roland-Morris Disability Questionnaire (RMDQ), has been validated across the spectrum of LBP, including the antepartum population.[31,63,64] However, LBP and PGP are distinct conditions that warrant separate outcome measures to capture the specific impairments and functional limitations that patients describe.

I. The PGQ is currently the only outcome measure specifically developed to evaluate impairments and functional limitations of PGP during pregnancy and postpartum.[65] The PGQ was developed to include questions from the DRI, ODI, and RMDQ, as well as functional activity questions that were considered clinically relevant by clinicians and a patient focus group. The PGQ is simple to concurrently administer with fear and catastrophization outcomes measures.

II. Outcome measures can be used to aid the clinician in the assessment of mental processing concerning the condition of PGP. It has been demonstrated that patients' beliefs and perceptions about their pain have been well demonstrated across the spectrum of orthopedic conditions and in the antepartum population.[31] Once such belief is fear-avoidance, which can be used to determine the relationship of fear related to PGP and its relationship to the ability to perform physical activities and work. There are studies that suggest that fear-related avoidance behavior can have a predictive function of the development of chronic LBP.[66–70] The FABQ is a common tool to measure fear beliefs in patients and is divided into Physical Activity (FABQ-PA) and Work subscales (FABQ-W). At this time, only the FABQ-PA subscale has been validated in the antepartum population.[63]

II. *Catastrophization of a painful condition*. It is the perception that patients will suffer the worst possible outcome due to their pain experience. This perception has also been linked to the development of chronicity of the condition,[31,45,46,48] and it has been demonstrated that patients who believe they will improve demonstrate greater improvement than those who do not.[32,71] The PCS has 3 subscales, Rumination, Magnification, and Helplessness, and has been utilized is various populations, including the antepartum population (Tables 5-9).[63,72]

A. Clinicians should administer self-reported outcome questionnaires such as DRI, ODI, PGQ, FABQ, and PCS. These scales are practical for the determination of baseline disability, function, and pain belief, as well as change throughout the clinical course. These should be utilized in combination with clinical examination for clinical decision. (Recommendations are based on strong evidence.)

Activity Limitation and Participation Restrictions

During the antepartum period, activity limitations and participation restrictions may be warranted to provide the patient an optimal function during pregnancy. This should include modifications of work and home environments, lifting restrictions, bed rest, positioning, etc. At the present time, there are no functional capacity evaluations that target the disability of PGP in the antepartum population. Further studies to validate current Functional Capacity Evaluation methods or development of additional evaluations are warranted in the antepartum population.

I. The antepartum population is at high risk for falls comparable with the geriatric population.[74] Incidences are reported at 26.8%, with 35.3% having fallen 2 or greater times during pregnancy. Individuals during the 7th month have the highest rate of falls, which coincides with peak of prevalence of PGP in the last trimester of pregnancy.[16–18] Significant gait pattern and speed changes have been documented in pregnant and postpartum patients with PGP in comparison with healthy pregnant women.[75,76]

I. Advancing pregnancy results in increased anterior-posterior postural sway and increased stance width, and individuals rely greater on visional input for postural balance.[77,78] Static balance challenged by perturbations is not indicative of dynamic falls in pregnancy. Utilization of dynamic balance tests such as gait speed,[75,79] Short Physical Performance Battery,[80] and Functional Reach Test[81] should be considered in this population for assessment of activity limitations and participation restrictions.

E. While strong evidence exists to support a high risk of falls, no measures have been validated to objectively assess the dynamic balance and fall risk in antepartum population. (Recommendation is based on theoretical/foundational evidence.)

Physical Impairment-Based Measures

See Tables 10-21.

Likelihood ratios were calculated with SPSS for data from Albert et al.[1]

Tables 22 and 23 describe the tests and measures from Albert et al[1] and Cook et al.[2] Albert et al[1] used the tests listed to categorize the Danish pregnant subjects in the 4 classifications that included PGP syndrome (PGS), symphysiolysis (pubic symphysis pain), one-sided SI syndrome, and double-sided SI syndrome. The patients were classified on the basis of the reported location(s) of their symptoms and the location of pain with provocation testing in the physical examination. The special tests of separation, compression, and hip abduction/adduction yielded an acceptable level of sensitivity for the pelvic girdle PGS group, whereas the PPPT, Menell's test, and FABER test yielded a higher level of sensitivity across the PGS,

Table 5. Disability Rating Index[a]

ICF Category	Measurement of limitation in activities and participation	
Description	The DRI was developed to assess physical disability in patients with chronic pain in the neck, shoulder, and low back. It is a 12-item scale of activities of daily living, demanding physical activity, and work-related or more vigorous activities. A mean score is calculated 0-100, with 100 representing the greatest possible disability.	
Measurement method	Self-report	
Nature of variable	Continuous	
Units of measurement	Individual: 0-100 Visual Analog Scale	
	0 = no disability; 100 = severe disability	
Measurement properties	Test-retest reliability: ICC (95%)	0.89 (0.79-0.94)
	MCD	17.6
	SEM	6.34
	Internal consistency (Chronbach α)	0.85
	Validity: PGQ Activity subscale (0.83), PGQ Symptom subscale (0.64), ODI (0.71), SF2 (0.63)	

