

PRINCIPLES OF FOOD SAFETY DURING PREGNANCY

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OBJECTIVES

When the learner completes this module, they will be able to:

1. Explain the four basic principles of safe food handling
2. Explain the importance of safe food handling, especially during pregnancy
3. Identify the specific precautions that pregnant women should take to protect themselves and their fetuses against listeriosis, toxoplasmosis, and methylmercury
4. Discuss the findings of recent research on pregnant women's knowledge of food safety and their attitudes toward current food safety recommendations

BACKGROUND

Each year in the United States, an estimated 76 million people develop foodborne illnesses, and about 5000 of them die.¹ A large proportion of all cases of foodborne illness are due to mishandling of food in consumers' homes.² Scrupulous attention to the principles of food safety could reduce the incidence of these illnesses.

Although safe food handling is important throughout life, it is especially crucial during pregnancy because 1) pregnancy weakens the mother's immune system; 2) some harmful bacteria can cross the placenta and infect the fetus; and 3) the immune system of the fetus is not yet capable of fighting off harmful bacteria.³ Some foodborne illnesses can cause spontaneous abortion, premature delivery, or permanent damage to the fetus.³

Instant feedback: Why is safe food handling especially important during pregnancy?

Answer: Pregnancy weakens the mother's immune system; some harmful bacteria can cross the placenta and infect the fetus; and the immune system of the fetus may not be able to fight off these bacteria. Some foodborne illnesses can kill or cause serious damage to the fetus.

There are two key aspects to food safety during pregnancy:

1. Pregnant women should be careful to follow the same basic principles of safe food handling that apply to everyone.
2. Pregnant women should take special precautions to avoid three foodborne hazards that are especially relevant during pregnancy — *Listeria*, *Toxoplasma gondii*, and methylmercury.

BASIC PRINCIPLES OF SAFE FOOD HANDLING

Educational programs on food safety in the United States (such as the first item listed under “Online References That May Be Helpful in Patient Education,” below) focus on the following four basic principles, all of which should be emphasized when you are teaching pregnant patients — or any patient — about safe food handling practices.

1. Clean

The basic principle is to wash hands and surfaces often so that bacteria will not be spread throughout the kitchen. Hands should be washed with warm water and soap for at least 20 seconds before and after handling food and after using the bathroom, changing diapers, or handling pets. All dishes, utensils, countertops, and cutting boards should be washed with hot soapy water after preparing each food item. Paper towels are safest for cleaning kitchen surfaces; if cloth towels must be used, they should be washed often in the washing machine in hot water.

Fresh fruits and vegetables should be rinsed under running tap water, and those with firm skins should be scrubbed during rinsing.

2. *Separate*

“Separate” means to take precautions to prevent cross-contamination, particularly from raw meat, poultry, seafood, and eggs, all of which may contain disease-causing bacteria. These foods should be kept separate from other foods in the grocery shopping cart, grocery bags, and home refrigerator. One cutting board should be used for raw meat, poultry, and seafood and another for all other foods. It is also important to never place cooked food (or food that will be eaten raw, such as vegetable salads) on a plate that previously held raw meat, poultry, seafood, or eggs unless the plate has been thoroughly washed with hot, soapy water between uses.

Instant feedback: How many cutting boards should there be in a home kitchen, and how should they be used?

Answer: At least two: one should be reserved for raw meat, poultry, and seafood only, and the other one should be used for all other foods.

3. *Cook*

Cooking foods to a high enough internal temperature to kill bacteria that cause foodborne illness is crucial. Emphasize to your pregnant patients — and all patients who need to learn about food safety — that they must use a food thermometer to be sure that meat, poultry, and egg dishes are cooked adequately. “Egg dishes” means all foods that contain eggs, including complex mixtures such as lasagna; food thermometers should be used to determine whether these foods are “done,” just as they are for meat and poultry. Experts do not recommend

assessing the doneness of foods by their appearance, except for eggs and for some types of seafood.

Table 1 shows the safe cooking temperatures, as measured with a food thermometer, for various specific foods. You can direct your patients to an almost identical chart online at <http://www.fightbac.org/content/view/93/2/> or simply copy this information for their use.

