Volume 11, Issue 1, January – 2026 International Journal of Innovative Science and Research Technology
ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1458

Perimenopausal Menstrual Irregularities:An Evidence Based Narrative Review

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Publication Date: 2026/02/07

Abstract: Perimenopause is a dynamic transitional phase in a woman's reproductive life characterized by progressive ovarian aging and fluctuating endocrine activity. Alterations in menstrual pattern are among the earliest and most frequent manifestations of this transition and constitute a major cause of gynecological consultation in midlife women. Clinical interpretation of perimenopausal bleeding is challenging becausee physiological cycle variability may coexist with structural uterine pathology or premalignant and malignant endometrial conditions. This narrative review synthesizes evidence on the epidemiology, biological mechanisms, clinical patterns, diagnostic approach, and management of perimenopausal menstrual irregularities. Emphasis is placed on individualized assessment using the FIGO PALM-COEIN framework and stepwise management strategies supported by international and national guidelines. A balanced approach is essential to provide symptom relief while ensuring timely detection of serious underlying pathology.

Keywords: *Perimenopause; Abnormal Uterine Bleeding; Heavy Menstrual Bleeding; PALM-COEIN; Menopausal Transition.*

How to Cite: Dr. Umme Aman Saba (2026) Perimenopausal Menstrual Irregularities:An Evidence Based Narrative Review. *International Journal of Innovative Science and Research Technology*, 11(1), 3195-3200. https://doi.org/10.38124/ijisrt/26jan1458

I. INTRODUCTION

The perimenopausal years represent a period of substantial reproductive and endocrine change. As ovarian follicular reserve declines, women experience increasing variability in menstrual cycle length, flow, and regularity. For many women, these changes are distressing and prompt medical consultation, particularly when bleeding becomes excessive or unpredictable [1,2].

Clinically, the major challenge is differentiating physiological menstrual alterations of the menopausal transition from abnormal uterine bleeding that requires further investigation. This distinction is crucial because advancing age is associated with a higher prevalence of uterine fibroids, adenomyosis, and endometrial hyperplasia or carcinoma [3]. Standardized definitions and classification systems have therefore become essential tools in ensuring consistent evaluation and evidence-based management [4].

II. DEFINITION AND STAGING OF PERIMENOPAUSE

Perimenopause, also referred to as the menopausal transition, spans the interval from the onset of menstrual variability until 12 months after the final menstrual period. The Stages of Reproductive Aging Workshop (STRAW +10) criteria define this transition primarily on the basis of menstrual cycle characteristics rather than isolated hormonal measurements [2,5].

Early perimenopause is marked by subtle but persistent changes in cycle length, whereas late perimenopause is characterized by pronounced irregularity, prolonged cycles, and episodes of amenorrhea lasting more than 60 days. These changes reflect underlying ovarian endocrine instability and form the basis for most perimenopausal menstrual disturbances [1,2].

III. EPIDEMIOLOGY

Longitudinal population-based studies have clarified the natural history of menstrual changes during the menopausal transition. Data from large cohorts, including the Study of Women's Health Across the Nation (SWAN), demonstrate a progressive increase in cycle irregularity and heavy menstrual bleeding with advancing reproductive age [1,6].

Approximately one-third of perimenopausal women report bleeding disturbances severe enough to impair daily functioning and quality of life [7,8]. Consequently, menstrual irregularities account for a substantial proportion of

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1458

gynecological outpatient visits among women aged 40–55 years.

IV. BIOLOGICAL BASIS OF MENSTRUAL IRREGULARITIES

Ovulatory dysfunction is the central biological mechanism underlying perimenopausal menstrual irregularities. Progressive depletion of ovarian follicles results in inconsistent ovulation and variable estrogen secretion [4,9]. In many cycles, insufficient luteal progesterone exposure leads to prolonged unopposed estrogenic stimulation of the endometrium, resulting in irregular proliferation and unpredictable shedding.

