Author
Andrew M Kaunitz, MD

Section Editors
Robert L Barbieri, MD
Deborah Levine, MD

Deputy Editor
Sandy J Falk, MD

All topics are updated as new evidence becomes available and our peer review process is complete.
Literature review current through: May 2014. | **This topic last updated:** Dec 23, 2013.

INTRODUCTION — Abnormal uterine bleeding (AUB) (a term which refers to menstrual bleeding of abnormal quantity, duration, or schedule) is a common gynecologic complaint, accounting for one-third of outpatient visits to gynecologists [1]. AUB can be caused by a wide variety of local and systemic diseases or related to medications (figure 1) [2]. The most common etiologies in nonpregnant women are structural uterine pathology (eg, fibroids, endometrial polyps, adenomyosis), anovulation, disorders of hemostasis, or neoplasia.

The initial approach to the evaluation of nonpregnant reproductive-age women with AUB will be reviewed here. An overview of genital tract bleeding in women, terminology regarding AUB, bleeding during pregnancy, and postmenopausal bleeding are discussed separately. (See "Differential diagnosis of genital tract bleeding in women" and "Postmenopausal uterine bleeding" and "Overview of the etiology and evaluation of vaginal bleeding in pregnant women".)

TERMINOLOGY — A revised terminology system for abnormal uterine bleeding (AUB) in nongravid reproductive-age women was introduced in 2011 by the International Federation of Gynecology and Obstetrics (FIGO) [3]. This was the result of an international consensus process with the goal of avoiding poorly defined or confusing terms used previously (eg, menorrhagia, menometrorrhagia, oligomenorrhea). The classification system is referred to by the acronym PALM-COEIN (polyp, adenomyosis, leiomyoma, malignancy and hyperplasia, coagulopathy, ovulatory dysfunction, endometrial, iatrogenic, and not yet classified) (figure 1).

In this topic, the term premenopausal women refers to women of reproductive-age and those in the menopausal transition (figure 2).

PREVALENCE AND ETIOLOGY — Abnormal uterine bleeding (AUB) is common. A United States population-based survey of women ages 18 to 50 years reported an annual prevalence rate of 53 per 1000 women [4]. The importance of AUB relates to its major impact on women's quality of life, productivity, and utilization of healthcare services [5].

The differential diagnosis of AUB in a nonpregnant reproductive-age woman is listed here (table 1 and table 2) and discussed in more detail separately (see "Differential diagnosis of genital tract bleeding in women"):

- Structural abnormalities – These abnormalities are common and a large proportion of them may be asymptomatic. Even when a lesion is noted, the clinician must determine whether it is the cause of the patient's symptoms:
  - Uterine leiomyomas (See "Epidemiology, clinical manifestations, diagnosis, and natural history of uterine leiomyomas (fibroids)".)
  - Endometrial polyps (See "Endometrial polyps".)
  - Adenomyosis (See "Uterine adenomyosis".)
  - Other lesions - Hysterotomy scar, arteriovenous malformation
- Ovulatory dysfunction (AUB-O) (See 'Irregular bleeding (ovulatory dysfunction)' below and "Differential diagnosis of genital tract bleeding in women", section on 'Ovulatory dysfunction'.)
- Bleeding disorders (See "Approach to the adult patient with a bleeding diathesis", section on 'Menorrhagia'.)
- Iatrogenic (eg, anticoagulants, hormonal contraceptives, intrauterine device [IUD]) – AUB is common in women on progestin-only contraceptives, particularly initially and users may eventually develop amenorrhea. (See "Management of unscheduled bleeding in women using contraception".)
- Neoplastic (endometrial hyperplasia or carcinoma, or uterine sarcoma) (See "Endometrial carcinoma: Epidemiology and risk factors" and "Classification and diagnosis of endometrial hyperplasia" and "Uterine sarcoma: Classification, clinical manifestations, and diagnosis".)
- Infection and inflammation – Endometritis, pelvic inflammatory disease (See "Endometritis unrelated to pregnancy" and "Clinical features and diagnosis of pelvic inflammatory disease".)
- Disorders of local endometrial hemostasis (See "Differential diagnosis of genital tract bleeding in women", section on 'Local endometrial hemostasis disorders'.)

INITIAL EVALUATION — In a patient with a complaint of possible uterine bleeding, several questions must be answered initially to confirm pregnancy status, reproductive status, and the source of the bleeding. This guides the further evaluation, differential diagnosis, and disposition of the patient (ie, whether immediate evaluation and intervention are needed). The algorithm includes the basic components of the evaluation (algorithm 1).

Is the uterus the source of the bleeding? — Women with abnormal uterine bleeding (AUB) typically present with a complaint of vaginal bleeding. There are many potential sources of genital tract bleeding, and the actual site must be determined (table 1). Sites that are commonly mistaken for uterine bleeding include the lower genital tract (vulva, vagina, or cervix), urinary tract, and gastrointestinal tract. The following elements of the history and physical examination help to exclude extrauterine sources of bleeding:

- Bleeding from the vulva, vagina, or cervix
  - Most genital tract bleeding is from the uterus or the lower genital tract (vulva, vagina, cervix). Extrauterine upper genital tract bleeding is less common. The most common etiology of upper genital tract bleeding is ectopic pregnancy, which can be excluded with negative pregnancy testing (see 'Pregnancy test' below). Uncommon extrauterine etiologies of upper tract bleeding are ovarian or fallopian tubal cancer.
  - The volume of bleeding gives some suggestion of the source for genital tract bleeding. Heavy bleeding typically derives from the uterus, while staining, spotting, or light bleeding may be from any genital tract site.
  - The color of the blood provides a limited amount of information regarding the source. Brown staining may represent old blood as a result of light bleeding or spotting from the upper vagina, cervix, or uterus. Red blood may derive from any genital tract site.
  - If the bleeding is consistently postcoital, this suggests cervical pathology, including cervical neoplasia. However, postcoital bleeding may occur with contact during intercourse of any site along the lower genital tract that is friable (eg, due to cervicitis or vulvovaginal atrophy) or has a lesion (eg, cervical polyp or vulvar ulcer). (See "Postcoital bleeding in women".)
  - Pelvic examination should include evaluation of all lower genital tract sites to assess for areas of friability or lesions. In addition, a finding on bimanual examination of pelvic tenderness or a pelvic mass warrants further evaluation for pelvic inflammatory disease (PID) or uterine or adnexal pathology.
- Urinary or gastrointestinal tract bleeding

