



## Abstract:

The emergency department (ED) is a frequent and important site for gynecologic care, and many women present to the ED for reproductive health concerns such as abnormal menses. Due to early menstrual age and increased incidence of sexually transmitted infections, adolescents are particularly prone to abnormal menses, but are also disproportionately affected by unintended pregnancy. While EDs have long been used for the evaluation and initial management of abnormal uterine bleeding, general contraceptive provision in the ED is a novel approach to addressing unmet contraceptive needs among adolescent women. We review normal menstruation and the evaluation and management of abnormal uterine bleeding in adolescents, including the use of combined oral contraceptives. Expanding on this established indication for contraceptive use in the ED, we present attitudes, barriers, and approaches to ED provision of contraceptives for adolescent pregnancy prevention.

## Keywords:

abnormal uterine bleeding; pregnancy prevention; confidentiality; adolescent contraception; emergency department

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# Adolescent Contraception in the Emergency Department: Abnormal Uterine Bleeding and Beyond

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Contraception uniquely allows for reproductive planning and menstrual control. The combined oral contraceptive pill (COCP) is established, popular, and effective when used correctly.<sup>1-3</sup> Adolescents are an ideal population for COCP use. Not only are they at increased risk for both unintended pregnancy and abnormal uterine bleeding (AUB), but they also have few contraindications.<sup>4-6</sup> Health care utilization models indicate that the ED is an important venue for gynecologic care, which is especially true for at risk populations.<sup>7-10</sup> Guidelines surrounding provision of developmentally appropriate reproductive care are well established,<sup>4,11</sup> however consistent uptake remains low.<sup>9,12-17</sup> Provider comfort, knowledge, and moral beliefs have been found to directly affect prescribing practices to adolescents.<sup>9,17-19</sup> While moral beliefs are generally fixed, variable prescribing can be targeted through increased education and access to concise, adolescent-specific management algorithms.<sup>14,17,19,20</sup> Effective utilization of contraception treatment modalities hinges on comprehension of the adolescent menstrual cycle, which differs from that of adult women.<sup>11,20-24</sup>

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## ABNORMAL UTERINE BLEEDING

Menstruation is rightfully considered an adolescent vital sign, as significant variations are often a harbinger of underlying conditions.<sup>21,22</sup> AUB has been estimated to occur in nearly 40% of adolescents.<sup>25</sup> AUB is defined by duration, quantity, and frequency of bleeding.<sup>23</sup> The anticipated duration of bleeding in adolescents is less than or equal to 7 days, using 3 to 6 menstrual products per day, and occurring every 21 to 45 days.<sup>11</sup> The etiology of AUB is first delineated into structural and nonstructural causes by the PALM-COEIN system and acronym (Table 1).<sup>23</sup> Structural etiologies that are identified through imaging, specifically polyp (AUB-P), adenomyosis (AUB-A), leiomyoma

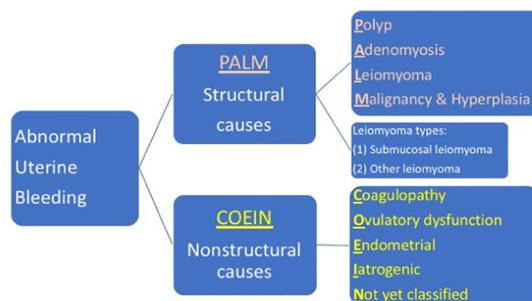
(AUB-L), and malignancy (AUB-M), are uncommon in adolescents.<sup>11,23</sup> Instead, nonstructural etiologies are the overwhelming majority, specifically coagulopathy (AUB-C), ovulatory dysfunction (AUB-O), endometrial (AUB-E), iatrogenic (AUB-I), and not otherwise classified (AUB-N).<sup>11,23</sup> The history is crucial to establishing a nonstructural diagnosis of AUB, therefore an understanding of the etiologies affecting adolescents is necessary to assist in guiding questions.<sup>23</sup> However, the menstrual history obtained in the ED, as extrapolated through documentation, is often inconsistent and inadequate.<sup>14,16</sup>

