

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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RECOMMENDATIONS

Risk Factors: A

Clinicians should utilize the following risk factors: prior histories of previous pregnancies, orthopedic dysfunctions, increased BMI, smoking as well as work dissatisfaction and a lack of belief of improvement in the prognosis of Pelvic Girdle Pain (PGP). (Recommendation 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 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, work dissatisfaction and lack of belief of improvement, as these are strong/moderate factors in determining the persistence of Pelvic Girdle Pain in late pregnancy and post-partum. (Recommendations based on strong/moderate evidence)

Diagnosis/Classification: B

Clinicians may consider the utilization of the classification system for the diagnosis of the type of pelvic girdle pain 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 Abdominus as possible co-morbidities in this population as well as the presence of hip and lumbar spine dysfunction.
(Recommendations are based upon 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, Oswestry Disability Index, Pelvic Girdle Questionnaire, Fear-Avoidance Belief Questionnaire, and Pain Catastrophizing Scale. These are scales are practical for the determination of baseline disability, function and pain belief as well as change throughout the clinical course. (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 four studies reviewed demonstrate different patient populations, varied intervention groups and controls, and different duration of intervention application and 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. ACOG and the Canadian CPG have recommended exercise for health benefits because of the low risk and minimal adverse effects for the antepartum population. The two systematic reviews as well as the recent RCTs were non-specific 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 al⁴, and Cook, et al²³. (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 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 upon weak evidence.)

Introduction

AIM OF THE GUIDELINES

The Section on Women's Health (SOWH) and the Orthopedic Section of the American Physical Therapy Association (APTA) has 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).¹⁰²

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 orthopaedic 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 orthopaedic physical therapists
- Provide information for payers and claims reviewers regarding the practice of women's health and/or orthopaedic physical therapy for common musculoskeletal conditions
- Create a reference publication for women's health and/or orthopaedic physical therapy clinicians, academic instructors, clinical instructors, students, interns, residents, and fellows regarding the best current practice regarding women's health and/or orthopaedic 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 guidelines only. 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 Section of Women's Health in partnership with Orthopedic Section of APTA, developed a clinical practice guideline for physical therapists in the examination and intervention of pelvic girdle pain 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. Secondly, 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 Section of Women's Health and 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)140 terminology would not be sufficient for these ICF-based clinical practice guidelines, 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 search the scientific literature related to prevalence, risk factors, examination, classification, outcome measures, and intervention strategies implemented by physical therapists for pelvic girdle pain in the antepartum population. Thus, the authors of this clinical practice guideline 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 pelvic girdle pain in the antepartum population. Additionally, 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 clinical practice guideline. This guideline will be issued in 2014 based upon publications in the scientific literature prior to July 2012. This guideline will be considered for review in 2019, or sooner, if new evidence becomes available. Any updates to the guideline in the interim period will be noted on the Section on Women's Health (www.womenshealthapta.org) and the Orthopaedic Section (www.orthopt.org) of the APTA.

CRITICAL APPRAISAL PROCESS AND RELIABILITY

Each literary article was reviewed by two reviewers and required greater than 95% agreement among reviewers via Key Questions from the *Evidence Based Physical Therapy*³⁴ 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 was utilized to grade individual clinical research articles for diagnostic, prospective and therapeutic studies.^{59,75}

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) (i.e. 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”

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^{44ref} as modified by Law and MacDermid^{52ref} and adopted by the coordinator and reviewers of this project.^{44,52} In this modified system, the typical A, B, C, and D grades of evidence have been modified to include the role of consensus expert opinion and basic science research to demonstrate biological or biomechanical plausibility.

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 & 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 support this conclusion.
F	Expert opinion	Best practice based on the clinical experience of the guidelines development team

REVIEW PROCESS

The authors in conjunction with the Section of Women’s Health APTA will select reviewers from the following areas to serve as reviewers of the first draft of this clinical practice guideline:

- American College of Obstetrics and Gynecologist guidelines
- Coding
- Manipulative therapy
- Obstetric physical therapy
- Orthopedic physical therapy rehabilitation
- Outcomes research
- Pain science
- Pelvic Girdle Pain Rehabilitation
- Physical therapy academic education
- Women’s health physical therapy education

Comments from these reviewers will be utilized by the authors to edit this clinical practice guideline prior to submission to the *Journal of Women’s Health Physical Therapy* and the *Journal of Orthopaedic and Sports Physical Therapy*. In addition, several physical therapists practicing in antepartum and pelvic

girdle pain rehabilitation physical therapy practices will be sent initial drafts of this clinical practice guideline for assessment.

