Chapter 20

GYNECOLOGIC AND REPRODUCTIVE HEALTH FOR THE FEMALE RECRUIT

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INTRODUCTION

The establishment of the US Army Nurse Corps in 1901 marked the official beginning of women in the US military.[1] Female soldiers were initially limited to service support, non–combat-related job fields. Since then, the roles of female soldiers have undergone a significant transition. Since 1994, female soldiers have been assigned to many units, except for units below the brigade level engaged in direct combat operations. Approximately 15% of all soldiers deployed in support of Operations Enduring Freedom and Iraqi Freedom have been female.

According to the US General Accounting Office, 16% of the current US military is female. Females represent 15% of the active duty forces and 17% of the reserve components.[2,3] The Marine Corps reserves have the smallest percentage of females (5%), and the Army and Air Force reserve components have the largest representations (24% and 23%, respectively).[2] Currently, females are estimated to represent approximately 20% of the military recruit population and approximately 7% of the US veteran population.[2,4]

With an unprecedented number of females serving, it is appropriate that the Department of Defense treats women's health as a significant concern. The military in many respects is a microcosm of US society. Gynecologic and reproductive health issues important in civilian life are just as important to military female personnel.

Approximately half of the active duty enlisted population is between the ages of 17 and 24. Recruits are on average 20 years old.[3] This population may manifest unique variations of common adolescent and adult gynecologic conditions.

This chapter provides an overview of the diagnosis and management of common gynecologic and reproductive health disorders that are unique to the female military recruit. Although the different military services may vary in the occurrence of specific health problems, the healthcare concerns of the female recruit should not vary greatly in presentation.

VAGINAL DISORDERS

Vulvovaginal symptoms have been identified as the most common reason for gynecologic consultation. They account for approximately 10 million clinic visits per year.[5] Vulvovaginitis can have both infectious and noninfectious causes (Table 20-1**)**. Despite the many causes, healthcare providers are likely to see the most common infectious causes—bacterial vaginosis (BV), vulvovaginal candidiasis (VVC), and trichomoniasis—in the female recruit population. Trichomoniasis is considered a sexually transmitted illness (STI) and is discussed in Chapter 14, Sexually Transmitted Infections Among Military Recruits. A thorough history and physical examination should help the healthcare provider identify the etiology of the vaginitis. The focus of this section of the chapter will be on the evaluation and management of BV and VVC.

Normal physiologic vaginal discharge has a pH ranging from 3.8 to 4.2. The discharge is typically odorless, white, and not associated with vulvar pruritus or inflammation; the amount varies with the menstrual cycle. Evidence suggests that "normal" vaginal flora may contain a representative amount of multiple organisms that reside in a homeostatic ecosystem. Alteration of the homeostatic balance results in an overgrowth of a single microorganism, which subsequently may lead to symptoms requiring treatment.[5–7]

TABLE 20-1

CAUSES OF VULVOVAGINITIS

Infectious	Noninfectious
Bacterial vaginosis	Chemical irritant
Vulvovaginal candidiasis	Trauma
Trichomoniasis	Atrophic vaginitis
Foreign body	Lichen planus
Streptococcal vaginitis	Collagen vascular disease
Toxic shock syndrome	
Idiopathic with human immunodeficiency virus infection	

Bacterial Vaginosis

Often referred to as *Gardnerella* vaginitis, BV is the most common form of vaginitis in the United States.[8] In BV, a reduction in lactobacilli with a subsequent overgrowth of the anaerobic bacteria *Gardnerella vaginalis* and *Mycoplasma hominis* alters the normal vaginal flora.[9] Many hypotheses have attempted to explain the specific etiology of change in vaginal flora that leads to the development of BV, but none have been widely accepted. It is felt that many factors can tip the ecosystem, including sexual activity, normal transitions of the menstrual cycle, pregnancy, antibiotics, foreign bodies, exogenous hormone therapy,

stress, excessive physical activity, and use of hygienic products.[10-13]

Recruits may present with the complaint of thin white vaginal discharge associated with a "fishy" smell. The odor may be reported to be more pronounced after unprotected sexual intercourse. Pruritus is unlikely to be one of the symptoms.

Diagnosis

The diagnosis of BV is based on Amsel's criteria.[14] The presence of three of the four criteria are diagnostic of BV: (1) presence of an abnormal vaginal discharge, (2) pH higher than 4.5, (3) presence of clue cells / mixed flora on Gram stain, or (4) the release of an amine-like odor with the addition of potassium hydroxide (KOH) to the discharge (positive whiff test).

Treatment

Metronidazole is the treatment of choice for BV.[15] Oral or vaginal preparations may be prescribed. To minimize potential hygiene issues associated with vaginal preparations, oral metronidazole may be a more practical choice for treatment during initial entry training. Recommended oral treatment is 500 mg twice daily for 7 days. A single 2-g oral regimen is also a viable option but may be associated with a higher relapse rate. Although metronidazole is the recommended treatment, evidence suggests that clindamycin is equally efficacious.[10,11] Despite appropriate initial responses to therapy, recurrence rates approach 30%. Prolonged therapy for 10 to 14 days may be appropriate.[12;13] If there is no response to initial therapy, the healthcare provider should reevaluate the entire clinical presentation and consider subspecialty consultation when appropriate.

Vulvovaginal Candidiasis

VVC is the second most common form of vaginitis in the United States.[5] The species *Candida albicans* is responsible for the majority of the vaginal yeast infections. Because the reproductive tract is normally colonized with this organism, the presence of a *Candida* species alone does not necessarily constitute an infection. Oral contraceptive use, sexual activity, antibiotic use, immunosuppression, diabetes mellitus, vaginal sponges, intrauterine devices, and pregnancy have been identified as factors that predispose patients to this infections.[11,16]

Recruits with VVC will present with complaints of vulvovaginal pruritus and a thick white "cottage cheese" discharge. There may be a history of worsening pruritus just prior to the onset of menses. In severe cases, recruits may report vulvar irritation and swelling.

