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Research Article

Menstrual Cycle Manipulation in Female Athletes to Avoid Competition-Day Bleeding: Symptom Control, Performance Limits, and RED-S-Safe Prescribing—A Narrative Review

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Abstract

Background: In elite sport, an increasing number of female athletes use menstrual cycle manipulation (MCM), most commonly via hormonal contraceptives, to delay or suppress withdrawal bleeding during key competitions. Although MCM may address legitimate functional needs, it is often misconstrued as a logistical strategy rather than a pharmacological intervention requiring contraindication screening, adverse-effect monitoring, and vigilance for masked underlying conditions. Objectives: This narrative review synthesizes current evidence on motivations for MCM use, commonly employed pharmacological approaches, limits of performance-related benefits, screening considerations for low energy availability (LEA) and Relative Energy Deficiency in Sport (RED-S), long-term safety, and clinical implementation in female athletes. Main Findings: Hormonal contraceptives improve menstrual predictability and reduce dysmenorrhea, heavy menstrual bleeding, and selected premenstrual symptoms. However, systematic reviews and meta-analyses consistently show no direct ergogenic benefit and no meaningful improvement in VO_2max, muscular strength, or explosive power. Perceived performance gains likely reflect symptom relief and reduced competition burden rather than intrinsic pharmacological enhancement. Athletes with oligomenorrhea, amenorrhea, rapid weight loss, chronic dietary restriction, or recurrent bone stress injuries should be evaluated for LEA and RED-S before initiating MCM to avoid delayed diagnosis and masking of energy deficiency. Conclusions: MCM can be integrated into individualized menstrual health management when guided by clear objectives, structured risk stratification, an assess-before-prescribing approach, and preseason pharmacological trials with longitudinal monitoring. Within such a framework, MCM may support athlete welfare without obscuring underlying pathology.

Keywords

Female Athletes, Menstrual Cycle Manipulation, Hormonal Contraceptives, Athletic Performance, Low Energy Availability, RED-S, Levonorgestrel-releasing Intrauterine System

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1. Introduction

Menstrual cycle-related concerns have become an increasingly important, yet historically underrecognized, issue in elite female sport [1, 2]. For many athletes, menstrual symptoms and competition-specific logistical challenges may disrupt training consistency, psychological readiness, and perceived preparedness [2-4]. Consequently, a growing number of athletes use menstrual cycle manipulation (MCM), most commonly through hormonal contraceptives, to avoid withdrawal bleeding during major competitions or congested competition schedules [3, 5].

In high-performance environments, the menstrual cycle is often treated as a logistical variable rather than a complex physiological process, creating a gap between performance-oriented management and appropriate clinical oversight [6, 7]. Unlike external strategies such as sleep optimization or nutritional supplementation, MCM is a pharmacological intervention that alters endogenous hormonal regulation [4]. It therefore requires a structured clinical framework incorporating contraindication screening, monitoring for adverse effects, and evaluation for potentially masked conditions—particularly low energy availability (LEA) and Relative Energy Deficiency in Sport (RED-S) [1, 8].

A central clinical tension underlies MCM use: although demand is largely driven by practical considerations [9], the interventions are medical in nature and carry established indications, contraindications, and safety implications [1]. Framing MCM solely as a strategy to "avoid menstruation during competition" risks trivializing its clinical significance and reducing it to a performance-management tool [6]. Failure to recognize its pharmacological nature may lead to inadequate monitoring and underrecognition of adverse effects [4, 6]. Importantly, hormonally induced withdrawal bleeding can create a false impression of endocrine normality, potentially masking functional hypothalamic amenorrhea (FHA) associated with RED-S [1, 8].

MCM is also frequently misconstrued as an ergogenic intervention. The assumption that menstrual suppression inherently enhances performance is not supported by meta-analytic evidence, which demonstrates no direct improvements in VO_2max, strength, or power with hormonal contraceptive use [10]. At most, MCM may mitigate symptom-related disruptions—such as dysmenorrhea or logistical burden—thereby improving perceived competitive readiness [2, 11]. Clear communication that MCM is a symptom-management strategy rather than a performance-enhancing intervention is essential for informed counseling and to prevent unrealistic expectations [12].

