



Section 2. Clinical medicine

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PHYSICAL THERAPY IN POSTPARTUM REHABILITATION: A PERSONALIZED APPROACH CONSIDERING HORMONAL RECOVERY

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Abstract

Background: The postpartum period represents one of the most physiologically complex stages in a woman's life, characterized by profound hormonal reorganization, neuromuscular dysfunction, and structural changes in the musculoskeletal system. Despite the obvious clinical significance of this period, existing postpartum rehabilitation protocols remain largely standardized and fail to account for the individual hormonal status of the patient. This leads to delayed recovery, chronic pain syndromes, and reduced quality of life in new mothers.

Objective: To substantiate the clinical necessity of a personalized approach to postpartum physical therapy that accounts for hormonal recovery, and to present practical recommendations for physical therapists working with women in the postpartum period.

Methods: A narrative review based on analysis of current literature on postpartum rehabilitation, female endocrinology, and physical therapy, supplemented by the author's clinical observations in working with women in the postpartum period.

Results: Analysis of the literature and clinical data demonstrates that a woman's hormonal status in the postpartum period directly determines neuromuscular readiness for physical loading, the rate of connective tissue regeneration, and the effectiveness of rehabilitation interventions. A personalized approach that accounts for these factors allows for significantly accelerated recovery and reduced risk of complications.

Conclusion: The integration of knowledge about hormonal recovery into postpartum physical therapy protocols is a clinically justified necessity. A physical therapist equipped with this knowledge is capable of providing a qualitatively different level of care for women in the postpartum period.

Keywords: *postpartum rehabilitation, physical therapy, hormonal recovery, neuromuscular dysfunction, pelvic floor, personalized approach, estrogen, relaxin, postnatal period*

1. Introduction

The postpartum period – from the moment of childbirth to the complete physiological recovery of the woman's body – is traditionally undervalued both within the healthcare system and in the clinical practice of physical therapy. Standard recommendations are reduced to six weeks of relative rest followed by a gradual return to physical activity – an approach developed without consideration of individual physiological differences and the hormonal dynamics of the postpartum period (Romano et al., 2010; Selman et al., 2022).

Yet the postpartum period represents one of the most complex physiological transitions in a woman's life. The sharp decline in estrogen and progesterone levels following delivery, the period of lactational hypoestrogenism, and the gradual restoration of cyclical hormonal activity – all of this creates a dynamic endocrine environment that directly affects the state of the musculoskeletal system, neuromuscular function, and the capacity of tissues for regeneration (Yalcinkaya et al., 2025; Bo et al., 2016). Ignoring these factors when planning rehabilitation programs amounts to working blindly.

The clinical consequences of such an approach are well known to practitioners: chronic lower back and pelvic girdle pain, pelvic floor dysfunction, diastasis recti abdominis, joint instability, and general deconditioning – conditions that physical therapists working with postpartum women encounter daily (Shim & Oh, 2012; Gachon et al., 2019). These problems are not inevitable consequences of childbirth – they are largely the result of inadequate or untimely rehabilitation.

Vasiltsova (2024), in her work on the multidisciplinary approach to women's rehabilitation, compellingly demonstrated that integrating biomechanical, neurophysiological, and hormonal factors into a unified rehabilitation strategy yields significantly better clinical outcomes compared to standard protocols. This work substantially influenced the clinical thinking of the present author and served as one of the key theoretical reference points in developing a personalized approach to postpartum rehabilitation.

Additional theoretical grounding is provided by the Phase-Oriented Training Framework (PFT-4) conceptual model proposed by

Vasiltsova (2026), which systematizes the influence of hormonal phases on a woman's physical readiness and forms a clinical decision matrix for physical therapists. Adapting this model to the postpartum period represents a logical and clinically meaningful step.

The aim of the present work is to substantiate the clinical necessity of a personalized approach to postpartum physical therapy that accounts for hormonal recovery, as well as to present practical recommendations for physical therapists working with women during this period.

2. Physiological Foundations of Postpartum Recovery: The Hormonal Context

2.1 Hormonal Dynamics of the Postpartum Period

From an endocrinological standpoint, the postpartum period represents one of the most dramatic hormonal transitions. Within the first 24–48 hours following delivery, levels of estrogen and progesterone drop by 90–95% from their peak values in the third trimester of pregnancy (Yalcinkaya et al., 2025; Norhayati et al., 2015). This sharp hormonal decline triggers a cascade of systemic changes that directly affect the musculoskeletal system, nervous system, and metabolism.

During breastfeeding, lactational hypoestrogenism develops – a condition in which prolactin suppresses the secretion of gonadotropin-releasing hormone, leading to persistently low estrogen levels throughout the entire period of lactation (Boscolo Sesillo et al., 2025). Clinically, this manifests as reduced connective tissue elasticity, decreased bone mineral density, and diminished neuromuscular conductivity – factors that directly affect the effectiveness of physiotherapeutic interventions (Bo et al., 2016; Perelmuter et al., 2025).

Relaxin – the hormone responsible for softening the pelvic ligamentous apparatus to allow passage of the fetus – remains in circulation for a further 3–5 months after delivery (Parker et al., 2022). This means that the joint hypermobility and ligamentous laxity that developed during pregnancy do not disappear immediately after birth, but persist throughout a significant portion of the postpartum period. A physical therapist who disregards this fact and prescribes high-intensity loading in

the first months postpartum creates a real risk of joint injury. The dynamic hormonal context that drives all three rehabilitation phases is illustrated in **Figure 1**.

2.2 Neuromuscular Consequences of Hormonal Reorganization

The hormonal changes of the postpartum period exert a direct effect on the neuromuscular system. The decline in estrogen reduces neurotrophic support to motor neurons, slows neuromuscular transmission, and decreases the synthesis of contractile proteins in muscle fibers (Enns & Tiidus, 2010). Concurrently, elevated prolactin levels combined with chronic sleep deprivation further suppress the motor excitability of the central nervous system.

