2 Tatiana Bennett: Later Postpartum Hemorrhage


Tatiana Bennett, age 26

Objectives

1. Identify current recommendations for Pap screening by patient age.
2. Recognize the diagnostic criteria for polycystic ovarian syndrome.
3. Recognize important risk factors and interventions for late (secondary) postpartum hemorrhage.
4. Distinguish between autosomal recessive and autosomal dominant genetic inheritance.
5. Identify signs of uterine atony and pertinent assessments.
6. Discuss the significance of Rh incompatibility.
7. Explain some of the noncontraceptive benefits of combined oral contraceptives.
8. Contrast true and false labor.
9. Identify infant feeding readiness cues.

Key Terms

Autosomal dominant
Autosomal recessive
Bloody show
Braxton Hicks contractions
Colostrum
Combined oral contraceptive (COC)
Cystic fibrosis
Engorgement
False labor
Orthostatic hypotension
Polycystic ovarian syndrome (PCOS)
Rho (D) immune globulin
Stripping of the membranes
Tay-Sachs disease
Uterine atony

Before Conception

Tati Bennett, who's 26 years old, has a pretty good life with her husband, Caleb. They met in college their senior year and have been together ever since. Tati and Caleb married 2 years ago on the shore of a small lake in her hometown. It rained a little that day, and Caleb said that was good luck. Caleb works as a computer engineer and Tati works for a company that rents out studio space to different artists and craftspeople. They have a Maltese dog named Thor and a black-and-white cat named Jim. Last year they bought a small house with a real picket fence and rose bushes that take turns blooming throughout the summer.

Tati has been on a **combined oral contraceptive** (COC), "the pill," since she was 19, and her menstrual cycle is as regular as clockwork. Before she started the pill, however, she would sometimes go months without getting her period. She did not have her first period until she was 16, long after most of her friends. She'd carried a little more weight than most of her friends for as long as she could remember, and her mother had thought maybe that was why she wasn't getting her period. Her mother was on the heavier side, as well.

A few years after her period finally started, when she was a freshman in college, she noticed that her skin seemed to be greasier than her friends' skin. Most of them had skin that was

getting smoother and clearer as time went on. Once, when she was using a friend's new magnifying mirror, she was horrified to notice spiky, dark hairs on her chin, and even some on her upper lip. She went home to borrow her mother's tweezers and then asked her mother to make an appointment with Elsa, the nurse practitioner she'd been seeing since childhood

Elsa asked her all about her periods, and Tati told her that she sometimes went as long as 4 or 5 months without having one. She thought it was normal because she was still a teenager, but if anything she was getting fewer every year instead of more. She told Elsa about the oily skin and acne, and how she'd found the hairs on her chin and her upper lip, and how she even had some thick, coarse hairs sneaking up from her bikini line toward her belly button. Elsa said she'd like to do some blood tests, but that she was pretty sure Tati had **polycystic ovarian syndrome (PCOS)** (Box 2.1, Fig. 2.1, and Lab Values 2.1).

When all of the lab results were returned, Elsa said that she was confident that Tati had PCOS and that, though they could manage the condition, there wasn't a cure. She said there wasn't good agreement on what caused the condition but that Tati's symptoms were a classic presentation.

The first thing that Elsa recommended was a healthy diet and exercise to get her down to a healthy body mass index (BMI), between 18.5 and 24.9 (Moran, Hutchison, Norman, & Teede, 2011) (see Box 1.5). She explained that this could help reduce the extra male hormones, known as androgens, she had, which could reduce the acne and the extra hair and might help prevent her from developing diabetes in the future. It might also make her periods more regular.

Tati felt embarrassed. She'd never felt so fat or unattractive in her whole life. Here was Elsa telling her that the best thing she could do was lose weight because she had way too much "boy hormone" in her. She wanted to cry.

Box 2.1 Rotterdam Criteria for Diagnosis of PCOS

Two of the following three criteria are required for the diagnosis of PCOS:

- Oligo- or anovulation (either fewer than nine menstrual periods a year or no menstruation is considered evidence of this)
- Clinical and/or biochemical signs of hyperandrogenism (clinical signs may include male-pattern hair growth and acne; biochemical signs would include laboratory test results such as high testosterone level)
- Polycystic ovaries (as seen on ultrasound, polycystic ovaries are enlarged by many cysts; not present in every woman with PCOS)

PCOS, polycystic ovary syndrome.

Adapted from Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group. (2004). Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovarian syndrome (PCOS). *Human Reproduction, 19*, 41.

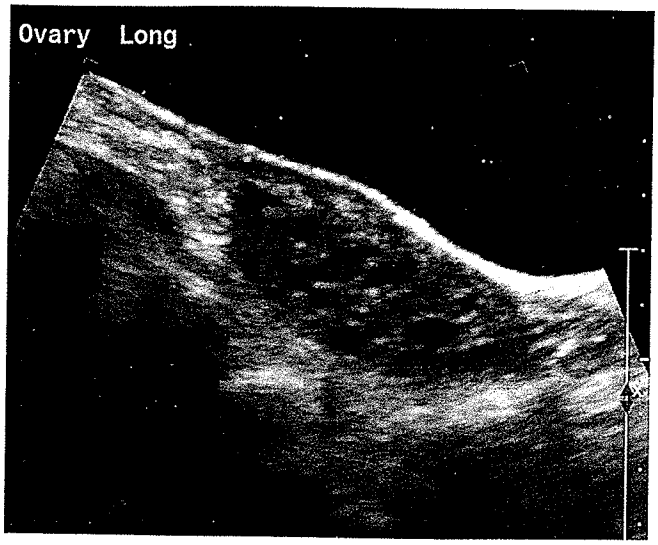

Figure 2.1. Ovarian cysts. Dark circles represent ovarian cysts. Although not independently diagnostic of polycystic ovary syndrome, they are a common finding. (Reprinted with permission from Iyer, R. S., & Chapman, T. [2015]. *Pediatric imaging: The essentials* [1st ed., Fig. 22.14B]. Philadelphia, PA: Lippincott Williams & Wilkins.)

Tati looked up and met Elsa's eye. "I feel like a big, gross blob," she said.

Elsa leaned toward her. "You're not a big, gross blob. You've just got your hormones in a twist. This is good news. We have a diagnosis to work with now. That means we can start to make you healthier."

Next, Elsa said she wanted to put her on a COC, birth control.

"I'm not even sexually active," said Tati. "I broke up with my boyfriend like a year ago and we maybe did it twice. We used condoms," she said quickly.

"I'm glad you're being safe, and as I'm sure you know from your sex education class, condoms are the best way to prevent the transmission of sexually transmitted infections, besides abstinence and regular screening." Elsa said. "But there's actually a couple of reasons I'd like to start you on the pill."

Elsa went on to explain that the pill would help keep her menstrual cycle regular and would also help with the acne and hair issues (Legro et al., 2013) (Fig. 2.2). She also told her that many people think a woman can't get pregnant if she has PCOS and that this wasn't true. Many women with PCOS still ovulate, but it can be a lot harder for them to tell when they're ovulating and thus fertile because of irregular menses (Durain & McCool, 2015).

"You may ovulate only once or twice a year and are fertile for only twenty-four hours each time, but we still have to consider you fertile until proven otherwise," said Elsa.

Tati had watched her mother put on weight as she'd grown older. She knew her mother now took medications for hypertension and high cholesterol. She had a grandmother who had such bad type 2 diabetes that she had to give herself insulin injections. Her father was overweight, and her mother said she thought she had some cousins with PCOS, as well. Tati had gained 12 lb in the first semester of college alone.

Lab Values 2.1 Polycystic Ovary Syndrome

Lab Name	Rationale	Value
Labs to Evaluate for Hyperandrogenism		
Total testosterone	Evidence of hyperandrogenism	For adult women, normal values are 40–60 mg/dL (1.4–2.1 nmol/L). Women with PCOS commonly have values in the range of 20–150 ng/dL (1.0–5.2 nmol/L). Values over 200 ng/dL (6.9 nmol/L) suggest a testosterone-producing tumor.
Free testosterone	Alternate to total testosterone	The normal range for women is 0.06–1.08 ng/dL.
Labs to Rule Out Other Conditions		
DHEA-S	Tests for adrenal sources of hyperandrogenism, especially if changes are rapidly progressing	A value over 700 µg/dL (13.6 mmol/L) is suggestive of an androgen-producing tumor.
TSH	Thyroid hormones may alter menstruation. Hypothyroidism (high TSH) may result in more menstrual bleeding than usual. Hyperthyroidism (low TSH) may cause amenorrhea or oligomenorrhea and lighter menstrual bleeding.	The normal range for TSH level is 0.03–5.0 U/mL.
Serum cortisol	Rule out Cushing disease or cortisol resistance	A value less than 10 µg/dL (276 nmol/L) suggests that Cushing disease is not present.
Prolactin	Prolactin is produced by the anterior pituitary. Some medications, as well as tumors of the pituitary, can cause elevated prolactin levels, which can lead to amenorrhea and oligomenorrhea.	A value over 25 ng/mL suggests that a high prolactin level may be causing menstrual irregularities.
IGF-1	Elevation may indicate acromegaly (a rare syndrome of excess growth hormone produced by the anterior pituitary, causing gigantism).	The normal range varies by age (in years): • 182–780 ng/mL for ages 16–24 • 114–492 ng/mL for ages 25–39 • 90–360 ng/mL for ages 40–54 • 71–290 ng/mL for ages 55 and older
Labs to Monitor for Associated Conditions		
Fasting lipids	Women with PCOS often also have elevated cholesterol.	• Desirable total cholesterol level is under 200 mg/dL. • Optimal LDL level is less than 100 mg/dL. • Optimal HDL level is greater than 59 mg/dL. • Normal triglycerides level is less than 150 mg/dL.
Two-hour OGTT	Insulin resistance and type 2 diabetes are common in women with PCOS.	The normal range is less than 140 mg/dL (7.8 mmol/L). The prediabetic range is from 140 to 199 mg/dL (7.8–11.1 mmol/L). The diabetic range is 200 mg/d (12 mmol/L) and over.
Fasting glucose or hemoglobin A_{1c}	Alternate to OGTT	A fasting glucose level of 126 mg/dL (7 mmol/L) or higher on two different occasions indicates diabetes. Hemoglobin A_{1c}: • 4%–5.6%, normal • 5.7%–6.4%, increased risk of diabetes • 6.5% or higher, diabetes

Not all labs may be performed.
PCOS, polycystic ovary syndrome; DHEA-S, dehydroepiandrosterone sulfate; TSH, thyroid-stimulating hormone; IGF-1, insulin-like growth factor 1; LDL, low-density lipoprotein; HDL, high-density lipoprotein; OGTT, oral glucose tolerance test.
Adapted from Buggs, C., & Rosenfield, R. (2005). Polycystic ovary syndrome in adolescence. *Endocrinology Metabolism Clinics of North America, 34*, 677.