Diagnosis

Recruit history, documentation of a thick, cottage-cheese–like vaginal discharge, and documentation of a normal vaginal pH are critical to making the appropriate diagnosis. Vaginal preparations further assist in making the diagnosis; 10% KOH is added to the preparation to eliminate background cellular elements. A negative whiff test following the addition of KOH is typically seen with yeast infections. The documentation of fungal elements (budding yeast forms or mycelia) by microscopy helps confirm the clinical diagnosis.

Typically, the physical examination is significant for minimal to moderate erythema of the vulva. In severe cases, the erythema may extend to the perianal region, and satellite lesions and excoriations may be present on the vulva and inner thigh. Speculum examination may also reveal erythema of the vagina with adherent, particulate discharge that is whitish in color.

Treatment

A single 150-mg dose of the antifungal fluconazole would be an appropriate treatment for recruits. If the recruit fails to respond to this therapy within 3 days, providers should reevaluate the diagnosis and consider subspecialty consultation as appropriate. In cases of significant inflammation of the vulva and satellite lesions, topical azole treatment should be prescribed in conjunction with the single-dose fluconazole therapy.[11]

Summary

Vulvovaginal complaints are common. Because asymptomatic infections are not typically associated with adverse clinical outcomes, the prevalence of asymptomatic BV and VVC is unknown. The prevalence of symptomatic BV and VVC varies depending on the clinical setting; in the United States, the prevalence varies from 40% to 50% and from 20% to 25%, respectively.

There are no studies that define the prevalence of these conditions in the initial entry trainee population. Extrapolating from deployment data, healthcare providers may see a significant number of initial entry trainees with vulvovaginal complaints, given the stress associated with acute changes in the physical environment.[13] Although there are published diagnostic criteria and algorithms for the management of vulvo-

vaginitis, many healthcare providers rely on their own clinical acumen for management. Evidence suggests that treatment by symptoms alone may not be as effective as once perceived.[17,18] Anderson[18] found that up to 70% of symptomatic patients may be misdiagnosed based on patient symptoms alone. Providers should use a combination of their own clinical acumen, the trainee's presenting symptoms, and adjunct laboratory tests as appropriate to make diagnoses. They should also seek consultation as appropriate.

MENSTRUAL DISORDERS

Ten to thirty percent of reproductive-aged women have menstrual irregularities that may require medical evaluation.[19,20] Menstrual irregularities are sited as one of the main reasons adolescents between the ages of 18 and 21 years seek health care.[21] Abnormal uterine bleeding (AUB) is the second most common complaint among women seeking gynecologic care. AUB is defined as excessive, unpredictable, or irregular bleeding in the presence or absence of intrauterine pathology. It may be associated with systemic or structural abnormalities. AUB can arise from reproductive tract pathology such as endometrial polyps or cancer, as well as from systemic causes such as coagulopathy.

The age of menarche in the United States is between 12 and 13 years, with slight ethnic and geographic variations.[22] The normal menstrual cycle is mediated by a unique and complex interaction between the hypothalamus, pituitary, ovaries, and the uterus. Hormonal fluctuations within the hypothalamic-pituitary-ovarian axis trigger a normal menstrual cycle. The normal menstrual cycle occurs in two phases, follicular and luteal. Endometrial sloughing marks the beginning of a typical menstrual cycle. During the follicular phase, hemostasis is obtained and endogenous estrogen initiates the repair of the endometrial lining. During the luteal phase, ovulation occurs and progesterone secreted from the corpus luteum works in concert with endogenous estrogen to rebuild and stabilize the endometrial lining. In females who are not pregnant, a decrease in progesterone initiates the menstrual cycle.

The average menstrual cycle is 28 days in length, with a range of 24 to 35 days. Typical flow lasts from 4 to 6 days. The high normal amount for menstrual flow is considered to be 80 mL.[23] In the adolescent population, there can be significant variations in the menstrual cycle immediately postmenarche secondary to anovulation. The majority of menstrual cycles will assume a more typical pattern by the third year postmenarche.[22] Table 20-2 provides definitions of common abnormal menstrual patterns.

Differential Diagnosis

The differential for AUB in the female recruit population is presented in Table 20-3. There can be anatomic, systemic, medicinal, and iatrogenic causes of the disorder. Important etiologies of AUB in the female recruit population include anovulation, pregnancy, hormone use, and coagulopathy.

Anovulation is the most common etiology of AUB. Anovulatory bleeding is often referred to as dysfunctional uterine bleeding (DUB). DUB is defined as excessive, unpredictable, or irregular bleeding in the absence of intrauterine pathology. Anovulation is the result of failure of the ovary to release an egg that subsequently produces a corpus luteum, so that no progesterone is secreted during the luteal phase of the menstrual cycle. As estrogen production continues, the endometrial lining proliferates and is unstable due to the lack of progesterone. The clinical result is uterine bleeding that is noncyclic, unpredictable, and inconsistent in volume.[24] DUB commonly presents in females immediately following menarche (adolescence) and preceding menopause.