Abbreviations: DRI, Disability Rating Index; ICF, International Classification of Functioning, Disability, and Health; MCD, minimal clinical difference; ODI, Oswestry Disability Index; PGQ, Pelvic Girdle Questionnaire; SEM, standard error of mean; SF2, Short Form 36: physical functioning.
[a]Data from Grotle et al[63] and Salen et al.[60]

one-sided, and double-sided SI syndromes. Palpation of the pubic symphysis and the Trendelenburg test were reported as the best tests for pubic symphysis involvement.[1]

Cook et al[2] using the same criteria found the same classification with a difference on emphasis from the findings of the physical examination with pregnant and nonpregnant subjects. This study reported the strongest diagnostic accuracy was with the Active Straight Leg Raise (ASLR) test, thigh thrust, and the lunge due to higher sensitivities compared with the other tests and measures. Combining the positive pain provocation findings from the lunge, manual muscle testing (MMT) of the hip and the hip passive range of motion (PROM) demonstrated the highest, positive likelihood ratios.[2]

CLINICAL GUIDELINES: *INTERVENTION*

Support Belts: Level D Evidence

Desmond,[84] in 2006, supported the use of support belts, mobilization, and exercise in the antepartum population with PGP. The use of belts was based on an expert opinion survey of 35 physiotherapists.[84]

Table 6. Oswestry Disability Index[a]

ICF Category	Measurement of limitation in activities and participation	
Description	A condition-specific outcome measure designed to assess the level of disability in individuals with spinal disorders. The ODI contains 10 sections that evaluate pain and domains of daily living including personal care, lifting, walking, sitting, standing, sleeping, sexual activity, social activity, and traveling. Scores are reported on a 0%-100% scale, with 100% representing severe disability.	
Measurement method	Self-report	
Nature of variable	Continuous	
Units of measurement	Individual items: 5-point Likert scale	
	0 = no disability; 5 = severe disability	
Measurement properties	Test-retest reliability: ICC (95%)	0.94 (0.89-0.97)
	MCD	11.1
	MCID	10 patients; 30%[2]
	SEM	4.02
	Internal consistency (Chronbach α)	0.83
	Validity: PGQ Activity subscale (0.72), PGQ Symptom subscale (0.71), DRI (0.71), SF2 (0.66)	

Abbreviations: DRI, Disability Rating Index; ICF, International Classification of Functioning, Disability, and Health; MCD, minimal clinical difference; MCID, minimal clinical important difference; ODI, Oswestry Disability Index; PGQ, Pelvic Girdle Questionnaire; SEM, standard error of mean; SF2, Short Form 36: physical functioning.
[a]Data from Delitto et al,[61] Fairbank and Pynsent,[62] and Grotle et al.[63]

Table 7. Pelvic Girdle Questionnaire[a]

ICF Category	Measurement of limitation in activities and participation			
Description	A condition-specific outcome measure designed to assess aspects of quality of life in the antepartum and postpartum populations who experience pelvic girdle pain. The PGQ is a 25-item questionnaire with 2 subscales: 20-item Activity subscale and 5-item Symptom subscale. There is 75 possible points that are adjusted (×4/3) to a 0%-100% scale, with 100% representing highest impact on quality of life.			
Measurement method	Self-report			
Nature of variable	Continuous			
Units of measurement	Individual items: 4-point Likert scale			
	0 = no impairment/pain; 3 = large extent/considerable pain			
Measurement properties		**PGQ**	**Activity Subscale**	**Symptom Subscale**
	Test-retest reliability: ICC (95%)	0.93 (0.87-0.96)	0.93 (0.86-0.96)	0.91 (0.84-0.95)
	MCD	14.8	14.4	19.6
	SEM	5.33	5.21	7.17
	Internal consistency (Chronbach α)	0.86		
	Validity: Activity subscale (0.93), Symptom subscale (0.96), DRI (0.76), ODI (0.72), SF2 (0.63)			

Abbreviations: DRI, Disability Rating Index; ICF, International Classification of Functioning, Disability, and Health; ODI, Oswestry Disability Index; MCD, minimal clinical difference; PGQ, Pelvic Girdle Questionnaire; SEM, standard error of mean; SF2, Short Form 36: physical functioning.
[a]Data from Grotle et al[63] and Stuge et al.[65]

Also in 2006, Mens et al[85] studied the mechanical effects of nonelastic belts in the postpartum population with the onset of PGP in the antepartum period. This study demonstrated increased resistance to vibration forces at the SI joint, with the belt applied over the ASIS (higher position) versus the pubic symphysis. The higher position provided increased support, whereas the lower position was hypothesized to increase pubic symphysis support.[85] The safety for support belts was demonstrated by Beaty et al[86] for subjects at 24 to 26 weeks of gestation. No acute changes in maternal or fetal hemodynamics occurred when support belts were used in the seated and standing positions.[86]