- The following medical history questions help to determine whether the bleeding is from a nongenital source: (1) Is the patient certain that the bleeding is from the vagina? (2) Does the patient see the blood in the toilet only during or after either urination or defecation? (3) Does the patient see the bleeding only when she wipes with toilet tissue? If so, has tried to separately dab the urethra, vagina, and anus with toilet tissue to check the source of the bleeding? (4) Does she still see the bleeding while she has a tampon in the vagina?
- Physical examination helps to identify some, but not all, urinary or gastrointestinal tract bleeding sources. Inspection of the urethra may reveal a urethral caruncle (see "Urethral caruncle"). A finding on anorectal examination of a lesion (eg, hemorrhoid or rectal mass) or positive fecal occult blood testing provides evidence of a nongenital source.
- In general, if the bleeding occurs solely with urination or defecation and the pattern of bleeding or findings on physical examination are consistent with a urinary or gastrointestinal tract source, this should be the focus of further evaluation. If these etiologies are excluded, evaluation of the genital tract should continue. Evaluation of hematuria and rectal bleeding is discussed in detail separately. (See "Etiology and evaluation of hematuria in adults" and "Approach to minimal bright red bleeding per rectum in adults".)

Is the patient premenarchal or postmenopausal? — The differential diagnosis of AUB for reproductive-age women differs from that of premenarchal or postmenopausal patients. Thus, it is important to establish the reproductive status of the patient.

The average age of menarche is 12 years [6]. For premenarchal girls, there is a range of causes of vaginal bleeding, for example, hormonal issues, infection, foreign body, trauma, or malignancy. (See "Evaluation of vaginal bleeding in children and adolescents", section on 'Vaginal bleeding before normal menarche'.)

The average age of menopause is 51 years [7]. Menopause is defined as 12 months of amenorrhea in the absence of other biological or physiological causes. This is typically preceded by several years of irregular uterine bleeding and menopausal symptoms (eg, hot flushes). In healthy women age 45 years and older, laboratory testing of serum follicle stimulating hormone is not required to make the diagnosis. (See "Clinical manifestations and diagnosis of menopause".)

Women with AUB who have not had amenorrhea for 12 months should be considered premenopausal for the purpose of evaluation, but should have endometrial sampling if risk factors for endometrial cancer are present (table 3 and table 4). All postmenopausal bleeding is abnormal, and requires evaluation for endometrial cancer. (See "Postmenopausal uterine bleeding" and 'Endometrial sampling' below.)

Is the patient pregnant? — All patients with AUB should have pregnancy testing. The history of the last several menstrual periods should be elicited to get some sense of whether menses are delayed. However, pregnancy testing should be performed even in women with recent vaginal bleeding, since this may represent bleeding during pregnancy rather than menses. It should also be performed in women who report no sexual activity and in those who report use of contraception.

Women who are pregnant are evaluated primarily for pregnancy-related causes of bleeding, but the evaluation should include assessment for etiologies not related to pregnancy if appropriate. (See "Overview of the etiology and evaluation of vaginal bleeding in pregnant women".)

FURTHER EVALUATION — In nonpregnant reproductive-age women with abnormal uterine bleeding (AUB), the goals of the evaluation are to determine the pattern, severity, and etiology of the bleeding, and thereby to guide management. Key questions that help to guide the clinician include:

- What is the bleeding pattern?
- Should endometrial sampling be performed?
- Should a coagulation evaluation be performed?
- Is bleeding related to a contraceptive method?

As the evaluation proceeds, the possibility of concurrent factors should be considered. As an example, a woman with a fibroid uterus may also have a defect of hemostasis that is the primary reason for her heavy bleeding or she may be bleeding from an endometrial or endocervical malignancy unrelated to the fibroid uterus. Therefore, several potential etiologies often need to be investigated and, if a cause of AUB is determined but bleeding persists despite treatment, the patient should be evaluated for additional etiologies.

The basic components of the evaluation are shown in the algorithm (algorithm 1). The table provides information about how to choose additional testing and use the information from the evaluation to make a diagnosis (table 5).

HISTORY — The relevant medical history in nonpregnant reproductive-age women with abnormal uterine bleeding (AUB) includes the following:

General history

- Gynecologic and obstetric history, including:
  - Menstrual history. (See 'Menstrual history' below.)
  - Sexual history – This information may help determine the patient's risk for pregnancy or sexually transmitted infections.
  - Contraceptive history – Women using estrogen-progestin contraceptives may develop unscheduled bleeding, while use of progestin-only contraceptives often results in irregular uterine bleeding or amenorrhea. Use of the copper intrauterine device (IUD) increases menstrual flow. Levonorgestrel IUDs typically cause an initial period of irregular spotting or bleeding, followed by a gradual decrease in menstrual flow and possible amenorrhea. (See "Management of unscheduled bleeding in women using contraception".)
  - Risk factors for endometrial cancer. The indications for endometrial sampling are discussed below. (See 'Endometrial sampling' below.)
- Other medical history; issues that help to determine the etiology of AUB include:
  - Symptoms, risk factors (anticoagulant therapy, liver or renal disease), or a family history of a bleeding disorder. The indications for coagulation testing are discussed below. (See 'Coagulation tests' below.)
  - Symptoms or family history of thyroid disease. (See 'Endocrine tests' below and "Pathogenesis, epidemiology, and clinical manifestations of celiac disease in adults", section on 'Nongastrointestinal manifestations'.)
  - Celiac disease. (See "Pathogenesis, epidemiology, and clinical manifestations of celiac disease in adults", section on 'Menstrual and reproductive issues'.)
- Medications - Medications can cause AUB in a variety of ways: (1) anticoagulants may result in heavy or prolonged uterine bleeding; (2) a variety of medications can cause hyperprolactinemia (table 6), resulting in oligomenorrhea or amenorrhea.

Additional questions that may help to suggest an etiology include:

- Were there precipitating factors, such as trauma? Bleeding related to trauma suggests a vaginal or cervical, rather than uterine, source of bleeding.
- Are there any associated symptoms? Lower abdominal pain, fever, and/or vaginal discharge could indicate infection (pelvic inflammatory disease [PID], endometritis). Dysmenorrhea, dyspareunia or infertility suggest endometriosis and possible adenomyosis. Changes in bladder or bowel function suggest extrauterine uterine bleeding or a mass effect from a neoplasm. Galactorrhea, heat or cold intolerance, hirsutism, or hot flashes suggest an endocrinologic issue.
- Has there been a recent illness, stress, excessive exercise, or possible eating disorder? This suggests hypothalamic dysfunction.