DUB has been associated with increased physical and psychological stress, eating disorders, and thy-

TABLE 20-2

TERMINOLOGY RELATING TO ABNORMAL MENSTRUAL PATTERNS

Term	Definition
Amenorrhea	Absence of menses
Menorrhagia or Hypermenorrhea	Excessive flow or loss of more than 80 ml of blood at regular intervals
Metrorrhagia	Bleeding at irregular but frequent intervals
Menometrorrhagia	Excessive bleeding at irregular intervals
Oligomenorrhea	Regular bleeding interval greater than 45 days
Polymenorrhea	Regular bleeding interval less than 24 days
Intermenstrual bleeding	Irregular bleeding of variable amounts between normal menstrual cycles

TABLE 20-3

DIFFERENTIAL DIAGNOSIS OF ABNORMAL UTERINE BLEEDING

Cause	Examples
Anovulation (most common diagnosis)	NA
Systemic disorders	Thyroid disease Polycystic ovarian syndrome Diabetes mellitus Coagulation disorders
Medications	Exogenous hormones Anticoagulants
Pregnancy-related	Threatened abortion Missed abortion Imcomplete abortion Ectopic pregnancy
Infections	Vaginitis Cervicitis Penlvic inflammatory disease
Anatomic	Polyps Fibroids Foreign bodies

NA: not applicable

roid dysfunction, which are all conditions relevant to the female recruit population.[25-27] Studies by Harlow[28] showed that stress, as measured by life events or perceived stress scales, caused increased rates of DUB. Symons[29] found a correlation between DUB and weight, physical activity, stress and the length of the menstrual cycle. Jeyaseelan[30] documented a longer cycle length in women performing hard physical labor. These studies point to a strong association of menstrual disturbances with increased stress. Over 50% of female military cadets report moderate to severe changes in their menstrual cycle during the first year of attendance at the US Military Academy.[31] There are no studies that accurately document the prevalence of DUB in the enlisted initial entry training population; however, extrapolating from the cadet data, an increased incidence of DUB can be anticipated in the female recruit population because of the stress and increased physical activity associated with recruit training.

Pregnancy should be considered in the differential for all women of reproductive age who present with AUB. Regardless of coital history, a pregnancy test should be obtained. Every female recruit should have a pregnancy test as she is processed through the military entrance center. The sensitivity of pregnancy tests make pregnancy misdiagnosis uncommon, but still possible. The healthcare provider must be aware of rare circumstances in which recruits may have opportunity to engage in sexual activity, such as emergency leave and other excused absences from basic training, and be knowledgeable about regulations governing this behavior in each branch of military service.

Recruits are disqualified from enlistment if they are pregnant.[32-35] If a soldier is confirmed to be pregnant by a military medical treatment facility while in entry-level status, the soldier will either be separated or retained[36] (entry-level status is the first 180 days of continuous active duty). Pregnant entry-level recruits may be involuntarily separated if they cannot fully participate in the required training for their military occupational specialty because of their physical condition.[37] They are eligible for maternity care at a military facility only.[38] They may voluntarily separate,[36] in which case the discharge is uncharacterized because pregnancy is considered a condition existing prior to service. The soldier may request a separation date, but the ultimate decision on the date is made by the separation authority and military physician. The separation date must be no later than 30 days before the expected delivery date or before the last day the recruit is authorized by the military healthcare provider to travel to her home of record or entry-on-duty destination. If the soldier desires to return to military service after the birth of her child, she may enlist at any time with a waiver[33] (see the Pregnancy Counseling section below).

Exogenous hormone use may be a significant cause of AUB in the female recruit population. Exogenous hormones are typically the first line of therapy for a number of common gynecologic disorders; therefore, it is very likely that some recruits will enter training already on some form of exogenous hormones. Oral contraceptives are the most common form of exogenous hormone. Between 30% and 40% of patients using oral contraceptives (OCs) may experience AUB. OC noncompliance is believed to be the most significant contributor to this phenomenon. It is estimated that less than half of all women exercise strict pill compliance, and missed doses typically result in intermenstrual bleeding. Given the time constraints of recruit training, patient education is the best remedy for noncompliance. Healthcare providers might suggest that patients designate a set time each day (bedtime, first meal, etc) to take OCs. It is also important that the healthcare provider be aware that other forms of exogenous hormones, such as Depo Provera (depomedroxyprogesterone acetate [The Upjohn Company, Kalamazoo, Mich]) may also cause AUB.

Systemic disorders that may cause AUB are of the most serious concern in the recruit population. Although coagulation disorders like von Willebrand's disease are often diagnosed early within the menstrual history, they can also be present in late adolescence. Although von Willebrand's disease has a prevalence of less than 5%, up to one third (33%) of adolescents presenting to an emergency room with menorrhagia have been diagnosed with the disease. A history of excessive menstrual bleeding that requires double protection in a recruit should be further evaluated. In addition to the general evaluation that has been outlined, the following laboratory tests should be obtained: bleeding time, prothrombin time, partial thromboplastin time, and ristocetin cofactor assay.[22,39]

Other systemic disorders, including thyroid and pituitary dysfunction, diabetes mellitus, and polycystic ovarian syndrome, have been associated with AUB and should be considered in the evaluation. Anatomic causes of AUB are less common in this population but should still be considered because most abnormalities can be easily diagnosed with a standard pelvic examination. STIs are of significant concern in this population and should also be considered in the differential. (Comprehensive diagnosis and management strategies are presented in Chapter 14, Sexually Transmitted Infections Among Military Recruits.)

Diagnosing Abnormal Uterine Bleeding

The diagnosis involves three equally important elements: (1) the history, (2) the physical examination, and (3) appropriate laboratory tests. The evaluation of recruits presenting with AUB should begin with a comprehensive history. The healthcare provider should make every effort to obtain as many details about the recruit's bleeding pattern as possible. Providers should obtain details about the onset of bleeding, frequency of bleeding, severity and duration of bleeding, whether or not the bleeding is cyclic, and whether abnormal bleeding is associated with pain or other pelvic symptoms. Providers should also obtain a detailed history of the recruit's typical menstrual cycle to determine just how much the current presentation deviates from what the recruit considers to be normal. Other pertinent components include sexual history, contraceptive use history, parity, STI history, date of last sexual encounter, cervical cancer screening history, and current medication use, including exogenous hormones. To assess the presence of potential systemic disorders that may present in the recruit population, providers must inquire about fluctuations in weight, family history of bleeding disorders, history of easy bruising, excessive bleeding with minor procedures, gingival or nasal bleeding, and the presence of petechiae or hematomas.