Table 1. Safe Cooking Temperatures

| | |
|--|---|
| Ground meat and meat mixtures | |
| Beef, pork, veal, lamb | 160°F |
| Turkey, chicken | 165°F |
| Fresh beef, veal, lamb (NOT ground) | |
| Medium rare | 145°F |
| Medium | 160°F |
| Well done | 170°F |
| Poultry | |
| Chicken or turkey, whole | 165°F |
| Poultry parts | 165°F |
| Duck or goose | 165°F |
| Stuffing (cooked alone or in the bird) | 165°F |
| Fresh pork | |
| Medium | 160°F |
| Well done | 170°F |
| Ham | |
| Fresh (raw) | 160°F |
| Pre-cooked (to reheat) | 140°F |
| Eggs and egg dishes | |
| Eggs | Cook until yolk and white are firm |
| Egg dishes | 160°F |
| Seafood | |
| Fin fish | 145°F or until opaque and flakes easily with fork |
| Shrimp, lobster, and crabs | Flesh pearly and opaque |
| Clams, oysters, and mussels | Shells open during cooking |
| Scallops | Milky white or opaque and firm |
| Leftovers and casseroles | 165°F |

Table Source: Partnership for Food Safety Education, Fight BAC: Keep food safe from bacteria. 2006. Available online at <http://www.fightbac.org/content/view/93/2/> Accessed September 27, 2007.

As the temperatures in the chart imply, ground beef should always be cooked to at least 160°F, which is the “medium” degree of doneness. It should never be eaten rare or medium-rare. Cooking to a medium-rare degree of doneness (145°F) is acceptable for steaks and roasts because the bacteria in intact pieces of meat are found only on the surface, which receives adequate cooking even if the center of the meat remains pink. Grinding distributes bacteria into the interior of the meat; thus, ground meats should be cooked thoroughly, even in the center.

Instant feedback: Why is the safe cooking temperature for ground beef higher than that for beef steaks or roasts?

Answer: The bacteria in steaks and roasts are on the surface, which receives thorough cooking even if the interior of the meat is only cooked to a medium-rare degree of doneness. Grinding distributes bacteria throughout the meat, so ground meats must always be cooked thoroughly.

4. *Chill*

Because cold temperatures slow the growth of bacteria, foods should be refrigerated promptly, using a refrigerator temperature of 40°F or lower. An appliance thermometer should be used to make sure that the refrigerator is cold enough. Frozen foods should be kept at 0°F or below, and the temperature of the freezer should also be checked with a thermometer.

Important points emphasized in U.S. government guidance on keeping food cold include 1) refrigerate all perishables immediately upon returning from the store; 2) never let any perishables or leftovers sit at room temperature for

more than two hours, 3) never defrost food at room temperature (instead, thaw it in the refrigerator, in cold water, or in the microwave); 4) marinate foods in the refrigerator; and 5) store large quantities of leftovers in shallow containers in the refrigerator for quicker cooling.

Instant feedback: Name two essential uses of thermometers in the home kitchen.

Answer: 1. To determine whether meat, poultry, and dishes containing eggs have been cooked to a high enough temperature to destroy disease-causing bacteria. 2. To determine whether the temperatures of the refrigerator and freezer are low enough for safe food storage.

In addition to the four basic principles of food safety listed above, a fifth principle — do not eat high-risk foods — should be added to the list for people who are especially vulnerable to foodborne illness, including pregnant women. Certain foods have high risks of contamination with disease-causing bacteria. Official food safety recommendations advise the general public to “avoid” these foods but use much stronger language to specifically warn members of vulnerable groups, including pregnant women, to “not eat” them. These high-risk foods are¹

- Raw sprouts
- Unpasteurized juices
- Raw or undercooked (“runny”) eggs or any dishes made with raw or undercooked eggs
- Raw or undercooked meat or poultry
- Raw or undercooked fish or shellfish (such as sashimi, ceviche, and those forms of sushi made with raw seafood)
- Raw (unpasteurized) milk or any foods made from it

Instant feedback: There are only two kinds of foods of plant origin that pregnant women have been advised not to eat. What are they?

Answer: Raw sprouts and unpasteurized juices

In addition to the foods listed above, there are several other foods that pregnant women should not eat because they are associated with one of the three specific foodborne hazards of special relevance to pregnant women. These hazards will be discussed in the next sections.

