

# Prevention of Hepatitis A through Food Handler Immunization

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## ABSTRACT

The number of cases of hepatitis A in the United States is decreasing as the result of adoption of universal childhood vaccination guidelines. Nevertheless, hepatitis A outbreaks occur regularly because of food handlers working while contagious. Infected food handlers can spread potentially deadly disease to co-workers and customers. Even without evidence of disease spread, hepatitis A scares can impose a significant financial burden to food establishments. Hepatitis A outbreak prevention should include vaccinating food handlers against the disease.

In the past, the economic burden of immunization has prevented mandatory vaccination policies in the food industry. However, as the majority of persons entering the food service industry in the coming years will already be vaccinated, this is likely to change. Further, hepatitis A is

likely to be targeted for eradication in the United States. Past experience has demonstrated that eradication campaigns aggressively target all potential routes of spread, and the food industry should be cognizant of the potential for changes in immunization policy.

## OVERVIEW

In late July 2016, the State of Hawaii Department of Health reported that a food service employee had worked in a restaurant while infected with the hepatitis A virus. The employee had worked during the period prior to symptom onset, during which this individual was unaware of having the disease but was highly contagious and therefore capable of transmitting the virus to co-workers and customers. To make matters worse, this employee worked in a sushi restaurant. Sushi not only requires a large amount of

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manipulation, which can facilitate the spread of hepatitis A, but also undergoes little if any heating that would otherwise aid in inactivating the virus. This employee was infected during a large outbreak in Oahu, the source of which was contaminated raw scallops. The sushi restaurant was not alone, in that employees of at least five other restaurants also were infected during this same outbreak and worked in food service during their contagious period (8). The employees of these restaurants were not ultimately the source of the hepatitis A outbreak, but there were consequences regardless. Restaurants with infected employees are required to notify customers that they may have been exposed to the virus, which can result in considerable impacts such as demands for vaccination and for post-exposure prophylaxis as well as loss of business reputation. All this for a disease that is ultimately vaccine preventable. In view of the decade that has passed since the adoption of universal hepatitis A vaccination and the likelihood that hepatitis A will be targeted for eradication, the food industry should consider and prepare for likely changes in vaccination policy.

### HEPATITIS A VIRUS

Hepatitis A virus (HAV) is the most common cause of acute viral hepatitis in the world (5, 23). In developed countries, HAV is transmitted primarily person-to-person via the fecal-oral route but can also be transmitted via contaminated food or water (10, 17, 18). On average, 28 days elapse between exposure to the virus and appearance of signs and symptoms of infection (18). Symptoms associated with HAV infection include fever, malaise, anorexia, nausea, abdominal pain, dark urine, and jaundice. In severe cases, fulminant hepatitis may result from HAV infection (24) and carries a case fatality rate up to 80%. Acute liver failure due to HAV may also result in the need for liver transplantation and/or significant morbidity and associated healthcare costs (26). The risk for acute liver failure increases with age (13) and consequently, the case fatality rate due to HAV infection also increases with age, being estimated at 0.1% in children < 15 years old and 2.1% in adults over the age of 40 (12).

The epidemiology of viruses spread by the fecal-oral route is understandably influenced by sanitation and hygiene standards, which are in turn influenced by socioeconomic status (11). Consequently, the majority of the world's HAV cases occur in lower-income countries where the virus is particularly common (11). The result of high endemicity is that most people in low-income countries are exposed to HAV as children (13). Therefore, in low-income countries, few adults are susceptible, as infection in childhood results in lifelong immunity (10, 17, 18). In contrast, high-income countries such as the United States have low endemicity of HAV and therefore a high proportion of susceptible adults (13). HAV infections in the United States have decreased 87% in the past decade (14), largely because of vaccination.

### HEPATITIS A CONTAMINATED FOOD AND INFECTED FOOD HANDLERS

Contaminated food has been implicated often in the spread of the hepatitis A virus. Food products can become contaminated at any step in the continuum from farm to fork. Products compromised in the field can result in widespread outbreaks, such as that caused by HAV contaminated frozen pomegranate arils, which sickened 165 patients in 10 states in 2013 (6). The pomegranate arils were likely infected by harvesters working in the fields in Turkey (6). The same scenario occurred a decade earlier when green onions imported from Mexico sickened 601 people, three of whom died (28); this outbreak resulted in a temporary ban on products from this particular farm. Both outbreaks illustrate the risk associated with accidental importation of HAV (6, 28). As a result of outbreaks such as this, many have suggested that hepatitis A vaccination should be used worldwide as a means of protecting the global food supply (21, 27).