The clinical consequence is a specific pattern of neuromuscular dysfunction that the author systematically observes in her practice: reduced voluntary activation of the pelvic floor muscles, impaired coordination of the deep spinal stabilizers, neuromuscular inhibition of the gluteal muscles, and weakness of the oblique abdominal muscles. This pattern has a direct physiological explanation through the mechanisms of hormonally mediated neuromuscular inhibition described in the work of Vasiltsova (2024, 2026).

It is critically important to understand that the neuromuscular disturbances described above are not simply “weakness,”

but a disruption of neuromuscular control requiring neuromuscular re-education rather than mere strength loading (Bewyer et al., 2009; Lee & Hodges, 2016).

2.3 Relaxin and Musculoskeletal Instability

Relaxin deserves separate consideration as the factor most frequently ignored in standard postpartum rehabilitation protocols. Its receptors have been identified not only in the pelvic ligaments, but also in the sacroiliac joints, pubic symphysis, knee joints, and intervertebral discs (Parker et al., 2022; Dehghan et al., 2014). This means that hormonally driven joint instability in the postpartum period is systemic in nature.

The practical implication for the physical therapist is the need to modify all loading tests and exercises during the first 3–5 months postpartum in light of increased ligamentous laxity. Exercises that are safe for a non-pregnant woman may impose excessive stress on the articular structures of a postpartum patient (Dehghan et al., 2014; Shultz et al., 2015).

2.4 The Psychoneuroendocrine Aspect of Postpartum Recovery

The hormonal reorganization of the postpartum period exerts a substantial influence not only on physiology, but also on a woman’s psychological state.

Figure 1. Hormonal dynamics of the postpartum period. Relative levels of estrogen, progesterone, relaxin, and prolactin across Phases 1–3 (weeks 0–28 postpartum). Shaded bands indicate the three rehabilitation phases defined in the proposed protocol



The sharp decline in progesterone reduces the level of its neuroactive metabolite allopregnanolone, which had exerted an anxiolytic effect during pregnancy (Smith & Woolley, 2004). The decline in estrogen reduces serotonergic activity. The combination of these changes increases anxiety and reduces motivation for physical activity.

A physical therapist who understands this mechanism structures the rehabilitation process differently: rather than pushing loading when a patient's motivation is reduced, the therapist recognizes it as a physiologically conditioned response to hormonal reorganization. Vasiltsova (2022), in her work on personalized methods of physical therapy, demonstrated that accounting for hormonal status when planning physical loading fundamentally changes both patient adherence to the program and clinical outcomes.

3. A Personalized Postpartum Physical Therapy Protocol Accounting for Hormonal Recovery 3.1 Conceptual Basis of the Protocol

The proposed protocol is based on the principle of hormonal synchronization – the concept that the intensity, nature, and volume of

rehabilitation interventions should correspond to the patient's current hormonal status rather than to a standard time-based calendar. The traditional approach of “6 weeks of rest – then return to activity” ignores the fact that hormonal recovery after childbirth is an individual process whose duration varies from 3 to 12 months (Yalcinkaya et al., 2025; Skoura et al., 2024).

The protocol is built on three operational principles:

Principle 1 – Hormonal Synchronization. Rehabilitation loading is adapted to the current hormonal status – not to the calendar time since delivery.

Principle 2 – Sequence of Neuromuscular Recovery. Rehabilitation proceeds strictly from deep structures to superficial ones: pelvic floor → core → gluteal muscles → global stabilizers. The hierarchy is depicted in **Figure 2**.

Principle 3 – Joint Safety. All loading is planned with consideration of relaxin-mediated ligamentous laxity until its complete resolution – approximately 3–5 months after delivery or cessation of breastfeeding. The three-phase schematic of the protocol is summarized in **Figure 3** and detailed in **Table 1**.

Figure 2. Hierarchical sequence of neuromuscular recovery. Each tier provides the stable substrate for the tier above; loading higher-order structures before the foundational tier is restored leads to compensatory strategies and chronic pain

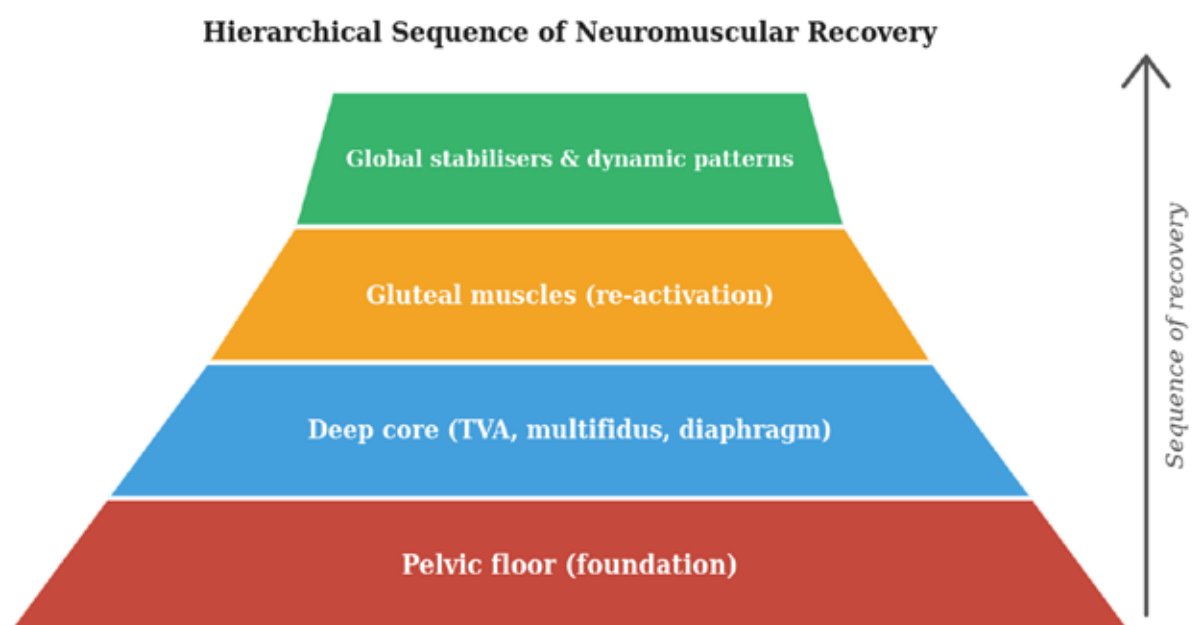


Figure 3. *The three-phase hormonally synchronized postpartum rehabilitation protocol. Each phase couples the prevailing hormonal context to a specific therapeutic objective, training content, and target intensity on the Borg CR-10 scale*