The physical examination should be comprehensive. Providers should attempt to identify anatomic abnormalities. Providers should start with a general examination to identify signs outside of the pelvic examination that might suggest an etiology for the clinical presentation, such as an enlarged thyroid gland. The pelvic examination must then be conducted (even if the recruit is actively bleeding). If there is a clinical suspicion of infection, appropriate cervicovaginal cultures should be obtained. A speculum should be used to assist the provider in adequately visualizing the cervix to rule out etiologies of AUB. When appropriate, imaging studies may be utilized as an extension of the history and physical examination. In the authors' opinion, imaging studies should not replace a comprehensive general physical and pelvic examination.

Healthcare providers should then use the history and physical examination to determine which laboratory tests to obtain. It is the authors' opinion that all recruits presenting with AUB should, at a minimum, be tested for pregnancy. The provider's clinical acumen and patient presentation should then be used to determine the next most appropriate tests. All of the following tests may be appropriate: complete blood count, bleeding time, coagulation studies, thyroid function tests, and gonorrhea/chlamydia cultures.

It is important that the healthcare provider make the appropriate diagnosis. Once all other causes of AUB have been ruled out, a diagnosis of anovulatory bleeding, or DUB, is made. DUB is the most common disorder seen in the female recruit population.

Treatment

AUB secondary to systemic disorders is managed by treating the underlying disorder. Detailed treatment regimens for all possible systemic disorders are beyond the scope of this chapter. Providers are encouraged to obtain subspecialty consultation as appropriate. The remainder of this section will focus on the medical management of DUB.

The goals of therapy include discontinuation of acute bleeding, prevention of recurrence, decreasing the risk of complications, and improving overall quality of life.[24] Medical rather than surgical management is the most appropriate treatment in the female recruit population. Surgical intervention is generally reserved for patients who have known anatomic etiologies of AUB, who fail to respond to medical intervention, who don't plan to bear children, or who have postmenopausal bleeding.

Patient presentation should dictate treatment. Recruits with acute bleeding may require hospitalization. Acute bleeding can be emergently managed with intravenous conjugated equine estrogens, 25 mg every 2 to 4 hours for 24 hours.[40] If acute bleeding fails to respond to this therapy within 24 hours, the patient should be reevaluated and the diagnosis of DUB should be reconsidered. Some cases may require surgical intervention. If the recruit does respond to intravenous therapy, a continuous OC regimen should be initiated to induce amenorrhea and allow the recruit's anemia to resolve.

For the majority of recruits with DUB, reassurance alone may be appropriate. Healthcare providers should use this time to properly educate the patient about normal menses and possible fluctuations secondary to the recruit training environment. Consider instructing the patient to keep a menstrual calendar over the next several months to reinforce the education and document deviations from her typical menstrual cycle.

Exogenous hormone therapy, mainly OCs, should be the initial treatment of choice. A standard 30- to 35-μg OC can be prescribed. The recruit should be instructed to take the prescribed therapy just as she would for regular contraception, and counseled about the benefits of pill compliance and morbidity associated with noncompliance. Treatment should be implemented for a minimum of three menstrual cycles. Some patients may require more than the standard OC regimen. Low-dose, 30- to 35-μg OCs can be prescribed initially up to four times per day and slowly decreased to standard once daily dosing over a 5- to 7-day period. The recruit should be educated about the likelihood of continued AUB with initiation of exogenous hormone therapy and counseled to return for worsening bleeding.

If initial medical treatment fails, the recruit should be reevaluated and the diagnosis reconfirmed. The healthcare provider can either change the medical treatment regimen or refer the patient for surgical management as appropriate.

CERVICAL CYTOLOGY

A frequently encountered problem for the general medical officer or primary care provider is the interpretation and management of an abnormal Papanicolaou (Pap) smear. This section provides general guidelines on how to identify and interpret the problem, how to treat the patient, and, most importantly, when to refer the patient to a gynecologist.

Risk Factors

Women with a history of a STI may be at increased risk for cervical cancer[15] (see Chapter 14, Sexually Transmitted Infections among Military Recruits). Human papilloma virus (HPV) infection is now clearly associated with the development of cervical cancer. The odds ratio for high-risk infection in cervical cancer ranges from 15 to 100.[41] HPV DNA is detected in 93% of cervical tumors, and more than 60% of HPV found in tumors is type 16 or type 18.[42,43]

Chlamydia trachomatis may be a possible cofactor of HPV in the etiology of cervical squamous cell cancer. A study[44] of 499 women from two different case-control studies conducted by the International Agency for Research on Cancer in Brazil and in the Philippines noted that the presence of *C trachomatis* antibodies increased the odds 2-fold of squamous cell cervical cancer among HPV-positive women, adjusting for important confounders such as the age at first intercourse, number of sex partners, parity, cytological screening, smoking, and oral contraceptive use.

Another nested case-control study,[45] taken from a cohort of 530,000 women from Finland, Norway, and Sweden, linked serum samples to their respective national cancer registries. This study showed a link between past *C trachomatis* infection and cervical squamous cell carcinoma, with *C trachomatis* serotype G being strongly associated with squamous cell carcinoma (adjusted odds ratio of 6.6; 95% confidence interval [CI], 1.6–27.0). Other *C trachomatis* serotypes associated with squamous cell carcinoma were serotype I (odds ratio of 3.8, 95% CI 1.3–11.0) and serotype D (odds ratio of 2.7, 95% CI 1.3–5.6).

