WILDERNESS & ENVIRONMENTAL MEDICINE 2023; 34(2): 201–10

CONCEPTS

First-Trimester Pregnancy: Considerations for Wilderness and Remote Travel CME

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Women increasingly participate in outdoor activities in wilderness and remote environments. We performed a literature review to address diagnostic and therapeutic considerations during first-trimester pregnancy for remote multiday travel. Pretrip planning for pregnant patients traveling outside access to advanced medical care should include performing a transvaginal ultrasound to confirm pregnancy location and checking D rhesus status. We discuss the risk of potential travel-related infections and recommended vaccinations prior to departure based on destination. Immediate evacuation to definitive medical care is required for patients with a pregnancy of unknown location and vaginal bleeding. We propose algorithms for determining the need for evacuation and present therapeutic options for nausea and vomiting, urinary tract infections, and candidiasis in the field.

Keywords: pregnant, vaginal bleeding, traveler, nausea and vomiting, women, remote medicine

Introduction

Women participate in extreme activities in remote and wilderness locations. They comprised 41% of trekkers in the Everest region in 2014[1] and, according to a US outdoor industry survey, made up 46% of outdoor activity participants in 2019.[2] Between 2014 and 2017, 41% of rescues by Seattle Mountain Rescue were for women.[3] Pregnant individuals partake in many outdoor activities, including hiking, mountain biking, rock climbing, skiing, snowboarding, sailing, diving, kayaking, surfing, stand-up paddling, and others, but may receive little advice from their healthcare advisers regarding these activities.[4]

It has been reported that 45% of pregnancies in the United States are unintended[5]; consequently, a person may not be aware of a current pregnancy when embarking on a wilderness trip. Wilderness providers and trip leaders need to be prepared to address medical concerns in travelers with a known or newly discovered early pregnancy. This literature review addresses common potential emergencies for pregnant travelers on multiday trips in the wilderness and other remote environments prior to 14 wk of gestation. Although women constitute most individuals who become pregnant and give birth, our aim is to provide helpful information pertaining to all pregnant persons.

Methods

We identified medical considerations in the first trimester of pregnancy and performed a literature review using PubMed and Cochrane Library, along with a targeted search for wilderness and travel-specific references. We identified original research where the evidence was directly applicable or could be extrapolated to practice in remote settings. Abstracts and non-English manuscripts were excluded.

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Submitted for publication March 2022.

Accepted for publication December 2022.

https://doi.org/10.1016/j.wem.2022.12.001

Pretrip Recommendations

Pretravel planning for expeditions, specifically extended travel into remote areas, must consider the needs of individual travelers, including issues around pregnancy. If a sexually active premenopausal traveler is embarking on a multiday wilderness trip, they should consider performing a pregnancy test before departure. A negative test, however, does not eliminate the risk of first-trimester pregnancy during travel. Early during pregnancy, urine human chorionic gonadotropin (hCG) testing may be negative before hormone levels rise adequately. A previous study reported a urine hCG test maximum sensitivity rate of 90% on the first day vs 97% 1 wk after a missed period.[6] For those taking oral contraceptives, travel disruptions, including illness, lost or missing medication in luggage, and changes in time zones, may impair adherence, increasing the risk of unintended pregnancy. Rapid urine hCG tests are essential in medical travel kits. If an individual is unable to provide a urine sample, several drops of blood can serve as a substitute for these tests.[7]

PRETRIP PLANNING IN PREGNANT TRAVELERS

Pretrip travel planning is important for pregnant patients, especially for those engaging in remote and more physically demanding travel. We recommend that travelers with a known pregnancy seek medical care prior to departure for any extended travel or travel to remote locations. Participants should investigate local resources at their destination and have an evacuation plan to reach definitive medical care. We recommend evacuation insurance for all pregnant travelers. The safety of remote travel during pregnancy may vary with individual risk factors such as age, medical history, conception method (in vitro fertilization or intrauterine insemination), and individual risk tolerance.