Menstrual history — AUB varies from normal menses in terms of frequency, regularity, volume, or duration. The characteristics of normal menstrual bleeding are (table 7) [8,9]:

- Frequency every 21 to 35 days
- Occurs at fairly regular intervals
- Volume of blood ≤80 mL
- Duration is 5 days

The clinician should determine the bleeding pattern by asking the patient the following questions:

- What was the first day of the last menstrual period and several previous menstrual periods?
- For how many days does bleeding continue? How many days of full bleeding and how many days of light bleeding or brown staining does this include?
- Does bleeding occur between menstrual periods?
- How heavy is the bleeding? The definition of normal menses is <80 mL of blood. Population-based studies that employed precise assessment of menstrual blood loss found that women with a loss per cycle of >80 mL were more likely to become anemic [10]. However, volume of blood is difficult to measure. In clinical practice, heavy menses are generally defined as soaking a pad or tampon more than every two hours or as a volume of bleeding that interferes with daily activities (eg, wakes patient from sleep, stains clothing or sheets). Questions that help to characterize the volume of uterine bleeding are shown in the table (table 8).
- If bleeding is irregular, how many bleeding episodes have there been in the past 6 to 12 months? What is the average time from the first day of one bleeding episode to the next?

A woman may have strong concerns over changes in menstrual blood loss, however, patient self-reports are inaccurate indicators of the quantity of blood lost at menses and pathologic examination of the uterus often shows no abnormality [11-15]. This was illustrated by a population-based study in which one-quarter of women with normal periods considered their blood loss excessive, whereas 40 percent of those with excessive bleeding (>80 mL) described their periods as light or moderate [10]. In another study, only one-third of women who considered their periods heavy had blood loss >80 mL [16].

There are several typical bleeding patterns that correlate with particular etiologies of AUB, including:

Heavy menstrual bleeding — Based upon current terminology, regular bleeding that is heavy or prolonged (referred to as heavy menstrual bleeding) refers only to cyclic (ovulatory) menses. The term heavy menstrual bleeding (HMB) was introduced as part of the PALM-COEIN (polyp, adenomyosis, leiomyoma, malignancy and hyperplasia, coagulopathy, ovulatory dysfunction, endometrial, iatrogenic, and not yet classified) classification system for AUB [3]. This replaces the term menorrhagia, which was previously used to describe heavy or prolonged uterine bleeding. Menorrhagia is a less precise word because it does not differentiate between volume and duration of bleeding or between cyclic and anovulatory bleeding. (See 'Terminology' above.)

The most common etiologies of HMB are:

- Uterine leiomyomas – HMB associated with uterine leiomyomas is most likely to occur with submucosal leiomyomas, but leiomyomas at other sites may also cause AUB. (See "Epidemiology, clinical manifestations, diagnosis, and natural history of uterine leiomyomas (fibroids)".)
- Adenomyosis – This is often accompanied by dysmenorrhea or chronic pelvic pain. (See "Uterine adenomyosis".)
- Bleeding disorder. (See 'Coagulation tests' below.)

Other etiologies associated with HMB include:

- Endometrial hyperplasia or carcinoma or, rarely, uterine sarcoma may be associated with HMB, but the typical bleeding pattern for these conditions is irregular or postmenopausal bleeding. (See "Endometrial carcinoma: Clinical features and diagnosis" and "Classification and diagnosis of endometrial hyperplasia" and "Uterine sarcoma: Classification, clinical manifestations, and diagnosis".)
- IUD – The Tcu-380A (Paraguard) IUD is associated with iatrogenic heavy or prolonged menses; in contrast, the levonorgestrel IUDs decrease menstrual blood loss. (See "Intrauterine contraception (IUD): Overview".)
- Endometrial polyps, endometritis, or PID – These entities may present with heavy or prolonged menses, but intermenstrual bleeding is the more common clinical manifestation. (See "Endometrial polyps" and "Postpartum endometritis" and "Endometritis unrelated to pregnancy".)
- Congenital or acquired uterine arteriovenous malformation – This is a rare cause of HMB [17-19]. This lesion should be suspected when an invasive procedure for unexplained bleeding seems to aggravate the problem. Acquired uterine arteriovenous malformations typically occur after an intrauterine procedure. (See "Differential diagnosis of genital tract bleeding in women", section on 'Arteriovenous malformation'.)
- Disorders of local endometrial hemostasis – Alterations in prostaglandins may result in HMB. (See "Differential diagnosis of genital tract bleeding in women", section on 'Local endometrial hemostasis disorders'.)

Thyroid disease has traditionally been thought to be a common cause of HMB. However, the available data suggest that it is an uncommon etiology of this bleeding pattern. As an example, one study reported that the prevalence of menstrual disturbances was similar among 586 women with hyperthyroidism and 111 women with hypothyroidism compared with 105 healthy controls [20]. Rates of hypermenorrhea were comparable in women with thyroid disease compared with controls, but there were few women with this bleeding pattern (hyperthyroidism: 2 of 586 women; hypothyroidism: 0 of 111; and 1 of 105 controls). Another study found that menorrhagia was more common in 171 women with hypothyroidism than in 214 healthy controls (7 versus 1 percent), but the proportion of women with this symptom was low [21]. (See "Clinical manifestations of hypothyroidism", section on 'Reproductive abnormalities' and 'Endocrine tests' below.).

Additional causes of HMB are listed in the table (table 9).

Intermenstrual bleeding — Intermenstrual uterine bleeding may be related to a variety of etiologies (table 10), including:

- Endometrial polyps. (See "Endometrial polyps".)
- Unscheduled bleeding due to a contraceptive method. (See "Management of unscheduled bleeding in women using contraception".)
- Endometrial hyperplasia or carcinoma or, rarely, uterine sarcoma. (See "Endometrial carcinoma: Clinical features and diagnosis" and "Classification and diagnosis of endometrial hyperplasia" and "Uterine sarcoma: Classification, clinical manifestations, and diagnosis".)
- Endometritis or PID – AUB in women with symptomatic chronic endometritis may present as intermenstrual bleeding or spotting, postcoital bleeding, or heavy menstrual bleeding (HMB). In women with AUB, the presence of pelvic pain, cervicitis, or vaginal leukorrhea should alert the clinician to the possibility of endometritis. Endometritis is most likely to occur in women with a recent history of childbirth or an intrauterine procedure (eg, pregnancy termination, IUD insertion). Regarding PID, for example, in one series, 15 percent of women with possible upper genital tract infection presented with AUB [22]. (See "Endometritis unrelated to pregnancy" and "Postpartum endometritis" and "Clinical features and diagnosis of pelvic inflammatory disease".)
- Endometrial abnormalities related to previous endometrial trauma (eg, a hysterotomy scar or “niche” following cesarean delivery) (See "Differential diagnosis of genital tract bleeding in women", section on 'Hysterotomy scar'.) Among women with regular menses, intermenstrual spotting occurs in less than 3 percent of cycles and may represent physiologic intermenstrual bleeding associated with ovulation [23].