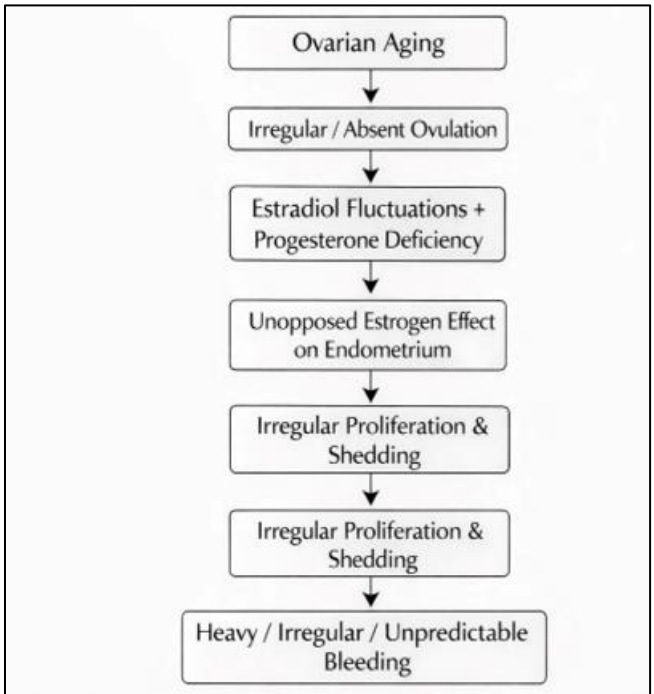

Fig. 1. Pathophysiological basis of menstrual irregularities during the perimenopausal transition.

Structural uterine pathology commonly coexists during this life stage. Leiomyomas are highly prevalent and may increase endometrial surface area or distort the uterine cavity, contributing to excessive menstrual blood loss [13]. Adenomyosis, characterized by ectopic endometrial tissue within the myometrium, often presents with heavy and prolonged menstruation and may be associated with dysmenorrhea [12]. Endometrial polyps frequently cause intermenstrual or postcoital bleeding.

Additionally, disturbances in local endometrial hemostasis have been implicated in heavy menstrual bleeding. Increased fibrinolytic activity and impaired vasoconstrictive responses within the endometrium contribute to excessive blood loss in susceptible women [15].

The relationship between hormonal alterations, endometrial response, and bleeding patterns during perimenopause is summarized in Table 1.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1458

Table 1

Hormonal changes, endometrial response, and bleeding patterns in perimenopause

Hormonal Changes	Endometrial Response	Bleeding Pattern
Irregular or absent ovulation	Unopposed estrogen stimulation	Heavy and/or prolonged bleeding
Estradiol fluctuations	Erratic endometrial growth	Irregular and unpredictable bleeding
Progesterone deficiency	Inadequate secretory transformation	Spotting and irregular shedding
Progesterone deficiency	Inadequate secretory transformation	Spotting and irregular shedding

The underlying pathophysiological sequence leading to menstrual irregularities is illustrated in Figure 1.

V. CLINICAL PATTERNS AND SYMPTOM BURDEN

Perimenopausal menstrual irregularities present with varied patterns, including shortened or prolonged cycles, heavy menstrual bleeding, irregular spotting, and episodes of amenorrhea followed by unpredictable bleeding [6,8]. The perception of abnormality is often based on deviation from a woman's established menstrual pattern rather than absolute blood loss.

These bleeding disturbances frequently coexist with vasomotor symptoms, sleep disruption, mood changes, and fatigue. Such symptom clustering reflects the systemic effects of fluctuating ovarian hormones and amplifies the overall impact on physical and emotional well-being [19,20].

VI. CLASSIFICATION OF ABNORMAL UTERINE BLEEDING

The FIGO PALM-COEIN classification system provides a structured framework for evaluating abnormal uterine bleeding [4,14]. Structural causes include polyp, adenomyosis, leiomyoma, and malignancy or hyperplasia, while non-structural causes include coagulopathy, ovulatory dysfunction, endometrial disorders, iatrogenic causes, and conditions not otherwise classified.