A comprehensive menstrual history starts with a focused assessment of the adolescent's bleeding pattern, as AUB is any deviation from expected normal values.<sup>11,20</sup> While duration of bleeding and frequency of cycles can be easily quantifiable, heavy menstrual bleeding (HMB) is consistently challenging to determine, as the volume of loss is prone to subjective interpretation.<sup>26,27</sup> Attempts have been made to standardize the volume of loss through pictorial representations, however it is not validated in adolescents.<sup>11</sup> Instead, it is recommended to query frequency of changing menstrual protection,

use of double menstrual protection, changing menstrual protection at night, inability to contain large volumes of flow, and frequent soiling of clothes or bed linens.<sup>11,26</sup> Symptoms of anemia, the most concerning complication of AUB, should be evaluated and include discussion of fatigue, dizziness, headache, palpitations, shortness of breath, and pica disorder. A physical exam assists in determining degree and acuity of anemia.<sup>11,25,28</sup> Associated symptoms that may indicate structural (PALM) etiologies should be evaluated including pain, fever, vaginal discharge, and increased size of the abdomen. Then, the history should be used to the identify nonstructural (COEIN) etiologies.

AUB-C is a common cause of adolescent HMB, with 20% having an underlying bleeding disorder.<sup>11,16,25</sup> A coagulopathy should be suspected with history of prolonged bleeding (eg, from trivial wounds, epistaxis, unexplained gastrointestinal bleeding, or following a procedure), recurrent and frequent bruising, anemia requiring transfusions or iron therapy, menstrual clots larger than 1 inch, bleeding through one form of menstrual protection in an hour, or family history of bleeding disorder or hysterectomy at a young age.<sup>11,25-27,29</sup>

**TABLE 1. International Federation of Gynecology and Obstetrics (FIGO) classification of abnormal uterine bleeding (AUB), with structural causes using the acronym “PALM” and nonstructural causes using the acronym “COEIN.”<sup>23</sup>**



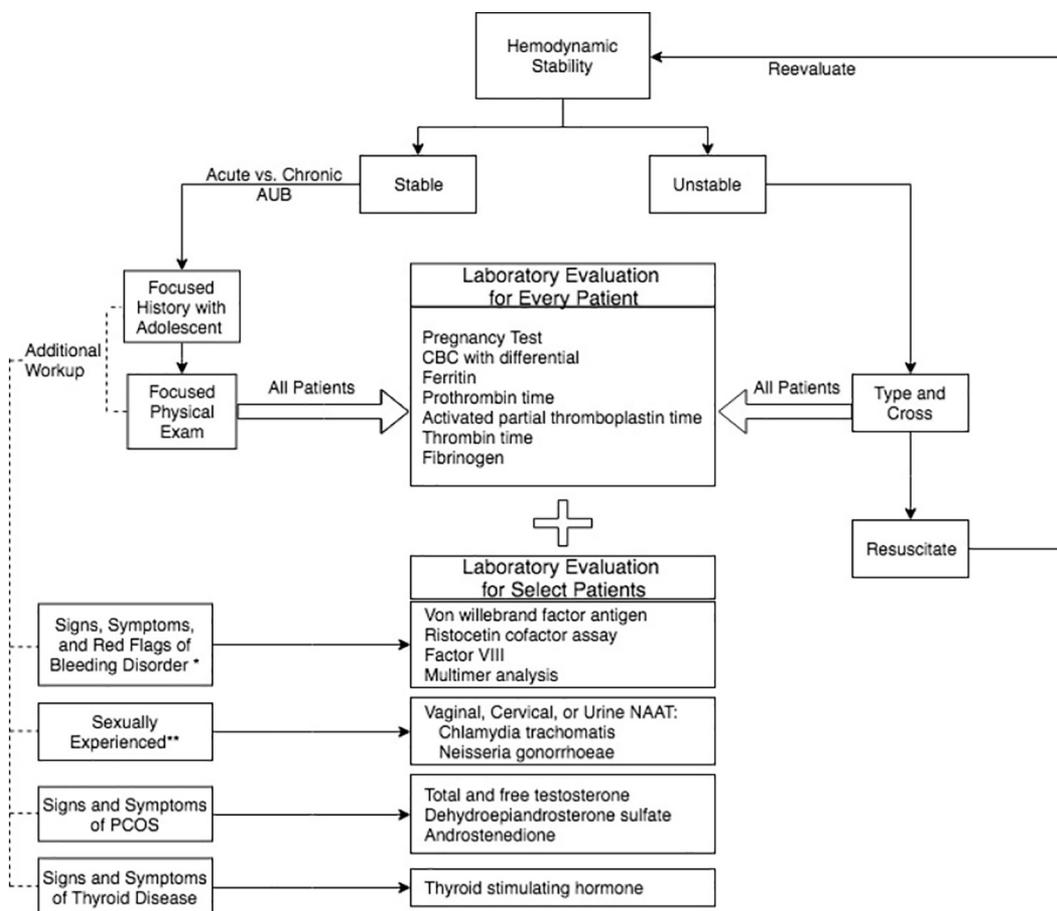
AUB-O, specifically ovulatory dysfunction due to immature hypothalamic–pituitary–gonadal (HPG) axis, is the most common cause of AUB in adolescents.<sup>11,20,24,29</sup> Screening is completed through determination of gynecologic age as well as evaluation for symptoms of nutritional abnormalities (eg, anorexia nervosa or obesity) and endocrinopathies known to alter the HPG axis, including polycystic ovarian syndrome (PCOS), hypothalamic disorders, hyperprolactinemia, hypothyroidism, and adrenal disorders.<sup>11,24</sup>