Intermenstrual bleeding is often due to conditions of the cervix, including cervical cancer, cervical polyps, cervicitis, or ectropion. These conditions are discussed separately. (See "Invasive cervical cancer: Epidemiology, risk factors, clinical manifestations, and diagnosis", section on 'Clinical manifestations' and "Congenital cervical anomalies and benign cervical lesions", section on 'Polyps' and "Congenital cervical anomalies and benign cervical lesions", section on 'Cervicitis' and "Congenital cervical anomalies and benign cervical lesions", section on 'Ectropion'.)

Irregular bleeding (ovulatory dysfunction) — Irregular uterine bleeding is most commonly associated with ovulatory dysfunction (AUB-O). Women may either have anovulation, which refers to the absence of ovulatory cycles, or oligo-ovulation, in which they shift between ovulatory cycles and anovulation. (See "Differential diagnosis of genital tract bleeding in women", section on 'Ovulatory dysfunction'.)

Irregular bleeding associated with AUB-O is typically characterized by phases of no bleeding that may last for two or more months and other phases with either spotting or episodes of heavy bleeding. Molimina are typically absent.

AUB-O should be suspected in women with an irregular bleeding pattern, particularly those at the extremes of reproductive age (postmenarchal and in the menopausal transition). In addition, polycystic ovarian syndrome and other endocrine disorders can cause AUB-O (thyroid disease, hyperprolactinemia). Causes of ovulatory dysfunction are shown in the table (table 11).

The diagnosis of anovulatory bleeding is made primarily by the bleeding pattern, provided that etiologies of intermenstrual bleeding have been excluded (see 'Intermenstrual bleeding' above). Laboratory evaluation is not generally required to confirm anovulation, but is helpful in excluding thyroid disease or hyperprolactinemia. (See 'Endocrine tests' below and "Evaluation of female infertility", section on 'Assessment of ovulatory function'.)

If a patient has a bleeding pattern consistent with AUB-O, subsequent evaluation is directed toward identifying the cause. In addition, women with prolonged amenorrhea due to anovulation are exposed to unopposed estrogen and are at risk of endometrial hyperplasia or cancer, and endometrial sampling may be required (table 4). Ideally, the cause of anovulation can be identified and treated so that normal cyclic menses can be re-established. (See 'Endometrial sampling' below.)

Other bleeding patterns — Other types of bleeding patterns include:

- **Amenorrhea** – Amenorrhea refers to absence of bleeding for at least three usual cycle lengths. Amenorrhea may be primary (ie, menarche is absent) or secondary (menses cease after menarche). The evaluation of amenorrhea is discussed separately. (See "Etiology, diagnosis, and treatment of primary amenorrhea" and "Etiology, diagnosis, and treatment of secondary amenorrhea".)
- **Decreased volume** – Women sometimes report that periods that are regular, but have become unusually light or of short duration. This may occur with use of hormonal contraception. Other causes include partial cervical stenosis or Asherman syndrome. However, the bleeding pattern should be reviewed to determine whether the light bleeding represents irregular bleeding or intermenstrual bleeding. (See "Congenital cervical anomalies and benign cervical lesions", section on 'Cervical stenosis' and "Intrauterine adhesions".)
- **Regular menses with increased frequency** – During the menopausal transition (figure 2), women may experience a decrease in the interval between menses (figure 3). Cycle length that has shortened, but not to less than every 21 days, may be normal during this phase. If the bleeding is also irregular or occurs less often than every 21 days, other etiologies should be investigated. (See 'Irregular bleeding (ovulatory dysfunction)' above and 'Intermenstrual bleeding' above.)

PHYSICAL EXAMINATION — Vital signs should be assessed and a complete pelvic examination should be performed, with a particular focus on:

- Potential sites of bleeding on the vulva, vagina, cervix, urethra, anus, or perineum
- Any abnormal findings along the genital tract (eg, mass, laceration, ulceration, friable area, vaginal or cervical discharge, foreign body)
- Size and contour of the uterus – An enlarged uterus may be due to pregnancy, uterine leiomyomas, adenomyosis, or uterine malignancy. Limited uterine mobility should be noted, if present; this finding suggests that pelvic adhesions or a pelvic mass is present. Pelvic adhesions may be due to prior infection, surgery, or endometriosis, and also may impact surgical planning if surgical treatment is indicated. A boggy, globular, tender uterus is typical of adenomyosis. Uterine tenderness is present in women with pelvic inflammatory disease (PID), but is not consistently found in those with chronic endometritis.
- Current uterine bleeding – The presence and volume of bleeding from the cervical os should be noted. Blood or blood clots in the vaginal vault should be noted. Patients who present with a complaint of heavy vaginal bleeding should be assessed for acute bleeding. Patients who are hemodynamically unstable or who have copious, ongoing blood flow from the uterus or other genital tract site should be evaluated and managed in an urgent care facility. (See "Managing an episode of severe or prolonged uterine bleeding", section on 'Hemodynamically unstable women' and "Approach to vaginal bleeding in the emergency department".)
- Presence of an adnexal mass or tenderness

A general examination should be performed to look for signs of systemic illness, such as fever, ecchymoses, an enlarged thyroid gland, or evidence of hyperandrogenism (hirsutism, acne, clitoromegaly, or male pattern balding). Acanthosis nigricans may be seen in women with polycystic ovarian syndrome (PCOS). Galactorrhea (bilateral milky nipple discharge) suggests the presence of hyperprolactinemia.

LABORATORY EVALUATION

Initial tests — Most reproductive-age women with abnormal uterine bleeding (AUB) should be evaluated initially with the following tests:

- Human chorionic gonadotropin (hCG) to exclude pregnancy
- Complete blood count, hemoglobin and/or hematocrit to assess for anemia; the exception to this are patients who do not have heavy or frequent bleeding

Pregnancy test — Pregnancy should be excluded in all reproductive-age women with AUB.

A urine hCG test may be performed as an initial test in a clinic or urgent care setting, since these results are available quickly. Regardless of the result, a quantitative serum hCG should also be performed:

- If the urine test is negative, but the clinician continues to suspect early pregnancy may be present, serum hCG should be measured. A serum hCG assay can detect a pregnancy by one week after conception, while a urine hCG test is able to detect most pregnancies within two weeks after conception (table 12) [24,25].
- If the urine test is positive, serial quantitative serum hCG testing is appropriate if ectopic pregnancy or spontaneous abortion is suspected. (See "Spontaneous abortion: Risk factors, etiology, clinical manifestations, and diagnostic evaluation" and "Clinical manifestations, diagnosis, and management of ectopic pregnancy".)
- If the serum hCG is negative, the test should be repeated in one week if an early pregnancy is suspected.