REVIEWERS TO DATE:

Joseph J. Godges, DPT, MA - Orthopedic Section, CPG director (Review of outline/format/permission of Orthopedic Section use of format)

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

Nancy Donovan PhD PT – Journal of Women’s Health Editor (Review of guideline intent and content outline – for Journal on Women’s Health)

Pat Downey PhD PT DPT – Chatham University – Department of Physical Therapy – Program Chair

Kimberly Ferreria PT MSPT PhD(c) – Andrews University Department of Physical Therapy – Entry level Chair

CLASSIFICATION

The primary ICD-10 codes and conditions associated with pelvic girdle pain during pregnancy are: **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, M99.04/.05 Segmental and somatic dysfunction of sacral region/pelvic region, S33.2 Dislocation of sacroiliac and sacrococcygeal joints, M46.1 Sacroiliitis, not elsewhere specified, M46.98 Unspecified inflammatory spondylopathy, sacral and sacrococcygeal region, M53.2X8 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, 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 psychological factors.¹⁰³ The corresponding ICD-9 codes and conditions associated, used in the United States are: **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 Public symphysis sprain/strain, 847.3 Sacroiliac joint pain, 839.42 Subluxation of the sacroiliac 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: **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.¹⁰²**

The primary ICF body-structure codes associated with pelvic girdle pain during pregnancy include: **s1100 Structure of cortical lobes, s1101 Structure of midbrain, s1102 Structure of diencephalon, s1103 Basal ganglia and related structures, s1104 Structure of brainstem, and 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 pelvic region,

Acute, Subacute, and Chronic Pelvic Girdle Pain with or without with Pregnancy Low Back Pain	R10.2 M54.5 M53.3 O26.9 R29.3 M48.48	Pelvic pain Low back pain Sacrococcygeal disorders, not elsewhere classified Pregnancy-related condition, unspecified Abnormal posture Fatigue (stress) fracture of vertebra, sacral and sacrococcygeal region
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unspecified, and s770 Additional musculoskeletal structure related to movement.¹⁰²

The primary ICF activity and participation codes associated with the above ICD-10 conditions are: 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, d710 Intimate relationships, d7203 Interacting according to social rules, d770 Intimate relationships, and d8451 Maintaining a job.¹⁰²

International Statistical Classification of Disease and Related Health Problems (ICD-10) Codes

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	Sacroilitis, 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	M53.2X8	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
Chronic- recurrent Pelvic Girdle Pain during pregnancy	M24.2	Disorder of ligament
	M24.4	Recurrent dislocation and subluxation of joint
Chronic Pelvic Girdle Pain with Related Generalized Pain during pregnancy	G96.8	Disorder of central nervous system specified as central nervous system sensitivity to pain
	F45.4	Pain disorders related psychological factors

International Classification of Functioning, Disability and Health (ICF) Codes

Acute, Subacute, and Chronic Pelvic Girdle Pain with or without with Pregnancy Low Back Pain		
Body Function	b2801 b28013 b6601	Pain in body part Pain in back Functions related to pregnancy
Body Structure	s7401 s7402 s7409 s770	Joints of the pelvic region Muscles of the pelvic region Structure of pelvic region, unspecified Additional musculoskeletal structures related to movement
Activities and Participation	d230 d410 d415 d460 d475 d640 d660 d770 d8451	Carrying out daily routine Changing basic body position Maintaining a body position Moving around in different locations Driving Doing housework Assisting others Intimate relationships Maintaining a job
Acute, Subacute and Chronic Pelvic Girdle Pain with mobility deficits during pregnancy		

Body Function	b2801 b7100 b7101 b715 b7201 b7300 b735 b770 b7800 b7801	Pain in body part Mobility of a single joint Mobility of several joints Stability of joint functions Mobility of pelvis Power of isolated muscles & muscle groups Muscle tone functions Gait pattern functions Sensation of muscle stiffness Sensation of muscle spasm
Body Structure	s7401 s7402 s7403	Joints of the pelvic region Muscles of the pelvic region Ligaments of fasciae of the pelvic region
Activities and Participation	d410 d415 d430 d455 d460 d640 d8451	Changing basic body position Maintaining a body position Lifting and carrying objects Moving around Moving around in different locations Doing housework Maintaining a job
Acute, Subacute, and Chronic Pelvic Girdle Pain with movement coordination impairments during pregnancy		
Body Function	b2801 b715 b735 b7601	Pain in body part Stability of joint functions Muscle tone functions Control of complex voluntary movements
Body Structure	s7401 s7402 s7403	Joints of the pelvic region Muscles of the pelvic region Ligaments of fasciae of the pelvic region
Activities and Participation	d410 d415 d430 d455 d640 d660 d770 d8451	Changing basic body position Maintaining a body position Lifting and carrying objects Moving around Doing housework Assisting others Intimate relationships Maintaining a job
Chronic- recurrent Pelvic Girdle Pain during pregnancy		
Body Function	b2801 b735 b7800 b7801	Pain in body part Muscle tone functions Sensation of muscle stiffness Sensation of muscle spasm
Body Structure	s620 s7401 s7402 s7403 s7409 s770	Structure of pelvic floor Joints of the pelvic region Muscles of the pelvic region Ligaments of fasciae of the pelvic region Structure of pelvic region, unspecified Additional musculoskeletal structures related to movement
Activities and Participation	d410 d415 d430 d455	Changing basic body position Maintaining a body position Lifting and carrying objects Moving around