This system is particularly valuable in perimenopausal women, in whom multiple etiological factors often coexist, and it facilitates systematic evaluation and evidence-based decision-making.

VII. DIAGNOSTIC APPROACH

Assessment begins with a detailed clinical history focusing on bleeding pattern, duration, severity, medication use, and risk factors for endometrial malignancy [3]. Physical examination aims to identify uterine enlargement, pelvic masses, cervical pathology, or signs of systemic disease.

Baseline investigations include hemoglobin estimation to assess anemia, with selective endocrine testing as clinically indicated. Transvaginal ultrasonography is the preferred initial imaging modality, providing assessment of uterine morphology, myometrial pathology, and endometrial thickness [11,22].

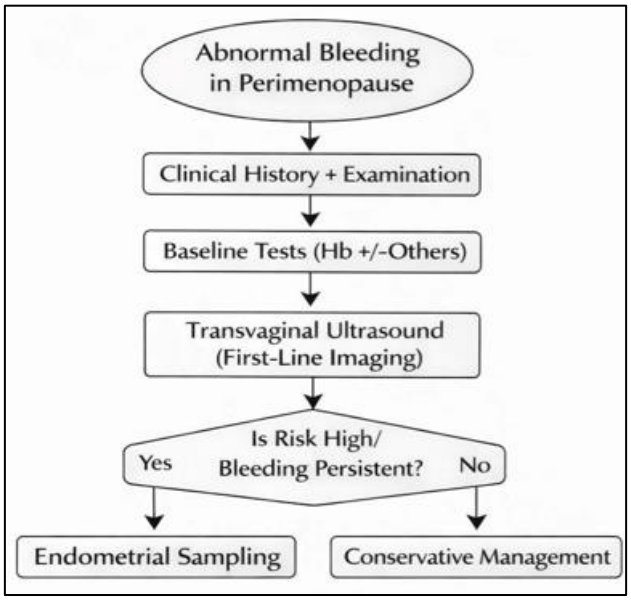

Fig 2 A Stepwise Approach to the Evaluation of Abnormal Uterine Bleeding in Perimenopausal Women

A stepwise approach to the evaluation of abnormal uterine bleeding in perimenopausal women is shown in Figure 2.

Endometrial sampling is recommended for women aged 45 years and older presenting with abnormal uterine bleeding, as well as for younger women with persistent symptoms or additional risk factors [3,10]. Although office-based sampling is convenient, hysteroscopy with directed biopsy remains the

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1458

reference standard for diagnosing focal intrauterine pathology [9].

Key components of the diagnostic work-up are summarized in Table 2.

Table 2
Dlagnostic approach to **abnormal uterine** bleeding in perimenopausal women

History	Assess bleeding patterns, frequency, duration, and associated symptoms
Physical Examination	Pelvic examination and cervical screening
Laboratory Investigations	CBC, TSH, as indicated (e.g., prolactin, coagulation tests)
Imaging	Transvaginal ultrasonography as first-line assessment
Endometrial Sampling	Indicated based on patient risk factors and persistence or progression of abnormal bleeding

VIII. THERAPEUTIC OPTIONS

Management is individualized and guided by etiology, symptom severity, patient preference, and reproductive goals. Available medical, device-based, and surgical treatment options are outlined in Table 3.

Table 3
Therapeutic options for **abnormal uterine bleeding** in perimenopausal women

Medical Therapy (First-Line)	Device-Based Therapy	Surgical Therapy (Last-Line)
▪ Tranexamic acid ▪ NSAIDs ▪ Oral progestins (cyclic or continuous)	▪ Levonorgestrel-releasing intrauterine system (LNG-IUS) as a preferred long-term treatment	▪ Endometrial ablation ▪ Hysteroscopic myomectomy ▪ Hysterectomy
▪ Consider LNG-IUS as indicated	▪ Highly effective in reducing heavy bleeding	

In the absence of suspected malignancy, medical therapy is the first-line approach for most women.