SPECIAL FOODBORNE HAZARDS DURING PREGNANCY

Listeriosis

Listeriosis is an infection caused by eating food contaminated with the bacterium *Listeria monocytogenes*. If a pregnant woman becomes infected with this bacterium, she is likely to experience only a mild, flu-like illness. However, the infection can have devastating effects on the fetus, leading to miscarriage, stillbirth, premature delivery, or serious infection of the newborn.⁴ Pregnant women are about 20 times more likely than other healthy adults to contract listeriosis and account for one-third of all listeriosis cases.⁴ Unlike many other foodborne bacteria, *Listeria* can grow at refrigerator temperatures. It is most likely to be found in refrigerated, ready-to-eat foods (for example, one widespread outbreak of listeriosis was traced to turkey deli meat⁵) and in unpasteurized dairy products.

To prevent listeriosis, the Food and Drug Administration recommends that pregnant women do the following:

- Follow the basic principles of safe food handling (as described earlier in this module).

- Do not eat hot dogs, luncheon meats, or deli meats unless they are reheated until steaming hot.
- Do not eat soft cheeses (such as feta, Brie, Camembert, blue-veined cheeses, and Mexican-style soft cheeses such as queso fresco, asadero, and queso blanco) unless they are labeled as having been made from pasteurized milk.
- Do not eat refrigerated pates or meat spreads.
- Do not eat refrigerated smoked seafood (such as lox, smoked salmon, smoked trout, or smoked whitefish) unless it is incorporated into a cooked dish, such as a casserole, that is thoroughly cooked.
- Do not drink unpasteurized milk or eat foods that contain it.

Listeriosis is an especially serious concern among Hispanic pregnant women because of the popularity of Mexican-style soft cheeses, often made from unpasteurized milk, in this population group. There have been serious outbreaks of listeriosis in the United States associated with the consumption of Mexican-style soft cheeses.^{6,7} Special efforts are being made to educate Hispanic pregnant women about the risk of listeriosis associated with these types of cheese (see “Online References That May Be Helpful in Patient Education,” below).

Instant feedback: What ethnic group in the United States is of special concern with regard to listeriosis?

Answer: Hispanics, because of the risk of listeriosis associated with the consumption of Mexican-style soft cheeses made from unpasteurized milk.

Toxoplasmosis^{3,8,9}

Toxoplasmosis is a disease caused by a parasite called *Toxoplasma gondii*, which grows in the intestines of cats and is shed in their feces, either into litter boxes or outdoors. Cats become infected by eating raw meat from infected animals; people can also become infected by eating raw or undercooked meat or certain other high-risk foods.

Many people become infected with *T. gondii* at some point in their lives; in most instances the infection causes little or no harm, and it creates immunity to future infections. However, if a woman becomes infected while pregnant, the fetus may also become infected. Infection of the fetus can cause spontaneous abortion or severe problems such as microcephaly, hydrocephalus, seizures, mental retardation, and chorioretinitis.

Pregnant women should avoid exposure to cat feces. Ideally, someone other than the pregnant woman should care for any family cats, including changing the litter box. If the pregnant woman must change the litter box, she should wear rubber gloves to avoid contact with the litter and wash her hands thoroughly afterwards. Removing cats from the household is *not* necessary. Because cat feces can contaminate soil, pregnant women should wear work gloves while gardening and wash their hands afterward.

Toxoplasma gondii can also contaminate foods, especially raw or undercooked meat. The precautions that pregnant women should take to avoid acquiring toxoplasmosis from food are as follows:

- Don't eat raw or undercooked meat or poultry.
- Don't eat raw eggs.
- Don't drink unpasteurized milk.

- Wash all fruits and vegetables before eating.

All of these are precautions that pregnant women should be taking anyway to minimize their risks of other foodborne illnesses.

Instant feedback: What type of food is most likely to be contaminated with the parasite that causes toxoplasmosis?

Answer: Raw or undercooked meat.