I. Depledge et al[87] conducted an RCT evaluating the use of elastic and nonelastic belts in comparison with traditional care (patient education and exercise) in 90 antepartum women with primary complaint of pubic symphysis pain with exclusion of PLBP. At a 1-week follow-up, the functional outcomes measures (RMDQ

Table 8. Fear-Avoidance Beliefs Questionnaire, Physical Activity Subscale[a]

ICF Category	Measurement of impairment of body function—fear-avoidance thoughts and behaviors	
Description	The FABQ was designed to assess fear-avoidance beliefs associated with LBP. It consists of 2 subscales: Physical Activity (FABQ-PA) and Work (FABQ-W). In the pelvic girdle pain population, the FAQB-PA is the primary subscale utilized. The FABQ-PA is a 5-item questionnaire, with a summation score (0-24) calculated from items 2 to 5. A score of 24 represents the highest level of fear-avoidance belief	
Measurement method	Self-report	
Nature of variable	Continuous	
Units of measurement	Individual: 7-point Likert scale	
	0 = completely disagree; 6 = completely agree	
Measurement properties	Test-retest reliability: ICC (95%)	0.88 (0.77-0.93)
	MCD	6.1
	SEM	2.2
	Internal consistency (Chronbach α)	0.6
	Validity: Low validity with PCS (0.27)	

Abbreviations: FABQ-PA, Fear-Avoidance Beliefs Questionnaire Physical Activity; ICF, International Classification of Functioning, Disability, and Health; MCD, minimal clinical difference; PCS, Pain Catastrophizing Scale; SEM, standard error of mean.
[a]Data from Grotle et al[63] and Waddell et al.[11]

Table 9. Pain Catastrophizing Scale[a]

ICF Category	Measurement of impairment of body function—pain catastrophic thoughts and behaviors	
Description	The PCS was designed to assess individuals' level of catastrophic thinking in regard to pain experience and to predict the chronicity of their pain experience. It allows the patients to reflect on past painful experiences and indicates the degree to which they experienced each 13 thoughts or feelings when experiencing pain. A summation of the 13 items provides a total possible score of 0-52, with 52 representing the highest level of catastrophization. The scale also has 3 subscales: Rumination, Magnification, and Helplessness.	
Measurement method	Self-report	
Nature of variable	Continuous	
Units of measurement	Individual: 5-point Likert scale	
	0 = not at all; 4 = all the time	
Measurement properties	Test-retest reliability: ICC (95%)	0.92 (0.84-0.96)
	MCD	10.5
	SEM	3.78
	Internal consistency (Chronbach α)	0.89
	Validity: Low validity with FABQ-PA (0.27)	

Abbreviations: FABQ-PA, Fear-Avoidance Beliefs Questionnaire, Physical Activity; ICF, International Classification of Functioning, Disability, and Health; ODI, Oswestry Disability Index; MCD, minimal clinical difference; PCS, Pain Catastrophizing Scale; SEM, standard error of mean.
[a]Data from Grotle et al[63] and Sullivan et al.[73]

and Patient-Specific Functional Scale) and highest pain rating showed no significant difference among groups. However, a significant time effect was demonstrated for all groups and there was as significant reduction in the average pain intensity for the exercise-only group and the exercise plus rigid belt group.[87]

II. Nilsson-Wikmar et al[88] performed a randomized, assessor-blinded clinical trial of 118 antepartum women with PGP with the onset before the 35th week of gestation. PGP was defined by 3 or greater positive PPPTs including pubic symphysis involvement. Lumbar involvement was excluded by a negative ASLR test, mobility testing, and radiating pain. All subjects where given patient education and were divided into 3 intervention groups: nonelastic support belt, home exercise, and clinic supervised exercise. No significant differences were found between groups at enrollment, 38 weeks of gestation, or 12 months postpartum. All 3 groups had reduction in pain intensity and an increase in activity ability only at 12 months postpartum. Study limitations include the generalized exercises utilized, poor follow-up on patient participation in home exercise group, and majority (71%) of patients with a previous history of back pain prior to pregnancy.[88]

II. Kalus et al[83] evaluated the use of an elastic support belt (BellyBra) versus a generic, elastic support

Table 10. Active Straight Leg Raise[a]

ICF Category	Measurement of body structure impairment, inability to stabilize	
Description	In the supine position, the patient actively raises the involved leg with knee in extension 6 in (20 cm) above the table. Then the clinician stabilizes the pelvic with either an SI joint belt around the pelvic or manually compresses the pelvis tightly. The patient then repeats the active LR. The examination is performed bilaterally if bilateral involvement is suspected.	
Measurement method	A positive result is indicated if the patient has pain during the first raise and is relieved during the second raise.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	
	Sensitivity	0.44
	Specificity	0.83
	Positive LR	2
	Negative LR	0.8