Nonsteroidal anti-inflammatory drugs reduce menstrual blood loss by inhibiting prostaglandin synthesis and are particularly useful in women with associated dysmenorrhea [17]. Tranexamic acid, through inhibition of fibrinolysis, provides an effective non-hormonal option for heavy menstrual bleeding [18].

Hormonal therapies, including combined oral contraceptives and progestins, are effective in regulating bleeding associated with ovulatory dysfunction. The levonorgestrel-releasing intrauterine system has demonstrated superior efficacy in reducing menstrual blood loss and improving quality of life compared with conventional medical therapy and is well suited to perimenopausal women seeking uterine preservation [7,8,16].

Surgical interventions, including hysteroscopic management of focal lesions or hysterectomy, are reserved for women with refractory symptoms or significant structural pathology [21,23].

IX. GUIDELINE-BASED CLINICAL PRACTICE

International and national guidelines advocate a structured, stepwise approach to abnormal uterine bleeding in perimenopausal women. Key principles include exclusion of malignancy, preference for minimally invasive diagnostic techniques, conservative management when appropriate, and shared decision-making [35,36]. Blind dilation and curettage is discouraged as a standalone diagnostic or therapeutic procedure [14,35].

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X. RECENT ADVANCES IN THE EVALUATION AND MANAGEMENT OF PERIMENOPAUSAL MENSTRUAL IRREGULARITIES

Recent developments in the care of perimenopausal menstrual irregularities highlight a transition toward individualized, risk-based, and less invasive management strategies. Current clinical guidance places decreasing emphasis on age alone as an indication for endometrial evaluation and instead promotes consideration of additional risk factors such as obesity, metabolic disorders, chronic anovulation, and persistence or progression of abnormal bleeding patterns [3,14,28,35]. This tailored approach facilitates appropriate use of endometrial sampling while reducing unnecessary invasive investigations in women at low risk of endometrial pathology [10,14].

Diagnostic pathways have also evolved with refinements in imaging techniques. Transvaginal ultrasonography continues to serve as the primary imaging modality for the initial assessment of abnormal uterine bleeding in perimenopausal women [11,22]. In selected cases, saline infusion sonography is increasingly utilized to enhance visualization of the endometrial cavity and improve detection of focal intrauterine abnormalities, including polyps and submucous leiomyomas [22]. This targeted use may decrease reliance on diagnostic hysteroscopy without compromising diagnostic accuracy [9,22].

Therapeutic advances have reinforced the role of long-acting and uterus-sparing medical options. The levonorgestrel-releasing intrauterine system remains the most effective long-term medical treatment for heavy menstrual bleeding in perimenopausal women desiring uterine conservation, demonstrating sustained reductions in menstrual blood loss and improvements in quality of life [7,8,16]. Continuous or extended progestin regimens are increasingly favored for managing bleeding associated with ovulatory dysfunction [6,27]. Non-hormonal therapies, particularly tranexamic acid and nonsteroidal anti-inflammatory drugs, continue to play an important role in individualized management, especially when hormonal therapy is contraindicated or declined [17,18].

A key contemporary principle is recognition that perimenopause is fundamentally a clinical diagnosis based on menstrual cycle changes rather than biochemical testing. Routine assessment of follicle-stimulating hormone or estradiol levels is discouraged due to marked hormonal variability and limited diagnostic utility [2,27]. Modern management frameworks further emphasize shared decision-making, incorporating symptom severity, impact on daily functioning, and patient preferences to optimize outcomes and satisfaction with care [19,20,28].

XI. FUTURE PERSPECTIVES

Future research should focus on refining perimenopause-specific diagnostic pathways, improving stratification of endometrial cancer risk, and evaluating long-term outcomes of medical therapies. Greater integration of menstrual symptoms with other menopausal manifestations may further enhance holistic and patient-centered care [24,30].

XII. CONCLUSION

Perimenopausal menstrual irregularities are common and arise from complex interactions between hormonal instability, structural uterine pathology, and endometrial factors. A systematic approach grounded in standardized classification, appropriate investigation, and evidence-based management is essential. Individualized care aligned with guideline recommendations can effectively address symptoms while ensuring early detection of significant pathology.

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