Approach to the adult with vaginal bleeding in the emergency department

AUTHOR: Joelle C Borhart, MD
SECTION EDITOR: Korilyn S Zachrison, MD, MSc
DEPUTY EDITOR: Michael Ganetsky, MD

All topics are updated as new evidence becomes available and our peer review process is complete.

Literature review current through: **Jan 2024.**
This topic last updated: **Sep 07, 2022.**

INTRODUCTION

The management of patients presenting to the emergency department (ED) with vaginal bleeding depends upon patient age, pregnancy status, chronicity and severity of bleeding, comorbidities, and medications. Formulating a diagnosis and treatment plan is helped by understanding the menstrual cycle and taking an organized approach to patient evaluation.

This topic will review the basic physiology of menstruation and provide an approach to the adult patient who presents to the ED with vaginal bleeding. Detailed discussions of pediatric patients with vaginal bleeding and of specific causes of genital tract bleeding are found separately. (See "Ectopic pregnancy: Clinical manifestations and diagnosis" and "Pregnancy loss (miscarriage): Terminology, risk factors, and etiology" and "Acute placental abruption: Pathophysiology, clinical features, diagnosis, and consequences" and "Causes of female genital tract bleeding" and "Evaluation and management of female lower genital tract trauma" and "Abnormal uterine bleeding in nonpregnant reproductive-age patients: Terminology, evaluation, and approach to diagnosis".)

BASIC PHYSIOLOGY

The regularity of the menstrual cycle and ovulation are dependent on a complex hormonal feedback mechanism involving the hypothalamus, the pituitary, and the ovary (figure 1). A basic summary of menstruation follows. A more detailed description of menstruation is found elsewhere. (See "Normal menstrual cycle" and "Normal puberty".)

The first half of the menstrual cycle is known as the **follicular phase**. During the follicular phase, gonadotropin-releasing hormone (GnRH) is secreted by the hypothalamus, which then stimulates the pituitary to release both luteinizing hormone (LH) and follicle stimulating hormone (FSH). In the ovary, under the influence of these two hormones, two things occur: A dominant follicle matures, and increasing levels of estrogen are secreted. Estrogen stimulates the endometrial glands and stroma to grow and proliferate, causing the endometrium to thicken.

Once estrogen levels reach a threshold level for about 36 hours, a surge in LH occurs, which triggers ovulation and the beginning of the second half of the menstrual cycle known as the **luteal phase.** Under the influence of LH, the ruptured dominant follicle rapidly evolves into the corpus luteum, which secretes increased amounts of progesterone. If pregnancy does not occur, the corpus luteum involutes 14 days after ovulation, and progesterone levels fall. This drop in progesterone during the latter part of the luteal phase triggers release of prostaglandins, which cause vasospasm of the arteries feeding the endometrium. This leads to a sloughing of the outer layers of the endometrium (ie, menstruation).

The median age of menarche is approximately 12.5 years. The mean duration of menstrual bleeding is four days. Bleeding for greater than seven days is considered abnormal. The average blood loss per menstruation is 35 mL; it is considered abnormal to lose greater than 80 mL of blood per menstruation.

HISTORY

Important elements of the history are listed here and discussed further below:

- Description of current bleeding (volume, duration)
- Normal menstrual bleeding pattern
- Pregnancy possibility and obstetrical history
- Sexual/pelvic infections
- Trauma and sexual assault
- Comorbid illnesses and medications (eg, hormone replacement, anticoagulants)
- Associated symptoms (eg, pain, urinary abnormalities, vaginal discharge)

- Other bleeding abnormalities or systemic symptoms

Begin by asking the patient about the volume and duration of bleeding to help quantify total or ongoing blood loss (table 1). Useful information includes the number of tampons or pads changed over the last 12 to 24 hours, whether these were saturated, and the presence or absence of clots. Women with heavy bleeding typically need to change pads/tampons a minimum of once every three hours. Clots with a diameter greater than 1 inch (2.5 cm) are associated with menstrual blood loss of at least 80 mL [1].

In the premenopausal patient, obtain a detailed menstrual history, including: the date of the last period, any change in the frequency of periods, whether flow is typically heavy or prolonged, and whether the patient has had similar episodes of bleeding. Ask whether the bleeding started at the expected onset of a menstrual period, or whether bleeding began prematurely or late. (See "Abnormal uterine bleeding in nonpregnant reproductive-age patients: Terminology, evaluation, and approach to diagnosis", section on 'Gynecologic and obstetric history'.)

The possibility of pregnancy must be addressed. Ask if the patient has missed a menstrual period. An obstetrical history should be obtained and includes: the outcome of all prior pregnancies (including miscarriages and procedures for pregnancy termination), pregnancy complications, current or recent methods of contraception, and any pelvic infections or sexually transmitted infections. Recognize that these questions are sensitive, and every attempt should be made to obtain this history from the patient privately (ie, in a room – not a hallway - without family or friends present).

Ask about trauma to the genitourinary tract, including sexual assault. The assessment and treatment of sexual assault survivors is reviewed separately. Pregnant patients should be asked about trauma, particularly to the abdomen; however, even seemingly minor trauma that does not result in direct injury to the abdomen (eg, a fall) can cause pregnancy complications. (See "Evaluation and management of adult and adolescent sexual assault victims in the emergency department" and "Intimate partner violence: Diagnosis and screening", section on 'Pregnancy' and "Initial evaluation and management of major trauma in pregnancy".)

Ask about systemic disease and obtain a complete list of the patient's current medications. Ask whether the patient takes postmenopausal hormone therapy or has used any assisted reproductive technologies. (See "In vitro fertilization: Overview of clinical issues and questions".)

Ask about associated symptoms. Fever and chills suggest an infectious etiology such as pelvic inflammatory disease (PID), a lower urinary tract infection (UTI), or pyelonephritis. When urinary symptoms are present, bleeding may be from hemorrhagic cystitis rather than a gynecologic

problem. Bleeding associated with vaginal discharge suggests infection, such as PID or vaginosis. Of note, PID is much more likely to present with pelvic pain, vaginal discharge, and possibly fever than with vaginal bleeding. Low, lateral abdominal pain associated with vaginal bleeding suggests pathology in the fallopian tube or ovary, such as ruptured ectopic pregnancy. Midline crampy abdominal pain often originates from the uterus but may be related to bladder or bowel pathology. Any pain should be characterized, including: onset, provocative or palliative elements, quality, radiation, site, and time course. (See "Pelvic inflammatory disease: Clinical manifestations and diagnosis" and "Acute simple cystitis in adult and adolescent females" and "Ectopic pregnancy: Clinical manifestations and diagnosis".)

A history of bleeding from multiple sites including mucous membranes, frequent bruising, prolonged heavy periods, or a family history of a bleeding disorder suggests a coagulation disorder. Coagulopathy should be suspected in a woman with heavy menstrual bleeding since menarche. Hemostatic abnormalities in women with heavy menstrual bleeding are common and may include abnormal platelet aggregation, Von Willebrand disease, and single clotting factor deficiencies. (See "Approach to the adult with a suspected bleeding disorder" and "Clinical presentation and diagnosis of von Willebrand disease" and "Abnormal uterine bleeding in nonpregnant reproductive-age patients: Terminology, evaluation, and approach to diagnosis", section on 'Medical history'.)