Younger women are at greater risk for HPV infection. At puberty, the influence of estrogen causes the squamous epithelium of the vagina and cervix to thicken. The columnar epithelium, within the cervical canal, meets the squamous epithelium at the squamo-columnar junction on the ectocervix. Small changes in estrogen result in the induction of squamous metaplastic epithelium, also known as the transformation zone (or T-zone). Young women have a T-zone located on the external cervix. The columnar epithelium exposed on the ectocervix is termed ectopy, and this area is circumscribed by the T-zone. Not until the woman has reached her late 20s to early 30s does substantial replacement of the columnar epithelium with squamous epithelium occur. The result is little or no visible ectopy.[46]

Moscicki and colleagues[47] showed that (1) active squamous metaplasia is important in the development

of low-grade squamous intraepithelial lesion (LSIL) in young women infected with HPV, and (2) those women with squamous intraepithelial lesion (SIL) had a greater area of ectopy than young women without SIL. The T-zone is the area of the cervix most prone to the development of SIL and invasive cancers; because younger women have more ectopy (therefore, an exposed T-zone) than older women, it is not surprising that young women are at risk for contracting HVP infection with subsequent progression to SIL.

It is believed that precursor lesions comprise a continuum of consecutive stages in the development of invasive cancer, so that the HPV that causes cervical intraepithelial neoplasia grade 1 (CIN-1) can progress to CIN-2 and ultimately to carcinoma in situ if left untreated. Among young women, most lesions regress.[48] Persistent infection with HPV is thought to be a key factor leading to cervical cancer and cervical dysplasia—thus explaining why most cervical cancers occur in women older than 30 years of age.

Age at first sexual intercourse is strongly associated with a risk for invasive cancer. This risk was 5-fold higher for women who reported that their first intercourse was before the age of 18 years, compared with women who reported first intercourse after age 22.[49] Other risk factors include the following:

- the number of sexual partners (≥ 4),
- prolonged oral contraceptive use,
- infection with organisms that cause other STIs (particularly with *C trachomatis* or herpes simplex type 2),
- human lymphocyte antigen haplotype, and
- cell-mediated immunity.

Smoking is variably associated with risk of invasive cancer. Older age, immunodeficiency, and infection with high-risk and multiple types of HPV are associated with persistent infectivity.[41]

Evaluation

Cervical cytology can be obtained in one of two ways in the military health system. The traditional Pap smear is collected by gently scraping the surface of the cervix—and sometimes the upper vagina—with a plastic or wooden spatula. A cytobrush is then used to obtain cells from inside the cervical canal. The glandular cells from the endocervix are rolled from the cytobrush onto a glass slide, and squamous cells are plated from the spatula to another section of the glass slide. The combination of cytobrush and spatula is optimal in obtaining sufficient samples to detect cancer when it is present. The cells are preserved with a fixative, stained for microscopic viewing, and then analyzed under a microscope by a cytopathologist.

Another collection system has been devised wherein cells from the cervix and endocervix (obtained in the same manner as in the traditional Pap smear) are placed immediately into a fixative (PreservCyt [Cytyc Corporation, Marlborough, Mass]) rather than spread onto a slide. In the cytology laboratory, monolayers are prepared using the company's processor, ThinPrep (Cytyc Corporation). The processor filters the sample, obtaining about 5% of the sample's cells. Then, those cells are transferred from the filter to the slide for routine Pap staining.

Both collection systems have disadvantages. One of the reasons attributed to the poor sensitivity of the traditional Pap smear is that only 10% of the exfoliated cells are collected onto the glass slide (the remaining 90% of the cells are on the swab or cytobrush). Also, the cells are often obscured by blood, inflammation, or drying artifact. An advantage of the ThinPrep Liquid-Based Cytology (LBC [Cytyc Corporation]) is that the filtered samples are devoid of blood and inflammatory cells. Therefore, the number of samples classified as unsatisfactory or limited for interpretation are fewer than those obtained in the traditional Pap smear. However, the ThinPrep LBC samples are more likely to lack cells representative of the T-zone, and, overall, fewer diagnostic cells are available for review (only 5% are filtered out for review).[49] One of the biggest advantages of ThinPrep LBC is that the cells can be preserved in the fixative solution, and other studies (called reflex testing) can be accomplished on the sample. Other tests that can be done on the preservative fixative include DNA studies for **c**hlamydia, gonorrhea, and HPV. If the healthcare facility has the capability of performing LBC, then the provider must become familiar with the laboratory protocol for reflex testing, which can vary from institution to institution.

The optimal age to begin screening is unclear. Data on the natural history of HPV and the incidence of high-grade lesions and cervical cancer suggest that screening can be safely delayed until 3 years after onset of sexual activity or until age 21, whichever comes first. Many US organizations recommend routine screening for all women by age 18 (eg, American College of Obstetricians and Gynecologists, 1996; American Medical Association, 1997), based on the generally high prevalence of sexual activity by that age in the United States and concerns that clinicians may not always obtain accurate sexual histories.[50] Screening should be performed at least every 3 years, but annual screening is appropriate until a woman has had at least two or three consecutive normal Pap test results.[51] The ideal situation for screening new recruits in the military is

to obtain a Pap test (and a test for **c**hlamydia) during the first week of initial entry training, when the other medical screening, immunizations, and induction matters occur. This timing allows for follow-up within the ensuing 8 to 9 weeks, if necessary, before the recruits are deployed to their next duty stations.

The standard cytology reporting system in the military health system is the Bethesda system, which provides a descriptive report of the findings after screening specimens for adequacy. Any smears missing endocervical cells are considered inadequate and should be repeated. The 2001 Bethesda system terminology is listed in Exhibit 20-1.