	d460 d640 d660 d770 d8451	Moving around in different locations Doing housework Assisting others Intimate relationships Maintaining a job
Chronic Pelvic Girdle Pain with Related Generalized Pain during pregnancy		
Body Function	b134 b1520 b1602 b2800	Sleep functions Appropriateness of emotion Content of thought Generalized pain
Body Structure	s1100 s1101 s1102 s1103 s1104 s1200	Structure of cortical lobes Structure of midbrain Structure of diencephalon Basal ganglia and related structures Structure of brainstem Structure of spinal cord
Activities and Participation	d129 d230 d640 d710 d7203 d8451	Purposeful sensory experiences, specified and unspecified Carrying out daily routine Doing housework Intimate relationships Interacting according to social rules Maintaining a job

CLINICAL GUIDELINES: *Impairment/Function-Based Diagnosis*

PREVALENCE

I The prevalence of pregnancy low back pain (PLBP) and pelvic girdle pain (PGP) is estimated to occur in 56-72% of the antepartum population with 20% reporting severe symptoms during 20-30 weeks of gestation.^{5,33,61,63} 33-50% of pregnant females report PGP before 20 weeks of gestation and the prevalence may reach 60-70% in late pregnancy.^{42,70,78}

RISK FACTORS

I Risk Factors for the development of PGP in this population include a history of multiparous, joint hypermobility, periods of amenorrhea, increased BMI, and Hip and/or lower extremity dysfunction including the presence of glutaeus gluteus medius and pelvic floor muscle dysfunction.^{12,41,61} There is an association of the development of PGP with a history of trauma to the pelvis and a history of LBP and/or pelvic girdle pain.^{18,47,71,80,92,94,96,97} Finally, an association also exists with work dissatisfaction and lack of belief in improvement.^{43,99}

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 to non-smokers.¹³

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

PATHOANATOMICAL FEATURES

Definition of Pelvic Girdle Pain

I European Guidelines:⁹⁷

"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 measured ~~antepartum~~^{ante}postpartum 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

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

Pathophysiology

Vleeming et al^{97,98ref}, has developed the hypothesis of hormonal and biomechanical factors as the contributors to Pelvic Girdle Pain. The loss of stabilization of the pelvis during load transfer can occur through the two 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.^{97,98} Changing in load transfers due to joint laxity may account for the development of PGP in this population. A change in adequate closure of the pelvic girdle has been postulated to occur by the presence of the hormone Relaxin which allows for joint laxity in preparation for delivery.⁵⁶ Post mortem studies completed in 1924 have provided some minimal evidence that the SIJ in pregnant women demonstrated increased laxity and greater synovial fluid volume.¹⁹ Finally, Mens et al^{62ref}, reported an increased motion in the pelvic joints in pregnant females with PGP compared to healthy non-painful pregnant controls.⁶²

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

CLINICAL COURSE

I The development and progression of PGP in the antepartum population has been demonstrated to include an increase in intensity and disability by the end of the antepartum period and persistence into the post-partum period. The most common time period for PGP to occur is between 14-30 weeks of gestation. The development of PGP in the first trimester, the number of pain locations within the pelvis (SIJs, pubic symphysis), and the presence of LBP are indicative of a higher intensity of symptoms in the last trimester.^{7,43,77,78,79,99} Other factors that also have a high predictive value include a positive Posterior Pelvic Pain Provocation Test (PPPT) in the first trimester, an increase in the sum scores of compression, distraction, Flexion Abduction External Rotation Test (FABER) and provocative palpation, along with an increase in distress and disability ratings.