AUB-E, or endometrial etiology of bleeding abnormality, is evaluated through a sexual and reproductive history to assess risk of pregnancy and sexually transmitted infection (STI). The history should include last sexual activity, bleeding or pain with sex, use of contraception and condoms, prior history of STI, prior pregnancies and outcomes, and symptoms that might indicate a current

pregnancy.<sup>11,23</sup> Regardless of history, we recommend pregnancy testing and STI screening for all adolescents with AUB given the high prevalence of these etiologies and the reluctance of some adolescents to share their complete history with health care providers due to confidentiality and other concerns.

AUB-I (iatrogenic etiologies) is frequently caused by medications. Implicated medications include hormonal contraceptives, intrauterine contraception, anticoagulants, selective serotonin reuptake inhibitors (SSRIs), antipsychotics, tamoxifen, and herbal supplements such as ginseng.<sup>11</sup> Some anti-epileptic medications increase the hepatic metabolism of COCPs causing AUB in patients who are taking both medications.

The first priority of the physical exam is determination of hemodynamic stability to facilitate immediate resuscitation of an unstable patient



**Figure 1.** Algorithm for ED evaluation of acute AUB in adolescents.<sup>11</sup> Proposed algorithm for the initial emergency department evaluation of AUB in adolescents based on 2017 NASPAG Clinical Recommendation. AUB, abnormal uterine bleeding; CBC, complete blood count; ED, emergency department; NAAT, nucleic acid amplification test; NASPAG, North American Society for Pediatric and Adolescent Gynecology; PCOS, polycystic ovary syndrome; vs., versus. \*If blood type is unknown, obtain type and screen. \*\*If sexual activity is unknown, obtain STI testing. Pending risk factors and local prevalence, consider HIV, syphilis, and trichomoniasis testing.

(Figure 1).<sup>11,14,17,28</sup> For the patient who is stable (either initially or after resuscitation), a thorough evaluation should be completed to identify stigmata of the nonstructural etiologies of AUB. This includes noting the body mass index (BMI), evaluating the thyroid, and examining the skin for pallor or bruising, hyperpigmentation, acne, or hair changes. Also, examine the abdomen for tenderness, masses, or distention. Complete an external genital inspection for sexual maturity rating and to identify a bleeding source, lesions, vaginal discharge, trauma, or prolapse.<sup>11</sup> Invasive gynecologic examination, including speculum and/or bimanual examination, should be performed when needed to make treatment decisions, and as tolerated or preferred by the patient.<sup>11,14,17,20</sup> A bimanual or speculum exam is not a prerequisite for receipt of any form of contraception, whether for AUB or pregnancy prevention. The exception to this is an intrauterine device (IUD), for which a pelvic exam is part of the device insertion.<sup>4,11,14,17,20,30</sup> In fact, pelvic examination is commonly cited as a deterrent for presentation to care to obtain contraception.<sup>4,7,30</sup>

All patients undergoing work up for AUB require a pregnancy test, complete blood count (CBC) with differential, ferritin, prothrombin time, activated partial thromboplastin time, thrombin time, and fibrinogen.<sup>11</sup> In hemodynamically unstable patients this universal laboratory evaluation should be completed prior to receiving blood products, and can be obtained simultaneously with the type and cross.<sup>11</sup> Additional laboratory studies will be directed by pertinent positives on the history and physical exam. If there is concern for bleeding disorder, obtain von Willebrand factor antigen, ristocetin cofactor assay, factor VIII, and multimer analysis.<sup>11</sup> Note that the von Willebrand range of normal is dependent on ABO blood type, so this should be determined if not previously known.<sup>31</sup> Additionally, von Willebrand factor antigen can be artificially elevated with stress, inflammation, illness, or exogenous estrogen.<sup>25</sup> It is therefore recommended to draw these labs before starting estrogen-containing treatments.