EXHIBIT 20-1

THE BETHESDA SYSTEM 2001 TERMINOLOGY

I. SPECIMEN ADEQUACY
1. Satisfactory for Evaluation (describe presence or absence of endocervical/transformation zone component and any other quality indicators; eg, partially obscuring blood, inflammation)
2. Unsatisfactory for Evaluation
   - Specimen rejected/not processed
   - Specimen processed and examined, but unsatisfactory for evaluation of epithelial abnormality because of (specify reason)

II. GENERAL CATEGORIZATION (optional)
1. Negative for Intraepithelial Lesion or Malignancy
2. Epithelial Cell Abnormality (see "Interpretation/Result")

III. INTERPRETATION/RESULT
1. Negative for Intraepithelial Lesion or Malignancy
   A. Organisms
      - *Trichomonas vaginalis*
      - Fungal organisms morphologically consistent with *Candida* species
      - Shift in flora suggestive of bacterial vaginosis
      - Bacteria morphologically consistent with *Actinomyces* species
      - Cellular changes consistent with herpes simplex virus

   B. Other Nonneoplastic Findings—Reactive cellular changes associated with:
      - Inflammation (includes typical repair)
      - Intrauterine contraceptive device (IUD)

2. Epithelial Cell Abnormalities
   A. Squamous Cell
      (1) Atypical squamous cells (ASC)
         - of undetermined significance (ASC-US)
         - cannot exclude high-grade squamous intraepithelial lesion (HSIL) (ASC-H)

      (2) Low-grade squamous intraepithelial lesion (LSIL)—encompassing: HPV/mild dysplasia/cervical intraepithelial neoplasia grade 1 (CIN-1)
      (3) High-grade squamous intraepithelial lesion (HSIL)—encompassing: moderate and severe dysplasia, carcinoma in situ (CIS)/CIN-2 and CIN-3 with features suspicious for invasion
      (4) Squamous cell carcinoma

   B. Glandular Cell
      (1) Atypical glandular cells (AGC)
      (2) Atypical glandular cells, favor neoplastic
         - Endocervical cells, favor neoplastic
         - Glandular cells, favor neoplastic

      (3) Endocervical adenocarcinoma in situ
      (4) Adenocarcinoma

IV. AUTOMATED REVIEW AND ANCILLARY TESTING (include as appropriate)

V. EDUCATIONAL NOTES AND SUGGESTIONS (optional)

HPV: human papillomavirus

Adapted from: National Cancer Institute. Bethesda System 2001 terminology. Available at: http://bethesda2001.cancer.gov/-terminology.html (also at: http://www.cancer.gov). Accessed December 6, 2005.

TABLE 20-4

COMPARISON OF DIFFERENT CYTOLOGICAL CLASSIFICATIONS

Classification	——————Increasing Severity——————>					
Dysplasia	Atypia	HPV	Mild dysplasia	Moderate dysplasia	Severe dysplasia	Carcinoma in situ
Cervical intraepithelial neoplasia	Atypia	HPV	CIN-1	CIN-2	CIN-3	
Bethesda	ASCUS	LSIL		HSIL		

HPV: human papillomavirus
CIN: cervical intraepithelial neoplasia
ASCUS: atypical squamous cells of undetermined significance
LSIL: low-grade squamous intraepithelial lesion
HSIL: high-grade squamous intraepithelial lesion
Data source: Jay N, Moscicki A-B. Human papilloma virus infection in women. In: Goldman MB, Hatch MC, eds. *Women and Health*. San Diego, Calif: Academic Press; 2000: 324–326.

However, different cytology system classifications are often used interchangeably. Table 20-4 compares different cytology classification systems.[52]

Management

Pap smears reported as unsatisfactory for evaluation can result from of a variety of conditions, such as insufficient cell quantity, poor specimen, air-drying artifact, or no endocervical cells present. These Pap smears should be repeated in 1 to 3 months.

Endometrial cells noted on the Pap smear may be normal if the patient is near her menses or if she is using oral contraceptives or an intrauterine device. If none of these conditions is apparent, the patient should be recalled and evaluated for endometrial pathology.

If the protozoal parasite *Trichomonas vaginalis* is seen on the Pap smear, the patient should be recalled for treatment and for further STI screening (if not already performed). Remind the patient that she should inform her partner of her STI diagnosis and that the partner should also be treated.

Yeast on the Pap smear does not necessarily imply clinical disease. Review the chart; if there are no symptoms, there is no need to follow-up until the next routine Pap smear visit.

Inflammation or obscuring inflammation prompts concern. Either of these conditions could be the result of something benign (eg, recent coitus) or something needing more immediate attention (eg, a subclinical infection). A patient with inflammation or obscuring inflammation should be recalled for additional testing (eg, for *C trachomatis, Neisseria gonorrhoeae,* and herpes simplex type 2) if the endocervical cells on the Pap smear are obscured by sheets of inflammatory cells. If not, repeat the Pap smear in 1 to 3 months.

Atypical squamous cells of undetermined significance (ASCUS) require follow-up in 4 to 6 months, although the high rate of regression among young women allows some latitude in management options (Table 20-5). If

TABLE 20-5

MANAGEMENT OPTIONS FOR ASCUS CYTOLOGY IN WOMEN LESS THAN 30 YEARS OF AGE

Cytology Method	Management	Result: Course of Action	
Pap	Repeat Pap in 4–6 mo	*Negative*: Repeat in 6 mo	*Negative*: Return to routine screening
			Positive: Refer for colposcopy
		Positive (ASCUS or worse): Refer for colposccopy	
LBC	Reflex testing	*Negative for high-risk HPV*: Return to routine screening	
		Positive for high-risk HPV: Refer for colposcopy	
Either Pap or LBC, if patient is high-risk (multiple partners) and follow-up is questionable	Refer directly for colposcopy		

ASCUS: atypical squamous cells of undetermined significance
HPV: human papillomavirus
LBC: liquid-based cytology

the healthcare provider feels confident that the patient will return for a repeat examination and laboratory tests, then that is the recommended course of action when a traditional Pap smear has been obtained. The risk of a patient having either LSIL or high-grade squamous intraepithelial lesion (HSIL) is increased among those whose Pap smear is classified as ASCUS. Therefore, follow-up is very important. If the subsequent Pap smear is negative, then a repeat test should be performed in 6 months. Two consecutive normal Pap smears allow young women to return to routine screening. But if the second Pap test is also classified as ASCUS, then referral for colposcopy is indicated.