Diagnosis of pregnancy is discussed in detail separately. (See "Clinical manifestations and diagnosis of early pregnancy".)

Gestational trophoblastic disease, which in some cases presents weeks to years after a pregnancy, is also associated with uterine bleeding and a positive pregnancy test. (See "Gestational trophoblastic disease: Epidemiology, clinical manifestations and diagnosis".)

Complete blood count — Women with heavy or prolonged bleeding should be evaluated with a hemoglobin and/or hematocrit for anemia. (See "Approach to the adult patient with anemia".)

In addition, a platelet count is helpful if a bleeding disorder is suspected. A white blood cell count is helpful if an infection is suspected. Pelvic inflammatory disease (PID) with endometritis is a potential etiology of AUB. Acute endometritis following childbirth or an intrauterine procedure may be associated with leukocytosis, but the white blood cell count is typically normal in chronic endometritis. (See "Clinical features and diagnosis of pelvic inflammatory disease", section on 'Laboratory tests' and "Endometritis unrelated to pregnancy".)

Additional tests — Additional testing is selective and depends upon information obtained on history and physical examination.

Endocrine tests — Tests of endocrine function are performed based upon the history and physical examination findings:

- **Thyroid function tests** — It is not necessary to assess for thyroid disease in all women with AUB. Thyroid disease appears to be associated mainly with oligomenorrhea or amenorrhea. If the menstrual history suggests ovulatory dysfunction, checking a thyroid-stimulating hormone (TSH) is appropriate. Some data suggest that heavy menstrual bleeding (HMB) is associated with hypothyroidism in a small proportion of women. For women with HMB, a TSH should be performed if no other etiology has been identified. (See 'Irregular bleeding (ovulatory dysfunction)' above and 'Heavy menstrual bleeding' above.)
- **Prolactin level** – A prolactin level should be measured in women who complain of anovulatory bleeding, amenorrhea, or galactorrhea, or are taking medications that can cause hyperprolactinemia (table 6). (See "Clinical manifestations and diagnosis of hyperprolactinemia".)
- **Androgen levels** – Serum androgens should be measured in women with AUB and signs of androgen excess. Hirsutism (excessive male-pattern facial and body hair) is far more common than virilization (deepening of the voice, temporal balding, breast atrophy, changes toward a male body habitus, and/or clitoromegaly) [26]. Polycystic ovarian syndrome (PCOS) is the most common cause of hirsutism and amenorrhea or anovulatory bleeding. However, clinical manifestations of hyperandrogenism may also be seen in women with congenital adrenal hyperplasia. If virilization is present, a more severe androgen excess should be suspected and the patient should be evaluated for an androgen-secreting tumor of the adrenal gland or ovary (table 13). (See "Diagnosis of polycystic ovary syndrome in adults", section on 'Serum androgens' and "Pathogenesis and causes of hirsutism".)
- **Follicle stimulating hormone or luteinizing hormone** – Follicle stimulating hormone (FSH) and luteinizing hormone (LH) are released by the pituitary gland. If premature ovarian insufficiency is suspected, a serum FSH should be performed. For women with suspected hypothalamic dysfunction (due to poor nutrition or intense exercise), a FSH and LH should be performed, as well as an estrogen/progestin withdrawal test. (See "Clinical manifestations and evaluation of spontaneous primary ovarian insufficiency (premature ovarian failure)", section on 'Diagnosis' and "Etiology, diagnosis, and treatment of secondary amenorrhea", section on 'Step 5: Follow-up testing'.)
- **Estrogen levels** – Estrogen excess due to an estrogen-secreting ovarian tumor is a rare etiology of AUB, but should be considered if an adnexal mass is present and if other etiologies have been excluded (table 13). (See "Sex cord-stromal tumors of the ovary: Granulosa-stromal cell tumors".)
- **Assessment of ovulatory function** – Anovulation is typically diagnosed based upon the characteristic bleeding pattern; laboratory evaluation is not typically required. Laboratory confirmation of anovulation may be useful in women with infertility. (See "Evaluation of female infertility", section on 'Assessment of ovulatory function'.)

Coagulation tests — Bleeding disorders are common in reproductive-age women. Up to 15 to 24 percent of women presenting with menorrhagia may have some type of bleeding diathesis (eg, von Willebrand disease, immune thrombocytopenia, or platelet function defect) [27-29]. In addition, excessive bleeding may be caused by leukemia, liver or renal disease, anticoagulants, prescription and nonprescription drugs that impact coagulation or platelet function, and chemotherapeutic agents. (See "Approach to the adult patient with a bleeding diathesis", section on 'Menorrhagia' and "Differential diagnosis of genital tract bleeding in women", section on 'Bleeding disorders'.)

Coagulation disorders typically present as heavy bleeding at menarche or in women in their later reproductive years. For von Willebrand disease, decreasing estrogen levels during the menopausal transition impact von Willebrand factor synthesis. Excessive bleeding related to medications or systemic illness may present at any age. (See "Clinical presentation and diagnosis of von Willebrand disease", section on 'Variations in VWF levels in health and disease'.)

A bleeding disorder should be suspected if heavy or prolonged menses began at menarche, is associated with a family history of coagulopathy, the patient has signs of a bleeding diathesis (eg, easy bruising or prolonged bleeding from mucosal surfaces), or is taking medications associated with an increased bleeding tendency (table 14) [30-32].

Women who are taking warfarin should have coagulation parameters assessed to see if the effect is within the therapeutic window. In addition, patients should be asked about other prescription or nonprescription medications that may impact coagulation or platelet function. (See "Approach to the adult patient with a bleeding diathesis", section on 'Medication use'.)

The evaluation for patients with a suspected bleeding disorder is discussed separately. (See "Approach to the adult patient with a bleeding diathesis", section on 'Laboratory testing'.)

Tests to exclude cervical bleeding — It is often difficult to differentiate cervical and uterine bleeding based upon history and physical examination. If there is uncertainty about the source of the bleeding, a basic evaluation for etiologies of cervical bleeding should be performed. (See 'Is the uterus the source of the bleeding?' above.)