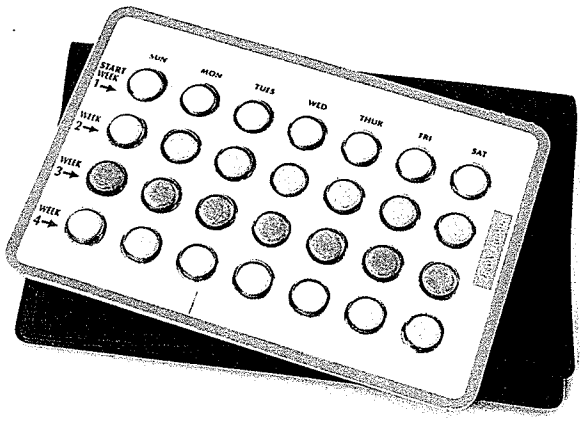

Figure 2.2. Combined oral contraceptive. Shown is a standard monthly dispenser package of a combined oral contraceptive that contains both estrogen and progestin.

Following that visit with Elsa, Tati began keeping a diary of all the food that she ate every day, along with calorie estimates. She started walking everywhere. She went to her school's gym and, finding it intimidating, she decided to run outside, instead. She didn't run far at first and mixed it with a lot of walking, but by the end of her freshman year, she'd lost the 12 lb she'd gained and another 15 on top of that. She could run 6 miles without stopping. She still took her pill every day, when she remembered, but she felt like it was really her hard work that had restored her period and given her nicer skin. She felt better. She felt good. And she kept it up.

By the time she met Caleb, she was eating mostly vegetarian, with the occasional cheeseburger to mark special occasions. She'd run three 10K races and one half marathon and was training for a full marathon that would happen a month after graduation. That's how they'd met, on the track when they were both interval training to improve their times. They trained together, graduated together, finished the marathon within a half hour of each other, and married at the end of the summer. The reception menu included cheeseburgers.

Now, 2 years after her wedding, Tati's health is excellent. Because of the PCOS, she has her cholesterol and fasting glucose levels checked every few years. The results are always great, and Elsa tells her to just keep doing what she's doing. And that's pretty much what she does. She runs most days and eats a balanced diet. She maintains her BMI in a healthy range. She takes her birth control pill—most of the time.

The truth is, Tati isn't great about taking her pill regularly. As disciplined as she is about most everything else in her life, something about taking that tiny pill every day trips her up. She has tried putting reminders in her phone. She has tried keeping her pill pack next to her toothbrush. She has tried having her pills delivered to her home automatically every 3 months so she wouldn't have to remember to pick them up from the pharmacy. Her mother, who wants grandchildren, jokes that it is her lizard brain, the primitive brain that answers to the basic biologic imperative of reproduction and sustaining of the species, that causes her to forget to take her pill, because it wants most of all for her to reproduce.

Whatever, thinks Tati. When she forgets her pill, she doubles up like she is supposed to (Patient Teaching 2.1). Sometimes she misses more than one. She knows that she should use back-up, such as condoms or abstinence, when that happens. But she figures the PCOS is her safety net. Because, really, what are the chances she will get pregnant without some sort of help? It has to be close to zero.

Patient Teaching 2.1

Missed Combined Oral Contraceptive Pills

Missing One Pill

- Take one pill as soon as remembered.

Missing Two Pills in Weeks 1 or 2 of the Pack

- Take two pills when remembered, and two pills the next day.
- *Pregnancy may occur from unprotected intercourse within 7 d of missed pills. Having a backup method is essential.*

Missing Two Pills in Week 3 or Missing Three Pills in a Row

- Take one pill daily until Sunday. Throw out the remainder of the pack, and start a new pack the same day.
- *Pregnancy may occur from unprotected intercourse within 7 d of missed pills. Having a backup method is essential.*
- A period may not occur in this month.

Adapted from Hatcher, R., Trussell, J., Nelson, A., Cates, W., Kowal, D., & Pollicar, M. (2011). *Contraceptive technology* (20th ed.). Atlanta, GA: Bridging the Gap Communications.

Pregnancy

First Trimester

When she misses her period, it is for the first time since she was 19. Even as often as she missed taking her pill, she never completely skipped a period until now. Two thin blue lines appear on the display of the grocery store pregnancy test. She takes two more tests, just in case. The second test uses pink lines and the third has a digital display, but they all indicate the same result: she's pregnant (Fig. 2.3).

It isn't so much an unplanned pregnancy as a mistimed one. She and Caleb do want children—someday. They haven't talked much about when they want to have children, just that it would happen in the future. Tati has thought maybe she could have children after she isn't needed so much at work, when it would be easier to cut back on her hours for a while. Or maybe after she turns 30. But this is happening now.

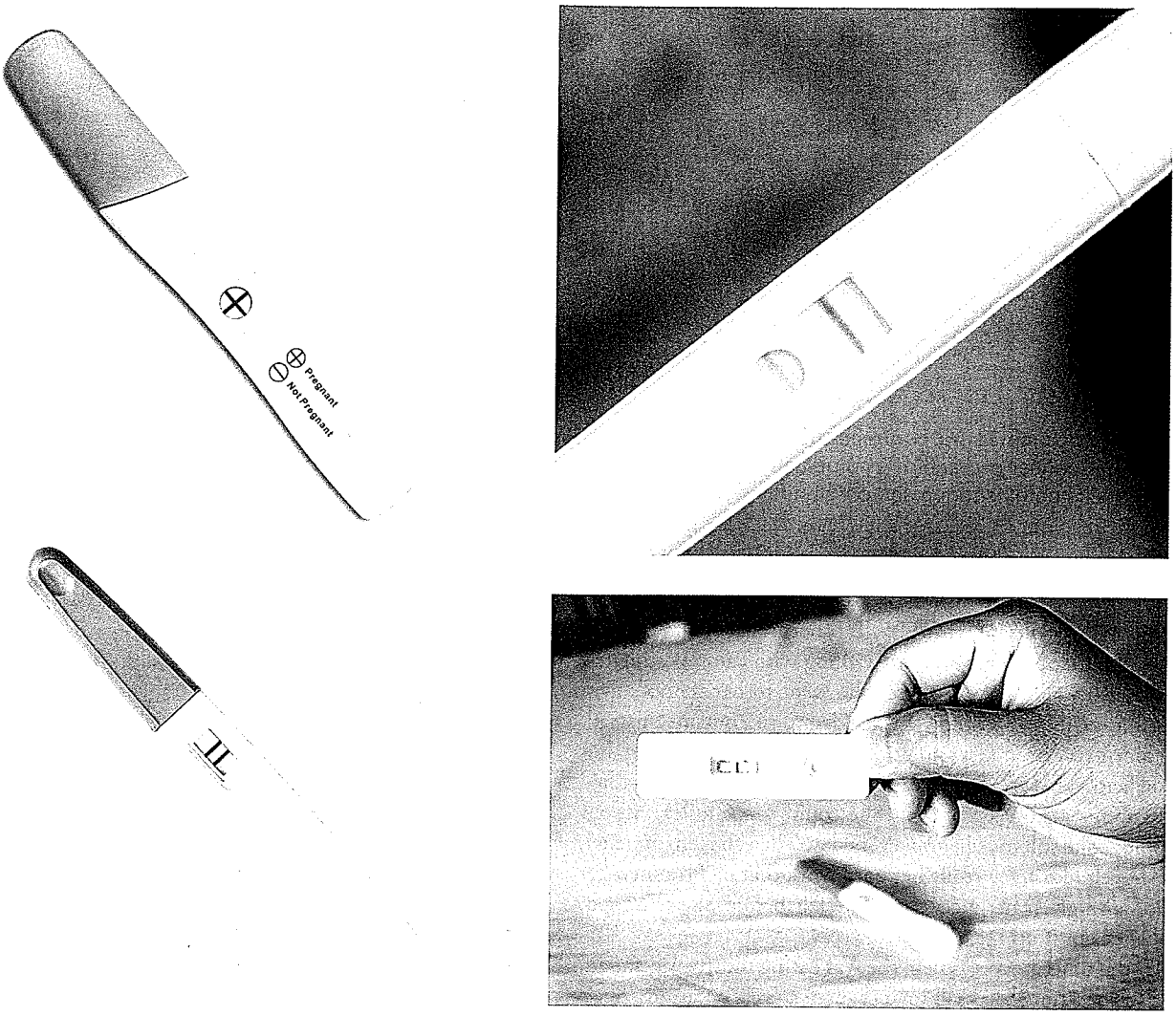

Figure 2.3. Positive pregnancy tests. Home urine pregnancy tests are now highly sensitive and accurate and may detect a pregnancy prior to missed menses. (The top right image is reprinted with permission from Pillitteri, A. [2002]. *Maternal and child health nursing: Care of the childbearing and childrearing family* [4th ed., figure from Chapter 5 opener]. Philadelphia, PA: Lippincott Williams & Wilkins.)

She and Caleb take stock. They have a house and jobs. They have a dog and a cat—at least they've managed to keep their pets alive. They have some savings, not a lot. Tati's mother lives half an hour from their little house. Maybe she could babysit sometimes.

"What do you think?" Tati asks Caleb.

"It's not what we planned," says Caleb. "I don't know if I'm ready."

"My mother says it's such a huge decision to have kids that you almost can't make it. It has to choose you."

"Or like you could choose not to take your birth control?" says Caleb. "I'm sorry. That was a jerk thing to say. I'm just kind of in shock."

Tati takes his hand. "He might look like you," she says.

He squeezes it. "If I'm incredibly lucky she will be just like you."

Tati meets Alice, a nurse practitioner working in an obstetrics and gynecology office she picks at random because it's closest to work. Alice explains that she will share Tati's care with another nurse practitioner and the two physicians, all of whom comprise the care providers in the practice.

Tati is transferred to an exam room and has her vital signs taken. Alice says they're excellent. She performs an initial history, asking about her family, her current living situation, her work, her health, and whether she feels safe in her home (see Box 1.2). They discuss her PCOS and past pregnancy history (Box 2.2).

"This is it," says Tati. "My first pregnancy."

"It's an exciting time," says Alice. "It can be a little nerve-wracking. Don't be shy about asking questions."

"I have an obvious one. I feel silly asking it," says Tati.

"Go ahead."

"I went on the pill originally for my PCOS. Now that I'm pregnant, should I still be taking it?"

Alice shakes her head. "You can stop taking it until after the pregnancy. You have some pretty great pregnancy hormones that will take over. However, don't worry if you've continued to take the pills. They won't hurt a pregnancy."

Box 2.2 Pregnancy and Birth Status

GTPAL

G: The number of pregnancies a woman has had in her lifetime
T: The number of pregnancies that have ended at term (37 wk plus)
P: The number of pregnancies that have ended preterm (20–37 wk)
A: The number of pregnancies that end by spontaneous or elective abortion before 20 wk
L: The number of living children

Tatiana is now *G1T0P0A0L0*

Gravidity and Parity

G: The number of pregnancies a woman has had in her lifetime
P: The number of pregnancies carried to viable gestational age (variously defined as 20–24 wk gestation)

Tatiana is now *G1P0*

Alice performs a full head-to-toe exam (see Box 1.3). Tati cannot remember the last time she had a Pap test—more than 3 years ago, she thinks. She's never had an abnormal one as far as she knows. Alice explains that women in their 20s should have a screening Pap every 3 years, possibly more often if anything abnormal is found (Patient Teaching 2.2 and Analyze the Evidence 2.1).