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise; SI, sarcoiliac.
[a]Data from Cook et al[2] and Robinson et al.[42]

Table 11. Compression Test[a]/Separation Test[b]

ICF Category	Measurement of body function impairment, pain with compression	
Description	The patient assumes a side-lying position with the painful side superior. Resting symptoms are assessed. The clinician then cups the iliac crest and applies a downward force for 30 s through the ilium.	
Measurement method	The reproduction of the patient's symptom is considered a positive result.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	0.84
	Sensitivity	0.04-0.59
	Specificity	0.5-1
	Positive LR	…
	Negative LR	0.45

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise.
[a]Data from Cook et al.[2]
[b]Data from Albert et al.[1]

(Tubigrip) in 115 antepartum women for a period of 3 weeks. Because of the high prevalence, the authors included subjects with lumbar and posterior pelvic pain but excluded subjects with only pubic symphysis pain. The participants were allowed to seek alternative treatments, with 24% in Tubigrip and 48% in BellyBra utilizing other treatments. No significant difference in pain level was demonstrated among groups. However, a significant reduction in medication use, improvement in sleep, ease of sit to stand, and the ability to walk were reported in the BellyBra group.[83]

II. Carr[82] employed a pilot study of the Loving Comfort Back Support in 40 antepartum females with pelvic girdle and lumbar pain. Thirty consecutive subjects were enrolled into the intervention group, with 10 wait-list control subjects. Subjects who wore the support during waking hours for 2 weeks demonstrated a significant reduction in the number of days per week, hours per day, and overall change in pain compared with controls.[82]

D. Clinicians should consider the application of a support belt in the antepartum population with PGP. The 4 studies reviewed different patient populations, had varied intervention groups and controls, different durations of intervention application, and different timing of follow-up. Further research is needed to clarify initial application, duration, and specific antepartum PGP patient classification for support belt intervention. (Recommendation is based on conflicting evidence.)

Exercise: Level D Evidence

The ACOG and the Canadian CPGs have issued guidelines for the contraindications, warning signs,

Table 12. Distraction Test[a]/Compression Test[b]

ICF Category	Measurement of body function impairment, pain with distraction	
Description	With the patient in a supine position, the clinician crosses his or her arms to form an "X" at the forearms. The clinician applies a posterior-lateral force on the ASIS for 30 s. If no pain is present after 30 s, the clinician applies a series of vigorous thrust through the ASIS. (This could potentially be a differentiating factor between the tests.)	
Measurement method	A positive result is the presence of pain with the testing maneuver.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	0.79
	Sensitivity	0.13-0.70
	Specificity	0.67-1
	Positive LR	1.6
	Negative LR	0.3-0.87

Abbreviations: ASIS, anterior superior iliac spine; ICF, International Classification of Functioning, Disability, and Health; LR, leg raise.
[a]Data from Cook et al.[2]
[b]Data from Albert et al.[1]

Table 13. Gaenslen Test[a]

ICF Category	Measurement of body function impairment, pain with counternutation torque	
Description	Near the end of the table, the patient assumes a supine position. Resting symptoms are assessed. The clinician passively raises the noninvolved leg into 90° hip flexion with the knee flexed, while the opposite leg is off the end of the table (as in a modified Thomas test position). A downward force is applied to the involved, extended leg to produce a counternutation torque.	
Measurement method	A positive result is pain with the application of the counternutation torque.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	
	Sensitivity	0.47
	Specificity	1
	Positive LR	…
	Negative LR	0.57

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise.
[a]Data from Cook et al.[2]

and recommendations for exercise in the antepartum population.[89–92] These are summarized in Table 24.

I. Boissonnault[93] performed a systematic review of exercise intervention on PLBP and PGP in the antepartum population. Of the 11 studies reviewed, 3 were determined good quality (7-8/10), 6 moderate quality (4-6/10), and 2 poor quality (0-3/10) by the PEDro scale. The heterogeneity of methodology, patient inclusion criteria, specific exercise protocols, intervention parameters, and varied outcomes measures did not allow for a meta-analysis to be performed.[93]

Of the 3 good-quality studies, only Elden et al[94] conducted a study of the management of PGP in antepartum women at the time of enrollment. Subjects were randomized into 3 groups: standard care (advice, patient education, and support belt), exercise group (including standard care), and acupuncture (including standard care). Exercises included stabilization of the back and pelvis and stretching of hip external rotators and extensors. The acupuncture group experienced less pain than the exercise group, and they both experienced less pain than the standard care group.[94]

The other good-quality studies of Garshasbi and Faghih Zadeh[95] and Morkved et al[96] studied healthy nulliparous women and focused on exercise intervention to prevent "low back pain" without distinguishing between lumbar pain and PGP. Both studies reported less pain in the exercise group than in controls.[95,96]

The authors reported, based on the good-quality studies, support for the intervention of exercise, either alone or combined with advice, patient education, and support belts, for the prevention or treatment of PLBP and PGP.