If the patient is sexually experienced or their sexual history is uncertain, obtain nucleic acid amplification testing (NAAT) for *Chlamydia trachomatis* and *Neisseria gonorrhoeae*.<sup>14,17,32</sup> This may be obtained with a vaginal self-swab as it is less invasive, has been shown to have equivalent sensitivity and specificity to clinician obtained cervical swabs, and is preferred by many patients. Urine NAAT testing is also available using a first stream dirty sample (not a clean catch), however the sensitivity is up to 10% lower than that for vaginal or cervical specimens.<sup>32</sup> Patients at risk for

STI should also be screened for HIV, and depending on local prevalence and associated symptoms may also warrant testing for syphilis and trichomoniasis.

If the patient has signs or symptoms of hyperandrogenism, obtain total and free testosterone, dehydroepiandrosterone sulfate, and androstenedione. If there is concern for thyroid disease, evaluate the level of thyroid stimulating hormone.<sup>11</sup> If a patient is found to be pregnant, the institutional pregnancy protocol should be initiated as appropriate.<sup>14,17</sup>

The acuity and rapidity of HMB will determine disposition, though the mainstay of treatment remains medical management.<sup>11,17</sup> In hemodynamically stable patients this may be initiated in the ED and continued as an outpatient. It is rare that adolescent women with AUB require procedural interventions such as dilation and curettage or balloon tamponade of the uterus, especially in first line management. Primary medical management of AUB without evidence of pregnancy is dependent on exogenous hormones, specifically estrogen and progestin.<sup>14,20,29</sup> Estrogen provides initial hemostasis, while progestin assists with endometrial stability.<sup>20</sup> In general, combined estrogen-progestin therapy is recommended over progestin-only. However, a progestin-only method is recommended when a patient has contraindications to estrogen.<sup>6,33,34</sup> Identification of contraindications to estrogen can be effectively determined through the history, though self-screening questionnaires are available for patients to complete.<sup>35</sup> The most common contraindications to estrogen therapy in adolescents include history of blood clot, migraine with aura or focal neurologic finding, uncontrolled hypertension, and certain chronic illnesses.<sup>4,20</sup> In contrast to adults, smoking is not a contraindication for estrogen therapy in adolescents.<sup>6</sup> Of note, the presence of a long acting reversible contraceptive (LARC) is not a contraindication for utilizing a COCP for menstrual management.<sup>33,34</sup> For additional information on the contraindications to estrogen, refer to the United States medical eligibility criteria for contraceptive use.<sup>6</sup> (<http://www.cdc.gov/reproductivehealth/UnintendedPregnancy/USMEC.htm>).

Duration and dosing of therapy will be dependent on rate and volume of blood loss, quantitatively represented by degree of anemia.<sup>14,20,28,29</sup> Estrogen-containing forms of contraception used with AUB are available in oral and intravenous (IV) formulations. COCPs contain both estrogen and progestin. The typical formulation of estrogen within a COCP is ethinyl estradiol. The dose can range from 10 to 50 µg, with 30–35 µg considered “low-dose”.<sup>4,33,34</sup> It is appropriate to start at “low-

dose” estrogen, and increase to 50 µg ethinyl estradiol as needed for improved hemostasis with severe or rapid anemia. Higher estrogen dosing is most commonly achieved by increasing the frequency of dosing rather than the dose in each pill, which has the added benefit of also increasing the progestin stabilization of the endometrium.