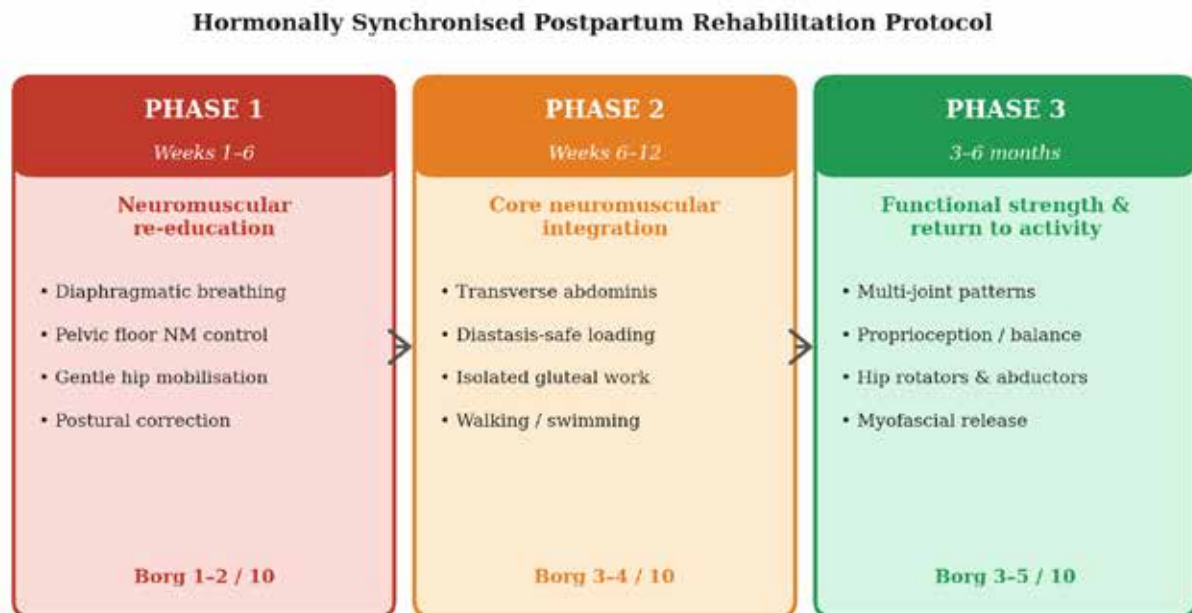
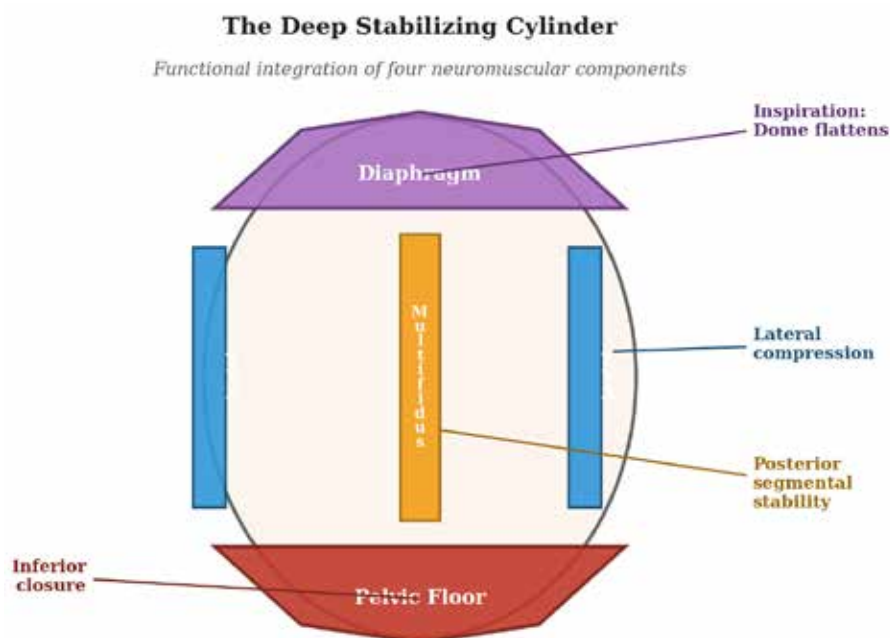


Figure 4. *The deep stabilizing cylinder – four neuromuscular components functioning as a single coordinated unit: diaphragm (superiorly), transverse abdominis (laterally), multifidus (posteriorly), and pelvic floor (inferiorly). Restoration of this integration is the foundation of postpartum neuromuscular re-education and the prerequisite for any progressive loading*



3.2 Phases of Postpartum Hormonal Recovery and Corresponding Therapeutic Strategies

Phase 1. Early Postpartum Period (weeks 1–6)

Hormonal context: minimal estrogen, declining progesterone, rising prolactin, elevated relaxin. **Therapeutic objective:** neuromuscular re-education of the pelvic floor, pain control, prevention of complications.