I Persistent pain into the postpartum period has been estimated at 7% - 25% with 1/5th of these subjects assumed to have serious problems.^{6,7,47,68,73,74,105} Of the serious cases, 8-10% continue to have pain for 1-2 years.^{6,72,80} Risk Factors for persistent pain include all of the factors listed earlier as well as some additional reports. Albert demonstrated that a higher number of positive pelvic pain provocation tests in the last trimester, the subjects were more likely to have pelvic pain 2 years after delivery. This group also found that a slower postpartum recovery was found in subjects with a greater number of pelvic pain locations.⁶ Robinson et al^{78ref} 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 (pre-antepartum).⁷⁸ Work dissatisfaction and lack of belief in improvement were also highly predictive of persistent pain.^{43,99}

Clinical Course: A/B

Clinicians should (consider) treat patients with early onset, multiple pain locations, a high number of positive pelvic pain provocation tests, work dissatisfaction and lack of belief of improvement, as these are strong/moderate factors in determining the persist Pelvic Girdle Pain in late pregnancy and post-partum. (Recommendations based on strong/moderate evidence)

DIAGNOSIS/CLASSIFICATION

II In 2002, Albert et al^{5ref} reported on a prospective, epidemiological cohort study in Denmark conducted over a 1-year period. During this time, 293 (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 four classification groups: pelvic girdle syndrome (PGS) (6%), defined as daily pain in both SIJs and the PS, symphysiolysis (2.3%), defined as daily pain in the pubic symphysis only, one-sided sacroiliac syndrome (5.5%), and double-sided sacroiliac syndrome (6.3%). All of these classifications were confirmed by physical examination. One final category discussed was the miscellaneous category (1.6%), which was defined as inconsistent objective findings when compared to the patient report.⁵ Cook et al^{23ref}, in 2007, supported the findings of Albert et al.²³

B Clinicians may consider the utilization of the classification system for the diagnosis of the type of pelvic girdle pain 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.⁹⁵ Pain that does not improve with rest and/or severe, disabling pain would require a medical specialist referral.

II Pelvic floor muscle weakness, a risk factor for PGP⁴¹, is associated with weakness of the abdominal wall in Diastasis Rectus Abdominus (DRA).⁸⁶ The incidence of DRA in the antepartum population in the third trimester is 66% with the occurrence in the post-partum population at 39% after 7 weeks to several years.^{14,76}

I Differential Diagnosis of pelvic girdle pain should consider the presence of hip dysfunction including the possibility of a femoral neck stress fracture due to transient osteoporosis. Studies have demonstrated average bone mineral density decreases with loss of trabecular bone of 1.8 to 3.4% in the lumbar spine, $3.2\pm 0.5\%$ at the total hip, 4.3% in the femoral neck, $4.2\pm 0.7\%$ at the distal forearm, and 6% at the calcaneus across trimesters in the antepartum period.^{16,64,69,93}

II Other 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, psoriatic and septic arthritis.⁹¹ 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. Ensure proper test interpretation is based on the location of the pain.

I The Physical Therapist should rule out the presence lumbar spine dysfunctions such as spondylolisthesis, discal patterns of symptoms that fail to centralize, and neurological screenings that may reveal the presence of LMN or UMN 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, pelvic girdle pain 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). PLBP appears to be concentrated in the lumbar region above the sacrum.⁹⁷

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 co-morbidities in this population as well as the presence of hip and lumbar spine dysfunction. (Recommendations are based upon 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 of adverse fetal effects. The frequent positive and negative results in the use of imaging with the low back pain population, lends the use of

imaging for interventional and or surgical planning as well as to determine the presence of serious medical conditions.³

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 clinical practice guideline 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 upon 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 pelvic girdle pain including pain, generalized disability, pelvic girdle activity-specific function, work and physical activity limitations, mental processing beliefs and perceptions.

I A common generalized disability outcome measure is the Disability Rating Index (DRI). DRI was developed to assess physical disability in patients with disability resulting in common motor functions including arthritis, neck, shoulder, and low back pain.⁸² In the antepartum population, those with pelvic girdle pain have higher DRI scores than those with low back pain.⁷⁷

I The Oswestry Disability Index (ODI) is a well-established functional outcome measure in the low back pain population.^{25,32} The ODI, along with the Roland-Morris Disability Questionnaire (RMDQ), have been validated across the spectrum of low back pain, including the antepartum population.^{39,84,99} However, low back pain and pelvic girdle pain are distinct conditions that warrant separate outcome measures to capture the specific impairments and functional limitations that patient's describe.