When selecting a COCP for treatment of AUB, it is important to select a monophasic option to allow for consistent amounts of hormones per pill throughout the pill pack.<sup>11,17,20</sup> This is particularly important when dosing multiple pills per day, and when extending the time interval between menses to decrease the occurrence of breakthrough bleeding. Monophasic COCPs contain the same amount of estrogen and progestin in each active pill during the first 3 weeks of the menstrual cycle (the fourth week of pills contain placebo). Biphasic COCPs change the level of hormone once, with progestin levels increased about halfway through the cycle. Triphasic COCPs change hormone doses approximately once every 7 days. Of note, monophasic COCPs have also been recommended over biphasic or triphasic COCPs for pregnancy prevention in adolescents. No specific brand has proven superior, though progestins differ between them and may have variable effects. Therefore, it is appropriate to select a COCP with the lowest cost to the patient.<sup>4</sup>

Intravenous conjugated equine estrogen should be used when the patient is unable to tolerate medications orally, or hemostasis is unable to be achieved with COCPs. The dose for intravenous conjugated estrogen is 25 mg as often as every 4 to 6 hours with a suggested maximum of six doses, due to theoretical increased risk of thrombosis. Intravenous conjugated estrogen can be transitioned to COCPs when adequate hemostasis is achieved.<sup>11,17,20,29</sup> The addition of progestin, either separately or with transition to a COCP is important for endometrial stabilization, as prolonged high dose estrogen may thicken the endometrium resulting in more bleeding over time.<sup>20</sup>

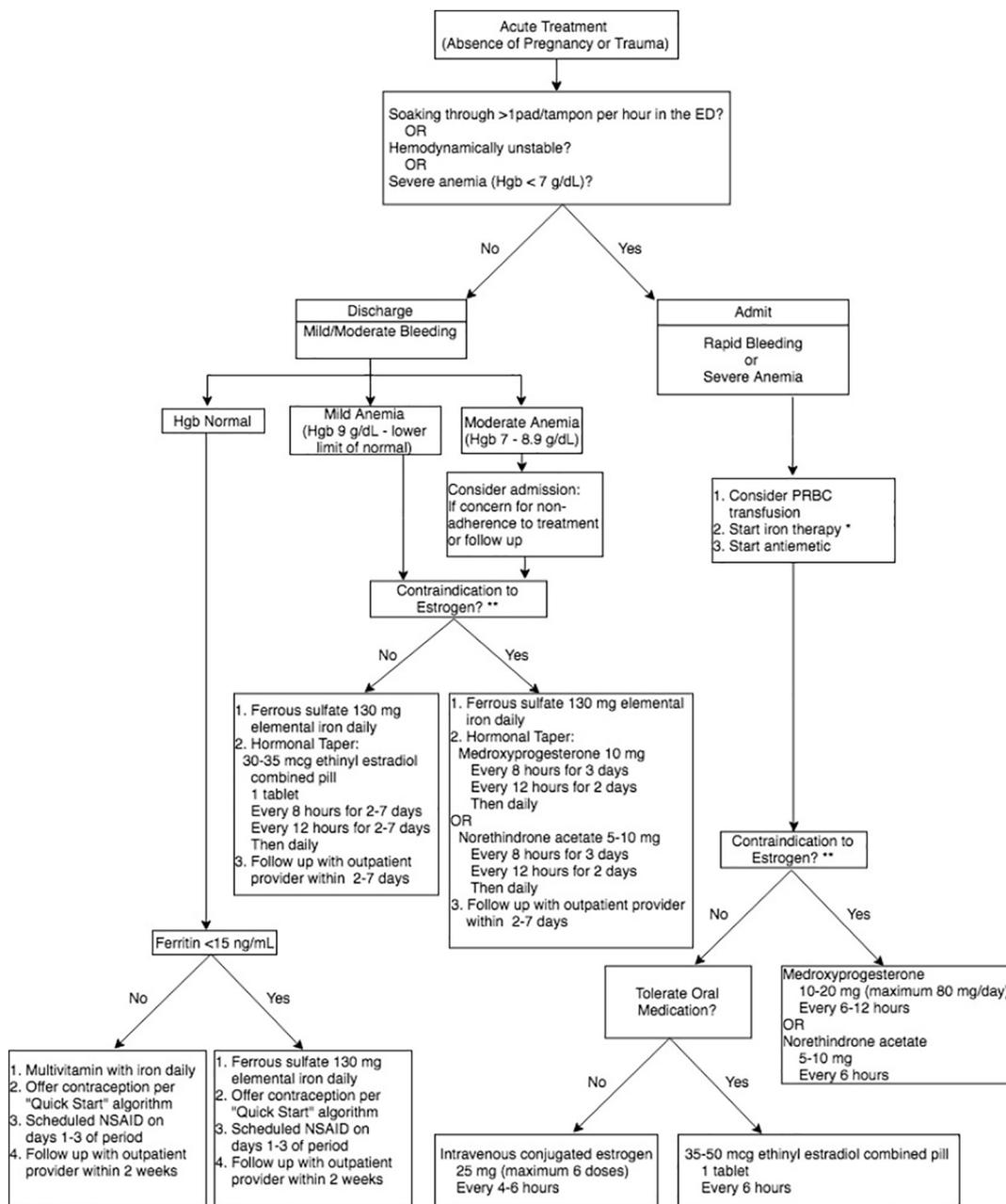
Formulations of progestin-only pills include medroxyprogesterone and norethindrone acetate. The recommended starting dose for medroxyprogesterone is 10 mg, and 5 mg for norethindrone acetate, though both can be increased either in dose or frequency of dosing to achieve hemostasis. At high doses norethindrone acetate is metabolized to ethinyl estradiol, so may not be safe with estrogen contraindications.<sup>36</sup> There is no intravenous formulation for a progestin-only medication for acute AUB, though high dose depo-medroxyprogesterone acetate has been used in some cases.<sup>20</sup>

