Hepatitis A Infection in Recent International Adoptees and Their Contacts in Minnesota, 2007–2009

OBJECTIVE: The goal of this study was to describe hepatitis A–infected adoptees and the risk of transmission to their contacts.

METHODS: This was a retrospective review of adoptee-associated cases of hepatitis A and hepatitis A–infected adoptees identified in Minnesota from 2007 through 2009.

RESULTS: From 2007 through 2009 in Minnesota, 10 cases of hepatitis A, including 1 fulminant case, were associated with international adoptees. Eight cases were direct contacts of a hepatitis A–infected adoptee, and 2 other cases secondary contacts of an adoptee. During the same period, hepatitis A infection was identified in 21 recently arrived foreign-born adoptees; all were younger than 60 months of age, and only 6 were symptomatic.

CONCLUSIONS: Clinicians should be aware that transmission of hepatitis A may occur among both direct and secondary contacts of young children recently adopted from hepatitis A–endemic areas and that infected young children may be asymptomatic. Household members and other close contacts of international adoptees should be counseled about hepatitis A prevention, including vaccination. In addition, screening for hepatitis A should be considered for recently arrived adoptees from endemic areas. Pediatrics 2011;128:e333–e338

WHAT’S KNOWN ON THIS SUBJECT: Infectious disease transmission from international adoptees to their contacts is well established. Transmission of hepatitis A from recent international adoptees to their contacts has been reported, but descriptions of infected adoptees and associated cases are limited.

WHAT THIS STUDY ADDS: A retrospective review found 10 adoptee-associated hepatitis A cases and 21 infected adoptees in a 3-year period. These findings highlight the need for hepatitis A prevention through immunization of those adopting internationally and consideration of screening of recent international adoptees.
Adoption of foreign children into US families increased nearly 2.5-fold, from 7093 in 1990 to 17,438 in 2008. Hepatitis A is endemic in each of the 20 most common countries of birth on immigrant visas issued to orphans coming to the United States. In these countries, people typically are infected with hepatitis A as infants or young children. Signs and symptoms of hepatitis A include jaundice, dark urine, fever, headache, malaise, nausea, vomiting, abdominal pain, and anorexia. Fewer than 10% of children younger than 5 years of age with hepatitis A have jaundice; thus, many young children with hepatitis A infection have unrecognized disease but are able to spread infection. Hepatitis A is transmitted through the fecal-oral route. In adults, viral shedding of hepatitis A in stool begins 2 weeks before symptoms appear and decreases after the onset of jaundice. In children and infants, shedding of hepatitis A virus (HAV) can continue extensively and has been observed for up to 10 weeks after the onset of symptoms in children and up to 6 months after the onset of symptoms in neonates.

Hepatitis A is a vaccine-preventable disease. Since 1996, the US Advisory Committee on Immunization Practices (ACIP) has recommended hepatitis A vaccine for travelers to countries with intermediate or high endemicity of hepatitis A, including individuals traveling to adopt children. Before the availability of the hepatitis A vaccine, immunoglobulin was recommended for such travelers to prevent hepatitis A infections. In 2006, the ACIP recommended the hepatitis A vaccine at age 1 year for all children in the United States and consideration of catch-up vaccination for those aged 2 to 18 years. In September 2009, the ACIP recommended hepatitis A vaccination before contact with the adoptee for persons who will have close contact, within 60 days of the adoptee’s arrival in the United States, with an adoptee from an endemic area. Examples of close personal contact (as described by the ACIP) are household contact and regular baby-sitting.

RESULTS

Hepatitis A Cases Associated With International Adoptees

From January 1, 2007, to December 31, 2009, 10 (6%) of 170 cases of hepatitis A reported in Minnesota were determined through epidemiologic investigations to be associated with internationally adopted children. The median age of these 10 cases was 47 years (range: 25–59 years). Three
(30%) cases were female and 7 (70%) were male. All 10 cases were IgM anti-HAV positive. Two (20%) of the cases were hospitalized, including 1 with fulminant hepatitis A. Symptom onset occurred an average of 43 days (range: 27–77 days) after the associated adoptee arrived in the United States. Eight (80%) cases had direct contact with a hepatitis A–infected adoptee (either polymerase chain reaction-positive or HAV IgM-positive), including 2 cases who had history of international travel in addition to adoptee contact. Two (20%) were secondary cases exposed to an adoptee-associated case. Only 1 (10%) of the cases was exposed to a asymptomatic adoptee; this adoptee also was diagnosed with concurrent giardiasis. Of the 6 primary cases without history of other international travel, 2 (33%) were household contacts, 2 (33%) were nonhousehold relatives, 1 (17%) was a health care provider, and 1 (17%) was a contract employee in the home of an adoptee. One of the 2 cases who were household contacts of an adoptee received a hepatitis A vaccine after 4 weeks of exposure but subsequently became ill.

PEP was recommended for at least 125 contacts of 5 of the 10 adoptee-associated cases of hepatitis A. PEP was not recommended for contacts of the remaining 5 cases; 4 cases had no contacts, and 1 had only previously vaccinated contacts. The average number of known contacts per case was 13 (range: 0–64). One case was the index source of a foodborne cluster of 2 cases of hepatitis A in a group home, and PEP was recommended for 115 contacts of these secondary cases. The 2 secondary cases in the group home attended different day training and habilitation programs, and their contacts lived in 37 group homes located in 6 counties.