I The Pelvic Girdle Questionnaire (PGQ) is currently the only outcome measure specifically developed to evaluate impairments and functional limitations of pelvic girdle pain during pregnancy and post-partum.⁸⁸ The PGQ was developed to include questions from the DRI, ODI, RMDQ as well as functional activity questions that were considered clinically relevant by clinicians and a patient focus group. The Pelvic Girdle Questionnaire is simple enough 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 pelvic girdle pain. 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.⁹⁹ Once such belief is fear-avoidance, which can be used to determine the relationship of fear related to pelvic girdle pain 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 low back pain.^{36,37,50,83} The Fear-Avoidance Belief Questionnaire (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.³⁹

II One such perception is the catastrophization of the painful condition. It is the perception that the patient 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,^{68,73,99,105} and it has been demonstrated that patients who believe they will improve demonstrate greater improvement than those who do not believe.^{66,87} The Pain Catastrophization Scale (PCS) has three subscales: rumination, magnification, and helplessness and has been utilized in various populations, including the antepartum population.^{11,39}

Disability Rating Index (DRI)^{82,39}

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%) MCD SEM Internal Consistency (Chronbach α) Validity: PGQ Activity subscale (0.83), PGQ Symptom subscale (0.64), ODI (0.71), SF2 (.63)	0.89 (0.79-0.94) 17.6 6.34 0.85 PGQ Activity subscale (0.83), PGQ Symptom subscale (0.64), ODI (0.71), SF2 (.63)

Oswestry Disability Index (ODI)^{25,32,39}

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	10pt; 30% ²⁵ (Delitto 2012)	
	SEM	4.02	
	Internal Consistency (Chronbach α)	0.83	
	Validity: PGQ Activity subscale (0.72), PGQ Symptom subscale (0.71), DRI (0.71), SF2 (.66)		

Pelvic Girdle Questionnaire (PGQ)^{39,88}				
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 post-partum population who experience pelvic girdle pain. The PGQ 25-item questionnaire with two subscales, 20-item activity subscale and 5-item symptom subscale. There is 75 possible points, that are adjusted (x4/3) to a 0-100% 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 (.63)			

Fear-Avoidance Beliefs Questionnaire, Physical Activity Subscale (FABQ-PA)^{39,100}				
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 low back pain. 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 2-5. 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	0.88 (0.77-0.93)		

	(95%)	
MCD	6.1	
SEM	2.2	
Internal Consistency (Chronbach α)	0.6	
Validity: Low validity with PCS (0.27)		

Pain Catastrophizing Scale (PCS)^{39,89}		
ICF Category	Measurement of impairment of body function- pain catastrophic thoughts and behaviors	
Description	The PCS was designed to assess individual's level of catastrophic thinking in regards to pain experience and to predict the chronicity of their pain experience. It allows the patient to reflect on past painful experiences, and indicate 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 three 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)	

A Clinicians should administer self-reported outcome questionnaires such as Disability Rating Index, Oswestry Disability Index, Pelvic Girdle Questionnaire, Fear-Avoidance Belief Questionnaire, and Pain Catastrophizing Scale. These are scales are practical for the determination of baseline disability, function and pain belief as well as change throughout the clinical course. (Recommendations are based on strong evidence.)

ACTIVITY LIMITATION AND PARTICIPATION RESTRICTIONS

During the antepartum population, activity limitations and participations restrictions may be warranted in order to provide the patient an optimal function during pregnancy. This should include modifications of work and home environments, lifting restrictions, bedrest, positioning, etc. At the present time there are no functional capacity evaluations that target the disability of pelvic girdle pain in the antepartum population. Further studies are warranted and/or validation of current Functional Capacity Evaluations methods, especially in the antepartum population.

I The antepartum population is at high risk for falls, comparable to the geriatric population.²⁹ 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 can coincide with peak of prevalence of pelvic girdle pain in late pregnancy.^{42,70,78} Significant gait pattern and speed changes have been documented in pregnant and post-partum patients with pelvic girdle pain in comparison to healthy pregnant women.^{104,106}

I With the advancement of pregnancy there is a noted increased anterior-posterior postural sway, increased stance width, and individuals rely greater on visual input for postural balance.^{20,58} Static balance challenged by perturbations is not indicative of dynamic falls in pregnancy and utilization of dynamic balance tests such as gait speed,^{57,104} Short Physical Performance Battery (SPPB)⁴⁰, and Functional Reach Test²⁸ 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

Active Straight Leg Raise (ASLR)^{23,77}

ICF Category	Measurement of body structure impairment, inability to stabilize	
Description	In supine, the patient actively raises the involved leg with knee in extension 6" (20cm) above the table. Then the clinician stabilizes the pelvis with either an SIJ belt around the pelvis or manually compresses the pelvis tightly. The patient then repeats the active leg raise. The exam is performed bilaterally if bilateral involvement is suspected.	
Measurement Method	A positive result is 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	

Compression Test²³/Separation Test⁴

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 seconds 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%) Sensitivity 0.04-0.59 Specificity 0.5-1 Positive LR - Negative LR 0.45	

