**Author:** Nikki Niewold Zarling, MD

**Expert reviewer(s):** Addie McClintock, MD

**Objectives**

1. Define abnormal uterine bleeding.
2. Identify common causes of abnormal uterine bleeding using the PALM-COEIN mnemonic.
3. Determine basic lab and imaging evaluation of abnormal uterine bleeding.

**Teaching Instructions**

Plan to spend at least 30-60 minutes preparing for this talk by reading through the Facilitator Guide and clicking through the Interactive Board to familiarize yourself with the animations. All clickable elements will be denoted as a rounded, shaded rectangle and/or a mouse cursor.

Anticipated time to deliver the talk with and without cases or other features: **20-30 minutes without cases, and an additional 5-10 minutes to review two cases.**

The talk can be presented in two ways:

1. Project the “Interactive Board” OR
2. Reproduce your own drawing of the presentation on a whiteboard. (Use the Learner worksheet as the board set-up)

With either method print out copies of the Learner’s Handout so they may follow along during the presentation and take notes. Begin with reviewing the objectives for the session.

**Objective 1: Define abnormal uterine bleeding. (*What is AUB?*)**
Ask your audience what bleeding patterns they would consider when taking a history on someone presenting with abnormal uterine bleeding (AUB). *Click on each of the buttons to reveal additional information.* There are 4 parameters we use to define normal bleeding patterns. Any variation outside of these norms is considered abnormal.

The 4 characteristics are the following:

1. Duration - Normal menstrual periods should be less than 8 days in length.
2. Frequency
* Normal frequency is menstrual bleeding every 24-38 days (other sources say 21-35 days).
* Abnormalities include frequent, infrequent, or absent (amenorrhea).
1. Regularity (or Pattern)
* Variation in cycle length depends on age. Cycle length is the number of days from the start of one period (day 1) until the start of the next period.
* Generally, the difference in cycle length should be ≤ 9 days in women under age 25 and older than age 42, and ≤ 7 days for women between age 26 and 41. Women should not have significant spotting between periods.
1. Volume
* Broadly speaking, it is a subjective value – menses should not interfere with patient’s life, job, emotional well-being, etc.
* Other more objective signs that menstrual bleeding is abnormally heavy include needing to change a super tampon/pad every two hours or needing to change a pad/tampon at night. Symptoms such as presyncope, fatigue, and dizziness are also considered objective signs of heavy menstruation.

It is important to ask about all four of these features when taking a menstrual history.

**Objective 2: Identify common causes of abnormal uterine bleeding using the PALM-COEIN mnemonic. (*Causes*)**

The first step in the evaluation of abnormal uterine bleeding is ruling out pregnancy. *Click on the “pregnancy” button.* If pregnancy is ruled out, the “PALM-COEIN” mnemonic is commonly used to develop a differential for the causes of AUB. It is divided into structural and non-structural etiologies. *Go through the mnemonic by letter and have participants guess different causes. Click on the “PALM” and “COEIN” buttons to reveal each letter and associated cause.*

* Structural:
	+ P – **Polyp** – usually endometrial, can be cervical
	+ A – **Adenomyosis** – growth of endometrium into the myometrium
	+ L – **Leiomyoma** – aka fibroid
	+ M – **Malignancy/Hyperplasia** – usually endometrial in the appropriate demographic, but cervical, vaginal, or vulvar lesions can also bleed. Patients with risk factors for endometrial hyperplasia include post-menopausal patients, patients with chronic anovulation, unopposed estrogen exposure, or tobacco use.
* Non-Structural:
	+ C – **Coagulopathy** – i.e., hemophilia, von Willebrand disease, thrombocytopenia, other platelet dysfunction (liver disease, kidney failure)
	+ O – **Ovulatory dysfunction** – includes endocrine abnormalities (hyperprolactinemia, prolactinomas, thyroid dysfunction), pregnancy and lactation, premature ovarian failure, or disorders of androgen excess (PCOS, hormone secreting tumor, Cushing’s).
	+ E – **Endometrial** – endometritis, infection (STIs), or inflammation
	+ I – **Iatrogenic** – Hormonal birth control, IUDs, implants, post-procedure, medications (including anticoagulants), etc.
	+ N – **Not yet classified**