Accordingly, discussion of MCM for competition-day bleeding should move beyond the question of how to delay menstruation and instead address three issues: when is MCM clinically justified; does it enhance physiological capacity or primarily the athlete's subjective experience; and under what circumstances might it obscure more consequential health conditions? This narrative review synthesizes evidence on motivations for MCM use, commonly employed modalities, limits of benefit, risk identification, and implementation strategies, with the aim of providing an evidence-informed framework for sports medicine physicians, gynecologists, and multidisciplinary support teams.

2. Materials and Methods

To inform this narrative review, literature published between January 2000 and March 2026 was identified through searches of PubMed, Scopus, and Web of Science. Key terms included "menstrual cycle manipulation," "hormonal contraceptives," "female athletes," "athletic performance," "low energy availability," and "RED-S." Emphasis was placed on systematic reviews, meta-analyses, and international consensus statements (e.g., International Olympic Committee and Endocrine Society reports) to establish the physiological and clinical context. Additional relevant publications were identified through reference screening.

3. Clinical and Practical Drivers of Menstrual Cycle Manipulation in Sport

3.1. Symptom Burden and Logistical Competition

Although meta-analytic evidence does not consistently demonstrate objective performance impairment during menstruation, menstrual-related factors may influence athletes through symptomatic and practical pathways [7]. Dysmenorrhea, fatigue, and gastrointestinal disturbances are commonly reported and may reduce training continuity and perceived competition readiness [13]. In addition, logistical challenges—such as managing menstrual products during prolonged events or competing in tight-fitting or light-coloured uniforms—may increase distraction and cognitive load [2].

For most athletes, menstrual cycle manipulation (MCM) is therefore pursued not for ergogenic enhancement, but to reduce symptom burden and improve bleeding predictability during key competitions. Its effectiveness should be evaluated primarily by functional outcomes—symptom control, scheduling reliability, and uninterrupted participation—rather than maximal physiological performance, as current meta-analyses do not support a direct ergogenic effect of hormonal contraceptives [10].

3.2. Sport-Specific Competitive Demands

The perceived need for MCM varies across sporting contexts. In endurance sports, athletes frequently report that fatigue and gastrointestinal symptoms disrupt training quality and competitive consistency [14]. In aesthetic or uniform-dependent sports, concerns regarding visible bleeding and limited opportunities for product management may heighten the desire for cycle control [2, 15]. These contextual differences underscore that decisions surrounding MCM are shaped as much by sport culture and competitive structure as by physiology alone.

3.3. Weight-Category Sport and RED-S-Sensitive Contexts

Particular caution is warranted in weight-category and leanness-focused sports, where intentional energy restriction is more prevalent. In these settings, hormonal manipulation may mask menstrual disturbances secondary to low energy availability or Relative Energy Deficiency in Sport (RED-S) [1]. Accordingly, MCM should not be adopted as a routine solution but individualized following appropriate clinical risk stratification and screening for underlying energy deficiency [5, 11].

4. Hormonal Strategies for Menstrual Cycle Manipulation: Options and Practical Fit

4.1. Combined Oral Contraceptives (COCs)

Combined oral contraceptives (COCs) remain the most commonly used method of menstrual cycle manipulation (MCM) in athletes [5]. By suppressing ovulation and stabilizing hormonal fluctuations, COCs provide relatively predictable bleeding patterns and allow short-term cycle control [10, 16]. In athletes already established on monophasic formulations, continuous use (omitting the hormone-free interval) is a practical strategy to delay or avoid withdrawal bleeding around key competitions [16-18]. Although unscheduled bleeding may occur—particularly after regimen changes—extended COC regimens are well supported in the broader clinical literature and represent a pragmatic option for competition planning [17, 18].

4.2. Progestin-Only Pills (POPs)

Progestin-only pills (POPs) are appropriate when estrogen is contraindicated; however, bleeding predictability is generally lower than with COCs, and unscheduled spotting is common [19, 20]. Even newer formulations demonstrate substantial rates of breakthrough bleeding in clinical trials [21]. Accordingly, in settings where high bleeding reliability is essential (e.g., major championships), POPs may be less suitable than estrogen-containing regimens for athletes without contraindications to estrogen [19, 20].