Distraction Test ²³ /Compression Test ⁴		
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 seconds. If no pain is present after 30 seconds, 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

Gasenslen Test ²³		
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 non-involved leg into 90° hip flexion with the knee flexed. 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

Flexion Abduction External Rotation (FABER) Test ⁴		
ICF Category	Measurement of Body Structure Impairment, Hip Joint or SIJ Pathology present	
Description	With the patient in supine, 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

Lunge ²³		
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 degrees.
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

Palpation of Sacroiliac Joints (SIJ)⁴		
ICF Category	Measurement of Body Structure Impairment, pain with palpation	
Description	The patient is lying in side-line with slight flexion at the hips and knees. The area proximal to both SIJ is palpated.	
Measurement Method	If the pain persists greater than 5 seconds 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%) Sensitivity 0-0.49 Specificity 1 Positive LR - Negative LR 0.51-1	0.34

Hip Passive Range of Motion (PROM)²³ , Passive Hip Abduction, Adduction⁴				
ICF Category	Measurement of Body Structure Impairment, pain with passive movement			
Description	In supine, the clinician passive moves the hip into flexion, abduction, adduction and internal and external rotation in each cardinal plane. ⁴⁸			
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 Specificity 1 Positive LR - Negative LR 0.45		0.17-0.70	0.30-0.67
			1	1
			-	-
			0.30-0.83	0.33-0.70

Palpation of Pubic Symphysis^{4,23}				
ICF Category	Measurement of Body Structure Impairment, pain with palpation			
Description	While laying in supine, the entire anterior aspect of the pubic symphysis is gently palpated.			
Measurement Method	If the pain persists greater than 5 seconds after palpation, it is considered positive pain with palpation.			
Nature of Variable	Dichotomous			
Units of Measurement	Present/Absent			
Measurement Properties	Test-retest Reliability: 0.89			

ICC (95%)	
Sensitivity	0-0.81
Specificity	0.5-0.99
Positive LR	0-81
Negative LR	0.19-1

Trendelenburg Test⁴	
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.
Nature of Variable	Dichotomous
Units of Measurement	Present/Absent
Measurement Properties	Test-retest Reliability: ICC (95%) 0.18-0.62 Sensitivity 0.99 Specificity 18-62 Positive LR 0.38-0.83 Negative LR

Menell's Test⁴	
ICF Category	Measurement of Body Structure Impairment, pain with joint loading
Description	In supine, the involved leg is positioned into 30° abduction and 10° flexion of the hip joint. The clinician first pushes the leg into, then pulls out from the pelvis in a sagittal movement.
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%) 0-0.70 Sensitivity 1 Specificity - Positive LR 0.30-1.0 Negative LR

*Likelihood Ratios were calculated with SPSS for data from Albert, et al-(2000).⁴

The following tables describe the tests and measures from Albert, et al^{14ref}, and Cook, et al^{4,23}. Albert et al^{14ref}, used the tests listed to confirm the placement of the Danish subjects in the four classifications that include pelvic girdle pain syndrome, symphysiolysis, one-sided SI syndrome and double-sided SIJ syndrome. The patients were placed in the classification based on 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 the FABER yielded a higher level of sensitivity across the PGS, one-sided, and two-sided SI syndromes. Palpation of the PS and the Trendelenburg test were reported as the best tests for PS involvement.⁴

Cook et al^{23ref}, using the same criteria found the same classification with a difference on emphasis from the findings of the physical examination. This study reported the strongest diagnostic accuracy was with the ASLR test, thigh thrust, and the lunge due to higher sensitivities compared to the

other tests and measures. Combining the positive findings from the lunge, MMT and the hip passive ROM demonstrated the highest, positive likelihood ratios.²³

Measurement Properties Based on Classification Groups: Albert, et al. (2000) ⁴					
	Sensitivity			Specificity	
	PGS	Sympsiolysis	1-Sided SI Syndrome	2-Side SI Syndrome	
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 Sacroiliac Joints	0.49	0	0.15	0.11	1
Palpation of Pubic Symphysis	0.81	0.6	0	0	0.99

Measurement Properties Based on Test Clusters: Cook, et al. (2007) ²³				
	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, Thigh Thrust (1/3)	0.88	0.66	2.6	0.18
ASLR, Gaenslen, 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