Because she has taken her pill packs, each of which has four rows of seven pills, month after month for the past 7 years, Tati is really confident about when her last period was. It was a normal period, not any lighter or heavier than usual, and the cramping was the same as ever. She reports all this to Alice. Alice says that because she's confident about her last period, they'll be able to calculate how far along she is based on the first day of her last period. Alice says she can use a computer program to calculate her due date or a little simple math, but she prefers to do it "old school," with a pregnancy wheel (Fig. 2.4).

"They're all based on the same idea," Alice explains. "You take the first day of your last period, subtract three months, and add seven days" (see Box 1.1). "Because your last period started on April 7th, you are five weeks and four days pregnant today. You are due January 14th."

Tati thinks about that for a second. "My period was five weeks and four days ago. I thought you couldn't get pregnant when you have your period."

Patient Teaching 2.2

Cervical Cancer Screening With Pap Testing and HPV

Cervical Cancer Screening Guidelines

- The first Pap test should be performed at age 21 y, regardless of sexual history.
- A Pap test without screening for the HPV virus should be performed every 3 y through age 29 y. Between 25 and 29, HPV testing should be added in the case of a low grade Pap abnormality called ASCUS.
- A Pap test with HPV testing (cotesting) should be performed every 5 y between the ages of 30 and 64 y.
- No further screening is required for women 65 y and older with no history of an abnormal Pap test in the past 20 y.

Quick Pap Facts

- A Pap test refers to the evaluation of samples of cells scraped from the cervix for changes that may indicate cancerous or precancerous conditions of the cervix. The sample is taken during a speculum examination.
- HPV screening may be done at the same time as the Pap test. HPV is a sexually transmitted virus that causes cancerous and precancerous changes in the cervix.
- Although Pap screening was once recommended annually, newer research indicates that less frequent screening leads to fewer unnecessary interventions and better outcomes.

HPV, human papillomavirus.

Adapted from Saslow, D., Solomon, D., Lawson, H. W., Killackey, M., Kulasingam, S. L., Cain, J., . . . Waldman, J. (2012). American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. *Journal of Lower Genital Tract Disease, 16*(3).

Analyze the Evidence 2.1 Frequency of Pap Tests

Fewer Paps, Current Guidelines

- Human papillomavirus (HPV), the virus that causes the cervical changes that can lead to cervical cancer, is usually transient, and changes caused by HPV typically regress spontaneously.
- Studies have indicated no reduced efficacy in fewer screening Paps, but less risk of false positives and unnecessary interventions (Moyer, 2012).

Retaining Annual Paps

- There is concern that if guidelines recommending annual Pap tests are eliminated, patients may not return for annual gynecologic visits, which are important for health assessments other than Pap tests.
- There is concern that patients will be uncomfortable with new guidelines (Perkins, Anderson, Gorin, & Schulkin, 2013).

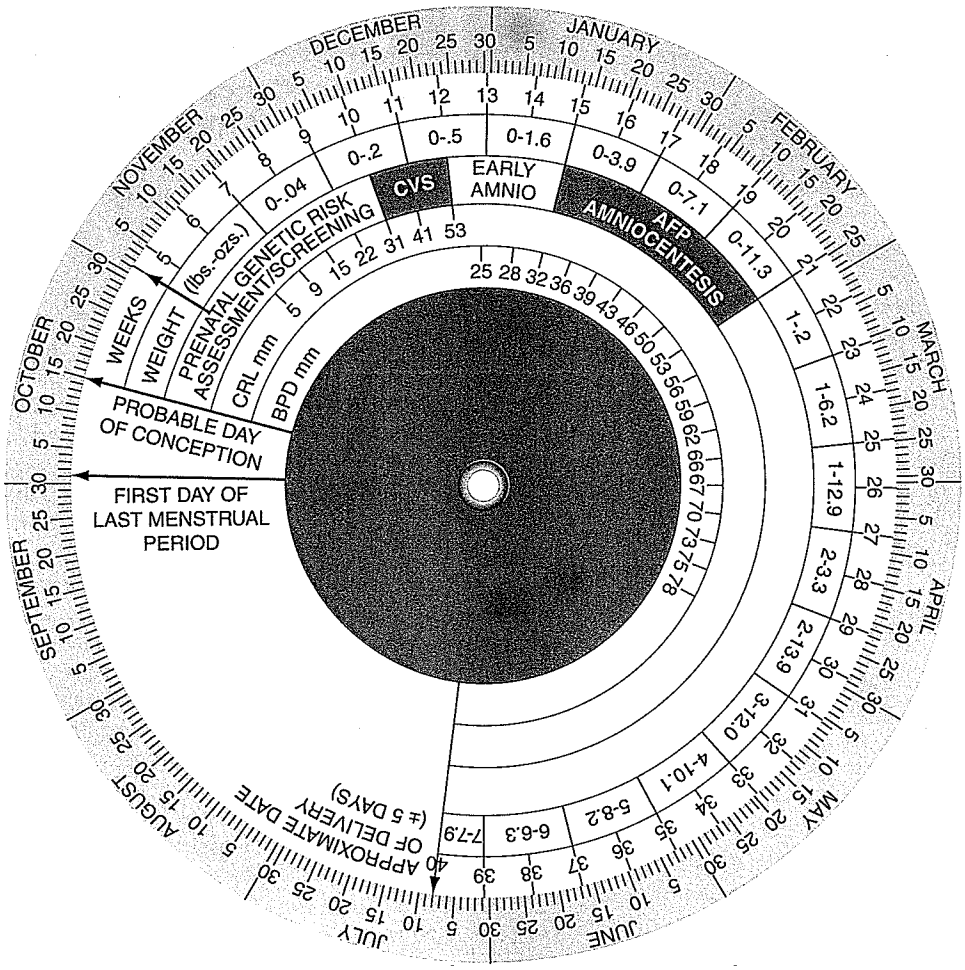

Figure 2.4. A pregnancy wheel. Based on Nagele's rule, pregnancy wheels are often still used for a quick way to identify the estimated date of delivery. (Reprinted with permission from Jensen, S. [2014]. *Nursing health assessment: A best practice approach* [2nd ed., Fig. 25.3]. Philadelphia, PA: Lippincott Williams & Wilkins.)

"I know it's confusing," says Alice. "So five weeks and four days ago isn't when you got pregnant. This calculation assumes you actually got pregnant three weeks and four days ago, but we talk about how long you've been pregnant as though you've been pregnant since the first day of your last period."

"That makes no sense," says Tati.

"I think it made more sense when they first came up with it," says Alice. "Before ultrasound, our best guesses had to be based on the first day of the last period. Because you've had PCOS since you were 19 and haven't always taken your pills on time, I'd like to do an ultrasound while you're here so we can get your date pinned down a little more precisely, just in case."

Because the fetus is still in the pelvis and not in the abdomen at this stage, Alice uses the vaginal ultrasound transducer. In the grainy image that looks like a snowstorm, she points out the gestational sac and the feathery outline of the yolk sac. She points to another tiny blob on the screen (Fig. 2.5).

"I can't be sure," says Alice, "but I think this is likely the fetal pole, which will become the fetus. If you were a little further on we'd be able to see the heartbeat to confirm that."

Alice then takes a series of measurements and explains that she's taking three measurements of the gestational sac from two different angles, or planes. She then adds the three numbers, divides the sum by three, and adds 30 to determine the gestational age in days (Butt & Lim, 2014).

"Looks like my earlier estimate was right on the money," says Alice. "You are at thirty-nine days, or five weeks, four days pregnant."

Alice and Tati discuss genetic screening recommendations. As far as Tati knows, her ancestors were all of northern European descent, though she does mention that her father's family identifies as French Canadian. Together they decide to order the genetic screening for **cystic fibrosis** because of the northern European part of the family, and genetic screening for **Tay-Sachs disease** because of the French Canadian side (see Table 1.1). They agree that she will also do the standard labs, such as blood typing and screening for sexually transmitted infections (see Lab Values 1.1). Later in the pregnancy she will have another ultrasound and more blood work for the integrated screening (see Table 1.1).

"Tell me how you've been feeling," Alice asks.

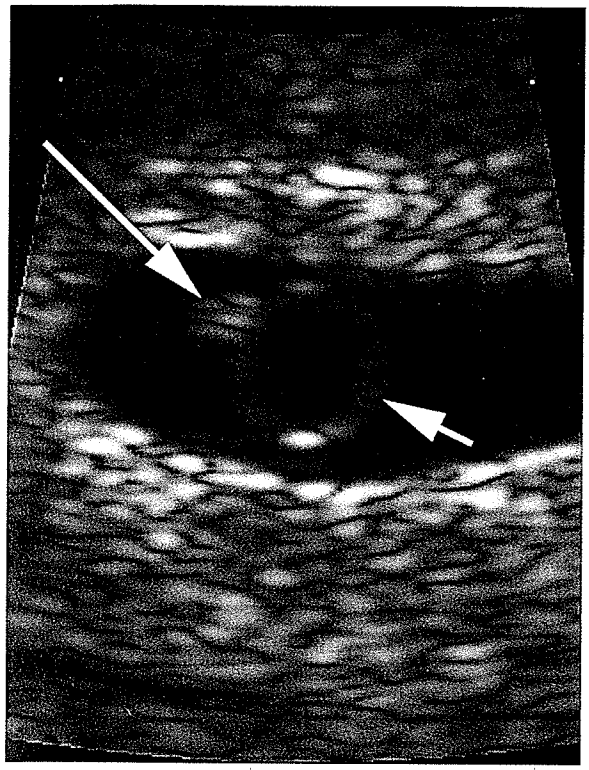

Figure 2.5. Ultrasound image of a gestational sac at 6 weeks. Shown are the embryo (long arrow) and yolk sac (short arrow). (Reprinted with permission from Doubilet, P. M., & Benson, C. B. [2011]. *Atlas of ultrasound in obstetrics and gynecology: A multimedia reference* [2nd ed., Fig. 1.6]. Philadelphia, PA: Lippincott Williams & Wilkins.)

"Not that different," says Tati. "My breasts have been really sore, like they are before my period starts but worse. I'm more tired than usual. I'm not nauseous at all, so that's good."

Alice tells her that the soreness in her breasts is normal and will improve over the next few weeks. The fatigue, she tells her, can last much longer and can return at the end of pregnancy. "Nausea may still occur, unfortunately" Alice says. "As for the fatigue, listen to your body. Rest when you can. You will get your energy back."

"What about exercise?" Tati asks. "I'm a runner. I'd like to keep doing it. I remember how hard it was to get into when I started. I'm worried that if I stop I'll never start again."