Methylmercury^{3,10}

Methylmercury is a toxic mercury compound that may contaminate some types of fish. It can build up in a woman's bloodstream and pass into the bloodstream of the fetus, where high levels can harm the nervous system. Methylmercury is removed from the human body naturally, but it can take more than a year for levels to drop into the safe range. Because of the slow removal of methylmercury from the body, avoiding methylmercury only during pregnancy is not considered adequate for safety; women should also minimize their exposure to this contaminant before they become pregnant. The Food and Drug Administration and the Environmental Protection Agency recommend that both pregnant women and those who may become pregnant take the following precautions to minimize exposure to harmful amounts of methylmercury.

1. Do not eat shark, swordfish, king mackerel, or tilefish. These fish contain high levels of mercury.
2. Eat up to 12 ounces (two average meals) per week of other types of cooked fish. Since albacore "white" tuna has more mercury than some other commonly eaten fish do, it is recommended that only six of the 12 ounces of fish permitted per week consist of albacore tuna.

3. Check local advisories before eating recreationally caught fish. If no advice is available, eat only up to six ounces of this fish per week, and avoid eating fish again during the same week.

Popular types of fish and shellfish that are low in methylmercury include shrimp, canned light tuna, salmon, pollock, and catfish.

Instant feedback: Why do official recommendations aimed at limiting methylmercury exposure apply to women who may become pregnant as well as those who are already pregnant?

Answer: Because it can take a year or more for methylmercury to be naturally removed from the human body.

Pregnant Women Can Benefit from Food Safety Education

The results of several recent studies indicate that women are not fully informed about the basic principles of food handling or the special food safety precautions that they should take during pregnancy.

In a recent survey of clients of a Women, Infants, and Children (WIC) clinic serving a predominantly African American population,¹¹ the majority of the women surveyed (who included mothers of young children as well as pregnant women) reported unsafe food handling practices, with the most common errors being failure to use a food thermometer, failure to refrigerate perishable foods within two hours, and thawing food in unsafe ways. Among the pregnant participants in the survey, half reported eating hot dogs or deli meats without first reheating them, and one-third reported eating soft or blue-veined cheeses.

In a focus group study of currently or recently pregnant women conducted by researchers from Colorado State University,¹² many reported not following seven of 12

specific recommendations for food safety during pregnancy. The women were resistant to advice to change their habits. They had no prior knowledge of many of the recommendations, and they doubted the need for them since they had followed their current practices without becoming ill. They also had personal preferences for some of the foods considered risky during pregnancy and regarded them as convenient and/or healthful; they were unwilling to give up eating these foods without strong evidence that it was necessary to do so.

Unfortunately, some health professionals may be missing opportunities to teach their pregnant patients about food safety. A preliminary study of 23 health care professionals who work with pregnant women indicated that only eight of the 23 currently provided food safety information to pregnant patients. The professionals' limited understanding of food safety issues and limited time with patients were seen as barriers to providing this information.¹³ Nurses who are well-informed about food safety during pregnancy may be able to contribute to educating patients on this important topic, thereby reducing the incidence of foodborne illness in this vulnerable population. When time is a barrier, or when nurses want to reinforce advice given in face-to-face communications, printed materials, such as those available from the online sources listed below, may be useful resources.

ONLINE REFERENCES THAT MAY BE HELPFUL IN PATIENT EDUCATION

<http://www.fightbac.org/> (an attractive, informative general food safety site that includes printable fact sheets on various topics that you can reproduce for your patients; the site is not specifically aimed at pregnant women, however)

<http://www.cfsan.fda.gov/~pregnant/pregnant.html> (This site, called “Food Safety for Moms-to-Be,” is specifically aimed at pregnant women and those who may become pregnant. It is sponsored by the U.S. Food and Drug Administration, and it provides extensive information in both English and Spanish. It includes both English and Spanish versions of a printable 2-page summary handout for pregnant women, which you can reproduce for your patients. English version of the handout: <http://www.cfsan.fda.gov/~pregnant/atglance.pdf> Spanish version of the handout: <http://www.cfsan.fda.gov/~pregnant/spatglan.pdf>)

<http://www.cfsan.fda.gov/~dms/lmp-toc.html> (This site provides materials, in English and Spanish, for an educational campaign specifically aimed at preventing listeriosis associated with the consumption of Mexican-style soft cheeses by pregnant Hispanic women in the United States.)

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