Other, apparently unrelated, symptoms may suggest a diagnosis. Obesity, hirsutism, and irregular periods are suggestive of polycystic ovary syndrome [2]. Headache accompanied by visual changes is suggestive of a pituitary tumor. Although thyroid disease does not often cause vaginal bleeding, the presence of weight gain, chronic fatigue, cold intolerance, constipation, alopecia, changes in normal menstrual bleeding pattern, or skin changes suggests hypothyroidism. (See "Clinical manifestations of hypothyroidism" and "Clinical manifestations of polycystic ovary syndrome in adults" and "Causes, presentation, and evaluation of sellar masses".)

Patient age alters the differential diagnosis. The risk of endometrial carcinoma increases substantially in any woman over the age of 45 with excessive genital tract bleeding [3]. Bleeding in a child under the age of 9 is uncommon and warrants evaluation [4]. (See "Endometrial carcinoma: Epidemiology, risk factors, and prevention" and "Overview of vulvovaginal conditions in the prepubertal child".)

Recent significant weight gain or loss, an eating disorder, or major stress may disturb hormonal regulation of the menstrual cycle.

PHYSICAL EXAMINATION

The physical examination is directed at determining hemodynamic stability, uncovering evidence of significant or ongoing blood loss, and identifying the underlying etiology of genital tract bleeding. Initial vital signs should be noted; orthostatic vital signs may be useful if the patient reports weakness, dizziness, or syncope associated with the bleeding. Keep in mind that young healthy females may present with near-normal vital signs despite substantial blood loss before rapidly decompensating. Thus, serial vital signs are important in patients with significant bleeding. Pale skin or conjunctiva suggests anemia. Mucosal hemorrhage, purpura, or petechiae suggests a bleeding disorder. Ecchymosis may stem from recent trauma or coagulopathy. (See "Diagnostic approach to anemia in adults" and "Evaluation of adults with cutaneous lesions of vasculitis".)

The abdominal examination focuses on the presence of an abdominal mass, localized abdominal tenderness, or peritoneal signs. Peritoneal signs may be present with pelvic inflammatory disease (PID), a hemorrhagic ovarian cyst, or a ruptured ectopic pregnancy. For a pregnant patient beyond 20 weeks gestation, uterine tenderness may suggest placental abruption. Loss of the normal uterine contour can occur with uterine rupture. (See "Pelvic inflammatory disease: Clinical manifestations and diagnosis" and "Evaluation and management of ruptured ovarian cyst" and "Ectopic pregnancy: Clinical manifestations and diagnosis".)

The pelvic examination is paramount for determining the source and volume of bleeding, and whether it is ongoing. Clinicians should assess for foreign bodies, signs of trauma, products of conception, and vaginal or cervical discharge. Uterine size and surface contour, adnexal mass or tenderness, and cervical motion tenderness should be noted. If the source of bleeding remains unclear, a rectal examination may be necessary to check for hemorrhoids, blood in stool, or other nongynecologic causes of bleeding. A bladder etiology should also be considered, and the absence of vaginal blood on examination despite a vaginal bleeding history should elevate this concern. (See "The gynecologic history and pelvic examination", section on 'Pelvic examination'.)

A manual pelvic examination should **not** be performed on pregnant women with vaginal bleeding after 20 weeks gestation until placenta previa has been ruled out definitively by ultrasound (US) examination. (See "Placenta previa: Epidemiology, clinical features, diagnosis, morbidity and mortality".)

A bimanual or speculum examination is **not** typically performed as an initial step in the examination of premenarchal patients with vaginal bleeding unless the bleeding is copious or the cause remains unclear after direct, external inspection. If an internal examination is

ultimately required, it typically should be performed under anesthesia or with sedation. (See "Evaluation of vulvovaginal bleeding in children and adolescents".)

ANCILLARY STUDIES

Pregnancy tests and pelvic ultrasound — A qualitative urine pregnancy test (hCG) should be obtained in any woman of childbearing age with vaginal bleeding, except those with a confirmed pregnancy.

A positive pregnancy test in a patient with vaginal bleeding should be followed by a pelvic ultrasound (US) examination. Using transvaginal ultrasound (TVUS), an intrauterine pregnancy (IUP) can be visualized around the fifth week of pregnancy. A quantitative serum hCG (beta-hCG) should be obtained when an IUP or clear ectopic pregnancy is not visualized on US, known as a pregnancy of unknown location. (See "Ultrasonography of pregnancy of unknown location".)

Trends in beta-hCG concentrations over time can be useful for distinguishing viable pregnancies from nonviable ones. Both ectopic pregnancy and nonviable intrauterine pregnancy are associated with beta-hCG levels that do not rise appropriately on serial examinations 48 hours apart (approximately double). Caution should be used when interpreting a single beta-hCG measurement; there is no single beta-hCG level that can exclude an ectopic pregnancy.

The author recommends obtaining a pelvic US on all patients in early pregnancy presenting with vaginal bleeding regardless of beta-hCG level [5]. In pregnant patients with vaginal bleeding after 20 weeks, TVUS is highly sensitive for identifying placenta previa but less sensitive for identifying placental abruption [6]. Patients with known placenta previa or a low-lying placenta presenting with vaginal bleeding constitute an obstetrical emergency and immediate obstetrical consultation should be obtained. TVUS is not necessary in these patients, though transabdominal US may be useful for fetal assessment. Any US examination performed on a bleeding patient with known placenta previa should be performed at the bedside in the emergency department (ED) where resuscitation can be performed, rather than the radiology suite. (See "Placenta previa: Management".)

Pelvic US is less helpful in the ED evaluation of nonpregnant patients with painless vaginal bleeding as the results rarely change ED management, but US may identify some causes of vaginal bleeding associated with lower abdominal pain, such as ruptured ovarian cyst and ovarian torsion. (See "Evaluation and management of ruptured ovarian cyst" and "Ovarian and fallopian tube torsion".)

Fetal heart rate — As a fetus approaches viability (between 22 to 24 weeks), fetal heart rate (FHR) becomes a key vital sign. Fetal heart rate can be determined using transabdominal Doppler auscultation or bedside US. The normal range for the FHR is 110 to 160 beats per minute. Assessment of the FHR is discussed in detail separately; basic characteristics are summarized in the following table (table 2). (See "Intrapartum fetal heart rate monitoring: Overview".)

Additional tests — Other studies are obtained based on clinical circumstances. A complete blood count should be obtained in all women presenting with significant vaginal bleeding. In unstable patients, type and crossmatch should be sent in preparation for blood transfusion. Pregnant patients with vaginal bleeding should have a blood type and Rh checked. If an underlying bleeding disorder or a coagulopathy is suspected, or if the patient takes anticoagulation medications, prothrombin time with international normalized ratio (INR) should be measured, and if appropriate, screening tests for disseminated intravascular coagulation (DIC).