4.3. Non-Oral Combined Hormonal Contraception (CHC)

Transdermal patches and vaginal rings offer non-oral combined hormonal options that can be used in extended or continuous regimens to reduce or suppress withdrawal bleeding [19]. Their dosing schedules may improve convenience; however, evidence for sustained menstrual suppression is less robust than for COCs, and unscheduled bleeding remains possible [19, 22]. In practice, their role in MCM is individualized and guided by athlete preference and prior tolerance rather than clear superiority in bleeding control.

4.4. Long-Acting Reversible Contraception (LARC)

Long-acting reversible contraceptives, including the levonorgestrel-releasing intrauterine system (LNG-IUS) and the etonogestrel implant, offer low-maintenance options with increasing rates of amenorrhea over time [19, 23]. However, bleeding irregularities are common in the early months after initiation [19, 23-25]. When the primary objective is to avoid bleeding during a specific competition, initiation should therefore occur well in advance—preferably during the off-season—to allow stabilization of bleeding patterns.

4.5. LNG-IUS for Heavy Menstrual Bleeding

For athletes seeking durable management of heavy menstrual bleeding (HMB) or dysmenorrhea rather than short-term cycle delay, the LNG-IUS provides strong evidence of reduced menstrual blood loss and symptom improvement [19, 22, 23, 26, 27]. Concerns regarding device stability during high-intensity sport are not supported by robust athlete-specific data; available population-based evidence suggests that expulsion risk is primarily related to established clinical factors rather than physical activity itself [23, 28, 29]. Counseling should therefore focus on recognized risk factors and early post-insertion bleeding changes. A side-by-side comparison of the hormonal strategies is provided in Table 1.

Table 1. *Comparison of hormonal strategies for menstrual cycle manipulation (MCM) in female athletes.*

Hormonal Strategy	Best Fit Goal	Bleeding Predictability	Early Unscheduled Bleeding Risk	Stabilization Time	Athlete-Specific Considerations	Key Contraindications / Cautions
Extended/Continuous Monophasic COC	Single-event bleeding avoidance; season-long symptom control	Moderate (improves over time)	Higher initially	Often months	Daily adherence required; portable; not affected by water exposure; possible breakthrough bleeding (BTB) may disrupt training; minimal kit concerns	Contraindicated with U.S. MEC estrogen restrictions; may mask RED-S/LEA; athlete-specific stability data limited
POP (Progestin-Only Pill)	Season-long symptom control; alternative if estrogen contraindicated	Low	Higher	May require several months	Stringent adherence (same time daily); unaffected by travel/water; possible BTB impacts training; minimal leakage concerns	Suitable if estrogen contraindicated; may mask RED-S/LEA; athlete-specific stability data limited
CHC Patch (Extended/Continuous)	Single-event bleeding avoidance; season-long control	Moderate	Moderate	Several months	Weekly application; concerns with sweating/water exposure (patch adhesion); visible on skin; possible BTB	U.S. MEC estrogen contraindications apply; may mask RED-S/LEA; athlete-specific stability data limited
CHC Vaginal Ring (Extended/Continuous)	Single-event bleeding avoidance; season-long control	Moderate	Moderate	Several months	Monthly/extended replacement; less impacted by water/sweating; possible discomfort; possible BTB	U.S. MEC estrogen contraindications apply; may mask RED-S/LEA; athlete-specific stability data limited
LNG-IUS (Levonorgestrel Intrauterine System)	Heavy menstrual bleeding (HMB)/dysmenorrhea reduction; season-long control	High after stabilization	Higher initial spotting, then improves	Often months (3–6)	No daily action; no effect from water/sweat; potential kit/leakage concerns early; possible BTB may affect training; athlete-specific expulsion rates not known	Counsel on early spotting; may mask RED-S/LEA; athlete-specific stability data limited
Etonogestrel Implant	Season-long symptom control; HMB/dysmenorrhea	Low to moderate (unpredictable bleeding patterns possible)	Higher	Often months	No daily adherence; not impacted by water/sweat; possible local discomfort; possible BTB; minimal kit issues	Counsel on unpredictable bleeding; may mask RED-S/LEA; athlete-specific stability data limited

Table Notes: Use cautious, non-promotional language throughout. Do not claim athlete-specific expulsion rates. Athlete-specific stability data are limited.