II. In contrast, Lillos and Young[97] performed a systematic review to examine the specific exercise interventions of core stabilization and lower extremity strengthening in PLBP and PGP.[97] Of the 7 studies reviewed, 5 were included in the Boissonnault et al[50] review, with 2 of

Table 14. Flexion Abduction External Rotation Test[a]

ICF Category	Measurement of body structure impairment, hip joint, or SI joint pathology present	
Description	With the patient in the supine position, the clinician passively flexes, abducts, and externally rotates the involved leg to place the heel on the opposite knee.	
Measurement method	A positive test is pain in either SI joints or pubic symphysis. Hip joint pathology is indicated when pain is present on the medial side of the femur and knee or in the inguinal area.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	0.54
	Sensitivity	0.40-0.70
	Specificity	0.99
	Positive LR	40-70
	Negative LR	0.30-0.61

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise; SI, sarcoiliac.
[a]Data from Albert et al.[1]

Table 15. Hip Passive Range of Motion,[a] Passive Hip Abduction, Adduction[b]

ICF Category	Measurement of body structure impairment, pain with passive movement			
Description	In the supine position, the clinician passively moves the hip into flexion, abduction, adduction, and internal and external rotation in each cardinal plane.[83]			
Measurement method	A positive test is indicated by an increase of pain from baseline.			
Nature of variable	Interval, continuous			
Units of measurement	Degrees			
		Hip PROM	**Hip Abduction**	**Hip Adduction**
Measurement properties	Test-retest reliability: ICC (95%)			
	Sensitivity	0.55	0.17-0.70	0.30-0.67
	Specificity	1	1	1
	Positive LR	…	…	…
	Negative LR	0.45	0.30-0.83	0.33-0.70

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise; PROM, passive range of motion.
[a]Data from Cook et al.[2]
[b]Data from Albert et al.[1]

the articles considered good quality.[50,95,98] One article related exercise to generalized, pregnancy-related discomfort, and the final article compared an education program including exercise with a control group.[69,99] On the basis of the included literature, the authors found no conclusive evidence to support exercise as a standard treatment option for PLBP and PGP.[100]

I. Eggen et al[98] investigated the reduction of severity and prevalence of PLBP and PGP via RCT of a supervised group exercise versus a control group. Healthy subjects (n = 257) were enrolled before the 20th week of gestation, with 18% reporting PGP and 29% reporting PLBP at baseline. Half of the subjects were provided supervised group exercise intervention including 16 to 20 weeks of 1-time per week group exercise, home exercise program, and ergonomic advice, whereas the others were followed through routine obstetric care. Exercises included aerobic activity, localized back and pelvic exercises, and global strengthening. Interventions were not differentiated for subjects based on the presence or type of pain. No effect on severity or prevalence was demonstrated by the exercise intervention in PLBP or PGP.[98]

I. Kluge et al[101] investigated the benefit of exercise on pain intensity and functional ability in an RCT of antepartum women with PLBP, PGP, or combination, based on a pain diagram. The intervention group (n = 26) underwent a 10-week progressive exercise program including group training, a home exercise program, and education using a posture and ergonomics brochure. The control group (n = 24) received only the posture and ergonomics brochure. Exercises included stretching, relaxation, breathing, and isometric pelvic stabilization with progressive exercise to include coactivation with gluteals, hip abductors, and quadriceps. While the authors reported low compliance with the exercise intervention, the exercise group demonstrated a significant reduction in pain intensity, as well as a significant difference between groups for pain and functional

Table 16. Lunge[a]

ICF Category	Measurement of body function impairment, pain with lunge	
Description	The patient is asked to step forward and shift the weight over the forward leg. Then the patient flexes the hip and knee of the forward leg to 90°.	
Measurement method	A positive test is indicated by an increase of pain from baseline.	
Nature of variable	Dichotomous	
Units of Measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	
	Sensitivity	0.44
	Specificity	0.83
	Positive LR	2.6
	Negative LR	0.68

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise.
[a]Data from Cook et al.[2]

Table 17. Menell's Test[a]

ICF Category	Measurement of body structure impairment, pain with joint loading	
Description	In the supine position, the involved leg is positioned into 30° abduction and 10° flexion of the hip joint. The clinician first compresses and then distracts the leg in the sagittal plane.	
Measurement method	A positive test is pain provocation with the maneuver	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	
	Sensitivity	0-0.70
	Specificity	1
	Positive LR	…
	Negative LR	0.30-1.0

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise.
[a]Data from Albert et al.[1]

ability following the intervention. The control group remained relatively unchanged regarding pain and functional ability during the intervention period.[101]

D. Clinicians should consider the use of exercise in the antepartum population with PGP. The ACOG and the Canadian CPGs have recommended exercise for health benefits because of the low risk and minimal adverse effects for the antepartum population. The 2 systematic reviews as well as the recent RCTs were nonspecific in the application of exercise to heterogeneous groups of PLBP and PGP. The populations varied in early and late pregnancy and demonstrated a variety of exercise interventions. No study based the exercise intervention on the classification of PGP proposed by Albert et al[1] and Cook et al.[2] (Recommendation is based on conflicting evidence.)