Vaginal cultures or urine polymerase chain reaction (PCR) tests are obtained if infection is a concern. Urinalysis with or without urine culture may be needed for women with urinary symptoms. In unusual circumstances, clinical findings may indicate a need for additional testing for conditions that cause bleeding (eg, liver disease, hypothyroidism, hemophilia, or other coagulopathies).

DIFFERENTIAL DIAGNOSIS

Many causes of genital tract bleeding exist. Below is a select list of causes important to the emergency clinician. More detailed discussions of the differential diagnosis are found separately. (See "Causes of female genital tract bleeding".)

Life-threatening causes

Pregnancy ≤20 weeks gestation — Life-threatening causes of genital tract bleeding associated with a pregnancy less than 20 weeks gestation include:

- **Ectopic pregnancy** – Clinical manifestations typically appear 6 to 8 weeks after the last normal menstrual period but can occur later. Normal pregnancy discomforts (eg, breast tenderness, frequent urination, nausea) may be present, in addition to the classic symptoms of abdominal pain and vaginal bleeding. Exam findings depend on whether the ectopic is ruptured or unruptured (with or without bleeding) and can range from

unremarkable to profound shock. (See "Ectopic pregnancy: Clinical manifestations and diagnosis" and "Ultrasonography of pregnancy of unknown location".)

- **Retained products of conception (RPOC)** – Patients may present with vaginal bleeding, fever, uterine tenderness, or pelvic pain. Necrotic RPOC may become infected, leading to sepsis or toxic shock syndrome. Bleeding can be intermittent or persistent and possibly life threatening. Pelvic ultrasound (US) with Doppler may also demonstrate enhanced myometrial vascularity (EMV). Dilation and curettage and/or antibiotics may be required. (See "Retained products of conception in the first half of pregnancy".)

- **Complication of pregnancy termination** – Though uncommon, complications of pregnancy termination include hemorrhage resulting from cervical or vaginal lacerations, uterine perforation, RPOC, infection, or uterine atony. (See "Overview of pregnancy termination".)

Pregnancy >20 weeks gestation — Life-threatening causes of genital tract bleeding in pregnancy after 20 weeks gestation and the peripartum period include:

- **Placental abruption** – The classic symptoms and signs include dark vaginal bleeding (>80 percent of patients), abdominal pain (>50 percent), uterine contractions, and uterine tenderness. Importantly, the amount of vaginal bleeding does not correlate with the extent of maternal hemorrhage and cannot be used to gauge the severity of abruption. US is not sensitive for detecting abruption. (See "Acute placental abruption: Pathophysiology, clinical features, diagnosis, and consequences".)

- **Placenta previa** – Most patients present with painless bright red vaginal bleeding, many have uterine contractions as well, but a few are asymptomatic until labor begins. US is a useful tool for diagnosis. (See "Placenta previa: Epidemiology, clinical features, diagnosis, morbidity and mortality".)

- **Uterine rupture** – This complication is rare but often catastrophic for mother and fetus. It is more likely in women who have had prior cesarean sections (scarred uterus) or following trauma, such as a motor vehicle collision. Patients may develop hemodynamic instability, sudden worsening of abdominal pain, persistent and profound fetal bradycardia, and loss of uterine contour. (See "Uterine rupture: After previous cesarean birth".)

- **Postpartum hemorrhage (PPH)** – PPH is diagnosed when bleeding results in signs and symptoms of hypovolemia, such as dizziness, tachycardia, syncope, sweating, and

hypotension. Severe bleeding following delivery most commonly stems from uterine atony. (See "Overview of postpartum hemorrhage".)

Other genital tract causes — Other life-threatening causes of genital tract bleeding can include:

- **Acute heavy menstrual bleeding** – Treatment of this condition may include high dose intravenous (IV) estrogen. (See "Managing an episode of acute uterine bleeding".)
- **Genitourinary trauma** (including sexual and physical abuse) – Rates of intimate partner violence increase during pregnancy, and abuse remains an important cause of maternal morbidity and mortality. (See "Evaluation and management of female lower genital tract trauma" and "Blunt genitourinary trauma: Initial evaluation and management" and "Penetrating trauma of the upper and lower genitourinary tract: Initial evaluation and management" and "Evaluation and management of adult and adolescent sexual assault victims in the emergency department" and "Intimate partner violence: Diagnosis and screening".)
- **Uterine arteriovenous malformation (AVM)** – Patients classically present with sudden onset of bleeding that is refractory to hormonal treatment. The diagnosis can be made using pelvic US with Doppler. (See "Causes of female genital tract bleeding".)

Non-life-threatening causes

Other important causes of genital tract bleeding include (table 3):

- **Labor** – Patients in labor may present with bloody show (vaginal discharge mixed with blood and mucous [ie, mucous plug]). (See "Labor and delivery: Management of the normal first stage".)
- **Spontaneous abortion** – Women who are actively in the process of having a spontaneous abortion usually present with a history of vaginal bleeding and pelvic pain. On examination, the cervix is usually open and in some cases products of conception may be visualized in the vagina or cervical os. US is the cornerstone of diagnosis and ruling out ectopic pregnancy. (See "Pregnancy loss (miscarriage): Terminology, risk factors, and etiology".)
- **Ruptured ovarian cyst** – Rupture is characterized by the sudden onset of unilateral, lower abdominal pain. The onset of pain often occurs during strenuous activities, such as exercise or sexual intercourse. Light vaginal bleeding may occur, but bleeding is not

present in many cases. Ectopic pregnancy must be ruled out. (See "Evaluation and management of ruptured ovarian cyst".)

- **Ovarian torsion** – The diagnosis should be considered in women with lower abdominal pain, an ovarian cyst/mass, and diminished or absent blood flow in the ovarian vessels (determined by US). The presence of local hemorrhage further suggests the diagnosis. Of note, most women with ovarian torsion do not present with vaginal bleeding; pain is the prominent symptom in the majority of cases. (See "Ovarian and fallopian tube torsion".)

- **Gynecologic infections**. (See "Pelvic inflammatory disease: Clinical manifestations and diagnosis" and "Vaginitis in adults: Initial evaluation".)

- **Foreign bodies** (eg, tampon, intrauterine device).

- **Drugs** (eg, hormones, anticoagulants, chemotherapeutic agents, steroids, antipsychotics).

- **Coagulation disorders**. (See "Approach to the adult with a suspected bleeding disorder".)

- **Gynecologic cancers**. (See "Endometrial carcinoma: Epidemiology, risk factors, and prevention".)

Common causes of genital tract bleeding in premenopausal women include (table 4):

- Ovulatory dysfunction or abnormal uterine bleeding (formerly known as dysfunctional uterine bleeding). (See "Abnormal uterine bleeding in nonpregnant reproductive-age patients: Management".)

- Uterine leiomyoma (fibroid). (See "Uterine fibroids (leiomyomas): Epidemiology, clinical features, diagnosis, and natural history".)