"There's no reason to stop," says Alice. "You were a runner before you got pregnant and you had a nice, normal exam today. This is another time to listen to your body. If you get too tired, slow down. Don't exercise so hard that you can't talk. Don't take up any exercise wherein you're likely to fall down or get hit in the abdomen. And don't quit. Healthy mothers make healthy babies" (The American College of Obstetricians and Gynecologists [ACOG] Committee on Obstetric Practice, 2015).

Within a week Alice calls her back with her blood test results.

"Two things," Alice says. "The first thing is, you came back as a carrier for cystic fibrosis. This doesn't mean that you have the disease. It does mean, however, that if your husband is also a carrier you could pass the disease on to your offspring. How much do you know about cystic fibrosis?"

"Not much," says Tati. "It has something to do with thick mucus in the lungs. I think I read that it's not curable but it's more manageable now that it used to be. Don't they do lung transplants for people who have it? And, like, salt air treatments and stuff?"

"Sometimes," Alice says. "And it is more manageable than it once was, certainly."

"Alright," says Tati. "What now?"

"First, I want you to know it's not at all uncommon to be a carrier of the mutation," says Alice. "About one in twenty-seven people who are of European descent carry a cystic fibrosis mutation. Cystic fibrosis is **autosomal recessive**, which means that to actually get the disease, you need two copies of the mutation, one from each parent. The next thing we need to do is get some blood from Caleb and see whether he's a carrier, as well" (Fig. 2.6) (Zvereff, Faruki, Edwards, & Friedman, 2013).

"Alright," says Tati. "I'm panicking a little. Can I have Caleb come in today for the blood work? How long will it be until we know the results?"

"Usually within a week," says Alice. "No panicking. You have a twenty-six in twenty-seven chance of Caleb not being a carrier. If he is a carrier, you have a twenty-five percent chance of having a child with cystic fibrosis and a fifty percent chance of having a child who is a carrier. You'd also have a twenty-five percent chance of having a child without the disease who is not a carrier."

"But if he's negative there's no chance of passing it on?" asks Tati.

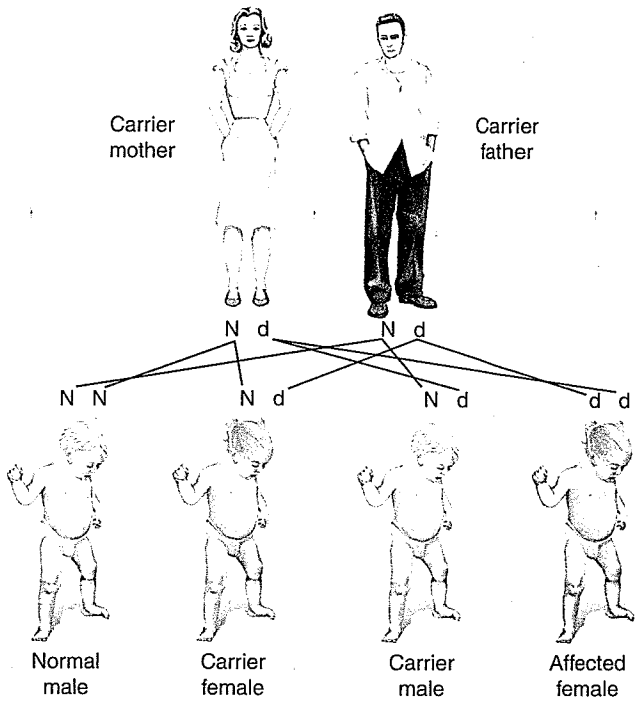

Figure 2.6. Autosomal recessive inheritance. (Reprinted with permission from Kyle, T., & Carman, S. [2016]. *Essentials of pediatric nursing* [3rd ed., Fig. 27.2]. Philadelphia, PA: Lippincott Williams & Wilkins.)

"Not quite," says Alice. "There would be no chance that the child would have cystic fibrosis, but there's a fifty percent chance with each pregnancy of passing on the mutation."

"What would the mutation do?" asks Tati.

"A single mutation does nothing by itself," says Alice. "It wouldn't hurt the baby. You have a single mutation and it doesn't hurt you. But that child, like you, would be at risk for passing on the mutation. If the child's future partner also had the mutation, there would be a twenty-five percent risk of your grandchild having cystic fibrosis."

"Alright," Tati says. "I'm not panicking anymore—worried, but not panicking."

"That's good. Do you have other questions?" asks Alice.

"You said there were two things," says Tati. "What's the second thing?"

Alice explains that Tati's blood work shows she is Rh negative, which isn't abnormal. In fact, she tells her, as many as 15% of people in some ethnic groups are Rh negative and that, as with cystic fibrosis, it is most common in people of European descent (American College of Obstetricians and Gynecologists [ACOG], 1999). She explains that women who are Rh negative can have completely normal pregnancies and healthy babies but that it is recommended that she have an injection at 28 weeks of pregnancy to ensure that she doesn't have an immune reaction to the fetus.

"I'm sorry, I don't understand," says Tati.

"Okay, because you have Rh-negative red blood cells, we ran another test to see whether you have any antibodies against Rh-positive red blood cells," says Alice. "If you have the antibodies, it would mean that you previously had a pregnancy with a fetus that was Rh positive and that you were exposed to the fetal blood."

"But I've never been pregnant before," says Tati.

"I know," says Alice. "But sometimes women have an early pregnancy loss before they're aware they're pregnant. You're considered at risk for sensitization to Rh blood if you're sexually active."

"What if Caleb is Rh negative, too?"

"If Caleb is Rh negative, then there'd be no chance of the fetus being Rh positive. If he's Rh positive, however, you'd have a fifty to one hundred percent chance of carrying an Rh-positive fetus, depending on whether he carries two Rh-positive genes or just one."

"I don't understand," says Tati. "With cystic fibrosis if he's a carrier there's a twenty-five percent chance of having a child with cystic fibrosis. Why would it be a fifty to one hundred percent chance with the Rh thing?"

"Good question," says Alice. "The difference is that cystic fibrosis is autosomal recessive. You need two copies, one from each parent, to have the disease. The Rh-positive trait is **autosomal dominant**. If you have one Rh-positive gene, you will be Rh positive. The Rh-negative trait is autosomal recessive. You'd need two Rh-negative genes to be Rh negative. So we know the only gene you can pass on is Rh negative. So, if Caleb is Rh positive and has one Rh-positive gene and one Rh-negative gene, you'd have a fifty percent chance of having an Rh-positive fetus because he might give the baby an Rh-positive gene or an Rh-negative gene. If he has two Rh-positive genes, you'd have a one hundred percent chance of carrying an Rh-positive fetus. We know that because you can give only Rh negative but he could give only Rh positive. Your baby would be guaranteed to have one Rh-positive gene and to, therefore, be Rh positive" (Fig. 2.7).

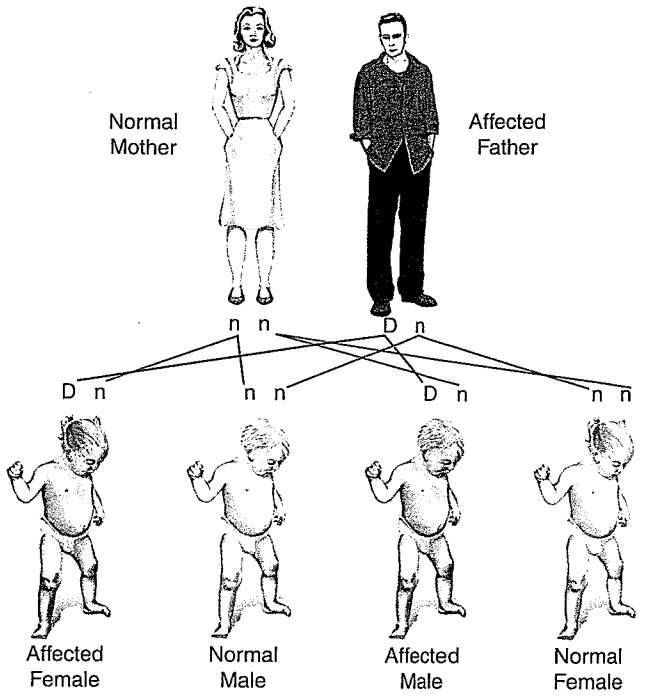

Figure 2.7. Autosomal dominant inheritance. (Reprinted with permission from Kyle, T., & Carman, S. [2016]. *Essentials of pediatric nursing* [3rd ed., Fig. 29.1]. Philadelphia, PA: Lippincott Williams & Wilkins.)

Alice suggests that they test Caleb's blood type at the same time that they screen him as a carrier for cystic fibrosis. If he is Rh positive, Tati would need an injection of **Rho (D) immune globulin**, often called by the brand name RhoGAM, at 28 weeks. They would then check the baby's blood type at birth. If the baby is also Rh positive, then Tati would need a second dose of the RhoGAM to prevent her from developing the antibodies against any Rh-positive blood she may have been exposed to during the birth process.

"Okay," Tati says slowly. "So the shot at twenty-eight weeks is about preventing my blood from attacking this pregnancy or any future pregnancy, and the shot after the birth is about preventing my body from attacking the next pregnancy."

"You got it," says Alice. "Almost all women who develop antibodies to Rh-positive blood do so after twenty-eight weeks" (ACOG, 1999).

"And this isn't about keeping me healthy, it's about making sure my body doesn't attack a fetus with a different blood type from mine," says Tati.

"Right again," says Alice.

"It's a wonder any of us manage to be born," says Tati.

"Tell me about it," says Alice.

Tati calls Caleb to tell him about her results, and he comes in and has his blood work done the same day. Within a week, they get the news that he is Rh negative and is not a carrier for cystic fibrosis. Tati will not need any RhoGAM injections, and no further testing is indicated to determine whether the fetus has cystic fibrosis.

Box 2.3 Routine Prenatal Visit Schedule

Recommended Visits

- First visit typically in the first trimester, especially for first pregnancies
- Once monthly through the 27th week of pregnancy
- Every other week from 28 to 36 wk
- Weekly from 36 wk until birth

Exceptions

- Visits may be more frequent if the pregnancy is diagnosed as high risk.
- Not all providers follow this classic schedule. Some providers follow schedules that include group visits, less frequent visits in the second trimester, and no first trimester visit, among other variations.

Second Trimester

After a dramatic start to prenatal care, Tati falls into the regular schedule as outlined by Alice (Box 2.3). The visits have a comforting routine to them, and Tati finds that she looks forward to them. Sometimes Caleb comes, and they listen to the fetal heart tones together and look on as Tati's belly measures bigger and bigger (Box 2.4). Caleb, a science geek at heart, particularly likes the predictability of the belly measurements.

"Who figured that out," he asks, rhetorically. "Who figured out that if you measure from the pubic bone to the top of the uterus after sixteen weeks of pregnancy, the number of centimeters should match the number of weeks? Genius!" (Fig. 2.8).

