WHY GLOVES ARE NOT THE SOLUTION TO THE FINGERTIP WASHING PROBLEM

O. Peter Snyder, Jr., Ph.D.
Hospitality Institute of Technology and Management

Background

The United States' FDA Food Code requires that there be no bare hand contact with ready-to-eat food. This is broadly interpreted as the "glove rule." There is no scientific reason for this requirement.

Correct fingertip washing makes hands safe. The resident microorganisms in the skin of the hands are non-pathogenic, except for *Staphylococcus aureus*. When one touches food, one might get 10 to 20 *S. aureus* per gram, maximum, into the food. *Staphylococcus aureus*, however, must multiply to 100,000 or 1,000,000 per gram in order to produce enough toxin to make people ill (Snyder, 1994b). Food must be grossly abused for this to happen; in this case, the operator should not have a license.

The problem, then, is not the skin's resident microorganisms. The problem is the transient microorganisms on fingers from human fecal material on the fingertips (because the toilet paper did not protect the hand) or contamination from touching raw food, especially chicken.

Do gloves help when touching a contaminated surface and then, touching ready-to-eat food?

The answer is, "No," because employees cannot determine by sight if a food contact surface or food is microbiologically contaminated or not. Potentially hazardous food may or may not be contaminated. When employees touch the handles on refrigerator doors, handles on display cases, buttons on scales, knife handles, etc., it makes no difference if they wear gloves or not. Cross-contamination occurs from one surface to another, but probably, at a tolerable level. It is known that pathogens die on metal surfaces over a period of a few hours. Hence, these surfaces are, to a degree, self-disinfecting. This is not so with raw chicken, which can commonly have infectious levels of *Campylobacter jejuni* on the surface.

The advantage to using bare hands in the case of handling raw food is that employees can "feel" if their hands are dirty—which they cannot do if wearing gloves—and will be more likely to wash them more frequently.

If gloves are used, the FDA code requires that employees first wash their hands for 20 seconds before putting the gloves on and for another 20 seconds immediately after removing the gloves, because the skin inside the gloves becomes hot and moist, and the resident skin microorganisms multiply to high levels underneath the gloves. Gloves only complicate the hand wash problem and make the process more time consuming.

This is not to say that gloves are not useful. They do protect the hands, and they are necessary for many people who work with food, because they may have their hands in very hot water or in alkaline or acid solutions. They may be allergic to lemon juice or other food products. Hence, they need gloves to prevent injury to the hands.

Why does the food code say, "no bare hand contact," to include wearing gloves? I suggest that this is because regulators do not know how to enforce their own laws regarding hand washing.

They do not know how to get employees to wash fecal pathogens from their fingertips when coming from an "unknown" location, presumed to be the toilet. As a result, regulatory officials have chosen to require food handlers to wear gloves or use utensils when working with ready-to-eat food.

Is wearing gloves or using utensils to handle food the correct answer to employees not washing fecal pathogens from their fingertips?

The answer, again, is "No." The first concern is that new gloves are packaged in a container; so, if an employee comes from the toilet without washing his/her hands, that employee will contaminate the outside of the gloves with fecal pathogens in the process of removing the gloves from the container and putting them on (Snyder, 1994a). These pathogens will then be transferred into the salad or other ready-to-eat food that the employee handles next. It is impossible to put gloves on unwashed hands without the contamination from the fingertips getting on the outside of the gloves.

The next problem is that the gloves used in foodservice are cheap and fragile, and the fingertips break out so that the fingertips are exposed to the food. There is a high failure rate in terms of the gloves blocking the transmission of contaminants on fingertips into the food. The fingertips must be clean before the gloves are put on. If they are properly cleaned, they are safe.

Proper hand and fingertip washing is the critical procedure to prevent cross-contamination.

Another problem with effective control is that the government does not provide correct hand and fingertip washing procedures. There are four components to successfully removing soil: 1) friction, 2) water, which washes bacteria from the surface and down the drain, 3) a chemical in the form of soap or detergent to loosen the bacteria, and 4) temperature, because most chemicals work better at warm temperatures than they do at cold temperatures.