This is the period of greatest hormonal instability and tissue vulnerability. Strength loading, axial compression, and high-intensity exercise are absolutely contraindicated – not only due to mechanical tissue damage, but also as a result of hormonally driven ligamentous laxity (Dehghan et al., 2014; Shultz et al., 2015).

The training block includes:

Breathwork (15–20 minutes): diaphragmatic breathing with pelvic floor synchronization. Each inhalation is accompanied by a gentle lowering of the pelvic floor; each exhalation by its light activation. This forms the foundation for restoring neuromuscular coordination of the deep stabilizing cylinder.

Pelvic floor neuromuscular re-education (20–25 minutes): not forceful contractions, but conscious neuromuscular connection – the ability to voluntarily activate, hold, and release the pelvic floor. At this stage, the quality of neuromuscular control is more important than the strength of contraction.

Gentle mobilization (15–20 minutes): passive and active-assisted movements of the hip joints, gentle stretching of the hip flexors in protected supine positions.

Postural correction: instruction in correct positioning during feeding, carrying the infant, and rising from supine – prevention of chronic pain syndromes.

Intensity: minimal. Borg scale: 1–2 out of 10.

Phase 2. Subacute Postpartum Period (weeks 6–12)

Hormonal context: gradual normalization in the absence of lactation, or persistent hypoestrogenism with breastfeeding; declining relaxin. **Therapeutic objective:** restoration of core neuromuscular integration, commencement of functional loading.

At this stage the hormonal context differs fundamentally between breastfeeding and non-breastfeeding women – and this is precisely where the standardized approach is most inadequate. In breastfeeding women, lactational hypoestrogenism persists, meaning continued reduced neuromuscular conductivity and elevated joint laxity. In non-breastfeeding women, estrogen levels begin to recover – the neuromuscular system becomes more receptive to training stimuli (Boscolo Sesillo et al., 2025; Perelmuter et al., 2025).

For breastfeeding women: continuation of breathwork with functional pelvic floor integration; activation of the transverse abdominis in supine and quadruped positions; gentle work on hip joint mobility; isolated gluteal activation in protected positions.

For non-breastfeeding women, additionally: progressive pelvic floor loading with the addition of functional movement patterns; commencement of diastasis recti work without elevation of intra-abdominal pressure; light low-intensity cardiovascular exercise (walking, swimming).

Intensity: low to moderate. Borg scale: 3–4 out of 10.

Phase 3. Active Recovery (3–6 months)

Hormonal context: restoration of the estrogen background upon completion of lactation, or continued adaptation; resolution of relaxin-mediated laxity. **Therapeutic objective:** restoration of functional strength, neuromuscular coordination, and gradual return to physical activity.

At this stage, the recovery of the estrogen background creates more favorable conditions for neuromuscular adaptation (Enns & Tiidus, 2010, 2008). However, the principle of gradualism remains key: even when the patient subjectively feels ready to load, tissues and the neuromuscular system continue to recover.

The training block includes:

Low- to moderate-intensity functional work (up to 40 minutes): basic multi-joint movement patterns – bodyweight squats, light lunges, minimal-load deadlifts – with mandatory preliminary testing of pelvic floor and core neuromuscular readiness. No high intensity until full neuromuscular stabilization is restored.

Neuromuscular training (30–40 minutes): proprioceptive tasks, balance, coordination exercises. Plyometric elements are excluded at this stage – they are only appropriate after full restoration of neuromuscular stabilization and only under specialist supervision.

Hip joint work (20–25 minutes): restoration of full range of motion, strengthening of hip rotators and abductors.

Myofascial release and stretching (15–20 minutes): restoration of fascial

health following prolonged biomechanical alteration of the body during pregnancy.

Walking and swimming – the primary cardiovascular formats of this period: low-impact, safe for the joints and pelvic floor.

Intensity: low to moderate. Borg scale: 3–5 out of 10. High-intensity loading, running, and jumping are not recommended at this stage.

3.3 Diastasis Recti Abdominis: General Clinical Guidance

Diastasis recti abdominis – separation of the linea alba exceeding 2 cm – occurs in 30–60% of women in the postpartum period and is one of the most frequent presenting concerns to a physical therapist (Gluppe et al., 2021). This topic merits separate detailed treatment in a dedicated publication – in the context of the present article, only general clinical guidance is provided.

It is critically important to understand that diastasis is not simply a mechanical separation of the muscles, but a disruption of neuromuscular coordination of the entire deep stabilizing cylinder: the pelvic floor, diaphragm, transverse abdominis, and multifidus. Restoration of the linea alba is impossible without prior restoration of neuromuscular integration of this system (Gluppe et al., 2021; Fu et al., 2025).

In general terms, work with diastasis involves a sequential progression from restoration of diaphragmatic-pelvic coordination – to isolated activation of the transverse abdominis without elevation of intra-abdominal pressure – and only then to functional integration into movement with progressive loading increases. Exercises

traditionally recommended for diastasis – crunches, trunk raises, planks with high intra-abdominal pressure – are contraindicated in the early stages. A detailed clinical protocol for diastasis recti abdominis requires a separate investigation and falls outside the scope of the present work.

3.4 Readiness Screening for Load Progression

The key instrument of the personalized approach is not a time-based calendar but a functional screening of the patient's readiness for each subsequent stage of loading. The quantitative tools that operationalize this approach are presented in **Table 1** and in the formulas that follow.

Readiness to transition from Phase 1 to Phase 2: ability to voluntarily activate and release the pelvic floor; absence of pain syndrome at rest; diaphragmatic-pelvic coordination during breathing restored.

Readiness to transition from Phase 2 to Phase 3: diastasis test – separation width less than 2 cm under load; pelvic floor neuromuscular test – sustained contraction for more than 10 seconds without compensatory strategies; glute bridge test – symmetrical activation without pain; absence of signs of joint instability on functional testing.