In addition to the routine meetings with Alice and others with a second nurse practitioner, named Nina, and the two physicians, Joy and Philip, she has routine testing done throughout her pregnancy. She is told that all is well (Box 2.5). Considering that since she was 19 she has assumed that her PCOS might make even getting pregnant challenging, her pregnancy has been remarkably easy.

Box 2.4 Common Visit Elements After the First Prenatal Visit

- Weight
- Vital signs
- Urine dip (protein, glucose, nitrites, and leukocytes)
- Fetal heart tones
- Fundal assessment (assessing how much the uterus has grown)
- Assessment of smoking use and exposure, alcohol use, and substance abuse
- Assessment of infant feeding plans and breastfeeding education

Figure 2.8. Symphysis-fundal height measuring. Starting in the 20th week of pregnancy, it is routine to measure the uterus from the pubic symphysis to the top of the uterine fundus to assess fetal growth. Measurement in centimeters should correspond with weeks of gestation. (Reprinted with permission from Weber, J. R., & Kelley, J. H. [2017]. *Health assessment in nursing* [6th ed., Fig. 29.11]. Philadelphia, PA: Lippincott Williams & Wilkins.)

One test, however, a vaginal and rectal swab, comes back positive for group B streptococcus (GBS).

"This isn't really a diagnosis," says Alice, who has just called her with the results. "It just tells us that you are colonized with the bacteria and that you and the baby are more at risk for certain infections. We'll start you on some intravenous, or IV, antibiotics, something called penicillin G, when you're admitted to the hospital and then we'll give you another dose every four hours until the delivery."

"Can't I just take some penicillin now?" Tati asks. "I was hoping I wouldn't have to have an IV."

"I'm sorry but no," says Alice. "Taking the antibiotic before delivery doesn't seem to be as helpful for avoiding an infection in the infant. By doing the IV antibiotic with delivery, we are able to get enough of the medicine into you that it gets into the amniotic fluid and the baby, as well" (Baecher & Gobman, 2008).

Third Trimester

Since she reached the 20-week mark, Tati has sometimes noticed some tightening of her abdomen. It doesn't really hurt, exactly, but it feels weird—almost as if her torso is making a fist. The tightening always goes away after a little while, and it usually stops if she walks around. Nina, one of the nurse practitioners in the practice, says that she is most likely experiencing **Braxton Hicks contractions**, or **false labor** (Patient Teaching 2.3). Tati starts to notice the contractions quite frequently in the final month of the pregnancy. Nina recommends that she drink some water or rest when they happen, or maybe take a warm bath. If they continue, Nina tells her, she can assess whether they're real labor contractions by remembering the "4-1-1" of contractions.

"When you start having contractions that are four minutes apart and last at least a minute each for at least an hour, that's

Box 2.5 Recommended Pregnancy Screenings

Screening for Trisomies: First Trimester

- Pregnancy-associated plasma protein A and hCG serum test at 11–13 wk
- Ultrasound of the back of the fetal neck at 11–13 wk

Screening for Trisomies and Neural Tube Defects: Integrated Screen at 15–16 wk

- Combined with first trimester screening
- Maternal serum alpha-fetoprotein, hCG, unconjugated estriol, and inhibin alpha serum testing (see Table 1.1)

Urinalysis

- Periodic clean-catch urine test
- Assessment for bacteria, white blood cells, and nitrites, which may suggest a urinary tract infection
- Assessment for glucose, which may suggest diabetes
- Assessment for protein, which may suggest preeclampsia

Second Trimester Ultrasound

- Assessment of fetal structure, placenta placement, and amniotic fluid volume
- An abdominal ultrasound (a full bladder is recommended to displace the uterus upward), usually done at 16–20 wk of gestation

One-Hour OGTT

- 24–28 wk to assess for gestational diabetes
- The patient drinks a glucose solution. A serum test is done an hour later to assess the blood glucose level.
- An elevated blood glucose level indicates the need for a 3-h OGTT.

Vaginal and Rectal Cultures

- Testing for group B streptococcus
- Performed at 35–37 wk

hCG, human chorionic gonadotropin; OGTT, oral glucose tolerance test.

when we start thinking you might be in labor," says Nina. "But listen to your body. Not everyone's the same. If you think it's time to go to the hospital, go to the hospital. The worst thing that will happen is that you'll be sent back home."

When she is just shy of 39 weeks, Tati has a visit with Joy, one of the physicians. Joy tells her that her cervix is pretty soft and that she is about 2 cm dilated.

"Two centimeters!" says Tati. "That means only eight more to go!"

"That's an excellent attitude," says Joy. "I like it. Although I do think it's only fair to tell you that many women can stay at two, three, or even four centimeters dilated for weeks before labor starts."

Tati makes a face. "I'm not sure about going on like this for weeks," she says. "I miss being able to lie on my stomach at night. I miss jeans. I miss being able to see my feet."

Joy suggests stripping Tati's membranes.

"That sounds horrible," Tati says. "What does it mean?"

Joy explains that **stripping of the membranes**, sometimes called sweeping of the membranes, would involve another pelvic exam. This time Joy would insert a finger right into the cervix and run her finger around the bottom part of her uterus to detach the fetal membranes from the uterine lining.

"Does it hurt?" asks Tati.

"Some women can get pretty crampy. It's probably not the most pleasant sensation," says Joy. "It's typical to get **bloody show** within about twenty-four hours of the stripping, as well, even if labor doesn't start."

"Bloody show?" Tati says. "That sounds even worse than stripped membranes. What does it mean?"

"Right now you have an accumulation of mucus in your cervix," explains Joy. "That's totally normal. But if I strip your membranes, I'll disrupt that mucus. Sometimes when it comes out it mixes with some blood from the cervix and is pink. This is called bloody show, and it usually indicates that labor will start within the next few days."

Tati decides against having her membranes stripped.

The next day, while she is at work, she feels the tightening in her abdomen again. It feels different this time, however—stronger. She finishes a letter to a donor she has been composing and shuts the door of her office to give herself some privacy. Every 5 minutes the contractions come, lasting for 30 seconds. And then every 4½ minutes, lasting almost a minute. After a half hour, she calls Caleb.

"I think this is it," she tells him. "I think it's time. Will you come get me?"

Patient Teaching 2.3 True Versus False Labor Contractions

Characteristic	True Labor Contractions	False Labor Contractions
Location felt	Lower back and abdomen, pressure in the pelvis	Abdomen
Quality of contractions	Regular, progressive; become stronger, closer together, and longer	Mostly irregular; may become regular for short periods of time
Effect of ambulation	Become more intense	May stop
Effect of rest and hydration	Do not resolve	Often resolve

"The baby?" he asks. And then quickly he says, "Yes the baby. Duh. I'll be right there."

It isn't far from her work to the hospital, maybe 5 miles, but by the time they get there the contractions are, if anything, less predictable. Sometimes they come 2 minutes apart, sometimes 6. By the time they see the triage nurse on the labor and delivery floor, she hasn't had a contraction in almost 10 minutes.

"It's a false alarm, I think," she tells the nurse, Judy. She's almost in tears saying it.

"Well, that happens," Judy says. "We make it sound like it's easy to tell the difference between true labor and false labor, but really, even experienced mothers can be fooled." She's a big woman and enthusiastic. "The only way to tell whether your labor is true or false is to see what your cervix is doing. With true labor, we'll see changes in your cervix. With false labor, your cervix doesn't change. We're lucky because you had an exam just yesterday, and we share the same records system as your obstetrics office. We can compare yesterday's exam to today's and see whether your cervix is opening."

"So I'll need an exam?" asks Tati.

"If those contractions come back you will," says Judy. "Right now I'd like to just check your vital signs and see how the baby's heart rate is doing."

First, Judy takes a set of Tati's vitals and listens for the baby's heartbeat. Judy says the fetal heart rate is 120, and that the baby is probably sleeping. She tells her that on average fetuses sleep 15.7 minutes at a time (Suwanrath & Suntharasaj, 2010). "Are you sure you're ready for a baby that sleeps for less than sixteen minutes at a stretch?" she asks, and everyone laughs.

Judy's hand is resting on Tati's belly as they talk. She asks about allergies (Tati has none) and whether she has any cold symptoms (she doesn't). She asks when she last ate (maybe a half hour ago? When was she *not* eating?). They discuss Tati's hopes for having an unmedicated birth, and how, if nothing else, she really doesn't want an epidural.

"There's something about the idea of having a needle stuck in my back," Tati says.

"I understand," says Judy. "It's not for everyone. The risks of major complications are low, but side effects are not uncommon. The important thing here is that you don't want one and you certainly don't have to have one" (Patient Teaching 2.4). Judy changes the subject. "So, Tati. I've had my hand on your belly for 15 minutes now and no action. Have you felt anything?"

"No. And I feel dumb. It's just more Braxton Hicks contractions. You'd think I'd know a Braxton Hicks when I felt one by now."

"Don't feel dumb," says Caleb. "It's not like you've ever done this before."

"Think of this as good news," says Judy. "You can go home, maybe soak in the tub. Maybe this husband of yours can make you a nice dinner. Maybe you can have some seltzer with some fresh lemon juice. You can rest in a place that's quieter and more comfortable than this hospital. We'll be here waiting when it's your time."

Tati doesn't want to rest and wait. She knows that she has only limited time off from work, and the clock is ticking. She loves her work and feels like she can make a real difference to the arts community in town, but the benefits aren't great. She is one of only three employees, and she is the only one who works full time. That means that, according to the Family and Medical Leave Act, she has no right to any time off at all when the baby comes. If the company were bigger, if it had at least 50 employees and she'd worked there for a year, then she could have 12 weeks of leave—unpaid leave, that is (U.S. Department of Labor, Wage and Hour Division, 2012).

In spite of the law, her employers have been generous to her. They are planning to let her take a few weeks off after the birth, work part-time for a little while, and even bring in the baby sometimes. But she doesn't want to press her luck by taking off any more time than is necessary. She really wants to keep her job. Too bad she doesn't live in New Zealand, she thinks. She read recently that mothers in that country get 18 weeks of fully paid leave. The article also mentioned that, in France, a mother can stay home for 16 weeks at 70% pay after the birth, and, in Canada, 15 weeks at 55% pay (Addati, Cassirer, & Gilchrist, 2014).

Patient Teaching 2.4

Potential Side Effects of Epidural and Spinal Anesthesia

- Maternal hypotension (occurs in as many as 50% of epidurals)
- Fetal heart rate changes, such as prolonged decelerations
- Transient increase in uterine tone
- Pruritus (itching; occurs in 50%–90% of women)
- Nausea and vomiting
- Urinary retention and bladder distension
- Respiratory depression
- Lower extremity numbness and weakness (occur only in epidurals)
- Headache (occurs in 1%–2% of combined spinal/epidural patients)
- Back pain
- Spinal cord injury (occurs in 0.06% of spinals and in 0.02% of epidurals)
- Maternal temperature above 38°C
- Increased risk of operative vaginal delivery

Adapted from Trout, K. K., & Eshkevari, L. (2015). Support for women in labor. In T. King, M. Brucker, J. Kriebs, J. Fahey, C. Gegor, & H. Varney (Eds.), *Varney's midwifery* (pp. 883–911). Burlington, MA: Jones & Bartlett Learning.