- **Cervical cancer screening** – Cervical neoplasia can cause cervical bleeding, which is often mistaken for uterine bleeding. All women with AUB should be appropriately screened for cervical cancer, according to current guidelines. (See "Screening for cervical cancer: Rationale and recommendations".)
- **Tests for cervicitis** – Genital tract infection with *Neisseria gonorrhoeae* or *Chlamydia trachomatis* may cause cervicitis and present with cervical bleeding. In addition, these are common pathogens in PID, which is an etiology of AUB. Although less common than *N. gonorrhoeae* and *C. trachomatis* as a cause of cervicitis, trichomonas and herpes simplex virus infections can cause cervicitis and result in cervical bleeding. Testing for these infections should be performed in women at high risk and in those with a finding on examination of a friable cervix, purulent vaginal or cervical discharge, or pelvic tenderness [2]. (See "Diagnosis of gonococcal infections" and "Acute cervicitis" and "Clinical manifestations and diagnosis of Chlamydia trachomatis infections".)

ENDOMETRIAL SAMPLING — After pregnancy has been excluded, endometrial sampling should be performed in women with AUB and an increased risk of endometrial hyperplasia or cancer (table 3 and table 4).

Indications for endometrial sampling in women of reproductive-age with AUB vary by age group (table 3):

- **Age 45 years to menopause** – In women who are ovulatory, any AUB, including intermenstrual bleeding. In any woman, bleeding that is frequent (interval between the onset of bleeding episodes is <21 days), heavy, or prolonged (>5 days) (table 7).
- **Younger than 45 years** – In reproductive-age women, the majority of cases of endometrial neoplasia occur in the setting of ovulatory dysfunction due to estrogenic proliferation with absent or inadequate progestational protection [33]. Endometrial sampling is indicated if AUB is persistent, occurs in the setting of a history of unopposed estrogen exposure (obesity, chronic anovulation) or failed medical management of the bleeding, or in women at high risk of endometrial cancer (eg, tamoxifen therapy, Lynch or Cowden syndrome).

Use of 45 years-old as the threshold for increased concern regarding endometrial neoplasia is supported by evidence that the risk of endometrial hyperplasia and carcinoma is fairly low prior to age 45 years and increases with advancing age; 19 percent of cases occur in women aged 45 to 54 years compared with 6 percent in those aged 35 to 44 years [34-36]. This age threshold is also consistent with American College of Obstetricians and Gynecologists (ACOG) guidelines [8,33]. (See "Classification and diagnosis of endometrial hyperplasia", section on 'Epidemiology' and "Endometrial carcinoma: Epidemiology and risk factors", section on 'Epidemiology'.)

Among women <45 years-old, there is no standard definition of persistent AUB. For women with ovulatory dysfunction, given that six months of unopposed estrogen therapy substantially increases the risk of endometrial hyperplasia in menopausal women, it is reasonable to consider six months or more of AUB-O as “persistent” [37]. For other types of AUB, the clinician must use their judgement regarding when abnormal bleeding is persistent.

Endometrial neoplasia is rare in adolescents ages 13 to 18 years (0.05 percent of cases of endometrial cancer occur in patients ages 15 to 19 years [38]), but it may develop in the setting of obesity with anovulation (polycystic ovarian syndrome [PCOS]) [39]. In this age group, as with other reproductive-age women, the level of suspicion is higher in patients who are obese or who fail medical therapy.

Transvaginal ultrasound measurement of endometrial thickness to evaluate for endometrial neoplasia is an alternative to endometrial sampling in women with postmenopausal bleeding, but **NOT** in premenopausal women. In premenopausal women, measurement of endometrial thickness is not a useful test, since major variation of the thickness occurs during the normal menstrual cycle. In this patient population, transvaginal ultrasound does provide useful information regarding structural causes of AUB and can identify a heterogenous endometrium due to hyperplasia or cancer.

(See "Evaluation of the endometrium for malignant or premalignant disease", section on 'Premenopausal women'.)

Suspicion of endometritis is another indication for endometrial sampling. For women with AUB during the postpartum or postabortal period, endometrial sampling may reveal retained products of conception. (See "Postpartum endometritis" and "Endometritis unrelated to pregnancy" and "Retained products of conception".)

Endometrial sampling is typically performed as an office biopsy, but dilation and curettage or hysteroscopically-directed biopsy may be performed if bleeding persists after a normal endometrial biopsy or if there are other indications for an operative procedure. (See "Endometrial sampling procedures" and "Evaluation of the endometrium for malignant or premalignant disease".)

IMAGING AND HYSTEROSCOPY — The decision to proceed with pelvic imaging should be based upon the clinician's judgement, depending on patient age, history and symptoms.

The choice to do imaging is guided by several factors:

- If the abdominal and/or bimanual pelvic examination findings include an enlarged or globular uterus or adnexal mass, imaging is appropriate to evaluate for leiomyomas, adenomyosis, and adnexal pathology.
- Imaging may be omitted, at least in the initial evaluation, if the bleeding is thought to be due to a lesion observed on physical examination (endocervical polyp), anovulation, or infection [40].
- If the pelvic examination is normal, imaging is also appropriate if symptoms persist despite treatment.

Choice of modality — Pelvic ultrasound is the first-line imaging study in women with AUB. Transvaginal examination should be performed, unless there is a reason to not perform the vaginal study (eg, virginal patient). Transabdominal sonography should also be performed if transvaginal imaging does not allow adequate assessment of the uterus or adnexa or if a large pelvic mass is present.

Ultrasound is effective at characterizing uterine and adnexal lesions. As noted above, assessment of endometrial thickness is not a useful test in premenopausal women. Ultrasound is less expensive than magnetic resonance imaging (MRI), which should be used for pelvic assessment only as a follow-up imaging test and only when it will give information that is not available on ultrasound. Computed tomography is used to evaluate the pelvis for metastatic disease in some malignancies, but has no role in routine pelvic assessment. (See "Evaluation of the endometrium for malignant or premalignant disease", section on 'Premenopausal women'.)

If intracavitary pathology (lesions that protrude into the uterine cavity, ie, endometrial polyps, submucosal myomas, intramural myomas with an intracavitary component) is suspected based upon the initial ultrasound, the patient may be evaluated with either saline infusion sonohysterography or hysteroscopy.

- Saline infusion sonography (SIS) — Saline infusion sonography (also called sonohysterography) is a technique in which sterile saline is instilled into the endometrial cavity and a transvaginal ultrasound examination is performed [41]. This procedure allows for an architectural evaluation of the uterine cavity to detect small lesions (eg, polyps or small submucous fibroids) that may be missed or poorly defined by transvaginal sonography alone (image 1). (See "Saline infusion sonohysterography".)
- Hysteroscopy — Hysteroscopy provides direct visualization of the endometrial cavity. Diagnostic hysteroscopy can be performed in an office setting. In an operative setting, hysteroscopy allows targeted biopsy or excision of lesions identified during the procedure [42,43]. (See "Overview of hysteroscopy".)