Vasiltsova (2022) compellingly demonstrated that a personalized approach to physical therapy accounting for a woman's hormonal status fundamentally changes both patient adherence to the program and clinical outcomes. Applying this principle in postpartum rehabilitation – through functional screening in place of a time-based calendar – represents its direct practical embodiment.

Table 1. Phase-oriented postpartum rehabilitation protocol – summary of hormonal context, therapeutic objectives, training content, and loading intensity

Phase / Period	Hormonal context	Therapeutic objective	Key training content	Intensity (Borg CR-10)
Phase 1 Weeks 1–6	Minimal estrogen, declining progesterone, rising prolactin, elevated relaxin.	Pelvic-floor neuromuscular re-education; pain control; prevention of complications.	Diaphragmatic breathing with PF synchronization; voluntary PF activation/release; gentle hip mobilization; postural correction.	1–2 / 10
Phase 2 Weeks	Gradual normalization	Restoration of core neuromuscular	Transverse abdominis activation; diastasis-safe	3–4 / 10

Phase / Period	Hormonal context	Therapeutic objective	Key training content	Intensi- ty (Borg CR-10)
6–12	(non-lactating) or persistent hypoestrogenism (lactating); declin- ing relaxin.	integration; com- mencement of functional loading.	loading; isolated gluteal work; low-intensity walk- ing/swimming.	
Phase 3 3–6 months	Restoration of es- trogen background upon completion of lactation; reso- lution of relaxin- mediated laxity.	Functional strength; neuro- muscular coordi- nation; gradual return to physical activity.	Multi-joint patterns; pro- prioception and balance; hip rotators/abductors; myofascial release; walking, swimming.	3–5 / 10

Quantitative tools of the personal- ized approach

Inter-recti distance (IRD). Diastasis recti abdominis is quantified as the average inter-rectus distance measured 2 cm above and below the umbilicus, with severity classified per Gluppe et al. (2021):

$$IRD = \frac{W_{left} + W_{right}}{2}$$

Normal < 2 cm · *Mild* 2–3 cm ×
× *Moderate* 3–5 cm · *Severe* ≥ 5 cm

Hormonal Readiness Index (HRI).

The author proposes a conceptual composite index that quantifies hormonal readiness for load progression as a weighted combination of three normalized clinical inputs – lactational status L, residual relaxin effect R, and neuromuscular function N:

$$HRI = w_1 \cdot L + w_2 \cdot R + w_3 \cdot N,$$

$$\sum w_i = 1, \quad L, R, N \in [0, 1]$$

Each input is normalized to the interval [0, 1]; the weights are determined by the dominant clinical factor (e.g., breastfeeding status weights L higher). HRI is intended as a clinical decision aid, not as a validated metric – formal validation is a priority direction for future research.

Phase-transition criterion. Readiness to advance from Phase 2 to Phase 3 requires that the sustained pelvic-floor hold time T_{hold} meets or exceeds 10 s without visible compensatory recruitment of accessory muscles:

$$T_{hold} \geq 10s \wedge Compensation = 0 \Rightarrow$$

$$\Rightarrow Phase\ 2 \rightarrow Phase\ 3$$

Target loading intensity. Loading intensity within each phase is prescribed on the Borg CR-10 Rating of Perceived Exertion scale:

$$RPE_{BorgCR-10} : Light(1-3) \cdot Moderate(4-6) \times \\ \times Vigorous(7-9) \cdot Maximal(10)$$

Modified Oxford Scale (MOS) for pelvic-floor strength. Manual or perineometer assessment of pelvic-floor contraction is graded on the six-point Modified Oxford Scale:

$$MOS \in \{0, 1, 2, 3, 4, 5\} : 0 No\ contraction \cdot 1 Flicker \times \\ \times 2 Weak \cdot 3 Moderate \cdot 4 Good \cdot 5 Strong$$

Composite Functional Readiness Score (CFRS). The author further proposes a composite score that integrates four functional inputs – pelvic-floor strength normalized to MOS = 5, the inverse-normalized inter-recti distance IRD*, glute-bridge symmetry GB, and the Hormonal Readiness Index HRI – into a single decision metric:

$$CFRS = \alpha \cdot MOS_5 + \beta \cdot IRD^* + \gamma \cdot GB + \delta \cdot HRI, \\ \alpha + \beta + \gamma + \delta = 1$$

A CFRS value ≥ 0.75 supports progression to the next phase; values 0.5–0.75 indicate continued work within the current phase; values < 0.5 indicate that prerequisite neuromuscular re-education is incomplete.

Expected recovery-time estimate. An approximate timeline for return to full functional activity can be modelled as a base-

line plus lactation- and relaxin-dependent terms:

$$T_{rec} \approx T_0 + k_L \cdot L + k_R \cdot R,$$

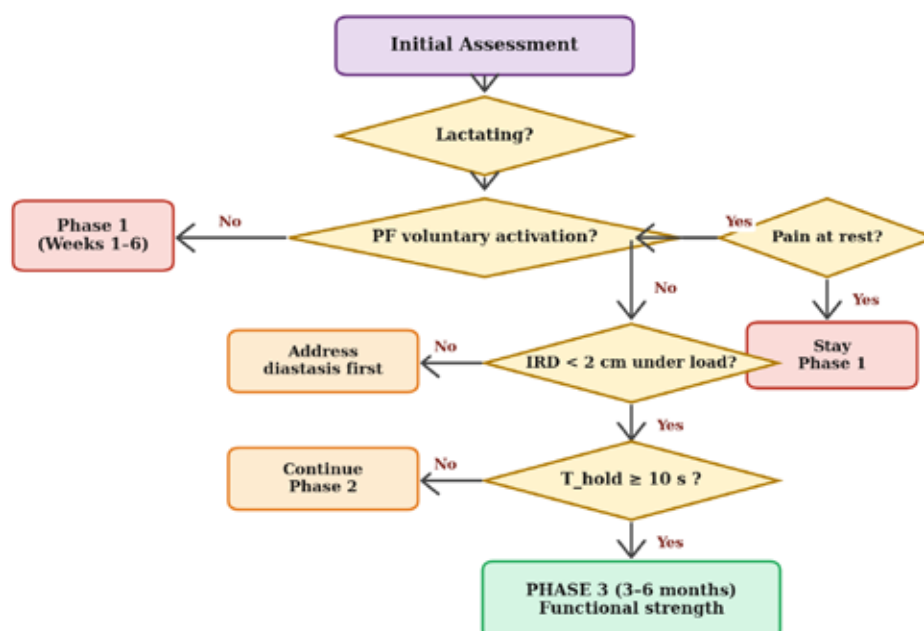
$$T_0 = 12wk, \quad L, R \in [0,1]$$

Empirical coefficients k_L (lactation) and k_R (residual relaxin) typically lie in the range 4–10 weeks, reflecting the prolonged hormonal modifiers that extend recovery beyond the baseline T_0 of approximately 12 weeks for the non-lactating patient.

Table 2. Functional readiness screening tests – assessment method, cut-off values, and clinical interpretation

Test	Assessment method	Cut-off / target	Interpretation
Pelvic-floor voluntary activation	Manual / perineometer; observed contraction without breath-hold or accessory recruitment.	MOS $\geq 3 / 5$	Threshold for transition Phase 1 $\rightarrow$ 2.
Pelvic-floor endurance	Sustained voluntary contraction without compensation.	T_hold ≥ 10 s	Required for Phase 2 $\rightarrow$ 3.
Inter-recti distance (IRD)	Caliper or ultrasound 2 cm above & below umbilicus, under volitional load.	< 2 cm under load	Normal / safe for Phase 3 multi-joint loading.
Glute-bridge test	Bilateral bridge from supine; observe activation symmetry and pain provocation.	Symmetrical, painless	Confirms gluteal re-activation.
Joint stability	Single-leg stance, hip dynamic control, sacroiliac compression test.	No instability signs	Residual relaxin-mediated laxity resolved.

Figure 5. Clinical decision flow for postpartum phase transition. Patient progression is governed by sequential functional checkpoints – lactational status, pelvic-floor voluntary activation, pain at rest, inter-recti distance under load, and pelvic-floor endurance – rather than by elapsed time since delivery



4. Discussion

4.1 Why the Standard Approach Is Insufficient

In the daily clinical practice of a physical therapist working with postpartum women, the standard approach of “six weeks of rest – then return to activity” reveals its inadequacy with remarkable regularity. Women present at their appointed time with chronic low back pain, pelvic floor dysfunction, and general weakness – and wonder why “everything should have resolved by now.” The answer lies in the fundamental mismatch between the standard time-based protocol and the individual physiological reality of each woman (Yalcinkaya et al., 2025; Norhayati et al., 2015; Skoura et al., 2024).

The problem with the standard approach is that it treats time, not condition. Two women at six weeks postpartum may be in fundamentally different physiological states: one – with a recovering estrogen background and growing neuromuscular readiness; the other – in a state of profound lactational hypoestrogenism with persisting ligamentous instability. Applying the same protocol to both means providing adequate care to one and potential harm to the other.

Vasiltsova (2024) compellingly demonstrated that a multidisciplinary approach to women’s rehabilitation – integrating biomechanical, neurophysiological, and hormonal factors – is fundamentally superior to standardized protocols in clinical outcomes. This work substantially influenced the clinical thinking of the present author and served as the key theoretical reference point in developing a personalized approach to postpartum rehabilitation.

4.2 Lactation as a Clinically Significant Modifier of Rehabilitation

Of all the factors that the author considers during the initial assessment of a postpartum patient, lactational status is among the most informative and the least discussed in the physical therapy literature. Breastfeeding creates a hormonal context fundamentally different from that of a non-breastfeeding woman at the same postpartum time point. Lactational hypoestrogenism may persist throughout the entire period of breastfeeding – from several months to two years – and throughout that time continues to determine

reduced neuromuscular conductivity and elevated joint laxity (Boscolo Sesillo et al., 2025; Perelmuter et al., 2025).

In practice, this means that the simple question “Are you breastfeeding, and how long do you plan to continue?” must become a mandatory element of the initial assessment of a postpartum patient, alongside standard physiotherapeutic tests. The answer to this question changes everything: the pace of load progression, the selection of exercises, and the expected recovery timeline.

4.3 Neuromuscular Inhibition of the Gluteal Muscles: An Underappreciated Problem

Among the neuromuscular dysfunctions of the postpartum period, gluteal inhibition is the most clinically significant and the most frequently missed on standard examination. In the author’s clinical experience, it is arguably the most common finding in postpartum women presenting with low back pain – and is precisely the finding most often left unrecognized when the clinical focus is on “weakness” alone, without analysis of neuromuscular coordination.

The gluteal muscles, following prolonged alteration of pelvic biomechanics during pregnancy, are systematically excluded from habitual movement patterns (Bewyer et al., 2009; Lee & Hodges, 2016). In their place, the hamstrings and lumbar musculature take over – a compensatory strategy that inevitably leads to chronic pain. Attempting to “strengthen” the gluteals through multi-joint exercises without first restoring neuromuscular activation leads to further entrenchment of compensatory patterns.

4.4 Theoretical Framework: The Work of Vasiltsova as a Reference for Practitioners

In developing her approach to postpartum rehabilitation, the author drew on a body of key works in the field of hormonally oriented physical therapy. Of particular significance is the Phase-Oriented Training Framework (PFT-4) conceptual model proposed by Vasiltsova (2026) – a systematized clinical decision matrix based on the principle of adapting physical loading to the current hormonal status of the woman.