Labor and Delivery

They don't have to wait long. Two days later, Tati is at work again when the contractions start. At first they feel like the tightening in her belly again—like the Braxton Hicks—and she tries to ignore them. She drinks some water and tries to concentrate. At 4:30, she notices that the pain is more in her back and that it wraps across the front. More than before, she thinks, it feels like

pain. But maybe it's just wishful thinking. They have only one car, and Caleb picks her up in it shortly after 5:00. As they drive along, she makes a sharp, gasping noise.

"Contraction?" he asks.

"Maybe. I don't know which kind, though," she says. "It's definitely stronger than before."

"Should we head to the hospital instead of home?" Caleb asks.

"No way," says Tati. "Thor and Jim have been alone all day and need to be fed. I want to go home, have a little something to eat myself, and maybe take a warm bath. I'm waiting for the four-one-one of contractions before we go back to the hospital."

"The four-one-one?" Caleb says. "What does that mean?"

"It means when the contractions are 4 minutes apart, last for 1 minute, and have been going like that for one solid hour. I may even wait more than an hour."

"You don't have to be a hero," says Caleb. "We can go back to the hospital."

Tati refuses and they head to the house. By the time Jim and Thor have been fed and Thor has tick-ticked his way down the sidewalk with Caleb to do his business, she is beginning to change her mind.

"I think I'm going to throw up," she says.

"Okay," says Caleb. "That's cool." His eyes are wide and he stands there looking at her, like he's not sure what to do. "That's a normal thing to do in labor, right?"

"Yeah," says Tati. She retches into the sink. When she's done, she says, "Let's go to the hospital."

At the hospital, a labor and delivery nurse, Nadia, takes her vital signs and asks her many of the same questions Judy asked at her previous trip to the hospital. Tati forgot to rinse her mouth before she left the house, and Nadia gives her some mouthwash to gargle.

Rather than just listening to the fetus with the Doppler ultrasound, Nadia places two belts over her rotund abdomen. The first belt, she explains, the one above her belly button, is attached to a round, plastic device that will measure her contractions. The device attached to the lower belt will measure the fetal heart rate.

"Why not just use the Doppler thing to listen to the baby, like last time?" asks Caleb.

"We want to get a better view of what's going on," says Nadia. "I've been observing your contractions while you've been here. I'd say they're four minutes apart, maybe closer, and they must be lasting close to a minute. This machine is more precise than I am, though. Plus, this setup allows us to check the fetal heart rate and see how the baby is responding to the contractions. The Doptone, the way we've been listening before, isn't as accurate for giving us the second-to-second variations in fetal heart rate."

"Do I have to wear this the whole time?" Tati asks, referring to the belts.

"That's between you and your provider," Nadia says. "In this hospital, most women do. In other places, they sometimes just listen to the baby on a schedule, like every fifteen minutes or half hour, depending on what's happening."

By the time Joy arrives to check on her, Tati doesn't care much what is wrapped around her abdomen. She's completely focused on each contraction, as though she's trying to control them with her mind.

Nadia starts an IV in Tati's left wrist, securing it with several pieces of tape.

"I have bacteria in my vagina," says Tati, recovering from a contraction. She is feeling a little loopy, as though talking requires her to wake up from a vivid dream. "I'm supposed to have antibiotics."

Nadia nods. "We're starting that now. We'll give you a big dose of penicillin G now and then we'll give you more every four hours. It says in your chart no penicillin allergy. Is that accurate?" (The Pharmacy 2.1).

Tati nods. She closes her eyes as she waits for the next contraction.

In between contractions, Joy performs a pelvic exam on Tati.

"You've made a lot of progress," Joy says. "Your cervix has opened right up to about five centimeters. You're doing awesome."

Tati just nods. She is concentrating on taking deep, slow breaths, which she is counting. She knows that each contraction is lasting about 12 breaths, and that the contraction is strongest at six breaths and then starts to relax. It is just like running up a hill, turning around, and running back down.

"How much longer do you think?" asks Caleb.

The Pharmacy 2.1 Penicillin G

Overview	• Antibiotic • First-choice medication for treatment of GBS colonization during labor and delivery
Route and dosing	• Initial dose of 5 million U IV, and then 2.5–3 million U IV every 4 h until delivery • Infuse over 15–30 min
Care considerations	• Patient education and reassurance • Penicillin allergies are common. It is essential to verify allergies with patients before administering any medication.
Warning signs	• Monitor for hypersensitivity (anaphylaxis), including shortness of breath, swelling of the tongue or throat, vomiting, itchy rash, low blood pressure, or lightheadedness.

GBS, group B streptococcus; IV, intravenous.
Adapted from Verani, J. R., McGee, L., & Schrag, S. J. (2010, November 19). Prevention of perinatal group B streptococcal disease: Revised guidelines from CDC, 2010. *Morbidity and Mortality Weekly Report*, 1–32.

"It's not something that's easy to guess," says Joy. "Right now I'd say she's in the active phase of the first stage. Because this is her first pregnancy, she should be dilating at the rate of a little over a centimeter an hour until she hits about seven centimeters dilated. Centimeters seven to ten are called the transition phase. That can go pretty fast, maybe a half hour or less, and be pretty intense. Then comes the pushing" (see Table 1.3).

"How long is that?"

Joy shrugs. "That can vary quite a bit. I think we'll all find that out at the same time. She's doing great. I'll be back to check on her soon."

Caleb tries his best to be helpful, but Tati's tolerance is low. He rubs her back until she can't stand it anymore and tells him not to touch her. He offers her water through a straw between contractions. She takes a few sips, but is irritated by the distraction and shakes her head when he offers it again. Time seems to compress and expand simultaneously. She zones out for a while.

Later, she seems to come out of a trance and sees Caleb sitting next to her eating a sandwich. Tati sits up and says, "I want a bath."

"Let's wait until after Joy has checked your cervix again," Nadia says.

Joy returns with Nadia within a few minutes and does another pelvic exam between contractions. "You've done fantastic," she tells Tati. "You're at ten centimeters, and that baby is down in your pelvis. How do you feel right now?"

Tati wrinkles her forehead. "I stopped contracting."

"You'll start again," Joy says. "When you do, it's going to be push time."

The contractions do start again. Tati has opted for a birthing bar that attaches to the bed and arches over it (Fig. 2.9), which allows her to hang in a squatting position, partially supported by her arms. The position opens her pelvis, giving the baby more room to descend, and lets gravity help. Between contractions, she lies back against Caleb, who is positioned behind her.

Tati does as she's told and tries not to hold her breath as she pushes. Several pushes in, she feels a mild, yet embarrassing release.

"I pooped," she says when the contraction has passed, to no one in particular.

"That's completely normal," says Nadia. "A lot of women poop during birth. It's already been cleared away."

With the next push, Tati feels a burning sort of pain. When did the pain move? When did it stop feeling like a giant trying to tear her spine out of her back and start feeling like, well, a ring of fire? She grits her teeth and grunts through the contractions, noticing that the pushing offers some relief, that the burning actually seems to get a little better when she is bearing down.

"You're doing amazing," Joy says. "I can see the baby's head. When you get your next contraction, I want little pushes. We want to avoid any tearing as much as we can."

In a different life those words would have sounded horrifying to her. In this life she just wants it over. Two more, and then three more contractions, and the baby's head is out. Tati knows mostly because people tell her it is.

"She has dark hair," says Caleb. "They're using a suction thing to get stuff out of her nose and mouth" (Fig. 2.10).

And then one more tremendous push and she feels the slither as the rest of the baby girl makes her way into the world.

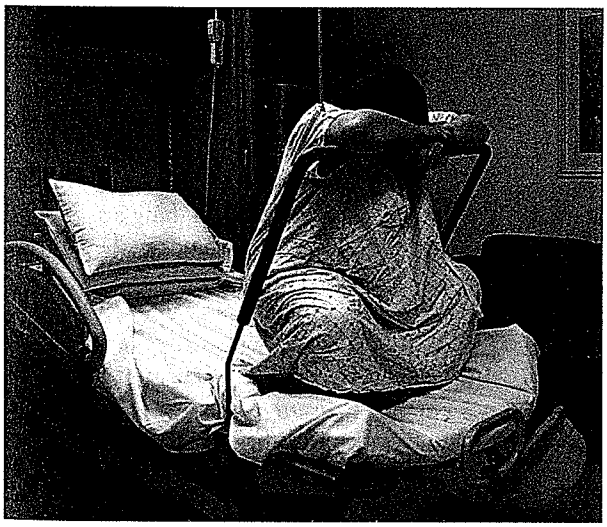

Figure 2.9. A birthing bar. Birthing bars are often available now with birthing beds. They are commonly used to help a patient assume a squatting position during the second stage of pregnancy. (Reprinted with permission from Irion, J. M., & Irion, G. L. [2009]. *Women's health in physical therapy* [1st ed., Fig. 15.9]. Philadelphia, PA: Lippincott Williams & Wilkins.)

Figure 2.10. Suctioning the airways of a neonate. A bulb syringe is usually sufficient to clear mucus from the airways of the neonate. (Reprinted with permission from Evans, R. J., Brown, Y. M., & Evans, M. K. [2014]. *Canadian maternity, newborn, and women's health nursing* [2nd ed., Fig. 20-4]. Philadelphia, PA: Lippincott Williams & Wilkins.)

After Delivery

The placenta is born soon after the baby is delivered, though Tati barely notices it. She is aware of calm activity in the room—of clean up and wind down. The tocodynamometer and Doppler device are removed from her abdomen. She feels cool washcloths applied between her legs and the changing of draw sheets. She relishes the delicious lack of pain. She watches her pink daughter with her little blue hands as she wriggles on Tati's chest, a warmed blanket over her, looking at the brand new world through dark gray eyes that squint because of the facial swelling brought on by the birth.

For the first hour after the birth, she notices that a nurse comes in and checks her about every 15 minutes. In the second hour, she is checked every half hour (Box 2.6).

Box 2.6 Schedule and Common Elements of Routine Maternal Postpartum Assessment

Schedule

1. First hour: every 15 min
2. Second hour: every 30 min
3. Hours 3–24: every 4 h
4. After 24 h: every 8–12 h

Assessment Elements

1. Maternal affect
2. Lung sounds
3. Uterine fundus
4. Lochia
5. Perineum
6. Pain
7. Intravenous site
8. Urinary output
9. Ambulation
10. Sensation and mobility (if epidural or other regional anesthesia is administered)
11. Urinary output
12. Abdominal incision (if any)

Vital Signs and Variations From Normal

1. *Blood pressure (BP):* BP should be equivalent to baseline (before labor). Increased BP may indicate pain, anxiety, or preeclampsia. Low BP is concerning for hemorrhage or severe dehydration. Orthostatic hypotension is common.
2. *Pulse:* Bradycardia (pulse of 50 beats per minute or less) may be normal. Tachycardia is concerning for pain, anxiety, and hemorrhage.
3. *Temperature:* A low-grade temperature is considered normal for the first 24 h. After 24 h, a temperature of 38°C is suspicious for infection.
4. *Respirations:* Respirations of 12–20 breaths/min are normal. Slower respirations with magnesium sulfate are concerning for magnesium toxicity. Slower respirations are also concerning for opioid overdose. Rapid respirations are concerning for pain, hemorrhage, pulmonary embolism, and anxiety.