An alternative management option for an ASCUS result consists of using reflex HPV testing if LBC was used for cytology screening. The laboratory retains the fixative from the ThinPrep LBC and will perform reflex testing on the fixative for high-risk HPV types. The sensitivity of HPV DNA testing for detecting CIN-2 and CIN-3 is between 83% and 100%, which is higher than repeat cytology performed by the traditional method. If the test is positive for high-risk HPV DNA, the woman should be referred for colposcopy. If the test is negative for high-risk HPV, then the woman can return for a repeat Pap test in 12 months. All patients with atypical squamous cells identified as ASC-H (HSIL cannot be excluded) should be referred for colposcopical evaluation.

Finally, if the patient is high risk (having multiple partners and being unlikely to return for a follow-up Pap test), then direct referral to colposcopy is indicated with the first ASCUS result.

Of women whose cytological examination demonstrates LSIL, 15% to 30% will have CIN-2 or CIN-3 on colposcopical directed biopsies.[46] Therefore, most women with LSIL on cytological examination should be referred for colposcopy. Most biopsy-demonstrated CIN-1 will regress over time, allowing customized management of this condition. Options may include repeat cytological and colposcopical examination or HPV DNA testing in 6 to 12 months. Treatment of CIN-1 with cryotherapy, laser vaporization, or loop electrosurgical excision procedure is usually reserved for women with persistent disease. Reflex HPV testing is not recommended in the treatment algorithm for LSIL, because studies have shown that 83% of the tests will be positive for high-risk HPV.[53]

For any woman whose cytological examination demonstrates HSIL, the indication is that she has moderate or severe dysplasia, CIN-2, CIN-3, or carcinoma in situ. Therefore, she requires colposcopical examination and directed biopsy. Biopsy results give accurate histological diagnoses and extent of the lesion. Treatment is generally recommended for all CIN-2 and CIN-3 lesions. Treatment options include cryotherapy, laser vaporization, and loop electrosurgical excision procedure. Recurrent lesions may require multiple treatments.

Atypical glandular cells of undetermined significance (AGCUS) are much rarer than ASCUS on cytological examination. Unlike women with ASCUS, a significant percentage of women with AGCUS will have more serious lesions, such as high-grade preinvasive squamous disease, adenocarcinoma in situ, adenocarcinoma, or invasive cancers from sites other than the cervix. Colposcopical examination is recommended for all women with a cytological diagnosis of AGCUS.[54]

Atypical endocervical cells are also far less frequent than their squamous cell counterparts. These cells arise from the columnar epithelial lining the endocervix and are important in sampling and obtaining endocervical cells when performing a Pap smear. HPV has also been associated with these lesions. Patients with lesions of this kind should be referred to the gynecology service for evaluation.

URINARY TRACT INFECTIONS

Urinary tract infections account for approximately 7 million physician office visits per year.[55] These infections can pose significant challenges in the female recruit population. Urinary tract infections are typically divided into upper and lower tract infections. Young, healthy, premenopausal women like recruits will typically have infections limited to the lower tract. Cystitis, infection of the bladder, is the most common urinary tract infection and will be the focus of this section of the chapter.

Recruits with cystitis may present with a history of an acute onset of dysuria, frequency, and urgency that may be associated with suprapubic or low back pain. The presence of fever, nausea or vomiting, and costovertebral angle tenderness may suggest upper tract infection.

Sexual intercourse, spermicide use, incomplete bladder emptying, history of previous urinary tract infection, and history of urologic surgery are known risk factors that may predispose someone to urinary tract infections.[56,57] Alterations in behavioral factors such as personal hygiene, fluid consumption, and voiding patterns are believed to be risk factors but have not been studied in randomized clinical trials.

Cystitis is typically caused by bacterial organisms found in the gastrointestinal tract that ascend into

the bladder. *Escherichia coli* accounts for approximately 80% of uncomplicated urinary tract infections. *Staphylococcus saprophyticus*, *Proteus mirabilis*, *Klebsiella* species, and *Enterococcus* species are other pathogens known to infect the urinary tract.[58]

All presenting recruits should undergo a comprehensive history and focused physical examination. Providers should attempt to illicit pertinent historical data that might help to narrow the differential and to distinguish between gynecologic and urological disorders. A pelvic examination should be performed to help aid in the assessment. A dipstick urinalysis is a useful and inexpensive screening test. The presence of nitrites and leukocyte esterase are suggestive of the presence of a urinary tract infection. All presumed cystitis should be confirmed with a urine culture so that treatment can be tailored to the appropriate microorganism.

Most uncomplicated cases of bacterial cystitis can be effectively treated with single dose or 3-day courses of antibiotics. Amoxicillin, nitrofurantoin, cephalexin, trimethoprim-sulfamethoxazole, ciprofloxacin, and levofloxacin can be prescribed for effective therapy.[58-60] If the recruit fails to respond to therapy, a repeat urine culture should be obtained, and the antibiotic regimen should be adjusted as appropriate.