We recommend a first-trimester transvaginal ultrasound to determine the location of the pregnancy prior to departure for any remote or multiday travel. If an intrauterine pregnancy (IUP) is confirmed, the risk of complications occurring during travel decreases. Individuals with early pregnancy of unknown location with bleeding or pain should not travel and should be referred immediately for definitive medical care. Low risk, asymptomatic pregnant participants may consider delaying travel to remote locations with poor access to medical care until an IUP can be confirmed at approximately 6 wk of estimated gestational age. We recommend that those at high risk of ectopic pregnancy (Table 1) do not travel to remote locales until an IUP is confirmed. Practitioners should advise against travel and address ectopic pregnancies immediately when suspected.

Table 1. Risk factors for ectopic pregnancy

Previous ectopic pregnancy	Assisted reproductive technology pregnancy
Previous fallopian tube surgery	Endometriosis
Previous pelvic or abdominal surgery	Smoking
History of pelvic inflammatory disease	Age > 35 y
History of infertility	Intrauterine device

All patients, especially those at high risk of fetal genetic disorders, such as advanced maternal age or a personal or family history of genetic diseases, may want to arrange the travel timing to accommodate fetal genetic testing, typically performed between 10 and 14 wk.

Blood type and D rhesus (RhD) status should be determined if not already documented. RhD-negative pregnant individuals should be counseled on the increased risk of RhD alloimmunization if they do not receive RhD immune globulin within 72 h of vaginal bleeding during pregnancy. During alloimmunization, anti-RhD antibodies develop, which may cause severe fetal anemia or death in subsequent pregnancies.[8] If RhD-negative pregnant travelers have vaginal bleeding, they should seek care at a facility with RhD immune globulin within 72 h.

NONGENITOURINARY INFECTIONS DURING TRAVEL

Travelers early in pregnancy should be counseled about the risks of mosquito-borne diseases. Zika is a teratogenic infection initially reported in a large epidemic throughout French Polynesia in 2013 and spread extensively during 2015. Zika infection during pregnancy can result in developmental abnormalities in the fetus, including microcephaly and central nervous system lesions.[9] This risk decreases as pregnancy progresses, with the reported highest risk (8%) in the first trimester, which gradually decreases to 4% in the third trimester.[9] Although most pregnant patients infected with Zika will have a mild or asymptomatic clinical course, the developing fetus can still be affected.[10] The risk of contracting Zika depends on multiple factors, including the local prevalence of Zika and the patient's exposure risk. Prevention primarily involves mosquito control measures,[11] which include wearing protective clothing, using mosquito repellants, staying indoors during heavy biting times, and sleeping

under bed netting. The US Centers for Disease Control and Prevention (CDC) recommends Environmental Protection Agency–registered insect repellents (N,N-diethyl-meta-toluamide (DEET), picaridin, insect repellent 3535, oil of lemon eucalyptus, or paramenthanediol) that are safe during pregnancy. Permethrin-treated clothing is also recommended. No adverse effects have been noted with topical permethrin use in pregnant patients.[12] Pregnant individuals or those desiring pregnancy should avoid travel to areas where Zika is prevalent.[13]

Malaria is a parasitic infection transmitted by the *Anopheles* mosquito, infecting millions of people worldwide annually. Pregnant individuals infected with malaria have increased morbidity and mortality and experience high risks of intrauterine demise, miscarriage, low-birth-weight neonates, premature delivery, and neonatal death.[14] Malaria is the leading infectious cause of fetal growth restriction worldwide.[15] Patients should be counseled about the risks of malaria during pregnancy and encouraged to take appropriate protection measures, including deferring travel if possible. If they are unable to defer travel, chemoprophylaxis and mosquito avoidance are recommended. The optimal antimalarial agent for prevention depends on regional transmission, drug resistance patterns, and patients' characteristics. For travel to chloroquine-sensitive areas, the agent of choice during pregnancy is chloroquine, and for travel to areas with chloroquine-resistant malaria, mefloquine is commonly used.[16] Doxycycline carries a risk of skeletal or dental malformation, and primaquine has a risk of severe hemolysis in glucose-6-phosphate dehydrogenase–deficient individuals, so both drugs should be avoided during pregnancy.[17] The mosquito avoidance measures previously mentioned should be taken.