5. Performance Implications and Physiological Considerations

5.1. MCM Is Not an Ergogenic Strategy

Current high-quality evidence does not support menstrual cycle manipulation (MCM) as an ergogenic strategy. Systematic reviews and meta-analyses consistently indicate that hormonal contraceptive use does not meaningfully improve objective physiological performance and may, at most, be associated with trivial or small changes in selected outcomes [10]. More focused evidence syntheses similarly report no clear effect on maximal aerobic capacity (VO_2max) [30] or on resistance training-induced adaptations in muscular strength and power [31].

Perceived improvements in training or competition "stability" after MCM are therefore more plausibly explained by reduced symptom burden and fewer practical disruptions rather than by direct pharmacological enhancement. Dysmenorrhea, fatigue, gastrointestinal symptoms, concerns about bleeding management, and distraction may all interfere with perceived readiness and competitive focus [2, 7, 11-13, 32]. In this context, MCM may help athletes maintain training availability and functional baseline performance during key periods. However, this should not be interpreted as evidence that MCM increases physiological capacity. Menstrual cycle-related performance differences, when observed, are generally small, inconsistent, and highly individualized [7, 10].

5.2. Formulation-Specific Effects: Limited and Inconsistent Evidence

The physiological effects of hormonal contraceptives may vary according to formulation characteristics, including estrogen dose, progestin type, and regimen design; however, the available evidence remains heterogeneous and difficult to translate into athlete-specific recommendations [33-37]. From a mechanistic and clinical pharmacology perspective, progestins differ in molecular structure, receptor activity profiles, and downstream effects, supporting the plausibility of individual variability in tolerability across formulations even when overall performance effects are small [38]. In addition, progestins used in contraception differ in pharmacokinetics, metabolism, and serum concentration profiles, which may contribute to inter-individual differences in bleeding patterns and side-effect experiences during training and competition periods [39]. Progestins also show differential transcriptional activity via non-target receptors (including the mineralocorticoid receptor), highlighting that "progestin type" is not pharmacologically uniform; the clinical significance of these mechanistic differences in elite athlete settings remains uncertain and under-studied [40].

Some studies have reported formulation-related differences in hypertrophy, strength, or other training outcomes, but these findings are generally small in magnitude and have not been consistently replicated [33-37]. Importantly, the most recent quantitative synthesis of resistance-training studies found no statistically significant overall effect of oral contraceptive use on hypertrophy, strength, or power adaptations [31].

Accordingly, broad claims that combined oral contraceptives either enhance or impair athletic performance are not justified. Potential formulation-specific effects should be discussed cautiously, particularly because most studies are limited by small samples, variable training protocols, inconsistent contraceptive classification, and limited longitudinal follow-up in elite athletes [10, 31, 33]. At present, formulation choice should be guided primarily by clinical indications, contraindications, bleeding control, side-effect profile, and athlete preference rather than expectations of performance enhancement.

5.3. Avoiding the "Ergogenic Aid" Misconception

A key counseling priority is to prevent MCM from being framed as a legitimate ergogenic aid. Athlete surveys suggest that perceived performance effects often influence contraceptive decision-making, sometimes leading to trial-and-error use driven by expectations rather than clear medical indications [5, 32]. Clinicians and support staff should emphasize that MCM may reduce symptoms and logistical burdens, but it does not provide intrinsic physiological advantages or reliably improve athletic capacity [10-12]. This distinction is clinically important because inappropriate use may also delay recognition of underlying conditions, particularly low energy availability and Relative Energy Deficiency in Sport (RED-S), by masking menstrual dysfunction [1].

6. Menstrual Dysfunction, LEA, and RED-S

6.1. Menstrual Dysfunction as a Clinical Signal

In female athletes, oligomenorrhea, amenorrhea, and other menstrual irregularities should not be regarded as benign consequences of intensive training [1]. Current consensus statements and clinical guidelines emphasize that such presentations warrant evaluation for low energy availability (LEA) and Relative Energy Deficiency in Sport (RED-S), including FHA within the RED-S spectrum [1, 8, 41, 42]. If unrecognized, LEA/RED-S may impair bone health—raising the risk of bone stress injury—and contribute to broader endocrine and metabolic dysfunction that compromises recovery, increases fatigue, and elevates overall injury risk [1, 41-44]. Accordingly, menstrual dysfunction should be interpreted as a potential clinical signal of systemic energy deficiency rather than as a training adaptation.