Manual Therapy: Level C Evidence

Introduction

Manual therapy in physical therapy can consist of joint manipulation (defined as high-velocity, low-amplitude force delivered to a joint) and joint mobilization (low-velocity passive movement techniques with the joint's normal range of motion). Manual therapy can also include soft tissue mobilization/manipulation, myofascial release, muscle energy, and muscle-assisted range of motion.

In the general population, severe adverse effects of joint manipulation to the spine are rare, especially related to the lumbar spine.[25,102,103] In 2002, Whitman[10] delivered an expert opinion that, based on support by numerous articles in the general population, the use of manipulation for acute musculoskeletal disorders in the antepartum population should be considered to restore normal movement in the lumbar spine and/or pelvis. There is little to no evidence that spinal manipulation and/or mobilization are harmful to the antepartum female or the fetus. Normal movement in all directions is advocated despite hypermobility or laxity in 1 or more directions.[10]

III. In 2009, Khorsan et al[104] published a systematic review on "Manipulative Therapy for Pregnancy and Related Conditions." The review was conducted to evaluate the evidence on treatment effects of spinal

Table 18. Palpation of Pubic Symphysis[a]

ICF Category	Measurement of body structure impairment, pain with palpation	
Description	The patient lies in a supine position; the entire anterior aspect of the pubic symphysis is gently palpated.	
Measurement method	A positive test is indicated if the pain persists for greater than 5 s after palpation.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	0.89
	Sensitivity	0-0.81
	Specificity	0.5-0.99
	Positive LR	0-81
	Negative LR	0.19-1

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise.
[a]Data from Albert et al[1] and Cook et al.[2]

Table 19. Palpation of Sacroiliac Joints[a]

ICF Category	Measurement of body structure impairment, pain with palpation	
Description	The patient is in a side-lying position with slight flexion at the hips and knees. The area proximal to both SI joints is palpated.	
Measurement method	If the pain persists for greater than 5 s after palpation, it is considered positive pain with palpation.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	0.34
	Sensitivity	0-0.49
	Specificity	1
	Positive LR	…
	Negative LR	0.51-1

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise; SI, sarcoiliac.
[a]Data from Albert et al.[1]

manipulation therapy and/or joint mobilization for back pain, PGP, and other related symptoms during pregnancy. Thirteen articles were included in the review, with 3 studies formally reporting no adverse effects, 2 studies reporting contraindications, and the rest of the studies did not include any report of adverse effects. Within the review, low-evidence case series and reviews investigated the relationship of PLBP/PGP and the use of manipulation or mobilization. The side posture manipulation was reported with greater frequency, and rotational manipulation was described in 1 article. Of these articles, all of the subjects had relief of symptoms, with some studies showing 70% to 91% relief. Three case reports noted a reduction of pain by the subjects. The authors concluded that expert opinion exists within the literature that the relative safety of spinal manipulation and/or mobilization in the general population exists. This intervention could be considered in the antepartum population for those without complications within the pregnancy.[104]

III. In a retrospective case series, Lisi[105] reported on spinal manipulation in the treatment of PLBP and PGP. Spinal manipulation was aimed at the lumbar facets and the SI joints. Other interventions were described as manual mobilization and manual myofascial release. Seventeen cases were reviewed, with an average decrease of 5.9 to 1.5 using the numerical pain rating scale. Sixteen cases reported clinical important improvement based on pain intensity 2 to 4 days following 2 interventions. No adverse effects were reported in any of the cases.[105]

Table 20. Posterior Pelvic Pain Provocation Test[a]/Thigh Thrust[b]

ICF Category	Measurement of body function impairment, pain with compression	
Description	*P4 test*: With the patient in a supine position, the clinician stands on examination side. The clinician places the leg into 90° hip flexion and applies a light manual pressure along the longitudinal axis of the femur. The pelvis is stabilized by the examiner's hand on the contralateral ASIS. *Thigh thrust*: With the patient in a supine position, the clinician stands on the noninvolved side. The involved hip and knee are flexed to 90°, and the clinician places one hand beneath the sacrum for stability. A downward pressure is applied through the femur to force a posterior translation of the pelvis.	
Measurement method	Pain in the posterior hip or near the SI joint is indicative of a positive result.	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	
	Sensitivity	0.17-0.93
	Specificity	0.67-0.98
	Positive LR	1.6-61.5
	Negative LR	0.07-0.85

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise; P4, posterior pelvic pain provocation; SI, sacroiliac.
[a]Data from Albert et al[1] and Robinson et al.[42]
[b]Data from Cook et al.[2]