Travelers' diarrhea is common during international travel, with the most common bacterial agents being *Escherichia coli*, *Campylobacter*, *Salmonella*, and *Shigella*. Norovirus and rotavirus dominate the viral landscape, whereas exposure to contaminated water can result in *Giardia intestinalis* and *Cryptosporidium* infections.[18] We recommend prompt oral hydration and use of azithromycin over fluoroquinolones during pregnancy because of an improved safety profile.[19,20] Rifamycin is used as an alternative treatment for noninvasive travelers' diarrhea. There is evidence demonstrating a decrease in systemic exposure of oral contraceptives with rifamycin use, but its safety in pregnancy is unknown,[21] and therefore, it is not recommended. The US Food and Drug Administration recommends avoiding bismuth subsalicylate during pregnancy but considers loperamide safe.

Nausea during pregnancy, combined with gastrointestinal losses due to travelers' diarrhea, places pregnant patients at a high risk of dehydration. Hydration status should be closely monitored. Management of nausea and vomiting is discussed below. Travelers and expedition leaders should ensure that they carry appropriate antimicrobials that are safe during pregnancy in their medical kit (Table 2).

VACCINATIONS DURING PREGNANCY

Many pregnant patients worry about the safety of vaccinations during pregnancy. Individuals who are planning a pregnancy should complete all age-based CDC-recommended vaccinations before becoming pregnant. Vaccinations during pregnancy should be considered when there is a high possibility of exposure to an infection that could harm the traveler or fetus and the vaccine is unlikely to cause adverse effects.[22] Regardless of destination, pregnant people should be encouraged to get an annual influenza vaccine and complete their coronavirus disease 2019 vaccine series and boosters based on current CDC guidance. Live attenuated virus vaccines, such as typhoid (oral) and yellow fever, are traditionally contraindicated during

Table 2. Antimicrobials for pregnant adventurers

Infection	*Medication*	*Dose (mg)*	*Frequency*	*Avoid*
Malaria prophylaxis	Chloroquine	300 base (500 salt)	Weekly	Doxycycline
	Mefloquine[a]	228 base (250 salt)	Weekly	Primaquine
Travelers' diarrhea	Azithromycin	1000	Once	Fluoroquinolones
Urinary tract infection	Amoxicillin	500 or	8 h	Fluoroquinolones
		875	12 h	
	Cephalexin	250 to 500	6 h	Sulfamethoxazole
	Nitrofurantoin[b]	100	12 h	Trimethoprim
Candidiasis	Clotrimazole	100	Daily	Fluconazole
	Miconazole (Vag supp)	200	Daily	

Vag supp, vaginal suppository.
[a]In chloroquine-resistant areas.
[b]In patients with anaphylaxis to penicillin.

pregnancy because of a theoretical risk of crossing the placenta and causing a viral infection in the fetus.[23] Pregnant people can receive a typhoid (injectable) polysaccharide vaccine when needed, but safety and efficacy studies have not been performed in pregnant individuals.[22] There are no large, prospective trials evaluating the risks of yellow fever vaccination in pregnancy; however, retrospective[24] and observational[25] studies support no association between vaccination during pregnancy and adverse outcomes. The World Health Organization recommends yellow fever vaccination when the risks of yellow fever infection outweigh the risks of vaccination, including unavoidable travel to an endemic area.[26] We recommend that patients seek counsel from a travel medicine specialist to discuss the need for other vaccines during pregnancy (Table 3).

Table 3. Travel vaccinations during pregnancy

Vaccine	*Type*	*Recommendation*
COVID-19	Messenger RNA Viral vector	Messenger RNA preferred over viral vector vaccines
Hepatitis A	Killed	If traveling to highly endemic areas
Influenza (injection)	Killed	Recommended annually
Influenza (nasal)	Live attenuated	Contraindicated
Japanese encephalitis	Killed	Consider when traveling to highly endemic areas. Discuss with travel physician
Meningococcal (MenACWY)	Conjugated	Recommended
(MenB)	Recombinant	Postponed until after pregnancy unless outbreak reported
Rabies	Killed	If high risk of rabies exposure Pre-exposure and postexposure prophylaxis safe
Typhoid (injection)	Killed	Avoid unless high risk of exposure
Typhoid (oral)	Live	Contraindicated
Yellow fever	Live attenuated	Consider if benefits outweigh risks

COVID-19, coronavirus disease 2019; MenACWY, Meningococcal serogroups A, C, W, and Y; MenB, Meningococcal serogroup B; RNA, ribonucleic acid.