6.2. Risks of Masking LEA/RED-S Through Hormonal Manipulation

When combined oral contraceptives (COCs) are used, scheduled withdrawal bleeding may occur during the hormone-free interval; however, this pharmacologically induced bleeding does not indicate restoration of spontaneous ovulation or recovery of hypothalamic-pituitary-ovarian axis function [1, 8]. In athletes at risk of LEA/RED-S, hormonal contraception used for menstrual cycle manipulation (MCM) should therefore not be considered a treatment for underlying menstrual dysfunction. Instead, it may obscure persistent energy-deficiency-related disturbances and delay appropriate diagnosis [1, 8].

For this reason, an "assess-before-prescribing" approach is essential. Athletes presenting with red flags suggestive of LEA/RED-S should undergo appropriate clinical evaluation before initiating MCM. Key indicators include oligomenorrhea or amenorrhea, rapid or unexplained weight loss, chronic dietary restriction or rigid eating behaviors, recurrent bone stress injuries, and persistent fatigue or impaired recovery [1, 41-45]. In such cases, identification and management of LEA/RED-S should take priority, and any consideration of MCM should follow comprehensive assessment and a structured longitudinal monitoring plan. Table 2 summarizes practical screening indicators to support clinical decision-making.

Table 2. *"Assess-before-prescribing" checklist: RED-S/LEA screening triggers prior to menstrual cycle manipulation (MCM) in female athletes.*

Domain	Screening Triggers ("Red Flags")	Recommended Evaluation Components Prior to MCM
Menstrual Function	Amenorrhea, oligomenorrhea	Assess medical history and perform physical examination. Review training load.
Weight Change/Energy Intake	Rapid weight loss, chronic dietary restriction, rigid eating patterns	Assess dietary intake. Use LEAF-Qscreening. Consider referral to dietitian.
Bone Health	Recurrent bone stress injuries, stress fractures	Consider bone health assessment (e.g., DXA) as indicated. Assess fracture history.
Fatigue/Recovery	Persistent fatigue, declining exercise tolerance	Assess recovery patterns and training logs. Consider targeted laboratory testing.
Psychosocial/Eating Behaviors	Body image distress, disordered eating	Assess for disordered eating. Consider psychosocial evaluation. Refer as indicated.

7. Safety Considerations and Clinical Limitations

7.1. Hormonal-Contraception-Related Symptoms

Hormonal contraceptives should not be framed as a risk-free scheduling tool. Common adverse effects include nausea, breast tenderness, headache, mood changes, bloating, perceived fluid retention, and unscheduled bleeding or spotting [19, 22]. Although often considered mild in the general population, even low-grade symptoms may have disproportionate consequences in elite sport, where sleep quality, training execution, and competition-day focus are highly sensitive to physiological disruption [2, 5, 11, 32]. Individualized counseling and follow-up are therefore essential when menstrual cycle manipulation (MCM) is implemented.

7.2. Breakthrough Bleeding (BTB) and Bleeding Predictability

Unscheduled or breakthrough bleeding (BTB) remains one of the most practically disruptive limitations of MCM, particularly when bleeding occurs during targeted competition windows [19]. BTB during extended or continuous combined oral contraceptive (COC) use is generally attributed to endometrial instability under sustained progestin exposure and local endometrial changes [46-48]. Regardless of mechanism, unpredictability may undermine the primary objective of cycle control and increase pre-competition anxiety and distraction [2, 5].

To improve bleeding reliability, extended or continuous regimens should be initiated well in advance of major competitions, allowing time to establish individual bleeding patterns and tolerability [19]. Where BTB occurs, management should follow established menstrual-suppression counseling and contraceptive practice recommendations rather than ad hoc,

pericompetitive adjustments [19, 23].

7.3. Venous Thromboembolism (VTE) Risk and Contraindications

Although the absolute risk of venous thromboembolism (VTE) in healthy young women using combined hormonal contraception (CHC) is low, it is higher than in nonusers and varies by formulation and route of administration [22]. In athletes, risk assessment should be individualized, particularly in the context of prolonged travel [49], injury-related immobilization, or perioperative periods—transient exposures that may increase thrombotic risk and are explicitly addressed within contraceptive eligibility guidance [50].

Estrogen-containing CHCs are contraindicated in athletes with a personal history of VTE, known thrombophilia, migraine with aura, severe hypertension, or perioperative immobilization, in accordance with the 2024 United States Medical Eligibility Criteria (U.S. MEC) [50]. Careful screening for contraindications remains a core component of safe prescribing.