- Endometrial (uterine) polyps – these may also occur in postmenopausal women. (See "Endometrial polyps".)

- Infection (eg, pelvic inflammatory disease). (See "Pelvic inflammatory disease: Clinical manifestations and diagnosis".)

- Endocrine dysfunction.

Common causes of genital tract bleeding in postmenopausal women include (table 4):

- Cancer – Most common forms are endometrial, uterine sarcoma, and cervical, but malignancy can occur anywhere along the genital tract. (See "Endometrial carcinoma: Epidemiology, risk factors, and prevention".)

Diseases sometimes mistaken for genital tract bleeding include:

- Urinary tract disease: infection, cancer.
- Lower gastrointestinal bleeding: hemorrhoids, inflammatory bowel disease.

DIAGNOSTIC APPROACH, INITIAL MANAGEMENT, AND DISPOSITION

Basic questions to guide management — The patient with vaginal bleeding is approached systematically based on the answers to a few simple questions (algorithm 1):

- Is the patient hemodynamically unstable?
- Is the patient pregnant? If yes, is the patient less than 20 weeks gestational age or later?
- If not pregnant, what are the most important diagnoses to consider in this patient's age group?

Determine hemodynamic status

Initial management of unstable patient — Hemodynamically unstable patients with vaginal bleeding, both pregnant and nonpregnant, are resuscitated in standard fashion, including: airway assessment and stabilization as needed, placement of two large bore (14 or 16 gauge) peripheral intravenous (IV) catheters, and activation of the hospital's massive transfusion protocol (MTP) in cases of severe bleeding (algorithm 1). Determine pregnancy status immediately. Pregnant patients past 20 weeks gestational age should be placed in the left lateral decubitus position or have their uterus manually displaced to the left during resuscitation in order to relieve aortocaval compression and improve cardiac output [7]. (See "Ectopic pregnancy: Clinical manifestations and diagnosis", section on 'Diagnostic evaluation'.)

Patients with hemodynamic instability from blood loss will likely require transfusion of blood products. The ideal ratio of packed red blood cells (PRBC), fresh frozen plasma (FFP), and platelets for massive obstetrical or gynecologic hemorrhage is uncertain. The majority of institutions report using a 1:1 ratio of PRBC:FFP [8]. The author too recommends a 1:1:1 ratio of PRBC:FFP:platelets, similar to trauma resuscitation protocols, which mimics the replacement of whole blood [9]. (See "Massive blood transfusion", section on 'Trauma'.)

Other transfusion protocols have been proposed. The American Congress of Obstetricians and Gynecologists (ACOG) notes that what is most important is that institutions have protocols in place for multicomponent blood product replacement, regardless of the specific ratios.

Transfusion in the setting of postpartum hemorrhage is reviewed in detail separately. (See "Postpartum hemorrhage: Medical and minimally invasive management", section on 'Transfuse red blood cells, platelets, plasma' and "Initial management of moderate to severe hemorrhage in the adult trauma patient".)

Immediate gynecologic consultation is required for any hemodynamically unstable patient with severe vaginal bleeding. Pregnant patients often require surgery or delivery. Nonpregnant patients may require uterine curettage or, rarely, hysterectomy. (See "Managing an episode of acute uterine bleeding", section on 'Preferred: Uterine curettage'.)

In the event that gynecologic consultation is not immediately available, several temporizing measures may be taken to control bleeding. For unstable, **nonpregnant** patients with significant ongoing blood loss from the genital tract, high-dose IV estrogen is a first-line treatment. The usual dose for heavy bleeding is 25 mg IV. Estrogen promotes rapid regrowth of endometrium, covering areas that are denuded and bleeding. (See "Managing an episode of acute uterine bleeding", section on 'Alternative: High-dose intravenous estrogen'.)

Occasionally bleeding is so severe that uterine tamponade is required. Specific balloon devices designed to control postpartum hemorrhage (eg, Bakri Balloon) may be used for acute, profuse uterine bleeding in nonpregnant patients. If such a device is unavailable, a bladder (Foley) catheter may be placed transcervically followed by inflation of the balloon, and this may provide tamponade in unstable **nonpregnant** women until definitive management can be instituted. (See "Managing an episode of acute uterine bleeding", section on 'Role of intrauterine tamponade'.)

If other temporizing methods are unsuccessful, IV tranexamic acid (TXA) may be a suitable treatment. TXA is an antifibrinolytic agent that prevents dissolution of clots. Onset of action is within 2 to 3 hours after administration. The risk of thromboembolic events following TXA therapy is unclear, and the risk of thrombosis when using TXA and hormonal treatments concurrently must be carefully considered. (See "Managing an episode of acute uterine bleeding", section on 'Tranexamic acid'.)

Stable patient — Management and disposition of the hemodynamically stable patient with vaginal bleeding depends upon pregnancy status and stage, patient age, and associated clinical findings, as discussed below and summarized in the accompanying algorithm (algorithm 1).

Determine pregnancy status

Early pregnancy (before 20 weeks) — A key step in evaluating premenopausal patients with vaginal bleeding is to determine pregnancy status using a human chorionic gonadotropin (hCG)

assay. In patients with early pregnancy, a pelvic ultrasound (US) is obtained to determine the pregnancy location (intrauterine versus ectopic versus pregnancy of unknown location) and viability. (See "Ultrasonography of pregnancy of unknown location".)

In patients with a nonviable intrauterine pregnancy (IUP), the decision to intervene surgically is based on the patient's hemodynamic status, degree of anemia, severity of active bleeding, the content of the endometrial cavity, and patient preference [10]. Gynecologic consultation is necessary. Many patients with early spontaneous miscarriage can be safely discharged with close follow-up. Stable patients found to have a viable IUP can be followed on an outpatient basis. (See "Evaluation and differential diagnosis of vaginal bleeding before 20 weeks of gestation" and "Pregnancy loss (miscarriage): Clinical presentations, diagnosis, and initial evaluation".)

If ectopic pregnancy is diagnosed or suspected, immediate gynecologic consultation should be obtained. A ruptured ectopic pregnancy is a surgical emergency. Assume such patients are in imminent danger of hemorrhagic shock, if not already in shock. Nonsurgical management is an option in a subset of stable patients with an unruptured ectopic pregnancy. This decision is made in consultation with a gynecologist, after considering patient preferences and reliability, and US findings [11]. (See "Ectopic pregnancy: Clinical manifestations and diagnosis".)

If after the emergency department (ED) evaluation the location or viability of the pregnancy remains uncertain (eg, definite IUP not visualized and no concerning signs of ectopic pregnancy), a stable patient can be discharged but requires outpatient follow-up with a gynecologist, typically within 48 hours, for a repeat evaluation and beta-hCG test [12]. If the patient is unable to see a gynecologist within two days, they should be instructed to return to the ED for reevaluation.