**Objective 3: Determine basic lab and imaging evaluation of abnormal uterine bleeding. (*Work-up)***

* Basic Work-up: *Click on “Basic Work-up” button on the navigation bar.* Ask you learners what tests every patient with AUB should receive. *Click on “Exam” and “Labs” to reveal the answers.*
	+ Every patient with AUB warrants a pelvic exam! It is important to visualize the vulva, vaginal walls, and cervix to see if another source of bleeding exists. If you see blood coming out of the cervical os, you can be fairly certain it is uterine in origin. You can also consider a bimanual exam to evaluate for an enlarged or tender uterus and any adnexal abnormalities.
	+ In addition, all patients presenting with AUB should get the following three lab tests: a pregnancy test, a CBC, and iron studies.
		- It is essential to rule out pregnancy in these patients.
		- A CBC is recommended to evaluate for anemia or thrombocytopenia.
		- Lastly, iron studies are recommended to check for iron deficiency in the absence of anemia, which is extremely common in pre-menopausal women. Generally, a ferritin < 50 in pre-menopausal women is considered abnormally low and warrants treatment.
* Structural Work-up***:*** *Click on “Structural” in the navigation bar or “How do you evaluate for structural causes of abnormal uterine bleeding?” button.*
	+ To further evaluate for structural causes of abnormal uterine building, additional imaging is warranted. A transvaginal ultrasound can help visualize the uterus, ovaries, and endometrial lining. Note: if feel an enlarged or boggy uterus on bimanual exam, or you see blood coming from the cervical os on pelvic exam, these are suggestive of structural etiologies.
	+ It is important to remember that abnormal uterine bleeding is the most common symptom of endometrial cancer. You should always consider an endometrial biopsy in patients who are at high risk for endometrial hyperplasia or malignancy (anovulatory, obesity, tobacco use, age >35, post-menopausal, etc.). *Click on “risk factors for hyperplasia” to reveal answers.*

Nonstructural Work-up:*Click on “How do you evaluate for non-structural causes of abnormal uterine bleeding?”*. In broad terms, the next step is to collect a good personal and family bleeding history, a personal surgical history, a thorough review of systems, and review all medications. Workup will be guided by your history-taking. *Click on “Nonstructural” button in the navigation bar or “How do we initiate cause-specific work-up”.*

* + Go through each non-structural category by reviewing a clinical vignette. Then ask the group for “clues” that may suggest that etiology, and their suggestions for initial workup by cause.
	+ Coagulopathy: it is estimated that up to 20% of women experiencing heavy menstrual bleeding have a bleeding disorder, and the prevalence may be higher in adolescents who are having heavy menstrual bleeding. Factors increasing likelihood for a bleeding disorder include heavy menstrual bleeding since menarche, history of postpartum hemorrhage; surgical bleeding, or bleeding with dental procedures; or two or more of the following: frequent gum bleeding, bruising > 5 cm at least monthly, epistaxis at least monthly, or family history of abnormal bleeding.
		- Clues – Strong personal/family bleeding history or heavy menstrual bleeding since onset of menses
		- Initial lab workup: Von Willebrand panel, PT/INR, PTT, factor activity
	+ Ovulatory dysfunction: Many endocrine disorders can lead to abnormal uterine bleeding. These can be broadly grouped into two categories: androgen excess (PCOS, hormone-secreting tumor, congenital adrenal hyperplasia) and hypothalamic-pituitary-adrenal axis dysfunction (Cushing’s, stress (severe emotional or physiologic, female athlete triad), malnutrition/starvation (eating disorders, female athlete triad), hyperprolactinemia, lactation-induced, thyroid dysfunction, perimenopause, premature ovarian failure, pituitary tumors/trauma). While a good history can help guide your workup, the most common conditions are PCOS, thyroid dysfunction, and hyperprolactinemia.

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| **Clues** | **Diagnoses** | **Work-up** |
| Weight increase | Cushing’s, hypothyroidism | TSH |
| Weight decrease | Stress, malnutrition, hyperthyroidism | TSH |
| Hirsutism | PCOS | Total testosterone |
| Congenital adrenal hyperplasia | 17- hydroxyprogesterone |
| Androgen-secreting tumor | DHEAS |
| Breast discharge | Prolactinoma | Prolactin |
| Hot flashes | Perimenopause | FSH, LH |

* + Endometrial: Most common is endometritis, i.e., endometrial infection or inflammation, and pelvic inflammatory disease (PID). This is frequently caused by sexually transmitted infections. However, there are disorders of endometrial hemostasis included in this category, but this is poorly understood. Initial work-up is STI testing (gonorrhea and chlamydia) testing.
	+ Iatrogenic: Review medication list and procedural history. Medications that can cause AUB include all hormonal birth control options, including IUDs and implants, anticoagulants, SERMs, like tamoxifen and raloxifene, steroids, and dopamine antagonists (TCAs, antipsychotics).
	+ Not otherwise specified: This is a catch-all bucket for weird or ~unknown~ causes, like endometrial AVMs and uterine scar defects.

**Take Home Points**

1. Abnormal uterine bleeding is defined by abnormalities in bleeding duration, frequency, regularity, and/or volume.
2. The “PALM-COEIN” mnemonic provides a comprehensive differential for abnormal uterine bleeding including both structural and non-structural causes.
3. All patients presenting with abnormal uterine bleeding should undergo pelvic examination and lab testing with a pregnancy test, CBC, and iron studies.

**References**

1. Practice bulletin no. 128: Diagnosis of abnormal uterine bleeding in reproductive-aged women. (20127). *Obstetrics and Gynecology.,* *120*(1), 197-206.
2. Abnormal uterine bleeding in pre-menopausal women. *Am Fam Physician.* 2019 Apr 1;99(7):435-443.
3. Kadir RA, Economides DL, Sabin CA, Owens D, Lee CA. Frequency of inherited bleeding disorders in women with menorrhagia. *Lancet*. 1998;351(9101):485–489.
4. Peter Joseph O'Donovan, Charles E Miller. Modern Management of Abnormal Uterine Bleeding (2008).