Although foods may become contaminated with the HAV virus during any one of a number of processing steps, most reported foodborne outbreaks have been traced to HAV-infected food handlers at the point of sale. HAV is the most common vaccine-preventable disease in the United States, and the food industry is the single largest private employer in the U.S. (9). Therefore, at any given point a number of food handlers are likely to be infected with HAV, especially given that many food handlers belong to groups at higher risk for infections, such as younger persons and those from lower socioeconomic backgrounds (9). Characteristics that increase the likelihood of HAV transmission include asymptomatic infections, long incubation periods, and long-term survival of the virus on surfaces (9). A single infected food handler can potentially infect foods, co-workers, and dozens if not hundreds of customers (9). For example, in 1992, an infected food handler working for a Denver catering facility spread disease to 43 people, including nine other food service employees at the same company (7). In total, these nine employees exposed up to 5,000 people to HAV; however, over 16,000 people requested post-exposure prophylaxis (PEP) as a result of this outbreak (7). This PEP immune globulin treatment accounted for the majority of the costs associated with this outbreak, which were estimated at over \$809,000 (7).

The impact of foodborne outbreaks of HAV can include many costs, such as providing vaccines, PEP, serology to test food workers for active infection, medical costs, and lost productivity (7, 9, 28). The losses to the business can also include loss of reputation, discarded foods, lost productivity, and potential lawsuits from victims (7, 9, 28). Businesses that employ HAV-infected food handlers are required to provide extensive notification to exposed patrons, which can lead to further loss of business

**TABLE 1. Mass Media Coverage of Hepatitis A and Food**

Headline	Source	Notation
“Thousands May Have Been Exposed to Hepatitis A at Missouri Restaurant”	CNN May 22, 2014	Class Action Lawsuit filed against Red Robin International.
“3706 People Vaccinated after Possible Hardee’s Hepatitis A Exposure”	WSPA News September 22, 2015	Class Action Lawsuit Filed against Hardee’s Food Systems LLC.
“McDonald’s Franchisor Prosecuted for Infection Hepatitis A to Customers (sic)”	Albany Daily Star August 16, 2016	Class Action Lawsuit filed against McDonald’s franchisor Jascor Inc.
“Beach Resort Sushi Restaurant Worker Could Have Unknowingly Exposed Diners to Hepatitis A as Outbreak Spreads to 93 People, Hawaiian Health Officials Reveal”	Daily News July 27, 2016	Developing Situation, Class Action Lawsuit filed against Genki Sushi, likely to expand to other restaurants.

reputation and subsequent loss of revenue (22). Although most infected food handlers never transmit disease to patrons, the competition for subscribers can lead news agencies to produce sensational headlines concerning hepatitis A infections (Table 1), potentially damaging the establishment’s reputation. Further, businesses may find themselves on the receiving end of class action lawsuits filed by those who were potentially exposed (Table 1).

#### HEPATITIS A VACCINES

Humans are the only host for hepatitis A virus infection and, as a result, global eradication of the virus is possible (18). The likelihood of eradication was greatly increased with the advent of hepatitis A vaccines (18). The first HAV vaccine (HAVRIX) was licensed in the United States in 1995, with the second preservative-free vaccine (VAQTA) following shortly thereafter (16, 17). In addition to these, a combination vaccine that provides protection against both hepatitis A and hepatitis B (Twinrix) is also commonly used in the United States (17, 18). The two hepatitis A-only vaccines are similar in that both require two doses, contain inactivated whole virus, and are highly immunogenic, resulting in nearly 100% seroconversion (17, 18). In addition, long-term persistence of anti-HAV antibody has been demonstrated, regardless of which vaccine is used (10, 12, 17, 18, 25). The hepatitis A vaccines also have a

remarkable safety profile. For example, a study of over 6 million vaccinations given identified no serious adverse events in the 2-year period post-licensure of the vaccine (19). This excellent safety profile is consistent across numerous studies of the three major hepatitis A vaccines (3, 10, 17, 18, 19, 25), demonstrating that the vaccine is both remarkably safe and efficacious.

Vaccination is the most effective way to reduce the incidence of hepatitis A. In 1996, the Advisory Committee on Immunization Practices (ACIP) recommended vaccinating children in communities with the highest rates of hepatitis A infections and disease (1). Vaccination was also recommended for other high-risk groups, including travelers from high-risk countries, men who have sex with men, injected-drug users, and persons with chronic liver disease (1). Three years later, however, epidemiological data suggested that without a change to the recommendations, there would be no chance of decreasing the incidence of HAV disease in the United States (2). Therefore, the ACIP guidelines were expanded in 1999 to include routine vaccination of all children living in areas with an elevated risk of HAV infection (2). In 2006, the ACIP further extended the guidelines by recommending routine vaccination of all children in the United States (10), setting the stage for future elimination of hepatitis A transmission in the United States. At present, the guidelines do not recommend routine

vaccination of adults, including those who work in food service. However, eradication will not be possible without addressing all possible routes of viral spread, and food and food handlers are a well-established hepatitis A risk factor.