Late pregnancy (after 20 weeks) — As a general rule, the fundus of the uterus reaches the level of the umbilicus at around 20 weeks gestation; therefore, uterine fundal height (ie, under or above the umbilicus) can be used as a quick way to determine gestational age if other methods of pregnancy dating are unavailable. For patients with vaginal bleeding after 20 weeks of pregnancy, placenta previa, placental abruption, and trauma (including intimate partner violence) are leading concerns. Painless bleeding should be assumed to be from placenta previa until proven otherwise. Digital pelvic examination is **NOT** performed in cases of possible placenta previa because of the risk of causing severe hemorrhage from separation of the placenta. Instead, a pelvic US should be performed. Placental abruption (abruptio placenta) is usually associated with pain. US is **not** sufficiently sensitive to diagnose placental abruption. For both placenta previa and placental abruption, immediate obstetrical consultation is required. (See 'Determine hemodynamic status' above and "Evaluation and management of female lower

genital tract trauma" and "Placenta previa: Epidemiology, clinical features, diagnosis, morbidity and mortality" and "Acute placental abruption: Pathophysiology, clinical features, diagnosis, and consequences".)

Rhogam — In general, all pregnant patients with vaginal bleeding who are Rh negative should be treated with Rh(D) immune globulin (Rhogam) to prevent RhD alloimmunization. The readily available 300 microgram dose may be administered for bleeding in both early and late pregnancy. (See "RhD alloimmunization: Prevention in pregnant and postpartum patients".)

The management of delayed postpartum hemorrhage is reviewed separately. (See "Secondary (late) postpartum hemorrhage", section on 'Definition/diagnosis'.)

Determine differential diagnosis based on age — Nonpregnant patients can be subdivided into three groups: premenarchal, premenopausal, and peri or postmenopausal. A bimanual and speculum exam is generally performed as part of the evaluation of vaginal bleeding in the nonpregnant patient. These examinations enable the clinician to determine the presence and extent of cervical bleeding and to detect several important causes of bleeding including vaginal trauma, masses, and foreign bodies. The discussion below focuses on diagnoses requiring immediate emergency interventions or urgent evaluation, and common diagnoses encountered in the ED. Alternative diagnoses are discussed separately. (See "Causes of female genital tract bleeding".)

Premenarchal patient — The differential diagnosis of vaginal bleeding in the premenarchal patient includes vulvovaginitis, trauma, foreign body, urethral prolapse, sexual abuse, and a hormonally active tumor [4]. Treatment is directed at the underlying cause. The management of children and young adolescents with vaginal bleeding is reviewed separately. (See "Evaluation of vulvovaginal bleeding in children and adolescents", section on 'Causes' and "Abnormal uterine bleeding in adolescents: Evaluation and approach to diagnosis" and "Blunt genitourinary trauma: Initial evaluation and management", section on 'Pediatric considerations' and "Overview of vulvovaginal conditions in the prepubertal child", section on 'Vaginal foreign body' and "Evaluation of sexual abuse in children and adolescents" and "Overview of vulvovaginal conditions in the prepubertal child", section on 'Urethral prolapse'.)

Premenopausal patient — Important and common causes of vaginal bleeding to consider in the nonpregnant premenopausal patient include ovulatory dysfunction, uterine leiomyoma (ie, fibroid), uterine polyps, ruptured ovarian cyst, ovarian torsion, and pelvic inflammatory disease (PID). Patients with a ruptured ovarian cyst, ovarian torsion, or PID present primarily with lower abdominal pain; vaginal bleeding is generally incidental. Vaginal discharge is neither sensitive nor specific for PID. Significant bleeding or any suspicion for torsion requires immediate

gynecologic consultation. (See "Evaluation and management of ruptured ovarian cyst" and "Ovarian and fallopian tube torsion" and "Pelvic inflammatory disease: Clinical manifestations and diagnosis" and "Uterine fibroids (leiomyomas): Epidemiology, clinical features, diagnosis, and natural history" and "Endometrial polyps".)

Painless vaginal bleeding in premenopausal women is often caused by ovulatory dysfunction or an atrophic endometrium [13]. If bleeding is sufficiently severe to require acute treatment, it can be managed with oral estrogen, combination oral contraceptive pills, oral progestin, or oral TXA [14]. (See "Abnormal uterine bleeding in nonpregnant reproductive-age patients: Management" and "Managing an episode of acute uterine bleeding".)

Disposition depends upon the severity of bleeding and the response to treatment. For patients whose bleeding is well controlled and who are hemodynamically stable without concerning clinical findings, discharge with close follow-up is generally appropriate. (See "Abnormal uterine bleeding in nonpregnant reproductive-age patients: Management" and "Managing an episode of acute uterine bleeding".)

Of note, endometrial cancer can present as vaginal bleeding in patients as young as 35 (most patients are 45 or older), and caution should be used in prescribing oral contraceptives to patients with suspected abnormal uterine bleeding who have predisposing risk factors for endometrial cancer (eg, family history of cancer, obesity, chronic estrogen therapy). Such patients should be referred to a gynecologist for evaluation before the initiation of such therapy. (See "Endometrial carcinoma: Epidemiology, risk factors, and prevention".)

Peri and postmenopausal patient — The most concerning diagnosis in the nonpregnant patient over 35 with abnormal bleeding is endometrial cancer. These patients should not be started on oral hormonal therapy and require close follow-up with a gynecologist who can direct the diagnostic evaluation. US or hysteroscopy with endometrial biopsy may be needed. Of patients undergoing hysteroscopy for evaluation of vaginal bleeding, 4 percent of premenopausal and 11 percent of postmenopausal women are ultimately diagnosed with endometrial cancer [3]. (See "Endometrial carcinoma: Epidemiology, risk factors, and prevention" and "Approach to the patient with postmenopausal uterine bleeding".)

In the hemodynamically stable patient, the need for blood transfusion is based upon the hemoglobin concentration as well as the presence of comorbidities that affect the ability to tolerate anemia, such as ischemic heart disease. Other important issues to consider in the older patient with vaginal bleeding include anticoagulant medications, hormonal medications, and underlying coagulopathy. At a minimum, patients with significant anemia should be started on iron supplementation. While most patients with vaginal bleeding can be managed as

outpatients, disposition depends upon hemodynamic status, the severity of ongoing blood loss, the degree of anemia, and the presence of major comorbidities. (See "Managing an episode of acute uterine bleeding".)

SUMMARY AND RECOMMENDATIONS

- **Emergency management algorithm** – An algorithm outlining the emergency management of the emergency department (ED) patient with vaginal bleeding is provided (algorithm 1).

- **Factors determining management** – Management of adults presenting to the ED with vaginal bleeding depends upon a number of factors including patient age, pregnancy status, chronicity and severity of bleeding, comorbidities, and medications. A basic understanding of the physiology of menstruation and a systematic approach are important for diagnosis and management. (See 'Basic physiology' above and "Normal menstrual cycle".)