CLINICAL GUIDELINES: *Intervention*

SUPPORT BELTS: LEVEL D EVIDENCE

Desmond²⁷, in 2006, supported the use of support belts, mobilization and exercise in the antepartum population with PGP. The use of belts was based upon a survey of expert opinion of 35 physiotherapists.²⁷ Also in 2006, Mens et al^{60 ref} studied the mechanical effects of non-elastic belts in the post-partum population with onset of PGP in the antepartum period. This study demonstrated increased resistance to vibrator forces at the SIJ with the belt applied over the ASIS (higher position) vs. the pubic symphysis. The higher position provided increased support while the lower position was hypothesized to increase pubic symphysis support.⁶⁰ The safety for support belts was demonstrated by Beaty *et al*⁹ for subjects at 24-26 weeks gestation. No acute changes in maternal or fetal hemodynamics when support belts were used in the seated and standing positions.⁹

I Depledge et al^{66 ref} conducted a randomized-controlled trial evaluating the use of elastic and non-elastic belts in comparison to 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 (Roland Morris Questionnaire 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 the average pain intensity had a significant reduction for the exercise only and the exercise plus rigid belt groups.²⁶

II Nilsson-Wikmar et al^{67ref} performed a randomized assessor-blinded clinical trial of 118 antepartum women with pelvic girdle pain with the onset before the 35th week of gestation. Pelvic girdle pain was defined by 3 or greater positive, pelvic pain provocation tests including pubic symphysis involvement. Lumbar involvement was excluded by negative testing of ASLR, mobility testing and radiating pain. All subjects were given patient education and were divided into three intervention groups: non-elastic support belt, home exercise, and clinic supervised exercise. No significant differences were found between groups at enrollment, 38 weeks gestation or 12-months post-partum. All three groups had reduction in pain intensity and an increase in activity ability only at 12-months post-partum. Study limitations include the generalized exercises utilized, poor follow-up on patient participation in home exercise group and majority (71%) of patients with previous history of back pain prior to pregnancy.⁶⁷

II Kalus et al^{46ref} evaluated the use of an elastic support belt (BellyBra® vs. a generic, elastic support (Tubigrip®) in 115 antepartum women for a period of 3 weeks. Due to high prevalence, the authors included subjects with lumbar and posterior pelvic pain with exclusion of the presence of 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 was reported in the BellyBra® group.⁴⁶

II Carr et al^{21ref} 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 wore the support during waking hours for 2 weeks with significant reduction in number of days/week, hours/day and overall change in pain compared to controls.²¹

D Clinicians should consider the application of a support belt in the antepartum population with PGP. The four studies reviewed demonstrate different patient populations, varied intervention groups and controls, and different duration of intervention application and 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 American College of Obstetrics and Gynecology and the Canadian Clinical Practice Guidelines has issued guidelines for the contraindications, warning signs and recommendations for exercise in the antepartum population.^{1,2,8,24} These are summarized in the table below:

Absolute Contraindications to Exercise	Relative Contraindications to Exercise
<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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

<ul style="list-style-type: none"> Preeclampsia/pregnancy-induced hypertension 	<ul style="list-style-type: none"> Poorly controlled hypertension, seizure disorder or hyperthyroidism Orthopedic limitations Heavy smoker
Warning Signs to Stop Exercise & Consult MD	Contraindications during exercise
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 non-pregnant levels (increased maternal core temperature above 1.5 c (first 45-60 days gestation) Avoid activities with high fall risk, abdominal trauma, potential contact and scuba (decompression sickness)
Recommendations during exercise	Exercise Safety
<ul style="list-style-type: none"> Heart rate monitoring (difficult during pregnancy – due to blunted heart rate) Borg Rate of Perceived Exertion Scale¹⁷ 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 non-pregnant in frequency – at least 30 minutes/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) 	<ul style="list-style-type: none"> Exercise does not cause minimal to no changes on uterine activity during the final 8 weeks of pregnancy Fetal Implications (no evidence): no effect transplacental transport of oxygen, carbon dioxide, and nutrients, birth weight, premature labor No increased risk of adverse pregnancy or fetal outcomes.

I Boissonnault et al^{15ref} 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.¹⁵

Of the 3 good-quality studies, only Elden et al^{31ref}, 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 than the standard care group.³¹

The other good-quality studies, Morkved et al^{38ref}, and Garshasbi and Faghah Zadeh^{65ref} studied healthy nulliparous women and focused on exercise intervention in order to prevent 'low back pain'

without distinguishing between lumbar and pelvic girdle pain. Both studies reported less pain in the exercise group compared to controls.^{38,65}

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, Lilloo and Young^{54ref} performed a systematic review to examine the specific exercise interventions of core stabilization and lower extremity strength in PLBP and PGP.⁵⁴ Of the 7 studies reviewed, 5 were included in the Biossonnault et al^{15ref} review with 2 of the articles considered good quality.^{15,31,38} One article related exercise to generalized, pregnancy-related discomfort and the final article compared an education program including exercise to a control group.^{45,85} Based on the included literature, the authors found no conclusive evidence to support exercise as a standard treatment for PLBP and PGP.⁵⁴