We suggest SIS for most women for intracavitary evaluation. Both SIS and hysteroscopy are effective tests for diagnosing endometrial polyps and submucosal leiomyoma [44], while ultrasound alone has limited sensitivity and specificity for the characterization of these lesions [45,46]. Compared with hysteroscopy, the major advantage of SIS is that it can assess the depth of extension of leiomyomas into the myometrium or serosal surface (image 2). Some fibroids appear to be submucosal at hysteroscopy, but are actually intramural with a component that protrudes into the uterine cavity. This information and the ability to identify fibroids at other sites (figure 4) can help surgical planning. Some data also suggest that SIS is less painful than office hysteroscopy [45,47]. SIS also is able to identify asymmetric or focal endometrial thickening, a potentially important marker of endometrial neoplasia (image 3) [44].

Advantages of hysteroscopy are that office hysteroscopy may offer patients greater convenience, particularly if it can be performed at the same visit as the initial evaluation. Operative hysteroscopy is not typically available in an office setting and therefore is not part of the initial evaluation of AUB.

Factors such as convenience, availability of equipment and trained personnel, and cost of SIS and hysteroscopy vary in different clinical settings, and these factors often influence the choice of study.

INFORMATION FOR PATIENTS — UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topics (see "Patient information: Heavy periods (The Basics)")
- Beyond the Basics topics (See "Patient information: Abnormal uterine bleeding (Beyond the Basics)" and "Patient information: Heavy or prolonged periods (menorrhagia) (Beyond the Basics)" and "Patient information: Absent or irregular periods (Beyond the Basics)".)

SUMMARY AND RECOMMENDATIONS

- Abnormal uterine bleeding (AUB) is a common gynecologic complaint. AUB can be caused by a wide variety of local and systemic diseases or related to medications (table 1) [2]. The most common etiologies are conditions associated with pregnancy, structural uterine pathology (eg, fibroids, endometrial polyps, adenomyosis), anovulation, bleeding disorders, or neoplasia. (See 'Introduction' above and 'Prevalence and etiology' above.)
- The initial approach to evaluation of nonpregnant reproductive-age women with AUB is to confirm that the source of bleeding is the uterus, exclude pregnancy, and confirm that the patient is premenopausal. In addition, women with acute bleeding should be evaluated in an urgent care facility. (See 'Initial evaluation' above.)
- The goals of further evaluation are to determine the pattern, severity, and etiology of the bleeding to guide management. A primary focus is to identify women who require evaluation for endometrial carcinoma or other uterine malignancies. (See 'Further evaluation' above.)
- AUB varies from normal menses in terms of frequency, regularity, volume, or duration (table 7). Typical abnormal bleeding patterns include: regular menses that are heavy or prolonged, intermenstrual bleeding, irregular bleeding (typically associated with ovulatory dysfunction), and amenorrhea. (See 'Menstrual history' above.)
- Endometrial sampling should be performed in nonpregnant women with AUB and an increased risk of endometrial hyperplasia or cancer. Indications for endometrial sampling vary by age group (table 3 and table 4). (See 'Endometrial sampling' above.)
- Bleeding disorders, particularly von Willebrand disease (VWD), are common in reproductive-age women. A disorder should be suspected if heavy or prolonged menses began at menarche or is associated with a family history of coagulopathy or other signs of a bleeding diathesis (eg, easy bruising or prolonged bleeding from mucosal surfaces). In addition, anticoagulants may cause heavy or prolonged uterine bleeding. (See 'Coagulation tests' above.)
- Hormonal contraception or an intrauterine device (IUD) may cause AUB. (See 'General history' above.)
- All women with AUB should have a complete history and physical examination. Information should be obtained on the frequency, duration, and volume of AUB, as well as the presence of

associated symptoms and precipitating factors. (See 'History' above and 'Physical examination' above.)

- Most reproductive-age women with AUB should be evaluated initially with the following tests: human chorionic gonadotropin (hCG), complete blood count, hemoglobin and/or hematocrit. Additional tests may be performed to assess for particular etiologies. (See 'Initial tests' above and 'Additional tests' above.)
- Pelvic imaging is useful if a structural lesion (endometrial polyps, leiomyomas, adenomyosis, or an adnexal mass) is suspected based upon the history and physical examination; it is not required in every woman with AUB. Pelvic ultrasound is the first-line study and is often used alone, or may be combined with either saline infusion sonography or hysteroscopy to provide information about lesions that protrude into the endometrial cavity (submucosal leiomyomas, myometrial leiomyomas that protrude into the cavity, and endometrial polyps). (See 'Imaging and hysteroscopy' above.)

ACKNOWLEDGMENT — The author and UpToDate would like to acknowledge Dr. Annekathryn Goodman, who contributed to earlier versions of this topic review.