Table 21. Trendelenburg Test[a]

ICF Category	Measurement of body structure impairment, inability to stabilize	
Description	The patient stands with her back to the clinician and actively flexes her hip and knee to 90°.	
Measurement Method	A test is positive if the flexed hip descends and if pain is experienced in the pelvic joints, the test becomes a test for classification	
Nature of variable	Dichotomous	
Units of measurement	Present/absent	
Measurement properties	Test-retest reliability: ICC (95%)	
	Sensitivity	0.18-0.62
	Specificity	0.99
	Positive LR	18-62
	Negative LR	0.38-0.83

Abbreviations: ICF, International Classification of Functioning, Disability, and Health; LR, leg raise.
[a]Data from Albert et al.[1]

I. Licciardone et al[100] conducted a randomized, placebo-controlled trial to observe the effects of osteopathic manipulation therapy versus sham ultrasound versus no treatment on antepartum patients with PLBP and PGP. A total of 127 subjects between the 28th and 30th week of gestation were entered into the study and divided into one of 3 groups: control, sham ultrasound, or osteopathic manipulative therapy. The groups were stratified on the basis of age and gravida. Both intervention groups received treatments for 7 visits over 9 weeks. Manipulation therapy included soft tissue mobilization, myofascial release, muscle energy, and range-of-motion mobilization. The osteopath interventionists determined regions of the body to be treated from the cervical spine to the sacrum. High-velocity, low-amplitude manipulation was not used, as the authors felt a "theoretical risk" was posed because of increasing ligamentous laxity in the antepartum population. No significant differences were found between groups for level of pain at the end of the treatment period. The manipulative therapy group demonstrated significantly less deterioration in back specific function. The authors concluded that the manipulative therapy techniques may not have had a significant impact on pain but did lessen or slow down the deterioration of back specific function.[100]

C. Clinicians may or may not utilize manual therapy techniques including high-velocity, low-amplitude manipulations for the treatment of PLBP and PGP. This evidence is emerging and treatment could be considered, as there is little to no reported evidence of adverse effects in the healthy antepartum population. (Recommendations are based on weak evidence.)

RECOMMENDATIONS

Risk Factors: A

Clinicians should utilize the following risk factors: prior history of pregnancy, orthopedic dysfunctions, increased BMI, smoking, as well as work dissatisfaction

Table 22. Measurement Properties Based on Classification Groups[a]

	Sensitivity				
	PGS	Symphysiolysis	1-Sided SI Syndrome	2-Sided SI Syndrome	Specificity
Menell's test	0.70	0	0.54	0.65	1
Trendelenburg test	0.60	0.62	0.19	0.18	0.99
Passive hip abduction	0.70	0.17	0.25	0.37	1
Passive hip adduction	0.67	0.38	0.30	0.30	1
Separation test	0.4	0.13	0.04	0.14	1
Compression test	0.7	0.13	0.25	0.38	1
PPPT	0.9	0.17	0.84	0.93	0.98
FABER test	0.7	0.4	0.42	0.4	0.99
Palpation of the SI joints	0.49	0	0.15	0.11	1
Palpation of pubic symphysis	0.81	0.6	0	0	0.99

Abbreviations: FABER, Flexion Abduction External Rotation; PGS, pelvic girdle syndrome; PPPT, posterior pelvic pain provoking test; SI, sarcoiliac.
[a]Data from Albert et al.[1]

Table 23. Measurement Properties Based on Test Clusters[a]

	Sensitivity	Specificity	Positive LR	Negative LR
Lunge, MMT, hip PROM (1/3)	0.7	0.83	4.2	0.36
Lunge, MMT, hip PROM (2/3)	0.35	0.83	2.2	0.78
ASLR, Gaenslen test, thigh thrust (1/3)	0.88	0.66	2.6	0.18
ASLR, Gaenslen test, thigh thrust (2/3)	0.58	0.83	3.5	0.51
ASLR, Lunge, thigh thrust (1/3)	0.94	0.66	2.8	0.09

Abbreviations: ASLR, Active Straight Leg Raise; LR, leg raise; MMT, manual muscle testing; PROM, passive range of motion.
[a]Data from Cook et al.[2]

and a lack of belief of improvement in the prognosis of PGP. (Recommendation is based on strong evidence.)

Postural Changes: B

Clinicians should not consider postural changes as indicative of the development and/or intensity of PGP in the antepartum population. (Recommendation is based on moderate evidence.)

Clinical Course: A/B

Clinicians should (consider) treat patients with early onset, multiple pain locations, a high number of positive PPPTs, work dissatisfaction, and lack of belief of improvement, as these are strong/moderate factors in determining the potential for persisting PGP in late pregnancy and postpartum. (Recommendations are based on strong/moderate evidence.)

