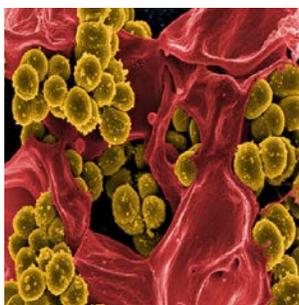


Staphylococcus aureus

A Common Cause of Foodborne Illness Associated with Improper Food Handling

What is *Staphylococcus aureus*?



Scanning electronic micrograph of *Staphylococcus aureus*
(Image credit: NIAID)

Staphylococcus aureus (Staph) is a bacterium and a significant cause of food poisoning worldwide. Staph is widely distributed in the environment, such as in the soil, water and air, and on everyday objects and surfaces. It is also commonly found on the skin and in the noses of 25% or more of healthy people. A report from the Food and Agriculture Organization of the United Nations (FAO) showed that Staph was isolated from 98.5% of crabmeat, 73.5% of prawns and 66.7% of fish.

What is Staph Food Poisoning?

Staph food poisoning is a foodborne illness that causes gastroenteritis. When people eat foods contaminated with Staph toxins, they can experience nausea, vomiting, stomach cramps, and diarrhea in as little as 30 minutes. These symptoms usually develop within one to six hours after eating the contaminated food. It takes one to three days to recover from the illness. Younger and elderly people may experience more severe symptoms.

How often does Staph Food Poisoning Occur?

The Centers for Disease Control and Prevention (CDC) estimates that Staph food poisoning causes approximately 241,188 illnesses, 1,064 hospitalizations, and 6 deaths in the U.S. each year.

The biggest U.S. outbreak of Staph food poisoning occurred in 1990. A total of 1,354 children who had eaten lunch served in 16 elementary schools in Texas became ill after consuming chicken salad that was contaminated with Staph toxins. The chicken was prepared at

Sources of Staph:

- Environments: soil, water, and air
- Human: skin, infected cuts, pimples, nasal passages

Symptoms of Staph Food Poisoning:

- Nausea
- Vomiting
- Diarrhea
- Stomach cramps

Foods Associated with Staph Food Poisoning:

- Meat and meat products;
- Poultry and egg products;
- Salads containing ham, egg, tuna, chicken, potato, and macaroni;
- Bakery products, such as cream-filled pastries, cream pies, and chocolate éclairs;
- Sandwiches fillings and deli meats;
- Milk and dairy products.

room temperature and cooled slowly during refrigerated storage and then left at room temperature before serving.

Another outbreak of Staph food poisoning occurred at a military base in 2012 with 22 people becoming sick after eating a chicken, sausage, and rice dish contaminated with Staph toxins. In this outbreak, the initial contamination of the dish might have occurred while the preparer was handling the chicken after it was cooked. The overnight storage of the precooked dish without refrigeration may have allowed the staph to grow and produce toxins. Further reheating before serving did not destroy the Staph toxins.

How do Foods Get Contaminated with Staph?

Foods contaminated with Staph may look and smell right, even when toxins are present. Foods can get contaminated with Staph when they are improperly prepared. Food workers handling foods without washing their hands and foods prepared and handled at elevated temperatures are the most common causes for the contamination of foods with Staph. Foods can also be contaminated if unclean food preparation areas and equipment are used. Since cooking or reheating contaminated foods will not destroy the toxins, it is important to prevent foods from becoming contaminated in the first place.

What Foods are Commonly Associated with Staph Food Poisoning?

Foods that are fully cooked or ready-to-eat (RTE), such as meat and meat products, salads containing eggs, tuna, or chicken, certain bakery products, sandwich fillings, deli meats, etc., are commonly associated with Staph food poisoning. Because these foods are high in protein and require a significant amount of manual handling usually at elevated temperatures during their preparation, the risk is high for Staph to be introduced, grow and form the toxin. Once the toxin is formed in the food, it cannot be removed by refrigeration, cooking or reheating.

How is Staph Food Poisoning Prevented?