7.4. Long-Term Use, and Monitoring

Continuous or extended hormonal regimens are acceptable options for many healthy athletes, as monthly withdrawal bleeding is not physiologically required [19]. However, long-term use should not be framed as a simple season-long suppression strategy. Ongoing follow-up is required to assess tolerability, bleeding patterns, and potential masking of underlying menstrual dysfunction in athletes at risk of low energy availability (LEA) or Relative Energy Deficiency in Sport (RED-S) [1, 19].

7.5. Post-Cessation Recovery

Athletes frequently inquire about the timeline for return of natural menstrual function after discontinuing hormonal contraception. For most individuals, fertility returns promptly following cessation of combined hormonal contraception, and persistent infertility is not expected [22, 51]. However, the timing of spontaneous cycle resumption is variable.

If menstruation does not resume within approximately three months—or if cycles remain persistently prolonged—clinical evaluation is warranted, particularly in athletes with prior irregularity or established LEA/RED-S risk [1, 8]. In such cases, delayed return of menses may reflect previously unrecognized menstrual dysfunction rather than a direct medication effect and should prompt assessment of energy availability, training load, and related health factors.

8. Practical Clinical Framework for Athlete-Centered MCM

8.1. Why MCM Should Not Be Initiated Immediately Before Competition

Menstrual cycle manipulation (MCM) should not be initiated immediately before a major competition. In the initial months following initiation or transition to extended or continuous hormonal regimens, unscheduled bleeding and tolerability concerns are common and may take time to stabilize [19, 23]. Introducing a new regimen in the pericompetitive period therefore risks creating greater uncertainty rather than reducing it.

A structured trial period—ideally at least three months prior to high-priority competition—allows clinicians and athletes to establish an individual bleeding pattern, assess tolerability, and make adjustments if necessary [19, 23]. In practice, perceived "failure" of MCM often reflects insufficient time for stabilization rather than lack of pharmacological effect. Early planning is therefore a core principle of athlete-centered implementation.

8.2. Trial Periods, Monitoring, and Competition Preparation

Method selection should be aligned explicitly with the athlete's primary objective—whether short-term bleeding delay for a specific event or longer-term reduction in heavy menstrual bleeding or symptom burden—while adhering to established contraceptive guidance (e.g., U.S. MEC, ACOG, CDC practice recommendations) [19, 23, 50].

For athletes already stabilized on combined hormonal contraception, shortening or omitting the hormone-free interval is often the most practical approach for event-specific bleeding control [19, 23]. For season-long symptom reduction, longer-acting options such as the levonorgestrel-releasing intrauterine system may be appropriate, recognizing the potential for early irregular spotting [19, 23, 26, 27]. When estrogen is contraindicated or thrombotic risk is elevated, regimen choice must reflect formal eligibility criteria, with progestin-only or non-hormonal methods considered as indicated [50].

Across scenarios, implementation should include prospective monitoring of bleeding patterns, tolerability, mood symptoms, and training quality (Table 3). In athletes with suspected low energy availability (LEA) or Relative Energy Deficiency in Sport (RED-S), evaluation and management of underlying dysfunction should take precedence over contraceptive-based cycle manipulation [1, 41-45]. A stepwise clinical pathway is illustrated in Figure 1. A fillable monitoring template incorporating these domains is shown in Table 3.

Table 3. *MCM trial-phase monitoring template (≥3 months) for female athletes.*

Instructions: Complete wekly during the MCM trial period (recommended 3 months). Use 0-10 numerical rating scales unless othervise indicated.

Context notes hep interpret fluctuations (eg. travel, competition, mised doses, llness, high training load). Cinician action should be recorded at each review.

Week	BTB days(0-7)	BTB severity	Headache	Mood/anxiety	Sleep quality	Key-session RPE	Fatigue/readiness	Context notes	Clinician action
Week1									
Week2									
Week3									
Week4									
Week5									
Week6									
Week7									
Week8									
Week9									
Week 10									
Week 11									
Week 12									

Record the RPE of your most important training or competition session of the week.

Scoring guidance: 0 = no symptoms / very poor; 10 = worst imaginable / excellent / very ready (as applicable to each domain).

Note: >3 consecutive weeks of moderate-heavy BTB, or any severe adverse effect (e.g., severe headache, mood worsening, unacceptable fatigue) should prompt clinician review.