I Eggen et al^{30ref} investigated the reduction of severity and prevalence of PLBP and PGP via RCT of supervised group exercise vs. 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 the subjects were provided supervised group exercise intervention including 16-20 weeks of 1 time/week group exercise, home exercise program and ergonomic advice, while the others were followed through routine obstetric care. Exercises included aerobic activity; localized back & pelvic exercise, and global strengthening. Interventions were not differentiated for subjects base on the presence or type of pain. No effect on severity or prevalence was demonstrated by the intervention in PLBP or PGP.³⁰

I Kluge et al^{51ref} investigated the benefit of exercise on pain intensity and functional ability in a RCT of antepartum women with LPBP, 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 a posture & ergonomics brochure. The control group (n=24) only received the posture and ergonomics brochure. Exercises included stretching, relaxation, breathing and isometric pelvic stabilization with progressive exercise to include co-activation with gluteals, hip abductors and quadriceps. While the authors reported low compliance with the exercise intervention, they demonstrated a significant reduction in pain intensity following the exercise intervention as well as a significant difference between groups for pain and functional ability following the intervention. The control group remained relatively unchanged regarding pain and functional ability during the intervention period.⁵¹

D Clinicians should consider the use of exercise in the antepartum population with PGP. ACOG and the Canadian CPG have recommended exercise for health benefits because of the low risk and minimal adverse effects for the antepartum population. The two systematic reviews as well as the recent RCTs were non-specific 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 al⁴, and Cook et al²³. (Recommendation is based on conflicting 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 within 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.^{22,81,90} In 2002, Whitman delivered an expert opinion that, based upon 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 is harmful to the antepartum female or the fetus. Normal movement in all directions is advocated despite hypermobility or laxity in one or more directions.¹⁰¹

III In 2009, Khorsan et al^{49ref}, 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 manipulation therapy and/or joint mobilization for back pain, pelvic girdle pain and other related symptoms during pregnancy. Thirteen articles were included in the review with three studies formally reporting no adverse effects and two studies reported reporting contraindications while 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 a rotational manipulation was described in one article. Of these articles, all of the subjects had relief of symptoms with some studies showing 70-91% relief. Three case reports were also included a report of 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.⁴⁹

III In a retrospective case series, Lisi^{55ref} 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 and the average decrease of the numerical pain rating scale from 5.9 to 1.5. Sixteen cases reported clinical important improvement based on pain intensity with 2-4 days following two interventions. No adverse effects were reported in any of the cases.⁵⁵

I Licciardone et al^{53ref}, conducted a randomized placebo controlled trial to observe the effects of osteopathic manipulation therapy vs. sham ultrasound vs. no treatment on antepartum patients with PLBL and PGP. 127 subjects between the 28th and 30th week of gestation were entered into the study and divided into one of three groups: control, sham ultrasound or osteopathic manipulative therapy. The groups were stratified based on age and gravida. Both intervention groups received treatments for 7 visits over 9 weeks. Manipulation therapy included soft tissue, 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 due to increasing ligamentous laxity in the antepartum population. No significant difference between groups for pain levels 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.⁵³

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 upon weak evidence.)

RECOMMENDATIONS

Risk Factors: A

Clinicians should utilize the following risk factors: prior histories of previous pregnancies, orthopedic dysfunctions, increased BMI, smoking as well as work dissatisfaction and a lack of belief of improvement in the prognosis of Pelvic Girdle Pain (PGP). (Recommendation 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 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, work dissatisfaction and lack of belief of improvement, as these are strong/moderate factors in determining the persistence of Pelvic Girdle Pain in late pregnancy and post-partum. (Recommendations based on strong/moderate evidence)

Diagnosis/Classification: B

Clinicians may consider the utilization of the classification system for the diagnosis of the type of pelvic girdle pain 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 Abdominus as possible comorbidities in this population as well as the presence of hip and lumbar spine dysfunction. (Recommendations are based upon 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, Oswestry Disability Index, Pelvic Girdle Questionnaire, Fear-Avoidance Belief Questionnaire, and Pain Catastrophizing Scale. These scales are practical for the determination of baseline disability, function and pain belief as well as change throughout the clinical course. (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 four studies reviewed demonstrate different patient populations, varied intervention groups and controls, and different duration of intervention application and 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. ACOG and the Canadian CPG have recommended exercise for health benefits because of the low risk and minimal adverse effects for the antepartum population. The two systematic reviews as well as the recent RCTs were non-specific 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 al⁴ and Cook, et al.²³ – (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 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 upon weak evidence.)

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