The HITM double hand washing process requires the use of a nail brush for friction on the first wash to aid in removing bacteria from fingertips that are soiled with high levels of fecal pathogens. HITM recommends the Anchor 2000 Surgeon's Scrub Brush. It is used when an employee enters the kitchen from using the toilet, coming from home, with the possibility of feces and vomit on the hands, etc. The process is as follows.

1. Turn on the water (75 to 110^{o}F).
2. Put 3 to 4 ml of plain liquid soap on the nail brush (soap put on fingertips is likely to slide off).
3. Underneath the flowing water in the sink, for about 10 to 12 seconds, lightly brush the fingertips with the tips of the brush bristles while the water flows over the brush and fingertips. The bacteria come off and go down the drain. This gives a 1,000-to-1 reduction of bacteria on fingertips.
4. Put the brush down. Put soap on the hands, and lather the hands underneath the flowing water for about 5 seconds to get a 100-to-1 reduction. Rinse the soap from the hands.
5. Paper towel dry for another 10-to-1 reduction.

The government method of hand washing is to put soap on the hands and lather for 20 seconds. This does not remove the bacteria. Lathering merely moves the bacteria around the back and front of the hands, between the fingers, etc., and the hands become completely contaminated with fecal bacteria from the fingertips. The last step to the food code's 20-second wash is to

rinse. This is not correct. One must rinse throughout the procedure. Flowing water, along with friction, is absolutely key to removing fecal pathogens from hands and fingertips.

Once in the kitchen, there is no need for the nail brush part of the HITM double wash. Food pathogens do not occur in as large a number as fecal pathogens, and a single, 5-second hand wash, as in the second wash in the double hand wash, is sufficient to reduce these food pathogens to a safe level. It is unreasonable to expect that employees will spend 20 seconds at the hand sink every time they touch a piece of raw food before touching ready-to-eat food or changing gloves. It is more realistic to expect employees to spend 5 seconds lathering and rinsing their hands under flowing water.

Summary

The resident skin bacteria are not a food safety issue. The only organism of concern is *S. aureus*, and it must grow to 1,000,000 per gram to cause illness. However, this is extremely unlikely. While using utensils can prevent cross-contamination, using gloves to prevent cross-contamination from raw food to ready-to-eat food is not a solution. First of all, gloves can become contaminated, but employees are less likely to realize this if they cannot feel the soil. Without the gloves, they are more likely to wash their hands to prevent cross-contamination, because they can feel the soil on the hands as a warning that it is time to wash the hands.

Covering up unwashed, fecal-pathogen-contaminated fingertips with gloves as a substitution for washing hands to prevent cross-contamination merely sidesteps the issue of the lack of regulatory enforcement of hand washing. Furthermore, gloves are not perfectly constructed. They have holes and can leak, and the fingers can break off, which means, pathogens on the hands, if present, will leak through and contaminate the food.

The only solution to preventing fecal-oral contamination is fingertip washing using the double hand wash with a nail brush, when entering the kitchen, to reduce pathogens on fingertips to a safe level. The friction on the fingertips from the nail brush, combined with flowing water, dramatically improves the reduction of bacteria on fingertips, compared to a simple lathering of the hands for 20 seconds, as required by the food code.

When the government puts forth a properly designed hand washing program—a double wash with a nail brush when an employee comes into the kitchen, presumably from the toilet, and a single wash and rinse once the employee is in the kitchen—there will be a 1,000,000-to-1 reduction of bacteria on fingertips with the double wash and a 1,000-to-1 reduction with the single wash, and there will be no need for gloves.

Gloves are simply an indicator that the regulatory system has failed in its responsibility to provide and enforce a correct hand washing program. Gloves are not a way to prevent foodborne illness.

References:

Snyder, O.P. 1994a. Cross-contamination of gloves when being put on. 1999 rev. Hospitality Institute of Technology and Management. St. Paul, MN.

Snyder, O.P. 1994b. Technology of HACCP-based, Chilled Food Production Systems. 1998 ed. Hospitality Institute of Technology and Management. St. Paul, MN.