– *Manage Personal Hygiene*



Wash Hand Thoroughly
(Credit: MDSG)

Washing hands thoroughly before handling food and often during food preparation, particularly after using the bathroom or touching the hair, face and body, is essential to preventing Staph contamination. Since Staph is the leading cause of skin infections, food workers with infected wounds, burns, cuts or sores must **keep affected areas bandaged** and use gloves to cover the bandaged areas until they are healed. Once Staph contaminates the food and the toxin is produced, it cannot be destroyed by cooking or freezing.

Preventing Staph Food Contamination When Preparing Foods:

- Wash hands
- Cover any cuts, sores and wounds
- Cook foods thoroughly
- Prepare foods under controlled temperatures
- Rapid cooling and refrigeration of prepared foods
- Clean and sanitize food preparation areas and equipment
- Do not prepare or serve food for others if you have wounds or skin infection on your hands or wrists

Decreasing the Risk of Staph Food Poisoning:

- Keep hot foods hot and cold foods cold
- Avoid foods prepared by a person with symptoms of skin infection
- Do not eat foods kept at room temperature
- Avoid improperly handled foods

Treatment of Staph Food Poisoning:

- Visit a medical doctor
- Manage any complications until it passes
- Do not use medicines unless the doctor recommends them

– Cook Foods Thoroughly



Cook Foods Properly
(Credit: safefood.gov)

Staph is expected to exist in any foods that are handled by humans or are of animal origin, unless heat process is applied. Therefore, it is very important to cook foods thoroughly (especially meat, poultry, eggs, fish and shellfish) and avoid post-cooking recontamination.

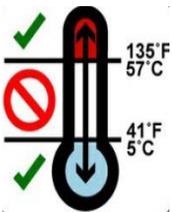
– Avoid Cross-contamination



Avoid Cross-Contamination
(Credit: MDSG)

Separating raw foods from cooked foods is essential to avoid cross-contamination. For example, separate raw meat, poultry and seafood from other cooked foods; use separate equipment, utensils and containers for handling and storing raw and cooked foods. In addition, it is also critical to avoid recontamination of cooked foods.

– Handle and Keep Foods at Safe Temperatures



Avoid Danger Zone
(Credit: IAFP)

Foods should not be prepared and stored at temperatures that allow Staph to grow. This means keeping hot foods hot (135°F or higher) and cold foods cold ($\leq 41^\circ\text{F}$ or lower). Keeping foods at elevated temperatures (between 50°F and 113°F) during handling and preparation can result in Staph growth and toxin production. Rapid cooling followed by adequate refrigeration of prepared foods are also important.

– Keep Food Preparation Areas and Equipment Clean



Keep Area Clean
(Credit: MDSG)

Washing and sanitizing all surfaces and equipment used for food preparation before and after use can minimize the risk of cross-contamination of Staph between foods and equipment.

How Can You Decrease the Risk of Staph Food Poisoning?

Keep in mind that eating foods prepared by a person with skin infection, that have been kept at room temperatures or eating the same food as someone who has symptoms of gastrointestinal illness can increase the risk of Staph food poisoning.

How is Staph Food Poisoning Diagnosed and Treated?

Food history and rapid onset of symptoms are sufficient to diagnose Staph food poisoning. A stool culture and blood tests may be done if necessary. The doctor treats Staph food poisoning by managing the complications until they pass. Dehydration caused by diarrhea and vomiting is the most common complication. Do not use medicines, including antibiotics and other treatments, unless the doctor recommends them.

Reference Resources

CDC: *Staphylococcal Food Poisoning*. Available at: http://www.cdc.gov/ncidod/dbmd/diseaseinfo/staphylococcus_food_g.htm. Accessed 04/08/2015.

Food and Drug Administration (FDA). *Bad Bug Book, Foodborne Pathogenic Microorganisms and Natural Toxins*. Second Edition. 2012.

FAO. *Fisheries Report No.514 Supplement*, 1994.

Chengchu Liu (cathylu@umd.edu) and Abigail Villalba (villalba@vt.edu)

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