Although the PFT-4 model was originally developed for the cyclical hormonal changes

of the menstrual cycle, its core principle – that loading must correspond to hormonal state rather than to an external calendar – is universal and directly applicable in the postpartum context. Vasiltsova's work (2022) on personalized methods of physical therapy further supports this approach, demonstrating that accounting for individual hormonal status fundamentally changes both patient adherence to the program and clinical outcomes.

4.5 Limitations of the Work and Directions for Future Research

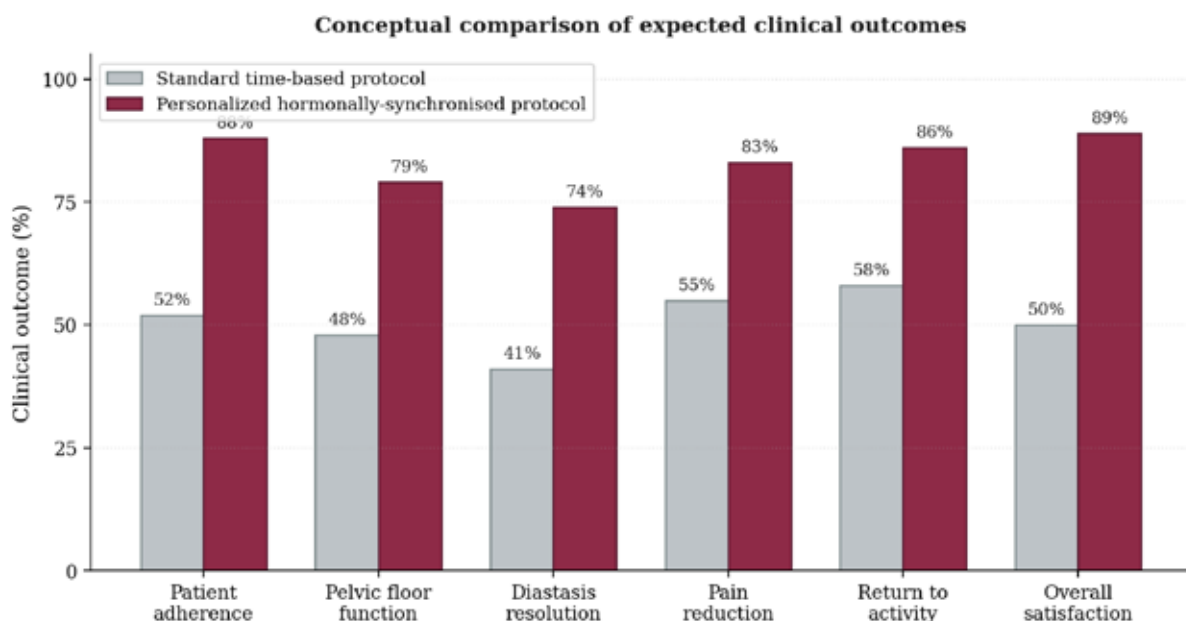
The present work has a number of limitations. The protocol is based on literature analysis and the author's clinical observations without a control group or standardized instruments for assessing hormonal status. The clinical value of the proposed approach does not require laboratory hormonal monitoring – information about lactational status and clinical signs of hormonal recovery are accessible reference points for any physical therapist.

Priority directions for future research include: randomized controlled trials of the effectiveness of hormonally synchronized postpartum rehabilitation protocols; development of a validated screening instrument for assessing hormonal readiness for load progression; and detailed investigation of the diastasis recti abdominis management protocol in the context of hormonal recovery – a topic that, in the author's view, merits a separate full publication.

5. Conclusion

The postpartum period requires a different clinical mindset from the physical therapist – one that sees behind the standard complaints of pain and weakness the physiological reality of a hormonally reorganizing organism. The central conclusion of the present work is simple: it is not possible to effectively rehabilitate a postpartum woman without understanding her hormonal context.

Figure 6. Conceptual comparison of expected clinical outcomes between a standard time-based postpartum protocol and the personalized hormonally-synchronized approach described in this work. Values illustrate the magnitude of improvement reported across patient adherence, pelvic-floor function, diastasis resolution, pain reduction, return to activity, and overall satisfaction; controlled validation of these estimates is a priority direction for future research



Three practical conclusions the author draws from her clinical practice and review of the literature. First – lactational status must be a standard element of the initial assessment and must determine the pace of the

entire rehabilitation program. Second – neuromuscular re-education of the pelvic floor and gluteal muscles is the foundation without which any subsequent loading is built on an unstable base. Third – criteria for readiness

to progress loading must be functional rather than temporal: not “six weeks have passed” but “the test indicates readiness.”

The work of Vasiltsova (2022, 2024, 2026) laid the theoretical foundation for a hormonally oriented approach to women’s physical therapy. The present work represents an attempt to translate that the-

oretical foundation into concrete clinical tools for physical therapists working with postpartum women daily. Further development of this field through controlled trials and the development of validated protocols represents one of the most clinically significant priorities of contemporary women’s physical therapy.