First-Trimester Bleeding

Early pregnancy bleeding has been reported to affect approximately 27% of pregnancies.[27] There are many causes of vaginal bleeding and pelvic discomfort during the first trimester, including normal gestation, early pregnancy loss, ectopic pregnancy, threatened miscarriage, and molar pregnancy.[28] Evacuation may not be required for all pregnant individuals who develop bleeding in the wilderness, but assessing risk is mandatory (Figure 1). A pretrip ultrasound that confirms an IUP provides reassurance against ectopic pregnancy. Assessment is more challenging for those without a prior confirmatory ultrasound or who are unaware that they are pregnant. Bleeding in these cases may represent an emergency requiring evacuation. Anyone with the potential to be pregnant who develops abdominal pain in the wilderness should have a urine hCG test performed and confirm the last menstrual period (LMP), defined as the first day of bleeding from the most recent period.

The severity of bleeding should be determined. Heavy bleeding is often defined as soaking through 1 to 2 large pad(s) or tampon(s) every hour for 2 h in a row.[28] A full menstrual cup is approximately equivalent to 2 saturated tampons. Menstrual cups often have measurements allowing for quantification of volume. Individuals with significant bleeding should be evacuated to mitigate risk of hemorrhage, which could lead to anemia, hypovolemia, shock, or death.

Early pregnancy ultrasound helps rule out ectopic pregnancy and should be performed in the field when available. Transabdominal ultrasound has lower sensitivity during early pregnancy than transvaginal ultrasound, which is often not available in remote settings. Identification of an intrauterine gestational sac with either a yolk sac or an embryo is required to diagnose an IUP. Fetal heart activity (FHA) confirms viability, but if assessed using transabdominal ultrasound, failure to detect FHA does not necessarily indicate a nonviable pregnancy.

Although mild cramping in the first trimester can be normal, ectopic pregnancy must be excluded for anyone with abdominal pain or pelvic pain and a positive pregnancy test result without confirmed IUP. If ultrasound is not available at the time of early pregnancy diagnosis in the field, any vaginal bleeding or pain should prompt evacuation to a medical facility with these capabilities as soon as possible. Quantitative β-hCG and other laboratory diagnostic tools used in clinical settings are unlikely to be available in most remote environments.

ECTOPIC PREGNANCY

An ectopic pregnancy is at risk of rupture within the abdomen, which can lead to severe occult bleeding that may not be recognized in the field until the patient has

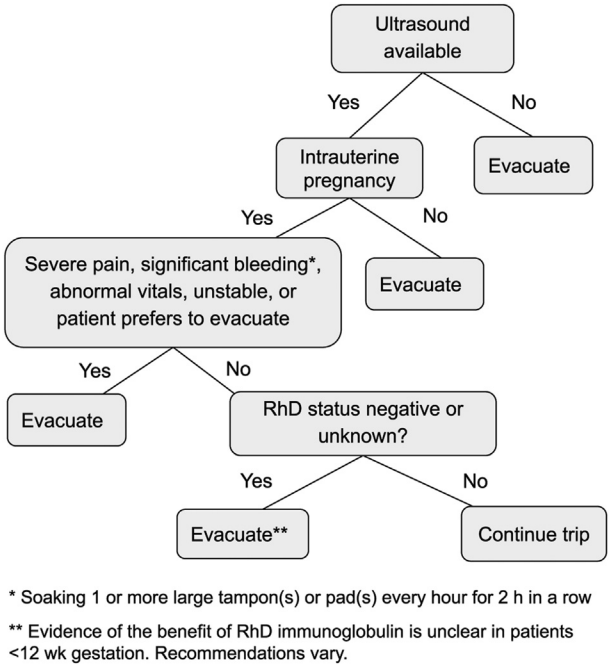

Figure 1. Evaluation of pregnant patients with abdominal pain or vaginal bleeding during the first trimester in a remote setting. RhD, D rhesus.