Table 24. ACOG Contraindications for Exercise in the Antepartum Population

Absolute Contraindications to Exercise	Relative Contraindications to Exercise
• Hemodynamically significant heart disease • Restrictive lung disease • Incompetent cervix/cerclage • Multiple gestation at risk for premature labor • Persistent second- or third-trimester bleeding • Placenta previa after 26 weeks of gestation • Premature labor during the current pregnancy • Ruptured membranes • Preeclampsia/pregnancy-induced hypertension	• Severe anemia • Unevaluated maternal cardiac arrhythmia • Chronic bronchitis • Poorly controlled type 1 diabetes • Extreme morbid obesity • Extreme underweight (BMI <12) • History of extremely sedentary lifestyle • Intrauterine growth restriction in current pregnancy • Poorly controlled hypertension, seizure disorder, or hyperthyroidism • Orthopedic limitations • Heavy smoker
Warning Signs to Stop Exercise and Consult MD	**Contraindications During Exercise**
• Vaginal bleeding • Dizziness or feeling faint • Increased shortness of breath • Chest pain • Headache • Muscle weakness • Calf pain or swelling • Uterine contractions • Decreased fetal movement • Fluid leaking from the vagina	• Supine position (relative obstruction of venous return and therefore decreases cardiac output) • Prolonged static standing (decrease in cardiac output) • Increased basal metabolic rate (heat production) above nonpregnant levels (increased maternal core temperature above 1.5°C (first 45-60 days of gestation) • Avoid activities with high fall risk, abdominal trauma, potential contact sport, and scuba diving (decompression sickness)
Recommendations During Exercise	**Exercise Safety**
• Heart rate monitoring (difficult during pregnancy—due to blunted heart rate) • Borg Rate of Perceived Exertion Scale[93] • Hydration (to keep blood volume up) critical for heat balance • Energy cost (considered for balancing intensity and duration of activity) • Exercise prescription: Include elements to improve cardiovascular and musculoskeletal function (American College of Sports Medicine: same as nonpregnant in frequency—at least 30 min per day) • All without contraindications should be encouraged to aerobic and strength training exercise with reasonable goals • Water exercise (redistribution of extravascular fluid into vascular space)	• Exercise does not cause minimal to no changes on uterine activity during the final 8 weeks of pregnancy • Fetal implications (no evidence): No effect on transplacental transport of oxygen, carbon dioxide, and nutrients, birth weight, premature labor • No increased risk of adverse pregnancy or fetal outcomes

Abbreviation: BMI, body mass index.

Diagnosis/Classification: B
Clinicians may consider the utilization of the classification system for the diagnosis of the type of PGP in the antepartum population. (Recommendation is based on moderate evidence.)

Differential Diagnosis: A
PGP, in this population, should be differentiated from signs and symptoms of serious disease and psychological factors when the symptoms are not associated with the described clinical course of PGP, impairments are failing to normalize, and the symptoms are worsening with increased disability. This should include the presence of transient osteoporosis and DRA as possible comorbidities in this population, as well as the presence of pelvic floor muscle, hip, and lumbar spine dysfunctions. (Recommendations are based on strong evidence.)

Imaging Studies: F
In the absence of good evidence, expert opinion and foundation science may be used to guide examination with the use of imaging studies.

Examination—Outcome Measures: A
Clinicians should administer self-reported outcome questionnaires such as DRI, ODI, PGQ, FABQ, and PCS. These scales are practical for the determination of baseline disability, function, and pain belief, as well as change throughout the clinical course. These should be utilized in combination with clinical examination for clinical decision. (Recommendations are based on strong evidence.)

Examination—Activity Limitation and Participation Restriction Measures: E
While strong evidence exists to support a high risk of falls, no measures have been validated to objectively assess the dynamic balance and fall risk in antepartum population. (Recommendation is based on theoretical/foundational evidence.)

Intervention—Support Belts: D
Clinicians should consider the application of a support belt in the antepartum population with PGP. The 4 studies reviewed investigated different patient populations and had varied intervention groups and controls, different durations of intervention application, and different timing of follow-up. Further research is needed to clarify initial application, duration, and specific antepartum PGP patient classification for support belt intervention. (Recommendation is based on conflicting evidence.)

Intervention—Exercise: D
Clinicians should consider the use of exercise in the antepartum population with PGP. The ACOG and Canadian CPGs have recommended exercise for health benefits because of the low risk and minimal adverse effects for the antepartum population. The 2 systematic reviews as well as the recent RCTs were nonspecific in the application of exercise to heterogeneous groups of PLBP and PGP. The populations varied in early and late pregnancy and demonstrated a variety of exercise interventions. No study based the exercise intervention on the classification of PGP proposed by Albert et al[1] and Cook et al.[2] (Recommendation is based on conflicting evidence.)

Intervention—Manual Therapy: C
Clinicians may or may not utilize manual therapy techniques including high-velocity, low-amplitude manipulations for the treatment of PBLP and PGP. This evidence is emerging and treatment could be considered, as there is little to no reported evidence of adverse effects in the healthy antepartum population. (Recommendations are based on weak evidence.)

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