During one of these assessments, about 3 hours after the baby's birth, her nurse, Geena, looks concerned as she feels Tati's uterus.

"When was the last time you emptied your bladder?" she asks.

Tati thinks. She's been napping and isn't sure when she fell asleep. She doesn't feel like she needs to urinate, and tells Geena so.

"Sometimes after a delivery women temporarily lose some of the sensation that tells them that they need to pee for a little while," says Geena. "If your bladder gets too full, it can push on your uterus in such a way that it can make it relax. A relaxed uterus is a bleeding uterus."

Tati looks down and gingerly feels her abdomen. To her eye, she still looks pregnant. "Is my uterus relaxed?" she asks.

"It's more relaxed than I want it to be," says Geena. "Let's get you up to the bathroom, and then we'll bring you back and check where you are."

Geena has her swing her legs over and sit on the edge of the bed for a minute before getting her on her feet. Geena explains that after giving birth women can get lightheaded and even faint if they stand up too fast. She calls it **orthostatic hypotension**.

"You also haven't been up for a little while, so you'll likely have some bleeding when you stand. It may look like a lot, but keep in mind that it's been pooling as you've been lying there," says Geena. Tati watches as Geena lays a trail of absorbent pads between the bed and the bathroom.

Tati stands up with Geena's help. She looks back on the bed and sees a pool of dark blood where she was sitting. "There's blood," she says.

"It's not unexpected," says Geena. "But it's more than I want to see. Let's get your bladder emptied and then assess you."

Geena keeps one arm around Tati's back on the way to the bathroom to stabilize her. Caleb is in a chair next to the bed and offers to help. He is holding the baby, and Geena tells him he can stay where he is.

Geena gets Tati to the bathroom and positions her on the toilet. She turns on the water in the sink for noise and inspiration and then leaves the room, discreetly closing the door behind her except for a few inches.

"I'm going to change your bedding while you're in there," Geena says when she steps out. "Don't try to get up without me."

Geena comes back a few minutes later and shows Tati a small squeeze bottle that she fills with warm water. "You'll use this to clean up," Geena explains. "It will feel soothing and won't get stuck like toilet paper. Make sure the water's warm, though. When it's too cold or too hot, it's not a nice surprise."

Next she shows her a pair of mesh panties and some large pads like the ones she's been wearing. She shows Tati how to put them on herself, and encourages her to change them often and keep track each time of how saturated the pad is.

Geena helps Tati back to the bed. Tati is feeling more steady, having made the first trip, and declines Caleb's support again. As promised, Geena has changed the bedding. She helps Tati into bed, and then feels again near her umbilicus for the fundus of her uterus. She is frowning again.

"No good?" asks Tati.

"It's still not as firm as I'd like it to be," says Geena. "When the uterus is soft like this, we call it **uterine atony**. It means the muscles aren't squeezing down like they should and so aren't

squeezing the blood vessels closed. When this happens, you can bleed."

As Geena says this, Tati watches her position her hands on Tati's abdomen. After explaining to Tati what she plans to do, she scoots Tati's fresh pad and panties back down her so she can visualize the lochia as it exits her vagina. Already they can both see that the pad contains a pocket of rich, dark blood in its center.

"This is going to be uncomfortable," Geena says, and starts kneading Tati's abdomen with her hands.

"Ow!" Tati says. "What are you doing?"

"This is a uterine massage," Geena explains. "It should help your uterus to firm. We want it hard, like a softball."

They both watch as her pad fills with a few gushes of dark blood, and then a brief trickle, and then nothing. After a few minutes, Geena stops kneading and looks satisfied.

"All firmed up," she says. "I'll check again in a half hour, but don't worry. I won't massage again unless I have to."

As it turns out, she does have to massage Tati again, and again her uterus firms up. Then, when it's nearly 48 hours since she gave birth—a time by which she should have been home from the hospital already—Tati wakes up in a pool of blood so large that she pulls the cord to call the nurse. She feels anxious and slightly panicky. A nurse she hasn't met yet answers the call light, followed by three others.

The Nurse's Point of View

Angela: It's not uncommon for people to accidentally set off their call lights. It's an easy thing to do because they're attached to strings that are hooked to the bed and next to the toilet rail. Even though most of the time when someone pulls the emergency cord it's an accident, all available nurses on the floor still go running. A lot of people don't know this, but most of the time when women die from a complication of childbirth, it's after the birth. So though most times the alarm is an accident, when it's the real thing, we need a well-trained team there immediately.

I'm the first nurse in the room. When I see the blood, I immediately start uterine massage. Another nurse, Melanie, comes in right after me, then calmly leaves the room and comes back in with the supplies to start an IV, which she does with equal calmness, and then checks Tati's vital signs. A third nurse, Rachel, opens the computer and starts charting everything in real time. A fourth nurse, Janet, leaves and returns within 5 minutes with Joy, who is the on-call provider today and also happens to be the person who delivered Tati's baby.

I stop uterine massage and Joy checks Tati's uterus again. After she's done checking, I start massaging again. Joy looks up at Rachel, the nurse who came into the room with her. "Let's do a shot of methylergonovine maleate, 0.2 mg intramuscular," she says (The Pharmacy 2.2). "And I'd like to get a bedside ultrasound in here." Joy then turns to Tati. "I think you're hemorrhaging, which I know sounds terrifying, but it's a fancy way of saying you're bleeding more than we'd like you to. This happens sometimes. I think you may still have some placenta in your uterus that's keeping it from contracting and firming up. I want to use the ultrasound to check."

By the time the ultrasound arrives, the combination of the methylergonovine maleate and the massage is working. I can feel that Tati's uterus is firmer, and she is bleeding less. Melanie checks Tati's vital signs again, and notes her temperature is 37.9°C. I stop the uterine massage again as Joy performs the ultrasound with Caleb and Tati looking on.

"I'm not seeing much," Joy says finally. "It may be that you have endometritis, a common infection of the lining of your uterus, or it could be something else. We don't always know what causes uterine atony, which is what we call a soft uterus. I'd like to keep you here for another few days on some antibiotics" (The Pharmacy 2.3). "We'll give you the oral version of that medication we just gave you a shot of; you'll take it every six hours for the next day or two and we'll see how you do. Hopefully your uterus will stay firm" (Box 2.7).

"What if it doesn't?" asks Caleb.

"If it doesn't, then we'll figure out something else," says Joy. "The good news is, this happened while you're all still here and we have the resources available right away. It can be a different story if it happens later, when you're out of the hospital. We'll also keep a close eye on the baby. If this bleeding is due to an infection, it may be related to the GBS. If that was an ongoing problem even with the antibiotics we gave you during labor, it could be an issue for the baby, as well."

"What kind of issue?" asks Caleb.

"We worry about a lung infection most," says Joy.

"How would we know if that's happening?" Caleb says.

"If the baby starts making little grunting noises or has a bluish tone to the skin—not just the hands and feet, that's expected, but around the mouth—that would be a cause for concern. Sometimes babies with infections have temperatures that drop instead of go up, so your nurses will look for that, as well.

"Tati, I know we've been pressing on your uterus a lot. This might seem like a silly question, but is it sore at all now when I push on it?" asks Joy, pushing firmly.

"Ow, yes," says Tati. "It doesn't feel good."

"Have you noticed any odor?" asks Joy.

"Besides the smell of all the blood?" Tati asks. "I don't know, really. I've felt really sweaty, particularly at night."

"That can be normal," says Joy. "Women offload a lot of fluid after a birth, some of it by sweating. You have a mild fever. The antibiotics are a good idea."

The Pharmacy 2.2 Methylergonovine Maleate

Overview	• Stimulates uterine contraction • Vasoconstrictive
Route and dosing	• IM: 0.2 mg every 2–4 h, maximum of four doses; onset in 2–5 min. • Oral: 0.2–0.4 mg every 6–12 h; onset in 5–10 min. • IV: contraindicated; for use in emergency only due to severe hypertension and stroke risk: 0.2 mg/min.
Care considerations	• This drug should never be used prior to the birth of the fetus because of its potential for very strong, prolonged contractions. • If used in the third stage, the obstetric care provider should be directly supervising administration. • Smoking is strongly discouraged while using this medication because of its vasoconstrictive properties. • Monitor for appropriate uterine firmness, fundal height, and lochia. • The patient may have very strong cramping.
Warning signs	• The patient's blood pressure should be carefully monitored for severe hypertension. • Monitor for toxicity: chest pain, headache, nausea, muscle pain, general weakness, cold or numb digits, or extremities tingling.

IM, intramuscular; IV, intravenous.

The Pharmacy 2.3 Common IV Therapy for Endometritis

Gentamicin and Clindamycin	
Overview	• The cure rate with combined treatment is 90%–97%. • Treatment continues until the patient is asymptomatic for 24 h. • IV ampicillin may also be included for a woman known to be GBS positive.
Route and dosing	• Gentamicin: 5 mg/kg IV every 24 h • Clindamycin: 900 mg IV every 8 h • *With GBS* • Additional ampicillin: 1–2 g every 4–6 h
Care considerations	• Provide comfort measures, including blankets, perineal care, hydration, and cool compresses. • Breastfeeding is encouraged during treatment. • Administer ampicillin over 10–15 min. • Administer clindamycin diluted over 10–60 min. • Administer gentamicin over 30–120 min.
Warning signs	• Ampicillin: Rapid infusion may cause seizures. • Clindamycin: Observe for bowel changes, as it can cause colitis (colon inflammation). • Gentamicin: May cause neurotoxicity. Monitor eighth cranial nerve (vestibulocochlear: hearing and balance) function. • All: Monitor for hypersensitivity (anaphylaxis), including shortness of breath, swelling of the tongue or throat, vomiting, itchy rash, low blood pressure, or lightheadedness.

IV, intravenous; GBS, group B streptococcus.