already experienced substantial, life-threatening blood loss. An ectopic pregnancy occurs when a fertilized egg implants in a structure outside of the uterine cavity. Patients with an ectopic pregnancy may report pelvic or abdominal pain, missed menses, or vaginal bleeding. Syncope, lightheadedness, referred shoulder pain, urinary symptoms, rectal pressure, or other gastrointestinal symptoms may be present. On examination, abdominal, pelvic, adnexal, or cervical motion tenderness may be present. Peritoneal signs, tachycardia, hypotension, pallor, or abdominal distention are also concerning findings.[29,30]

Ultrasound findings that may indicate an ectopic pregnancy include empty uterus, fluid collection within the uterine cavity (pseudosac), or free fluid. The absence of a mass does not rule out ectopic pregnancy.[31] Although heterotopic pregnancy is rare, the adnexa should also be evaluated, even when an IUP is identified. Given the limitation of diagnostics in the wilderness environment, one should err on the side of caution and evacuate any pregnant person with a suspected ectopic pregnancy. Patients with an intrauterine device who discover that they are pregnant should be evacuated immediately regardless of symptoms because there is a high likelihood of an ectopic pregnancy.[32,33]

EARLY PREGNANCY LOSS

Early pregnancy loss (EPL), also referred to as miscarriage or spontaneous abortion, is defined as a nonviable IUP with either an empty gestational sac or a gestational sac containing an embryo or fetus without FHA prior to 13 completed weeks of gestation.[29] Pregnancy loss is most common during the first trimester.[34] Prior EPL and advanced maternal age are risk factors for EPL, and rates of EPL rise with increasing maternal age.[35]

Diagnosing EPL in remote environments may be appropriate if there was a previously confirmed viable IUP on ultrasound, followed by vaginal bleeding, and subsequent ultrasound imaging revealing an empty uterus (complete miscarriage) or an IUP without FHA (missed or incomplete miscarriage) (Figure 2). Transvaginal ultrasound confirmation is the most reliable imaging method but is unlikely to be available in the wilderness setting. The LMP may not accurately represent gestational age because of variation in menstrual cycle length; therefore, LMP alone should not be used to determine whether FHA is expected.[29] Wilderness providers should be cautious to diagnose EPL based on an initial field transabdominal ultrasound without a prior confirmed viable IUP, because they could misdiagnose an ectopic pregnancy or an early viable pregnancy that does not yet meet radiographic criteria. This is particularly relevant when the equipment quality or sonographer's experience are limited. When available, remote telemedicine consultation should be considered to review images. If ultrasound is not available to confirm EPL, the patient should be evacuated.

A patient who has passed products of conception, has an empty uterus on subsequent ultrasound (complete miscarriage), and has minimal to no bleeding does not require medical evacuation and may desire to remain in the wilderness environment. Providers should recognize the need for grief management and the potential desire to be evacuated even if a physical complication is unlikely following a complete miscarriage. A person with a complete miscarriage, with significant bleeding, should be evacuated.

In the clinical environment, missed or incomplete miscarriages can be treated with expectant, medical, or surgical management. It is difficult to predict when and if significant bleeding and pain will occur in these cases. Expectant management has the potential to pose risks to the patient and group in remote environments, and other options are unlikely to be available. We recommend evacuation for all missed or incomplete miscarriages.