- **Life-threatening and common causes** – Life-threatening causes of vaginal bleeding include the following:

  - **Pregnancy ≤20 weeks gestation** – Ectopic pregnancy, retained products of conception, complication of pregnancy termination
  - **Pregnancy >20 weeks gestation** – Placental abruption, placenta previa, uterine rupture, postpartum hemorrhage
  - **Other genital tract causes** – Acute heavy menstrual bleeding, genitourinary trauma, uterine arteriovenous malformation

  Common non-life-threatening causes of vaginal bleeding include labor ("bloody show"), spontaneous abortion, ruptured ovarian cyst, ovarian torsion, gynecologic infection, foreign body, medications, coagulation disorders, and gynecologic cancers. (See 'Differential diagnosis' above.)

- **History** – Important factors to consider in the history include patient age, the characteristics of the bleeding (eg, severity, duration, onset), the possibility of pregnancy or trauma, associated symptoms (including bleeding at other sites, pain, fever), any systemic disease, and medications (particularly those affecting coagulation or platelet function). Women with heavy bleeding typically need to change pads/tampons a minimum of once every three hours. (See 'History' above.)

- **Physical examination** – The physical examination is directed at determining hemodynamic stability, uncovering evidence of significant blood loss, and identifying the underlying etiology of genital tract bleeding. Young, healthy females may present with near-normal vital signs despite substantial blood loss before rapidly decompensating. The pelvic examination is paramount for determining the source and volume of bleeding, and whether it is ongoing, but a manual examination is **not** performed on pregnant women with vaginal bleeding after 20 weeks gestation until placenta previa has been ruled out definitively by ultrasound (US) examination. As a fetus approaches viability (between 22 to 24 weeks), fetal heart rate (FHR) becomes a key vital sign. The normal range for the FHR is 110 to 160 beats per minute. (See 'Physical examination' above and 'Fetal heart rate' above.)

- **Diagnostic studies** – Obtain a blood sample for type and crossmatch for any woman with severe or symptomatic vaginal bleeding who may require transfusion; for less severe but concerning hemorrhage, a blood type and screen is generally sufficient. A complete blood count should be obtained in all patients with significant vaginal bleeding. A qualitative urine pregnancy test (hCG) should be obtained in any female of childbearing age whose pregnancy status is in doubt. A positive test is followed by a pelvic US examination. Pregnant patients with vaginal bleeding should have a blood type and Rh status checked. Other studies are obtained based upon clinical circumstances. (See 'Ancillary studies' above.)

- **Three questions guiding management** – The patient with vaginal bleeding is approached systematically based upon the answers to a few simple questions (algorithm 1):

  - Is the patient hemodynamically unstable?
  - Is the patient pregnant? If yes, is it the patient less than 20 weeks gestational age, or later?
  - If not pregnant, what are the most important diagnoses to consider in this patient's age group?

- **Hemodynamically unstable patient** – Hemodynamically unstable patients are resuscitated in standard fashion (algorithm 1), including airway assessment and stabilization as needed, placement of two large-bore (14- or 16-gauge) peripheral intravenous (IV) catheters, and activation of the hospital's massive transfusion protocol in cases of severe bleeding. Determine pregnancy status immediately. Pregnant patients past 20 weeks gestational age should be placed in the left lateral decubitus position or have their uterus manually displaced to the left during resuscitation. Immediate

gynecologic consultation is required for any hemodynamically unstable patient with severe vaginal bleeding. Pregnant patients often require surgery or delivery. (See 'Diagnostic approach, initial management, and disposition' above.)

- **Hemodynamically stable patient** – Further diagnostic workup of hemodynamically stable patients is based upon pregnancy status and patient age (algorithm 1). The appropriate workups for the common patient categories are described in the text. (See 'Diagnostic approach, initial management, and disposition' above.)

ACKNOWLEDGMENT

The editorial staff at UpToDate acknowledge Robert Dart, MD, who contributed to an earlier version of this topic review.

REFERENCES

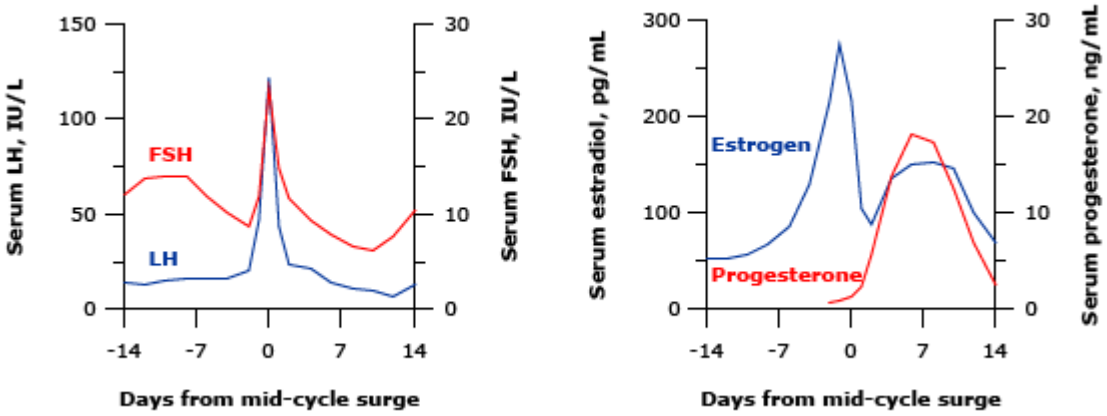
1. Warner PE, Critchley HO, Lumsden MA, et al. Menorrhagia I: measured blood loss, clinical features, and outcome in women with heavy periods: a survey with follow-up data. Am J Obstet Gynecol 2004; 190:1216.
2. Lane DE. Polycystic ovary syndrome and its differential diagnosis. Obstet Gynecol Surv 2006; 61:125.
3. Clark TJ, Voit D, Gupta JK, et al. Accuracy of hysteroscopy in the diagnosis of endometrial cancer and hyperplasia: a systematic quantitative review. JAMA 2002; 288:1610.
4. Fishman A, Paldi E. Vaginal bleeding in premenarchal girls: a review. Obstet Gynecol Surv 1991; 46:457.
5. American College of Emergency Physicians Clinical Policies Subcommittee (Writing Committee) on Early Pregnancy:, Hahn SA, Promes SB, Brown MD. Clinical Policy: Critical Issues in the Initial Evaluation and Management of Patients Presenting to the Emergency Department in Early Pregnancy. Ann Emerg Med 2017; 69:241.
6. Taipale P, Hiilesmaa V, Ylöstalo P. Transvaginal ultrasonography at 18-23 weeks in predicting placenta previa at delivery. Ultrasound Obstet Gynecol 1998; 12:422.
7. Jeejeebhoy FM, Zelop CM, Lipman S, et al. Cardiac Arrest in Pregnancy: A Scientific Statement From the American Heart Association. Circulation 2015; 132:1747.