Box 2.7 Risks Factors for Postpartum Hemorrhage

Pregnancy-Related Risks*

- *Uterine atony (a failure of the uterus to stay contracted)*
- *Retained placenta or membranes*
- *Subinvolution (the uterus does not contract after birth)*
- Failure to progress during the second stage of labor (the pushing stage)
- Adherent placenta (the placenta does not detach from the uterine wall within half an hour)
- *Lacerations of the vulva, vagina, or cervix*
- Surgical vaginal delivery (forceps or vacuum)
- *Genital hematoma*
- Large for gestational age newborn (>4,000 g)

Box 2.7 Risks Factors for Postpartum Hemorrhage (continued)

- Hypertensive disorders (preeclampsia, eclampsia, and HELLP syndrome [hemolysis, elevated liver enzymes, and low platelets])
- Induction of labor with oxytocin
- Prolonged first or second stage of labor (the pushing stage)

Maternal Risk Factors†

- Personal history of postpartum hemorrhage
- Family history of postpartum hemorrhage
- Maternal obesity
- Multiple previous births
- Precipitous labor
- Uterine overdistension (macrosomia [large baby], multiple gestation [twins or more], or polyhydramnios [excess amniotic fluid])
- Uterine infection
- Asian or Hispanic ethnicity
- Uterine inversion
- *Coagulopathy (a defect of coagulation)*
- Uterine inversion (the uterus turns inside out so that the fundus exits the cervix as the placenta is removed)

Note: All risk factors apply to immediate (primary) postpartum hemorrhage. Italicized risk factors also apply to late (secondary) postpartum hemorrhage. Primary postpartum hemorrhage occurs in the first 24 hours after birth. Secondary postpartum hemorrhage may occur after 24 hours or for up to 12 weeks postpartum.

*Adapted from Sheiner, E., Sarid, L., Levy, A., Seidman, D., & Hallak, M. (2005). Obstetric risk factors and outcome of pregnancies complicated with early postpartum hemorrhage: A population-based study. *The Journal of Maternal-Fetal & Neonatal Medicine,* 18(3), 149.

†Adapted from Bateman, B., Berman, M., Riley, L., & Leffert, L. (2010). The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. *Anesthesia & Analgesia, 110*(5), 1368–1373.

As frightening as the bleeding is for Tati and Caleb, the nurses on the team make them feel safe and supported. A nurse has checked in with them hourly throughout Tati and the baby's stay, but they notice the nurses come even more often now, always ready to talk, answer questions, and reassure. Over the next 48 hours, Tati doesn't have any more frightening bleeding, and the tenderness in her uterus goes away completely. Her temperature goes down to 36°C and stays there.

The Newborn

The upside of this extended stay is the extra help Tati received with breastfeeding the baby (who still didn't have a name). She'd had an initial visit with a lactation consultant starting soon after the baby was born, but breastfeeding was tougher than she'd expected. Neither Tati nor Caleb had thought much about it prior to the birth. So much focus had been on the birth itself and the supplies—so many supplies!

"All you really need is a boob and a blanket," her mother had told her early in the pregnancy. Of course, when she'd visited, she'd brought gift bags full of those same supplies she'd deemed unnecessary, most in shades of pink.

Caleb and Tati had agreed that her mother's initial advice was solid, and yet they had a crib that the cat had been sleeping in for the past 3 months. They had an infant swing that was piled with tiny t-shirts. They had a stroller that folded down into a carriage and then folded again, origami-like, almost flat to slide into the back of the car. They had a breast pump, diapers, organic lotion, no-gas baby bottles, a diaper bag, cloth wipes, disposable wipes, a baby bath, a baby bucket, a bouncy seat, a sling carrier, a front carrier, and a back carrier. They had a book about how to breastfeed your baby that neither had thought about after Tati had unwrapped it at her baby shower until now. Now, watching their baby girl cry as she rooted, shoved her own fist into her mouth, and failed to find a nipple, they both wished very much they'd packed it for the hospital.

The first time Donna, the lactation consultant for the day, had checked in with the family within the first 24 hours of the birth, Tati was in tears. Caleb had gone out for supplies and she'd been trying to get the baby to latch onto her breast for half an hour.

"This is supposed to be natural," she said. "Mammals have survived for millennia by breastfeeding. What am I doing wrong?"

Donna perched on the edge of the chair next to the bed. "It is natural, but that doesn't mean it's automatic. We're going to work on this, all four of us: you, me, Dad, and baby."

"I don't even think my milk has come in," said Tati. "I think it's just that yellow stuff. What if I'm starving her?"

"Look at that beautiful baby," said Donna. "She's not starving. She's getting all that she needs from the **colostrum**, the yellow stuff. That's liquid gold (Box 2.8). We'll work on the latch to make sure she gets as much as she can. You're headed into day two after the birth now. Your milk should come in very soon."

"How will I know?" asked Tati.

"You'll know," said Donna. "When you feel your breasts now, they're very soft. As they begin to fill, you'll notice they'll feel fuller. Sometimes they can feel a little too full. We call that **engorgement**. Right now let's start with the basics. The best time to feed your baby is when she wants to eat."

Tati looked at her daughter, who was crying while trying to stick her entire tiny hand in her mouth. "She looks pretty ready to me," she said.

Donna agreed. "Maybe a little too ready. When the baby gets to the point of crying, it makes it much more challenging to get her to latch. You want to pay attention to earlier signs, like what she's doing with her hands and her mouth, licking her lips, or making sucking motions. Some babies will smack their lips. Almost all of them will root if you touch their cheek, regardless of how hungry they are, so sometimes that's a harder sign to work with." Donna paused and patted Tati's hand. "I know none of this feels natural right now. It will."

Box 2.8 Composition of Breast Milk

Lactogenesis I: Colostrum (Starts in Pregnancy and Lasts Through the First Few Days After Birth)

- Rich in immunologic components
  - Immunoglobulin A (helps protect the gastrointestinal tract)
  - Lactoferrin
  - Leukocytes
- Epidermal growth factor (responsible for repair of damage from low oxygen exposure)
- Laxative properties (help with excretion of meconium and bilirubin)
- Low in lactose compared with later milk
- High in magnesium, chloride, and sodium compared with later milk
- Low in calcium and potassium compared with later milk

Lactogenesis II: Transitional Milk (Starts on Day Two or Three and Lasts About 10 d)

- Lactose increases
- Immunologic components decrease
- Fat and calories increase

Lactogenesis III: Mature Milk

- Foremilk and hindmilk (foremilk may appear watery, whereas hindmilk appears creamier and has a higher fat content)
- 20 kcal/oz
- About 50% of calories are from fat
- Provides almost complete nutrition for the infant: carbohydrates, fat, protein, vitamins, minerals, and digestive enzymes.
- Only vitamin D is not provided in sufficient quantity. Supplementation with 400 IU daily is recommended.

Adapted from Ballard, O., & Morrow, A. L. (2013). Human milk composition: Nutrients and bioactive factors. *Pediatric Clinics of North America, 60*(1), 49–74.

Donna positioned Tati on the bed with pillows behind her back and supporting her arms. She unswaddled the baby and, after telling Tati what she planned to do and asking her permission, she opened her gown and positioned the baby against her, belly to belly, with the baby's face directly facing Tati's breast.

Next, Donna showed Tati how to hold her breast with her hand in the shape of the letter C, with her thumb on top, well back on the breast from the nipple and areola. The baby almost seemed to be paying attention and had calmed just a little. While Tati watched, Donna assisted her in brushing her nipple against the baby's lips. As she did so, the little girl opened her mouth wide and Donna quickly pushed her little mouth against the nipple. Tati felt a tug and watched, fascinated, as the baby's cheek began to move.

"Beautiful!" said Donna. "That's a lovely latch. Look at how much of the areola the baby has in her mouth. That's just what you want to see. And see how those lips are flanged out over the breast and not tucked in? That's just right" (Fig. 2.11).

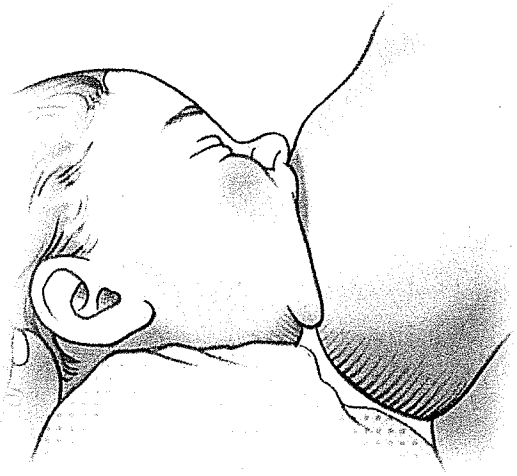

Figure 2.11. A perfect latch in breastfeeding. (Reprinted with permission from *Lippincott Procedures*. [2018, February]. Philadelphia, PA: Wolters Kluwer.)

Both adults watched as the baby settled into her own rhythm. After about 5 minutes, Donna spoke again.

"Listen," she said. "Do you hear that? That little clicking noise? That means that she's swallowing. Good job, Mom."

"How long should I feed her?" asked Tati.

"She'll let you know. Until she stops," said Donna. "If she's still awake after that, you'll know to switch her to the other breast."

They watched for a few minutes longer. Caleb came in quietly with a bag containing some extra clothing and a paper bag full of deli sandwiches.

"First cold deli meat after the birth," he said, holding up the bag.

"That roast beef best be rare," says Tati.

"Yes ma'am," said Caleb. Then he noticed the baby on the breast. "You did it," he said quietly. "Nice job. What does it feel like?"

"I don't know," said Tati. "Strange. It makes me so sleepy. Like I could just nod off right here, right now."

"That's the prolactin and the oxytocin," said Donna. "I promise it won't always be like this, but it's really common, early on in particular, to feel really drowsy with breastfeeding. It's important to make sure the baby's back in her crib though, if you think you really will fall asleep."

Donna then turned to Caleb, and recruited him to monitor for Tati's sleepiness, and to take the baby if it seemed she would fall asleep. She explained to him the same points she'd explained to Tati about recognizing a hungry baby, and advised that he too could be instrumental in recognizing when it was a good time to feed.

"How often should she feed?" he asked.

"It varies," Donna said. "She may feed eight to twelve times a day for a while. Sucking helps with the production of the hormones that are making Tati so tired. Those hormones also

help with milk production. The more the baby sucks, the better the milk supply."

Tati turned to Caleb. She looked drowsy but satisfied, like a cat having drunk a bowl of cream. "We can't just call her baby forever. She'll need a name."

"Tati Junior," Caleb proposed.

"Donna is a beautiful name," said Donna.

"Calebetta," said Tati. "Calebina."

"Don't worry," said Donna. "In this state they give you sixty days to decide. Go ahead and get to know her a little. It will come to you. I think you three are going to be just fine."

Think Critically

1. Write a brief script explaining to a patient in your care how she should correctly use COCs.
2. You have a patient with brown eyes who is carrying a child fathered by a man with blue eyes. You know that brown eyes are a dominant trait, whereas blue eyes are a recessive trait. How would you describe the chances of their child having blue or brown eyes?
3. How would you describe to a first-time mother the difference between true and false labor?
4. Why do we treat GBS during labor? What important question should you ask a patient before administering the medication?
5. Describe what behaviors would make you suspect a baby is hungry. How would you describe to a new mother what a good latch looks like?
6. What is uterine atony? What are the priority actions when you suspect it?
7. You are caring for a patient postpartum who is reluctant to get up to empty her bladder, stating she doesn't feel like she has to. How would you convince her it's a good idea?

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