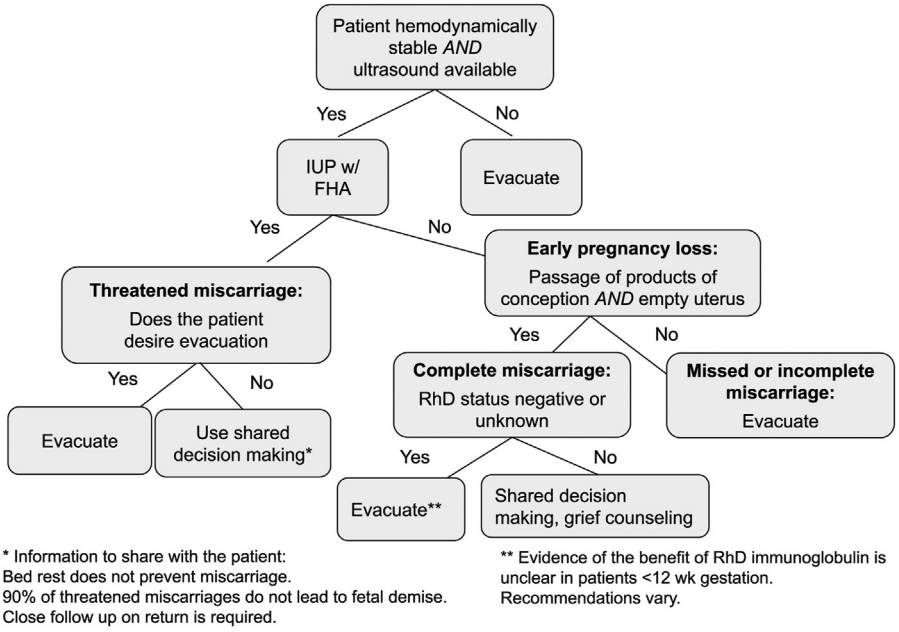

Figure 2. Evaluation of pregnant patients with a previously confirmed intrauterine pregnancy and bleeding during the first trimester in a remote setting. IUP, intrauterine pregnancy; FHA, fetal heart activity; RhD, D rhesus.

THREATENED MISCARRIAGE

A threatened miscarriage is diagnosed in a patient with a confirmed IUP with FHA and vaginal bleeding. It has been reported that over 90% of threatened miscarriages result in viable pregnancies.[36] Light bleeding is not a significant marker of risk of miscarriage, although heavy bleeding is concerning.[28] If bleeding stops, it may be appropriate to continue the current wilderness activity based on the patient's level of comfort and ability to access healthcare facilities if needed. The patient should be evacuated promptly if bleeding worsens. Bed rest does not prevent miscarriages.[37] Proposed strategies for preventing or reducing risk of miscarriage, such as progestogen supplementation, have little supporting data[38] and are not applicable to remote settings.

MEDICATIONS

Ideally, RhD status is known before travel to identify those at risk of alloimmunization. Pregnant patients with vaginal bleeding who are not confident that they are RhD positive should consider evacuation for confirmation of RhD status and potential need for Rho(D) immunoglobulin.[8]

Tranexamic acid is indicated for many severe bleeding scenarios and is often included in expedition medical kits. There are limited case reports on its successful use for hemorrhage in ectopic pregnancies.[39,40] The safety of tranexamic acid regarding birth defects and obstetric complications, including venous thromboembolism, is unclear. Therefore, tranexamic acid should only be used to mitigate severe, life-threatening hemorrhage during early pregnancy when immediate evacuation is not possible or in unstable patients during evacuation. Dosing options include 1 g of tranexamic acid intravenously once (may repeat in 30 min to 1 h if severe bleeding persists) or 1300 mg orally 3 times daily up to 5 d.

Nausea and Vomiting during Pregnancy

When travelers of reproductive age present with nausea and vomiting in a remote environment, pregnancy should be considered. A careful history, including LMP (if known) and use of contraception, should be taken and a pregnancy test performed. Nausea and vomiting may occur in 50% of pregnancies, and typical onset is prior to 9 wk gestational age.[41] Persistent vomiting may represent a condition known as hyperemesis gravidarum, which can present with ≥ 5% body weight loss, abnormalities of electrolytes, liver function tests, and thyroid function tests.[41]

Other causes of nausea and vomiting should still be ruled out (Figure 3). Associated fever, headache, and moderate-to-severe abdominal pain raise concerns for an alternative etiology.[41] Abdominal pain could suggest