8. Committee on Practice Bulletins-Obstetrics. Practice Bulletin No. 183: Postpartum Hemorrhage. Obstet Gynecol 2017; 130:e168. Reaffirmed 2023.
9. Butwick AJ, Goodnough LT. Transfusion and coagulation management in major obstetric hemorrhage. Curr Opin Anaesthesiol 2015; 28:275.
10. Nielsen S, Hahlin M. Expectant management of first-trimester spontaneous abortion. Lancet 1995; 345:84.
11. Lipscomb GH, McCord ML, Stovall TG, et al. Predictors of success of methotrexate treatment in women with tubal ectopic pregnancies. N Engl J Med 1999; 341:1974.
12. Dart RG, Mitterando J, Dart LM. Rate of change of serial beta-human chorionic gonadotropin values as a predictor of ectopic pregnancy in patients with indeterminate transvaginal ultrasound findings. Ann Emerg Med 1999; 34:703.
13. Hickey M, Higham JM, Fraser I. Progestogens with or without oestrogen for irregular uterine bleeding associated with anovulation. Cochrane Database Syst Rev 2012; :CD001895.
14. Bradley LD, Gueye NA. The medical management of abnormal uterine bleeding in reproductive-aged women. Am J Obstet Gynecol 2016; 214:31.

Topic 286 Version 34.0

GRAPHICS

Hormonal changes during normal menstrual cycle



Sequential changes in the serum concentrations of the hormones released from the pituitary gland (FSH and LH; left panel) and from the ovaries (estrogen and progesterone; right panel) during the normal menstrual cycle. By convention, the first day of menses is day 1 of the cycle (shown here as day -14). The cycle is then divided into two phases: the follicular phase is from the onset of menses until ovulation, and the luteal phase is from ovulation until the next menses. To convert serum estradiol values to pmol/L, multiply by 3.67, and to convert serum progesterone values to nmol/L, multiply by 3.18.

LH: luteinizing hormone; IU: international units; FSH: follicle-stimulating hormone.

Graphic 72415 Version 5.0

Questions to ask to help quantify blood loss during menses

How often do you change your sanitary pad/tampon during peak flow days?
How many pads/tampons do you use over a single menstrual period?
Do you need to change the pad/tampon during the night?
How large are any clots that are passed?
Has a medical provider told you that you are anemic?
Women with a normal volume of menstrual blood loss tend to:
Change pads/tampons at ≥3 hour intervals
Use fewer than 21 pads/tampons per cycle
Seldom need to change the pad/tampon during the night
Have clots less than 1 inch in diameter
Not be anemic

Adapted from: Warner PE, Critchley HD, 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.

Graphic 69390 Version 3.0

NICHD definitions of FHR characteristics and patterns

Variability
Fluctuations in baseline that are irregular in amplitude and frequency
Absent = amplitude undetectable
Minimal = amplitude 0 to 5 bpm
Moderate = amplitude 6 to 25 bpm
Marked = amplitude over 25 bpm
Measured in a 10-minute window. The amplitude is measured peak to trough. There is no distinction between short-term and long-term variability.
Baseline rate
Bradycardia = below 110 bpm
Normal = 110 to 160 bpm
Tachycardia = over 160 bpm
The baseline rate is the mean bpm (rounded to 0 or 5) over a 10-minute interval, excluding periodic changes, periods of marked variability, and segments that differ by more than 25 bpm. The baseline must be identifiable for two minutes during the interval (but not necessarily a contiguous two minutes) otherwise, it is considered indeterminate.
Acceleration
An abrupt* increase in the FHR. Before 32 weeks of gestation, accelerations should last ≥10 sec and peak ≥10 bpm above baseline. As of 32 weeks gestation, accelerations should last ≥15 sec and peak ≥15 bpm above baseline.
A prolonged acceleration is ≥2 minutes but less than 10 minutes. An acceleration of 10 minutes or mor is considered a change in baseline.
Late deceleration
A gradual* decrease and return to baseline of the FHR associated with a uterine contraction. The deceleration is delayed in timing, with the nadir of the deceleration occurring after the peak of the contraction. The onset, nadir, and recovery usually occur after the onset, peak, and termination of a contraction.
Early deceleration
A gradual* decrease and return to baseline of the FHR associated with a uterine contraction. The nadir of the FHR and the peak of the contraction occur at the same time. The deceleration's onset, nadir, and termination are usually coincident with the onset, peak, and termination of the contraction.
Variable deceleration

An abrupt* decrease in FHR below the baseline. The decrease is ≥15 bpm, lasting ≥15 secs and <2 minutes from onset to return to baseline. The onset, depth, and duration of variable decelerations commonly vary with successive uterine contractions.
Prolonged deceleration
A decrease in FHR below the baseline of 15 bpm or more, lasting at least 2 minutes but <10 minutes from onset to return to baseline. A prolonged deceleration of 10 minutes or more is considered a change in baseline.

NICHD: National Institute of Child Health and Human Development; FHR: fetal heart rate; bpm: beats per minute; sec: seconds.

* "Gradual" and "abrupt" changes are defined as taking ≥30 seconds or <30 seconds, respectively, from the onset of the deceleration/acceleration to its nadir/peak.

Adapted from:

1. *National Institute of Child Health and Human Development Research Planning Workshop. Am J Obstet Gynecol 1997; 177:1385.*
2. *Macones GA, Hankins GD, Spong CY, et al. The 2008 National Institute of Child Health and Human Development Workshop Report on Electronic Fetal Monitoring: Update on Definitions, Interpretation, and Research Guidelines. Obstet Gynecol 2008; 112:661.*

Graphic 65859 Version 10.0

Causes of abnormal genital tract bleeding in females

Genital tract disorders	Trauma
Uterus	Sexual intercourse
Benign conditions:	Sexual abuse
▪ Endometrial polyps	Foreign bodies (including intrauterine device)
▪ Endometrial hyperplasia	Pelvic trauma (eg, motor vehicle accident)
▪ Adenomyosis	Straddle injuries
▪ Leiomyomas (fibroids)	Cesarean scar defect (prior cesarean delivery)
▪ Arteriovenous malformation (acquired or congenital)	**Drugs**
Cancer:	Contraception:
▪ Endometrial adenocarcinoma	▪ Hormonal contraceptives
▪ Sarcoma	▪ Intrauterine devices
Infection:	Postmenopausal hormone therapy
▪ Pelvic inflammatory disease	Anticoagulants
▪ Endometritis	Tamoxifen
Ovulatory dysfunction	Corticosteroids
Cervix	Chemotherapy
Benign conditions:	Phenytoin
▪ Cervical polyps	Antipsychotic drugs
▪ Ectropion	Antibiotics (eg, due to toxic epidermal necrolysis or Stevens-Johnson syndrome)
▪ Endometriosis	**Systemic disease**
Cancer:	Diseases involving the vulva:
▪ Invasive carcinoma	▪ Crohn disease
▪ Metastatic (uterus, choriocarcinoma)	▪ Behçet syndrome
Infection:	▪ Pemphigoid
▪ Cervicitis	▪ Pemphigus