When treating AUB, both estrogen-containing and progestin-only medications may be started as

“loading” multiple times per day dosing, which are eventually tapered to “maintenance” daily dosing. Many taper regimens are available for both estrogen-containing and progestin-only methods. The proposed algorithm (Figure 2) contains one option. The key to an effective taper is to maintain hemostasis with each decrease in dose. If this is unable to be achieved, it is possible the patient will require additional time on the higher dose.<sup>14,20,29</sup> In patients where hemostasis is difficult to achieve with either estrogen or progestin, the addition of an antifibrinolytic medication can be initiated with the guidance of a consultant.<sup>11,17,20,29</sup>

Adjunctive therapy to the primary hormonal management includes iron supplementation, use of scheduled nonsteroidal anti-inflammatory drugs (NSAIDs), and antiemetic medications.<sup>11,17,20</sup> Iron supplementation is provided for anemia or iron deficiency. Iron deficiency can occur with or without anemia, and is defined as ferritin less than 15 ng/mL.<sup>25,28</sup> While it is widely understood that anemia results in systemic symptoms, it is important to recognize that iron deficiency itself can result in fatigue.<sup>25</sup> AUB is the most common cause of iron deficiency, as it is estimated that 0.4 to 0.5 mg of iron is lost with every 1 mL of blood.<sup>28</sup> Recommended iron supplementation dosing is 65 to 130 mg of elemental iron in the form of ferrous sulfate once daily, taken with dinner to increase adherence and decrease gastrointestinal side effects.<sup>25,28</sup> Initiation of oral iron therapy may be delayed to decrease gastric irritation and nausea in patients who are taking COCPs multiple times daily, in which case intravenous iron supplementation should be considered. Of note, oral or IV iron supplementation should be initiated for all patients with anemia regardless of their receipt of blood products, as the iron contained in packed red blood cell transfusions is not immediately usable and will not result in iron overload.<sup>16,20</sup>

Adolescents without evidence of anemia or iron deficiency likely do not have clinically significant HMB, though it may still be very distressing to the patient and family and is a common reason for missed school. Nonetheless, interest in contraceptive initiation should be evaluated, and if desired should be started utilizing the same day “Quick Start” protocol (<https://www.reproductiveaccess.org/resource/contraceptive-pearl-quick-start/>).<sup>20,33</sup> Ideally, this would be offered in a confidential manner with the adolescent involving the caregiver as they are comfortable, but parental involvement may be required according to local legislation.<sup>4</sup> For up-to-date, additional information on state policies refer to the Guttmacher Institute website (<https://>



**Figure 2.** Algorithm for ED treatment of acute AUB in adolescents not due to trauma or pregnancy.<sup>6,11,14,17,20,25,28,29,33</sup> Proposed algorithm for the initial and short-term management of AUB in adolescents. AUB, abnormal uterine bleeding; CBC, complete blood count; dL, deciliter; ED, emergency department; g, gram; Hgb, hemoglobin; NSAID, nonsteroidal anti-inflammatory drug; PRBC, packed red blood cell. \*Enteral (ferrous sulfate 130 mg elemental iron daily) or intravenous (per institutional formulary) according to patient tolerance. Receipt of PRBC transfusion does not change initiation of iron therapy. \*\*Management with estrogen-containing contraception is preferred to progestin only, however this may be contraindicated for some patients. For additional information on contraception eligibility, please see <https://www.cdc.gov/reproductivehealth/contraception/mmwr/mec/summary.html>. For additional information on “Quick Start” Algorithm, please see <https://www.reproductiveaccess.org/resource/quick-start-algorithm/>.