REFERENCES

1. Spencer CP, Whitehead MI. Endometrial assessment re-visited. Br J Obstet Gynaecol 1999; 106:623.
2. Committee on Practice Bulletins—Gynecology. Practice bulletin no. 128: diagnosis of abnormal uterine bleeding in reproductive-aged women. Obstet Gynecol 2012; 120:197.
3. Munro MG, Critchley HO, Broder MS, et al. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. Int J Gynaecol Obstet 2011; 113:3.
4. Kjerulff KH, Erickson BA, Langenberg PW. Chronic gynecological conditions reported by US women: findings from the National Health Interview Survey, 1984 to 1992. Am J Public Health 1996; 86:195.
5. Matteson KA, Boardman LA, Munro MG, Clark MA. Abnormal uterine bleeding: a review of patient-based outcome measures. Fertil Steril 2009; 92:205.
6. Anderson SE, Must A. Interpreting the continued decline in the average age at menarche: results from two nationally representative surveys of U.S. girls studied 10 years apart. J Pediatr 2005; 147:753.
7. McKinlay SM. The normal menopause transition: an overview. Maturitas 1996; 23:137.
8. Committee on Practice Bulletins—Gynecology. Practice bulletin no. 128: diagnosis of abnormal uterine bleeding in reproductive-aged women. Obstet Gynecol 2012; 120:197.
9. Treloar AE, Boynton RE, Behn BG, Brown BW. Variation of the human menstrual cycle through reproductive life. Int J Fertil 1967; 12:77.
10. Hallberg L, Högdahl AM, Nilsson L, Rybo G. Menstrual blood loss--a population study. Variation at different ages and attempts to define normality. Acta Obstet Gynecol Scand 1966; 45:320.
11. Greenberg M. The meaning of menorrhagia: an investigation into the association between the complaint of menorrhagia and depression. J Psychosom Res 1983; 27:209.
12. Hurskainen R, Aalto AM, Teperi J, et al. Psychosocial and other characteristics of women complaining of menorrhagia, with and without actual increased menstrual blood loss. BJOG 2001; 108:281.
13. Wright B, Gannon MJ, Greenberg M, et al. Psychiatric morbidity following endometrial ablation and its association with genuine menorrhagia. BJOG 2003; 110:358.
14. Grant C, Gallier L, Fahey T, et al. Management of menorrhagia in primary care-impact on referral and hysterectomy: data from the Somerset Morbidity Project. J Epidemiol Community Health 2000; 54:709.
15. Clarke A, Black N, Rowe P, et al. Indications for and outcome of total abdominal hysterectomy for benign disease: a prospective cohort study. Br J Obstet Gynaecol 1995; 102:611.
16. Warner PE, Critchley HO, Lumsden MA, et al. Menorrhagia I: measured blood loss, clinical features, and outcome in women with heavy periods: a survey with follow-up data. Am J Obstet Gynecol 2004; 190:1216.
17. Hoffman MK, Meilstrup JW, Shackelford DP, Kaminski PF. Arteriovenous malformations of the uterus: an uncommon cause of vaginal bleeding. Obstet Gynecol Surv 1997; 52:736.
18. Halperin R, Schneider D, Maymon R, et al. Arteriovenous malformation after uterine curettage: a report of 3 cases. J Reprod Med 2007; 52:445.
19. Nicholson AA, Turnbull LW, Coady AM, Guthrie K. Diagnosis and management of uterine arterio-venous malformations. Clin Radiol 1999; 54:265.
20. Kakuno Y, Amino N, Kanoh M, et al. Menstrual disturbances in various thyroid diseases. Endocr J 2010; 57:1017.
21. Krassas GE, Pontikides N, Kaltsas T, et al. Disturbances of menstruation in hypothyroidism. Clin Endocrinol (Oxf) 1999; 50:655.
22. Peipert JF, Boardman LA, Sung CJ. Performance of clinical and laparoscopic criteria for the diagnosis of upper genital tract infection. Infect Dis Obstet Gynecol 1997; 5:291.
23. Dasharathy SS, Mumford SL, Pollack AZ, et al. Menstrual bleeding patterns among regularly menstruating women. Am J Epidemiol 2012; 175:536.
24. O'Connor RE, Bibro CM, Pegg PJ, Bouzoukis JK. The comparative sensitivity and specificity of serum and urine HCG determinations in the ED. Am J Emerg Med 1993; 11:434.
25. Norman RJ, Menabawey M, Lowings C, et al. Relationship between blood and urine concentrations of intact human chorionic gonadotropin and its free subunits in early pregnancy. Obstet Gynecol 1987; 69:590.
26. Fritz MA, Speroff L. Hirsutism. In: Clinical Gynecologic Endocrinology and Infertility, 8th ed., Lippincott Williams & Wilkins, Philadelphia 2011. p.533.
27. Kadir RA, Economides DL, Sabin CA, et al. Frequency of inherited bleeding disorders in women with menorrhagia. Lancet 1998; 351:485.
28. Kouides PA, Byams VR, Philipp CS, et al. Multisite management study of menorrhagia with abnormal laboratory haemostasis: a prospective crossover study of intranasal desmopressin and oral tranexamic acid. Br J Haematol 2009; 145:212.
29. Committee on Adolescent Health Care, Committee on Gynecologic Practice. Committee Opinion No.580: von Willebrand disease in women. Obstet Gynecol 2013; 122:1368.
30. Dilley A, Drews C, Miller C, et al. von Willebrand disease and other inherited bleeding disorders in women with diagnosed menorrhagia. Obstet Gynecol 2001; 97:630.
31. Philipp CS, Faiz A, Dowling N, et al. Age and the prevalence of bleeding disorders in women with menorrhagia. Obstet Gynecol 2005; 105:61.
32. Lukes AS, Kadir RA, Peyvandi F, Kouides PA. Disorders of hemostasis and excessive menstrual bleeding: prevalence and clinical impact. Fertil Steril 2005; 84:1338.
33. Committee on Practice Bulletins—Gynecology. Practice bulletin no. 136: management of abnormal uterine bleeding associated with ovulatory dysfunction. Obstet Gynecol 2013; 122:176.
34. http://seer.cancer.gov/statfacts/html/corp.html (Accessed on August 13, 2012).
35. Reed SD, Newton KM, Clinton WL, et al. Incidence of endometrial hyperplasia. Am J Obstet Gynecol 2009; 200:678.e1.
36. http://seer.cancer.gov/statfacts/html/corp.html (Accessed on December 20, 2011).
37. Lethaby A, Suckling J, Barlow D, et al. Hormone replacement therapy in postmenopausal women: endometrial hyperplasia and irregular bleeding. Cochrane Database Syst Rev 2004; :CD000402.
38. http://seer.cancer.gov/statfacts/html/corp.html (Accessed on September 11, 2013).
39. Brown AJ, Westin SN, Broaddus RR, Schmeler K. Progestin intrauterine device in an adolescent with grade 2 endometrial cancer. Obstet Gynecol 2012; 119:423.
40. Doubilet PM. Diagnosis of abnormal uterine bleeding with imaging. Menopause 2011; 18:421.
41. Khan F, Jamaat S, Al-Jaroudi D. Saline infusion sonohysterography versus hysteroscopy for uterine cavity evaluation. Ann Saudi Med 2011; 31:387.
42. APGO educational series on women's health issues. Clinical management of abnormal uterine bleeding. Association of Professors of Gynecology and Obstetrics, 2006.
43. Bradley LD. Diagnosis of abnormal uterine bleeding with biopsy or hysteroscopy. Menopause 2011; 18:425.
44. La Sala GB, Blasi I, Gallinelli A, et al. Diagnostic accuracy of sonohysterography and transvaginal sonography as compared with hysteroscopy and endometrial biopsy: a prospective study. Minerva Ginecol 2011; 63:421.
45. Kelekci S, Kaya E, Alan M, et al. Comparison of transvaginal sonography, saline infusion sonography, and office hysteroscopy in reproductive-aged women with or without abnormal uterine

bleeding. Fertil Steril 2005; 84:682.

46. Farquhar C, Ekeroma A, Furness S, Arroll B. A systematic review of transvaginal ultrasonography, sonohysterography and hysteroscopy for the investigation of abnormal uterine bleeding in premenopausal women. Acta Obstet Gynecol Scand 2003; 82:493.
47. Van den Bosch T, Verguts J, Daemen A, et al. Pain experienced during transvaginal ultrasound, saline contrast sonohysterography, hysteroscopy and office sampling: a comparative study. Ultrasound Obstet Gynecol 2008; 31:346.

Topic 3263 Version 12.0