CONTRACEPTION

Nearly half of all pregnancies in the United States are unplanned. The percentage increases to nearly 90% among US adolescents.[47] These statistics should encourage women's healthcare providers to remain familiar with contraception and to constantly inform patients about the many options available. One of the primary reasons for initiation of contraception is to avoid an unwanted pregnancy. During recruit training, sexual intercourse and the sequelae of having unprotected intercourse theoretically should not be an issue; however, this time period allows for education and possible initiation of contraception. This chapter will provide a general overview of the contraceptive options that are available in the United States, with emphasis on the variety of delivery systems (a comprehensive review of every available contraceptive option is beyond the scope of this chapter).

OCs are the most commonly used form of reversible contraception in the United States.[61] The reported typical use failure rate of OCs is approximately 8%.[62] Patient motivation for pill compliance plays a significant role in the efficacy of this delivery method. Pill noncompliance can result in contraceptive failure as well as dysfunctional uterine bleeding. Traditional OCs provide 3 weeks of hormonally active pills followed by 1 week of placebo pills. For the recruit who prefers not to have monthly menstrual cycles, a relatively new OC may be a viable option. Ethinyl estradiol/levenorgestrel (Seasonale [Duramed Pharmaceuticals Inc, Cincinnati, Ohio]) provides 12 weeks of hormonally active pills instead of the traditional 3 weeks.[63] As with the initiation of all OCs, patients must be counseled about the risks of AUB during the first few months of therapy.

The contraceptive patch Ortho Evra (Ortho-McNeil Pharmaceuticals Inc, Raritan, NJ) provides the traditional OC hormones via a transdermal delivery system. Patches are applied weekly for 3 weeks, followed by a patch-free week, which marks the initiation of the monthly menstrual cycle.[64] Perfect use failure rates approach 1%. Local skin irritation may be an issue.

Another delivery system that recruits may find attractive is the contraceptive ring. NuvaRing (Organon USA, Roseland, NJ) provides the traditional OC hormones via a vaginal ring. A ring is placed into the vagina for 3 weeks, followed by a ring-free week, which the initiation of the monthly menstrual cycle.[65,66] Perfect use failure rates are less than 5%.

Depo-Provera (medroxyprogesterone acetate [Pfizer, New York, NY]) is a highly effective injectable contraceptive option for recruits who prefer an intramuscular injection every 3 months or who are noncompliant with OCs. Typical use failure rate is less than 1%.[62] AUB has been sited as a potential side effect of this option. The recruit should also be counseled about reversible declination in bone mineral density. However, no direct correlation of bone mineral density to orthopedic fractures has been found in this population, and providers should not let this concern deter them from prescribing Depo-Provera.[67,68]

Intrauterine devices (IUDs) may be the option for recruits looking for long-term reversible contraception. Traditionally, this option has been reserved for parous women in a monogamous relationships; however, nulliparity is not a strict contraindication for prescribing this form of contraception. There are currently two types available, hormone-secreting and non–hormone-secreting.[69] The typical use failure rate for both devices is less than 1%. The Mirena IUD (Berlex Inc, Montville, NJ), which secretes levonorgestrel, is the first intrauterine delivery system of its kind. The copper T and Mirena IUDs provide effective contraception for 10 and 5 years, respectively.

In summary, the female recruit has a large variety of contraceptive options available for use. Healthcare providers should not initiate contraception without

intense recruit education about STIs and disease prevention. Patients should understand the risks, benefits, and alternatives to the chosen contraceptive option.

PREGNANCY COUNSELING

If a recruit thinks she is pregnant, she should go to the military treatment facility for a pregnancy test. Once her condition is confirmed by a positive pregnancy test, the healthcare provider will prepare a pregnancy profile for the soldier, which she must then provide to her commander. After the soldier informs the unit commander of a medically confirmed pregnancy test, a pregnancy counseling session should take place as soon as possible. Although the counseling session is typically performed by the company commander, the healthcare provider may be consulted. This consultation can avert misunderstandings, indecision, and potential problems.

A standard checklist, shown in Figure 8-1 of Army Regulation 635-200, *Active Duty Enlisted Administrative Separations*,[36] is often used during the pregnancy counseling session. Supplemental information for pregnancy counseling is available in USACHPPM Technical Guide 281B, *A Soldier's Guide to Female Soldier Readiness*.[70]

RECRUITS WITH CHILDREN

Soldiers can enter the Army with children only in accordance with Army Regulation 601-210, *Regular Army and Army Reserve Enlistment Program*, chapters 2 through 9.[33] Single parents are allowed to enlist only if they do not have custody of dependents. They are required to execute DA Form 3286-69, "Statement of Understanding for Persons Having Dependents in the Custody of Another," stating that they do not intend to regain custody after enlistment. If prospective recruits are married, various dependency requirements make them ineligible for enlistment.[33] Soldiers are not allowed to bring their children with them during basic or advanced individual training. All married soldiers with children are encouraged to complete and maintain a DA Form 5305-R, "Family Care Plan," even if they are not required to do so by Army Regulation 600-20, *Army Command Policy*, chapter 5.[71] The plan assists the spouse, next-of-kin, and commander in the event that the spouse is unable to care for the dependent family member. The US Marine Corps,[35] Air Force, and Navy also have similar policies regarding recruits with children.

Medical professionals need to be prepared to assess and deal with the stress of soldiers separated from their children. These psychological and emotional concerns can make soldiers more fragile, and may be evidenced particularly with female recruits. In some cases, referral to community mental health for counseling and treatment is required. In severe cases, the soldier may access the medical system for discharge.

CONCLUSION

The female military recruit is a vital component to US military services. The importance of providing optimal healthcare to this population can not be minimized. The female recruit may manifest unique variations of common adolescent and adult gynecologic conditions. Healthcare providers are encouraged to use the data presented in this chapter in combination with subspecialty consultation as appropriate.

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