[www.guttmacher.org/state-policy/explore/minors-access-contraceptive-services](http://www.guttmacher.org/state-policy/explore/minors-access-contraceptive-services)).<sup>37</sup>

## PREGNANCY PREVENTION

It is well known that adolescents presenting for ED care are a high-risk population for unintended pregnancy, primarily attributed to nonuse of contraception.<sup>10,38-40</sup> They have lower rates of presentation to their primary care provider (PCP), are frequently uninsured, and have riskier sexual encounters including reproductive coercion, which also put them at risk of STIs.<sup>8,38</sup> Importantly, they recognize that they need reproductive health care. They also have significant interest in initiating contraception in the ED, which they believe should be offered at all visits regardless of chief complaint.<sup>7,10,38,39,41</sup> Primary motivators for obtaining contraception from the ED include anonymity, accessibility, and bypassing PCP bias.<sup>38,39,41</sup> Attempts to refer to a PCP or outpatient clinic from the ED have had mixed results in terms of adherence to follow-up appointments.<sup>42,43</sup> As such, pregnancy prevention research is focusing on ED stakeholder engagement and willingness to provide what was once considered an outpatient primary care task.<sup>9,10,15,18,19</sup>

Qualitative data from health care providers indicates that barriers are both systemic and individual.<sup>9,10,15,18,19</sup> Systemic concerns primarily revolve around time management and the role of the ED in care provision, including inability to effectively provide confidentiality, equating the ED with the PCP, interference with the patient-PCP relationship, starting a chronic medication without guaranteed follow-up, and liability.<sup>12,13,41,44,45</sup> Individual factors include personal comfort with discussing adolescent sexual health, knowledge of contraception or updated guidelines, knowledge of state laws regarding adolescent capacity to consent to sexual health care without a parent or guardian, and moral objection.<sup>9,12,13,18,19,44</sup> Despite the many barriers, health care providers understand the profound healthcare inadequacies that can be addressed through a reproductive justice model. A recent qualitative study found that the majority of pediatric ED program directors throughout the country are interested in prescribing contraception from the ED.<sup>45</sup>

Novel approaches to bridge the perceived barriers of ED providers to the provision of contraception in the ED are currently underway. One approach is through use of a universal computerized clinical decision support system, which integrates individual patient's sexual history survey responses into an algorithm of risk factors with corresponding evaluation and treatment recommendations based on

current guidelines. Patients and providers thus far find the interface user friendly.<sup>44</sup>

Another approach is through an embedded contraceptive counselor, independent of ED providers, to provide face-to-face contraceptive counseling and ensure follow-up care.<sup>41</sup> Behavioral interventions through this method have proven to be successful.<sup>43</sup> For many providers and patients, the ultimate goal is the development of an ED-based reproductive health clinic to prescribe short-acting contraception and/or place LARCs.<sup>10,38</sup> All approaches – the independent counselor, computerized support system, reproductive health clinic, and knowledgeable emergency physician comfortable with initial patient education – serve to decrease unintended adolescent pregnancy through increased access to necessary and safe preventive care.

## SUMMARY

Adolescent women often present to the ED with concerns for AUB. While the differential diagnosis is broad, a detailed history allows for focused evaluation. Hormonal contraceptive treatment is clearly indicated for patients whose bleeding has led to hemodynamic instability or significant anemia, but should be offered to others for management of menstrual symptoms, and arguably to all adolescents for contraception. Though not a common practice historically, the provision of routine contraception from the ED is a natural extension of the other reproductive health services the ED provides to adolescents such as STI testing and treatment, pregnancy testing, and emergency contraception. Given that the population of young women who present to the ED are less likely to have PCP provided care, there is a unique opportunity for the ED to fill this contraceptive and public health gap with various novel approaches. ☒

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