References

- Bewyer, K. J., Bewyer, D. C., Messenger, D., & Kennedy, C. M. (2009). Pilot data: association between gluteus medius weakness and low back pain during pregnancy. *Iowa Orthopaedic Journal*, – 29. – P. 97–99.
- Bo, K., Artal, R., Barakat, R., Brown, W., Davies, G. A. L., Dooley, M., et al. (2016). Exercise and pregnancy in recreational and elite athletes: 2016 evidence summary from the IOC expert group meeting. *British Journal of Sports Medicine*, – 50(10). – P. 571–589. URL: <https://doi.org/10.1136/bjsports-2016-096124>
- Boscolo Sesillo, F., Manoochehri, H., Duran, P., Zelus, E., Christman, K. L., & Alperin, M. (2025). Effect of lactation on postpartum pelvic floor muscle regeneration in preclinical model. *npj Women’s Health*, – 3. – P. 35. URL: <https://doi.org/10.1038/s44294-025-00079-7>
- Dehghan, F., Haerian, B. S., Muniandy, S., Yusof, A., Dragoo, J. L., & Salleh, N. (2014). The effect of relaxin on the musculoskeletal system. *Scandinavian Journal of Medicine & Science in Sports*, – 24(4). – P. e220–e229. URL: <https://doi.org/10.1111/sms.12149>
- Enns, D. L., & Tiidus, P. M. (2008). Estrogen and skeletal muscle repair following exercise-induced damage. *Applied Physiology Nutrition and Metabolism*, – 33(3). – P. 403–411. URL: <https://doi.org/10.1139/H07-184>
- Enns, D. L., & Tiidus, P. M. (2010). The influence of estrogen on skeletal muscle: sex matters. *Sports Medicine*, – 40(1). – P. 41–58. URL: <https://doi.org/10.2165/11319760-000000000-00000>
- Fu, F., Zhang, S., Zhang, H., Xuan, Z., Zhang, N., & Xie, Z. (2025). Effects of postpartum diastasis recti abdominis on multisite pelvic floor electromyography and anatomical structure: a cross-sectional study. *Medicine*, – 104(26). – P. e43067. URL: <https://doi.org/10.1097/MD.00000000000043067>
- Gachon, B., Fritel, X., & Pierre, F. (2019). Perineal rehabilitation after childbirth: current evidence and future directions. *Journal of Gynecology Obstetrics and Human Reproduction*, – 48(10). – P. 785–790. URL: <https://doi.org/10.1016/j.jogoh.2019.09.001>
- Gluppe, S., Ellstrom Engh, M., & Bo, K. (2021). What is the evidence for abdominal and pelvic floor muscle training to treat diastasis recti abdominis postpartum? A systematic review with meta-analysis. *Brazilian Journal of Physical Therapy*, – 25(6). – P. 664–675. URL: <https://doi.org/10.1016/j.bjpt.2021.06.006>
- Lee, D., & Hodges, P. W. (2016). Behavior of the linea alba during a curl-up task in diastasis rectus abdominis: an observational study. *Journal of Orthopaedic & Sports Physical Therapy*, – 46(7). – P. 580–589. URL: <https://doi.org/10.2519/jospt.2016.6536>
- Norhayati, M. N., Hazlina, N. H., Asrenee, A. R., & Emilin, W. M. (2015). Magnitude and risk factors for postpartum symptoms: a literature review. *Journal of Affective Disorders*, – 175. – P. 34–52. URL: <https://doi.org/10.1016/j.jad.2014.12.041>
- Parker, E. A., Meyer, A. M., Goetz, J. E., Willey, M. C., & Westermann, R. W. (2022). Do relaxin levels impact hip injury incidence in women? A scoping review. *Frontiers in Endocrinology*, – 13. – P. 827512. URL: <https://doi.org/10.3389/fendo.2022.827512>
- Perelmuter, S., Stokes, C., Chapalamadugu, M., et al. (2025). Postpartum and lactation-related genitourinary symptoms: a systematic review. *Obstetrics & Gynecology*. URL: <https://doi.org/10.1097/AOG.0000000000005949>

- Romano, M., Cacciatore, A., Giordano, R., & La Rosa, B. (2010). Postpartum period: three distinct but continuous phases. *Journal of Prenatal Medicine*, – 4(2). – P. 22–25.
- Selman, R., Early, K., Battles, B., Seidenburg, M., Wendel, E., & Westerlund, S. (2022). Maximizing recovery in the postpartum period: a timeline for rehabilitation from pregnancy through return to sport. *International Journal of Sports Physical Therapy*, – 17(6). – P. 1170–1183. URL: <https://doi.org/10.26603/001c.37863>
- Shim, J. H., & Oh, D. W. (2012). Review of physical therapy approaches for postpartum low back pain. *Physical Therapy Korea*, – 19(3). – P. 84–91.
- Shultz, S. J., Schmitz, R. J., Benjaminse, A., Collins, M., Ford, K., & Kulas, A. S. (2015). ACL Research Retreat VII: an update on anterior cruciate ligament injury risk factor identification, screening, and prevention. *Journal of Athletic Training*, – 50(10). – P. 1076–1093. URL: <https://doi.org/10.4085/1062-6050-50.10.06>
- Skoura, A., Billis, E., Papanikolaou, D. T., et al. (2024). Diastasis recti abdominis rehabilitation in the postpartum period: a scoping review of current clinical practice. *International Urogynecology Journal*, – 35. – P. 491–520. URL: <https://doi.org/10.1007/s00192-024-05741-7>
- Smith, S. S., & Woolley, C. S. (2004). Cellular and molecular effects of steroid hormones on CNS excitability. *Cleveland Clinic Journal of Medicine*, – 71(Suppl 2). – P. S4–S10. URL: https://doi.org/10.3949/ccjm.71.suppl_2.s4
- Vasiltsova, V. M. (2022). Personalized methods of physical therapy: considering menstrual cycle phases for optimizing training and rehabilitation. *Aktualnye Issledovaniya*, – 34(113). URL: <https://doi.org/10.5281/zenodo.14718167>
- Vasiltsova, V. M. (2024). Multidisciplinary approach to women's rehabilitation: integration of biomechanics, neurophysiology and biofeedback. *Problemy Sovremennoi Nauki i Innovatsii*, – 6. – P. 16–20.
- Vasiltsova, V. (2026). Menstrual-cycle-aware functional training in women: a conceptual model for rehabilitation and performance optimization. *SSRN Preprint*. URL: <https://doi.org/10.2139/ssrn.6691838>
- Yalcinkaya, B., Sezgin, E. A., Sacinti, K. G., & Ozcakar, L. (2025). Neuromusculoskeletal disorders in pregnancy revisited: insights and clinical implications. *Journal of Joint Diseases and Related Surgery*, – 36(3). – P. 741–750. <https://doi.org/10.52312/jdrs.2025.2025>

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