8.3. Goal-Stratified Method Selection

Effective implementation of MCM requires shared decision-making grounded in realistic expectations. Athletes should understand that the primary benefits of MCM relate to symptom reduction, bleeding predictability, and logistical convenience—not enhancement of physiological performance capacity [10, 12, 19].

Acute bleeding avoidance for a single major competition: For an athlete already stabilised on a combined hormonal contraceptive (CHC) regimen, the most practical approach is typically to omit or shorten the hormone-free interval (i.e., continuing active hormone administration) to delay scheduled withdrawal bleeding [19, 23].

Equally, clinicians should communicate that cycle control may introduce new uncertainties, including unscheduled bleeding or tolerability concerns. Framing MCM as a collaborative, revisable strategy—rather than a definitive performance intervention—supports informed consent and promotes athlete welfare within a structured follow-up plan [19, 23]. The stepwise clinical algorithm is illustrated in Figure 1.

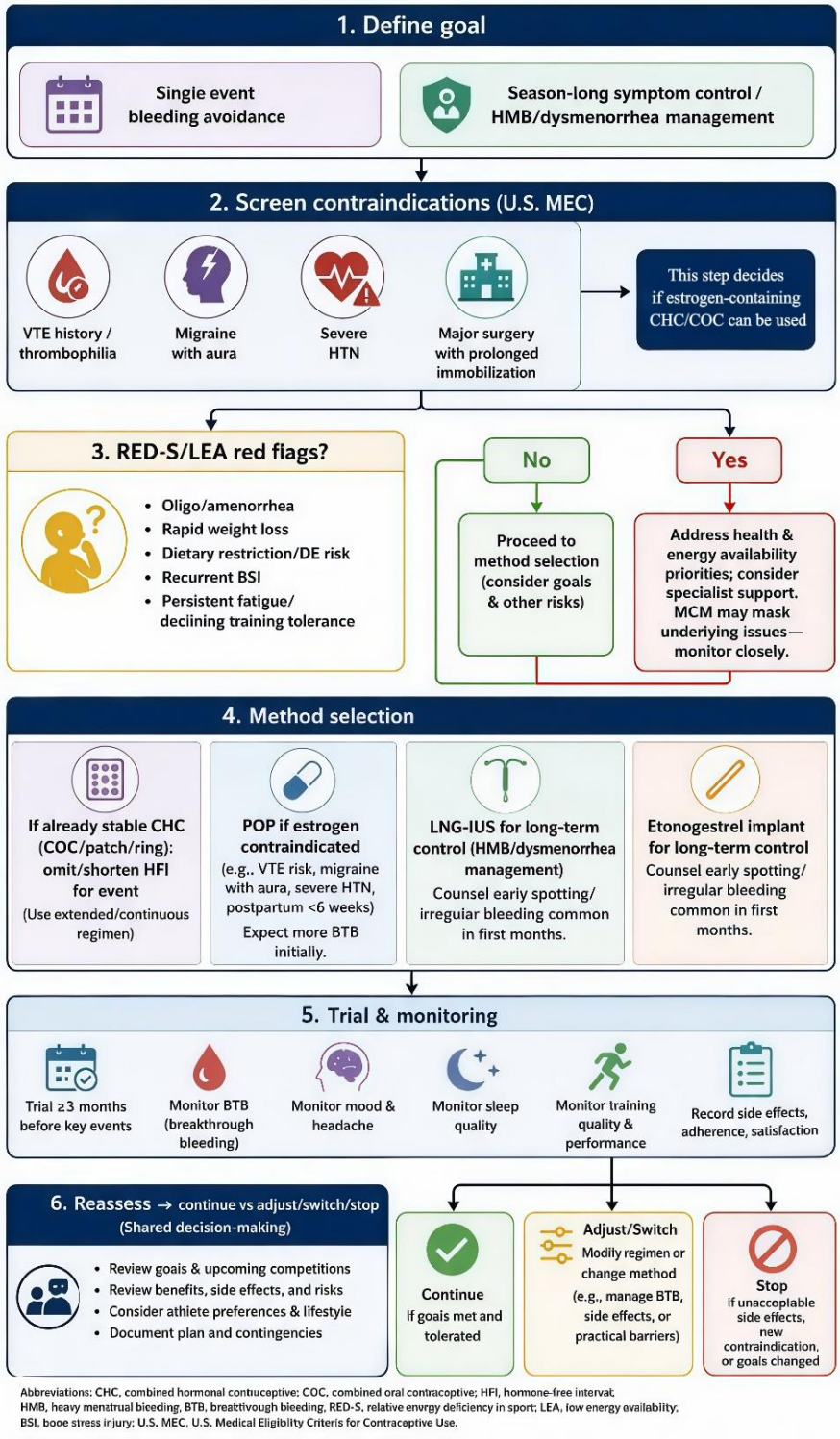

Figure 1. *Clinical algorithm for goal-directed menstrual cycle manipulation (MCM) in female athletes.*

9. Evidence Gaps and Future Directions

Despite increasing clinical use of menstrual cycle manipulation (MCM) in elite sport, most prescribing decisions remain extrapolated from general-population data. Athlete-specific evidence is limited, particularly regarding competition-relevant outcomes such as time to bleeding stabilization, likelihood of disruptive unscheduled bleeding during priority events, and discontinuation due to performance-facing side effects. Prospective athlete cohorts incorporating standardized bleeding outcomes alongside sport-specific measures of training continuity and competition readiness are needed to inform counseling and method selection [19, 23, 50].

Second, heterogeneity in contraceptive formulation and regimen limits actionable guidance. Many studies compare "oral contraceptive users versus non-users," pooling diverse

estrogen doses, progestin types, and cyclic versus continuous regimens. Although mechanistic and pharmacological data highlight differences in progestin receptor activity and pharmacokinetics [38-40], performance-relevant effects appear small and inconsistent. Future research should therefore prioritize formulation-stratified, longitudinal designs powered to detect clinically meaningful differences in bleeding control, tolerability, and training response [10, 27, 43, 44].