### **PREVENTION OF HEPATITIS A THROUGH VACCINATION OF FOOD HANDLERS**

The strategy of vaccinating food handlers as a means to control the spread of hepatitis A has been a topic of interest since the first vaccine was licensed in 1995. The fact that the vaccine is highly efficacious and has a remarkable safety record has led many to consider policies requiring mandatory vaccination of food handlers. This was indeed the case in St. Louis County, where sequential outbreaks of hepatitis A linked to food service handlers caused a huge strain on local health resources (20). In response, the county passed an ordinance in late 1999 requiring restaurant handlers to be vaccinated (20). Subsequent analysis has demonstrated that this policy has reduced the number of hepatitis A outbreaks, thereby lowering the morbidity and economic burden to St. Louis County (20). Recently, Bill Marler, well known for representing victims of foodborne illness, has renewed the call for mandatory vaccination in response to a recent hepatitis A outbreak in Hawaii (15). In his letter, Mr. Marler stated that restaurants have a moral obligation to protect customers from serious disease and reminded businesses of the need to protect themselves from the potential multimillion dollar fallout that can occur if people become ill or have to obtain PEP (15). An often-cited paper asserted that vaccinating restaurant workers would be unlikely to be economical (16). The authors claim that litigation is not a serious concern for most businesses, as they carry insurance to protect themselves from such losses (16). Although this is likely the case for larger businesses, it may not apply to smaller facilities and does not protect against loss of business reputation. The study further claims that it is not economically feasible for restaurants to vaccinate all their employees (16). However, it is not clear why restaurants would have to pay the costs of vaccination. Vaccination is a requirement for employment in a number of industries, including veterinary and healthcare establishments, and employees are often responsible for paying for their own vaccines prior to hiring. The economic analysis determined that the chance of any individual restaurant incurring an outbreak is outweighed by the costs associated with vaccination (16). However, although the chance of an individual restaurant being the source of an outbreak is very low, the ramifications for that establishment are quite high. Thus, although recent papers still quote this study, with its claim that mandating vaccination for food service employees is not cost effective (22), assumptions of the paper, now 15 years old, may no longer apply. These include the assertion that the food establishment would have to absorb the cost of the vaccines, the assumption that none of the employees

would have been vaccinated previously, and finally, the rising costs of PEP and the popularity of the class action lawsuit since the earlier paper was published.

There are therefore several reasons to consider vaccinating food handlers. Foremost is the ACIP vaccination recommendation of 2006. A decade has passed since hepatitis A vaccination was routinely recommended for all children. Therefore, in the coming decade, many of the individuals entering employment in the food service industry will already be vaccinated. Those who have missed the vaccination, if they are both under the age of 18 and unable to pay for the immunization, can receive it at no cost through the federally funded Vaccines for Children (VFC) program (4). The food industry should also consider the precedent set by the medical industry in that proof of vaccination is a requirement prior to hiring. Therefore, the employer will not incur any costs associated with vaccination of new employees. This approach and the current vaccination schedule challenges the findings of earlier economic studies suggesting that the cost of ensuring that employees are vaccinated outweighs the risks (16, 22). The food industry must also be aware that the costs of foodborne outbreaks continue to rise as juries award large settlements to victims of foodborne disease and class action lawsuits rise in popularity among those persons potentially exposed. The industry should also be aware the hepatitis A is an obvious target for eradication and aggressive campaigns to do so will not overlook the role of food and food handlers in virus spread. Finally, the food industry does indeed have a moral obligation to take as many precautions as possible to protect consumers.

### **CONCLUSIONS**

Lessons can be learned from the way the nation adopted the hepatitis A vaccine for children, in that requiring vaccination can be a gradual process for the food industry. The most obvious first step would be to require proof of vaccination for all new hires, who, in the food industry in the upcoming years, will likely consist largely of young individuals who were vaccinated as children. The high turnover rate in the food industry would also increase compliance, as employees who leave one establishment would have to be vaccinated, or to show proof of immunity to HAV, as infection results in lifelong immunity, prior to entering as a new employee elsewhere. The next step would likely be providing non-immune present employees with a time frame in which to complete the vaccination series or risk being fired. This time frame would best be determined by the given establishment, but the sooner the better. It is important to note that some districts offer tax breaks for businesses with vaccinated employees and some insurance companies also offer incentives. Eventually, vaccination would be mandatory for all persons working in food establishments following a gradual rollout of recommendations.

Hepatitis A vaccination is extremely safe and efficacious, and vaccinating food handlers not only protects customers and communities but should be the next step toward eliminating HAV transmission in the United States.

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