Vulva	▪ Erosive lichen planus
Benign conditions:	▪ Lymphoma
▪ Skin tags	Bleeding disorders:
▪ Sebaceous cysts	▪ von Willebrand disease
▪ Condylomata	▪ Thrombocytopenia or platelet dysfunction
▪ Angiokeratoma	▪ Acute leukemia
Cancer	▪ Some coagulation factor deficiencies
Vagina	▪ Advanced liver disease
Benign conditions:	Thyroid disease
▪ Gartner duct cysts	Polycystic ovary syndrome
▪ Polyps	Cushing syndrome
▪ Adenosis (aberrant glandular tissue)	Hormone-secreting adrenal and ovarian tumors
Cancer	Renal disease
Vaginitis/infection:	Emotional or physical stress
▪ Bacterial vaginosis	Smoking
▪ Sexually transmitted infections	Excessive exercise
▪ Atrophic vaginitis	**Diseases not affecting the genital tract**
Upper genital tract disease	Urethral disease (eg, urethral prolapse, atrophic urethral changes, urethritis)
Pelvic inflammatory disease	Bladder cancer
Fallopian tube cancer	Urinary tract infection
Ovarian cancer	Colorectal cancer
Pregnancy complications	Inflammatory bowel disease
Pregnancy complications are discussed in related UpToDate content	Hemorrhoids
	Other
	Endometriosis

Graphic 74527 Version 14.0

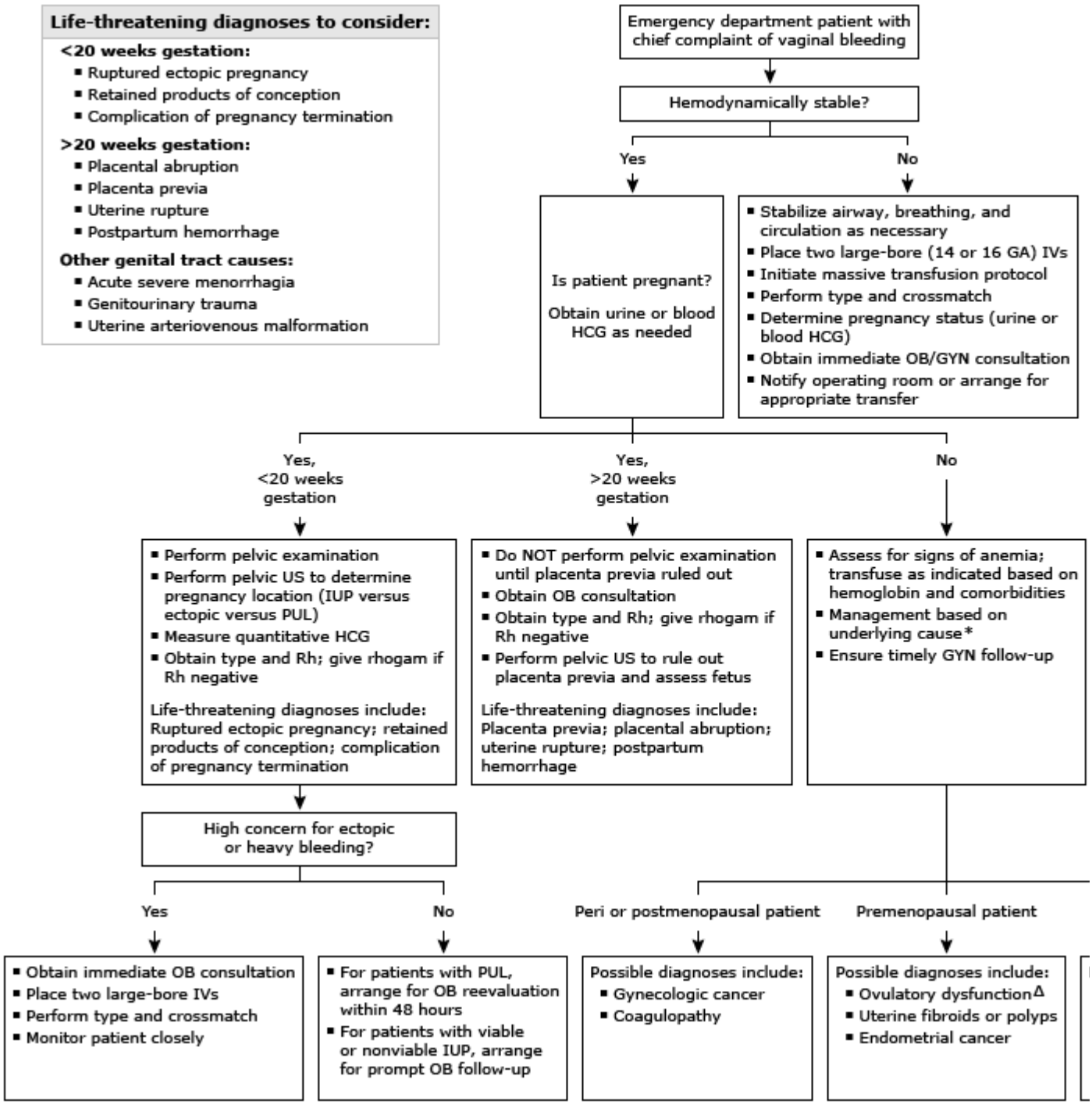
Usual causes of abnormal genital bleeding in women by age group

Neonates	Reproductive-age
▪ Estrogen withdrawal	▪ Ovulatory dysfunction ▪ Pregnancy ▪ Endometrial hyperplasia ▪ Cancer ▪ Polyps, leiomyomas, adenomyosis ▪ Infection ▪ Endocrine dysfunction (polycystic ovary syndrome, thyroid, hyperprolactinemia) ▪ Bleeding diathesis ▪ Medication related (eg, hormonal contraception
Premenarchal	**Menopausal transition**
▪ Foreign body ▪ Trauma, including sexual abuse ▪ Infection ▪ Urethral prolapse ▪ Sarcoma botryoides ▪ Ovarian tumor ▪ Precocious puberty	▪ Anovulation ▪ Polyps, fibroids, adenomyosis ▪ Endometrial hyperplasia ▪ Cancer
Early postmenarche	**Menopause**
▪ Ovulatory dysfunction (hypothalamic immaturity) ▪ Bleeding diathesis ▪ Stress (psychogenic, exercise induced) ▪ Pregnancy ▪ Infection	▪ Endometrial polyps ▪ Endometrial hyperplasia ▪ Cancer ▪ Postmenopausal hormone therapy

Adapted from: APGO educational series on women's health issues. Clinical management of abnormal uterine bleeding. Association of Professors of Gynecology and Obstetrics, May 2002.

Graphic 61684 Version 7.0

Emergency department patient with chief complaint of vaginal bleeding



GA: gauge; IV: intravenous; HCG: human chronic gonadotropin; OB: obstetrics; GYN: gynecology; US: ultrasound; IUP: intrauterine pregnancy; PUL: pregnancy of unknown location.

* Iron supplementation may be indicated for some anemic patients. Patients requiring a transfusion require an expeditious workup to determine the cause, and close follow-up. Refer to specific UpToDate topics covering causes of vaginal bleeding.

¶ For a complete discussion of the evaluation and diagnostic approach to vaginal bleeding in the premenarchal patient, refer to UpToDate topics and graphics on the evaluation of vulvovaginal bleeding in children and adolescents.

Δ Most common cause of abnormal uterine bleeding in adolescents.

Graphic 115080 Version 3.0