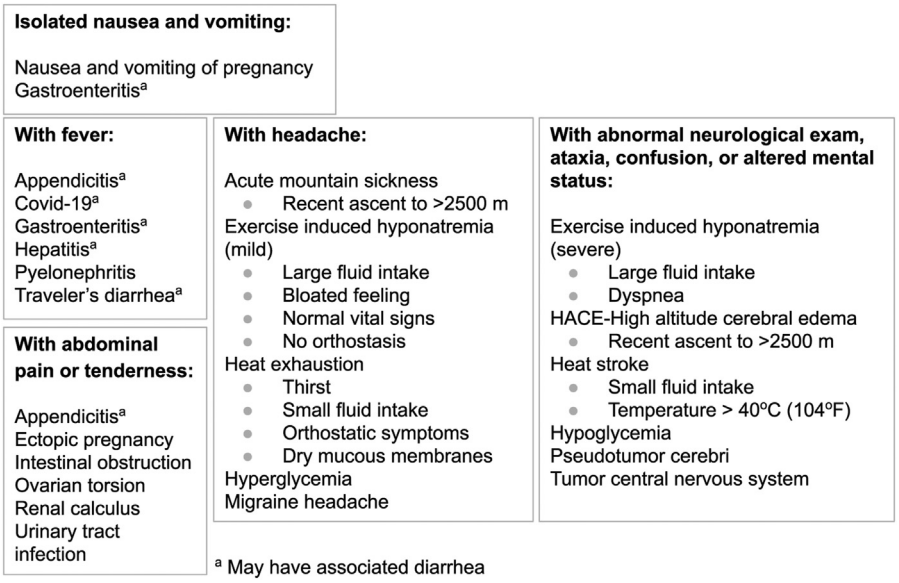

Figure 3. Differential diagnosis of nausea and vomiting during pregnancy.[41-44]

appendicitis, ectopic pregnancy, ovarian torsion, renal calculi, urinary tract infection, or intestinal obstruction.[41] Diarrhea does not usually accompany nausea and vomiting of pregnancy (NVP) and suggests an alternative diagnosis. In individuals who have recently ascended to altitudes >2500 m, nausea and vomiting, accompanied by headache, suggest acute mountain sickness; or if severe and associated with altered mental status or gait abnormalities, suggest high altitude cerebral edema.[42] An abnormal neurological exam does not occur with NVP.[41] Fever may accompany gastroenteritis, appendicitis, hepatitis, or pyelonephritis.[41] Exercise-associated hyponatremia should be considered in those aggressively hydrating with water who develop nausea and vomiting.[43] Activity in high ambient temperatures may lead to heat exhaustion or heat stroke, accompanied by nausea and vomiting.[44] Evaluation of NVP in a remote environment includes assessment of the differential diagnosis, available treatments, and ability of the patient to continue with the trip vs evacuation. Adequate hydration is critical in pregnant patients with nausea and vomiting, regardless of the underlying cause.

If evaluation is consistent with NVP, dietary changes may help, including eating frequent, small meals, avoiding fatty and spicy foods, and eating bland or dry foods (Table 4).[41] Ginger may help with nausea (tea or capsules) but not with vomiting.[45] Acupressure on the inside of the wrist (wrist bands) may be beneficial.[41] Various medications are used, although evidence of their effectiveness is limited.[46] Vitamin B6 with doxylamine is safe and considered first-line therapy for NVP.[47] Diphenhydramine has also been shown to be effective in controlling NVP.[48] Metoclopramide and phenothiazines (promethazine and prochlorperazine) are effective and, in most studies, have not been associated with increased congenital malformations.[48,49] Ondansetron has been used successfully to treat NVP, with insufficient data on fetal safety; however, the absolute risk is believed to be low.[50-52] Ondansetron should not be combined with phenothiazine because of cardiac risk of QT interval prolongation.[41]

Patients with isolated nausea and vomiting may respond to conservative measures or treatment. Mild NVP does not have an adverse effect on the fetus, and some data support an association with a lower risk of miscarriage compared with controls.[53] We recommend evacuation if the patient is unable to tolerate fluids for 24 h or has coffee ground or bloody emesis.