Finally, stronger integration between MCM prescribing and RED-S risk management is required. While consensus guidance emphasizes that hormonally induced bleeding does not confirm endocrine recovery, few studies evaluate whether structured prescribing pathways improve early detection of low energy availability or reduce downstream complications such as bone stress injury [1, 8, 39, 47, 48]. Advancing the field will require athlete-centered, longitudinal research that links cycle control and symptom management to performance readiness while preserving diagnostic vigilance for underlying energy deficiency.

10. Conclusion

Menstrual cycle manipulation (MCM) can be a clinically useful strategy for female athletes when the objective is to reduce symptom burden and improve bleeding predictability during training and competition [19, 23]. Established indications include management of dysmenorrhea, heavy menstrual bleeding, and selected premenstrual symptoms when appropriate therapies are chosen [19, 26, 27]. Implementation should be individualized and grounded in standard contraceptive safety principles, including contraindication screening and venous thromboembolism risk assessment when estrogen-containing regimens are considered [22, 50]. Advance planning—rather than pericompetitive initiation—remains central to minimizing unscheduled bleeding and tolerability concerns [19, 23].

Current evidence does not support MCM as a performance-enhancing intervention; perceived benefits are more plausibly related to improved symptom control and logistical stability than to direct physiological augmentation [7, 10]. Importantly, in athletes with menstrual irregularity or other indicators of low energy availability or Relative Energy Deficiency in Sport (RED-S), evaluation and management of underlying energy deficiency should take precedence over hormonal cycle manipulation, given the risk of obscuring clinically significant dysfunction [1, 8, 41, 42, 45]. Within an individualized, safety-focused clinical framework, MCM may support athlete well-being without compromising diagnostic vigilance.

Abbreviations

BTB	Breakthrough Bleeding
CHC	Combined Hormonal Contraception
COC	Combined Oral Contraceptive
FHA	Functional Hypothalamic Amenorrhea
HMB	Heavy Menstrual Bleeding
LARC	Long-acting Reversible Contraception
LEA	Low Energy Availability
LNG-IUS	Levonorgestrel-releasing Intrauterine System
MCM	Menstrual Cycle Manipulation
POP	Progestin-only Pill
RED-S	Relative Energy Deficiency in Sport
U.S. MEC	United States Medical Eligibility Criteria
VO2max	Maximal Oxygen Consumption
VTE	Venous thromboembolism
UV	Ultraviolet

Author Contributions

Qiquan Guo: Conceptualization, Formal Analysis, Investigation, Methodology, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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