Genitourinary Infections

URINARY TRACT INFECTIONS

Urinary tract infections (UTIs) in pregnant people risk progressing to pyelonephritis because of multiple different physiologic changes during pregnancy and may be associated with preterm birth, low birth weight, and perinatal mortality,[54] as well as a risk of sepsis and maternal death if left untreated. The most common pathogens are *Klebsiella*, *E coli*, and group B streptococcus.[54]

Table 4. Therapeutic options for management of nausea and vomiting during pregnancy[41]

Dietary changes:				
Frequent, small meals *Eat bland and dry foods (toast, dry cereal, crackers)*				
Avoid fatty or spicy foods				
Over-the-counter options:				
Medication	*Dosage (mg)*	*Frequency*	*Route*	*Special notes*
Folic acid alone rather than full prenatal vitamin	0.6	Daily	Oral	Standard 600-microgram dose
Ginger capsules	250	Every 6 h	Oral	
Vitamin B6 (pyridoxine) and/or	10 to 25	Every 6 to 8 h	Oral	
Doxylamine	12.5	Every 6 to 8 h	Oral	
Dimenhydrinate or	25 to 50	Every 4 to 6 h	Oral	WARNING: Do not exceed 200 mg daily if patient also taking doxylamine
Diphenhydramine	25 to 50	Every 4 to 6 h	Oral	
Wrist bands for nausea	-	As needed	Wrist	Ex: Sea-Band, ReliefBand
Prescription medications:				
Medication	*Dosage (mg)*	*Frequency*	*Route*	*Special notes*
Doxylamine or Pyridoxine	10/10 DR (2 tablets) or	At bedtime	Oral	More frequent dosing per pharmaceutical guideline
	20/20 ER	At bedtime	Oral	
Prochlorperazine or	25	Every 12 h	Rectal	Long-term or excess use may cause dystonic reactions
Promethazine	12.5 to 25	Every 4 to 6 h	Oral or rectal	
If symptoms persist:				
Metoclopramide or	5 to 10	Every 6 to 8 h	Oral	WARNING: Do not combine ondansetron with use of prochlorperazine or promethazine
Ondansetron	4	Every 8 h	Oral	

DR, delayed release (Diclegis); ER, extended release (Bonjesta).

UTI symptoms may include burning or pain with urination, urinary frequency, and change in urine smell or color. Urine dipsticks can easily be carried in medication kits to test for infection. If a pregnant individual has symptoms consistent with a UTI, oral antibiotics should be initiated, such as penicillins or first- and second-generation cephalosporins. Amoxicillin and cephalexin are safe during pregnancy.[55] In the case of severe anaphylaxis to penicillins, nitrofurantoin can be used. Patients with symptoms that include fever, flank pain, vomiting, and/or costovertebral angle tenderness[56] require evacuation to a medical center that can evaluate and manage pyelonephritis and sepsis. Pregnant patients with symptoms of a UTI that do not improve in 48 h should be reevaluated and evacuation considered.[57]

CANDIDAL INFECTIONS

Candida vulvovaginitis is a vaginal yeast infection caused by *Candida*. Normally, *Candida* is not pathogenic, but loss of chemical balance, especially hormonal changes during pregnancy, can cause *Candida* to multiply.[58,59] Common symptoms include thick, white vaginal discharge; vaginal itching or soreness; swelling; painful urination; and painful intercourse.[60]

Pregnant patients with symptoms of vulvovaginal candidiasis can use clotrimazole or miconazole creams or suppositories. Common medication side effects include burning, redness, and irritation. While oral azole treatment is commonly used for uncomplicated infections outside of pregnancy, oral treatment during the first trimester is not recommended because of a potential increased risk of miscarriage or birth defects, although data are conflicting.[61,62] Vulvovaginal candidiasis does not require evacuation.

Conclusions

With proper preparation and precaution, remote travel can be safe and appropriate during early pregnancy. We offer considerations for pretrip planning and a practical approach to vaginal bleeding, nausea and vomiting, and

genitourinary infections for pregnant individuals participating in wilderness and remote travel. Research is lacking on pregnancy outcomes and first-trimester exposure to remote and extreme environments. Future investigations are needed to address this important health issue.

Acknowledgments: The authors acknowledge the Wilderness Medical Society Women in Wilderness Medicine Research Committee for creating the space for collaboration on women's health in wilderness environments. The authors thank Hillary E. Davis, MD, PhD, and Jonathan Steller, MD, for their critical revision of the manuscript.

Author Contributions: All authors participated in the concept and design, drafting, critical revision, and final approval of the manuscript.

Financial/Material Support: None

Disclosures: None.

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