### Hepatitis A–Infected Adoptees

From January 1, 2007, to December 31, 2009, a total of 21 recently arrived internationally adopted children were identified as infected with hepatitis A. Although only 3 (14%) of the hepatitis A–infected adoptees met the case definition, all were considered to be potentially infectious. Eighteen (86%) of these adoptees had a positive IgM anti-HAV result, and the remaining 3 (14%) were not tested for IgM anti-HAV. Fourteen (67%) of the hepatitis A–infected adoptees were tested using HAV polymerase chain reaction, including 10 with serum alone, 2 with serum and stool, and 2 with stool alone. Of the 14 adoptees tested by using polymerase chain reaction, 12 (86%) had detectable HAV (8 in serum, 2 in stool, and 2 in both serum and stool), including the 3 adoptees not tested for IgM anti-HAV. The median age of the 21 hepatitis A–infected adoptees was 11 months (range: 9–53 months). Sixteen (76%) of these adoptees were born in Ethiopia, 3 (14%) were born in Guatemala, and 2 (10%) were born in Liberia (Table 1).

Three (14%) of the 21 adoptees infected with hepatitis A had discrete onset of symptoms (either jaundice or elevated serum aminotransferase levels) and a positive IgM anti-HAV serologic result, thereby meeting the Centers for Disease Control and Prevention/Council of State and Territorial Epidemiologists criteria for a confirmed case of hepatitis A. In addition to these 3 confirmed cases, 6 (29%) of the hepatitis A–infected adoptees had elevated serum aminotransferase levels with no reported symptoms, and 3 (14%) had at least 1 symptom consistent with hepatitis A but no reported jaundice or elevated serum aminotransferase levels. The most commonly reported symptoms among the 6 symptomatic adoptees were diarrhea (100%), fever (50%), and anorexia (33%). Serum aminotransferase levels were reported for 11 (52%) adoptees; the mean alanine transaminase level was 225 U/L (range: 17–737 U/L), and the mean aspartate aminotransferase level was 180 U/L (range: 36–739 U/L).

Of the 21 hepatitis A–infected adoptees, 12 (57%) were identified through routine screening of adoptees from endemic areas by the University of Minnesota International Adoption Clinic, 5 (24%) were identified through routine public health follow-up of reported cases of hepatitis A, 2 (10%) were identified through routine screening at a primary care clinic, 1 (5%) was tested due to symptoms (ie, fatigue, anorexia, diarrhea, elevated serum aminotransferase levels), and 1 (5%) was tested during a 5-day hospitalization for fever, diarrhea, anemia, and salmonellosis. Eight (38%) of these 21 adoptees were linked to ≥1 of the 10 hepatitis A cases reported in Minnesota during the same period among persons who were associated (primarily or secondarily) with an international adoptee. No known cases of hepatitis A were associated with 13 (62%) of the 21 hepatitis A–infected adoptees.

### Table 1: Characteristics of Hepatitis A–Infected Foreign-Born Adoptees Grouped According to Country of Origin, Minnesota, 2007–2009

<table>
<thead>
<tr>
<th>Country of Origin</th>
<th>Total Hepatitis A–Infected Adoptees, n (%)</th>
<th>Median Age, mo (Range)</th>
<th>Gender, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia</td>
<td>16 (76)</td>
<td>11 (9–53)</td>
<td>9 (56)</td>
</tr>
<tr>
<td>Guatemala</td>
<td>3 (14)</td>
<td>11 (11–12)</td>
<td>2 (67)</td>
</tr>
<tr>
<td>Liberia</td>
<td>2 (10)</td>
<td>25 (11–35)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>21 (100)</td>
<td>11 (9–53)</td>
<td>11 (52)</td>
</tr>
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PEP (hepatitis A vaccine or immunoglobulin) was recommended for 36 contacts of 10 hepatitis A–infected adoptees, including 17 (47%) child care contacts of 3 adoptees, 12 (33%) nonhousehold relatives of 3 adoptees, and 7 (19%) household contacts of 4 adoptees. Of the 11 hepatitis A–infected adoptees with no contacts for whom PEP was recommended, 7 (64%) had only fully vaccinated contacts, 2 (18%) were identified after an associated case and all contacts already had been vaccinated as part of case follow-up, 1 (9%) had only 2 contacts who both were diagnosed with hepatitis A before PEP could be recommended, and 1 (9%) was lost to follow-up. No secondary cases occurred among household contacts vaccinated before exposure to a hepatitis A–infected adoptee.

Seventeen children and 6 adults were exposed to 3 hepatitis A–infected adoptees in 2 child care facilities. As mentioned in the preceding paragraph, PEP was recommended for the 17 of these contacts who were considered susceptible. Eight of the 17 exposed children were <12 months of age (the age at which vaccination is indicated). Of 9 children aged more than 1 year in those child care facilities, 3 (33%) were previously vaccinated. Of the 6 adult child care providers exposed in these 2 facilities, 3 (50%) had previous immunity, including 2 who were vaccinated previously and 1 who had a history of hepatitis A infection. Screening for hepatitis A infection, however, is not routinely recommended. Transmission of hepatitis A from internationally adopted children to contacts in the United States has been reported previously. A single report of transmission from a Russian adoptee was published in 2001, and, in 2007, a cluster of 4 cases of hepatitis A identified throughout the United States associated with children adopted from the same orphanage in Ethiopia was reported. In Minnesota from 2007 through 2008, 21 recently internationally adopted children were found to be infected with hepatitis A. Only 6 of these children were symptomatic and, therefore, might have been tested for hepatitis A based on signs and symptoms; the remaining 15 were asymptomatic and would have been missed if not identified through routine screening of international adoptees or investigations of hepatitis A cases.

The finding that 10 cases of hepatitis A reported in Minnesota during a 3-year period were associated with international adoptees highlights the risk of transmission of hepatitis A from international adoptees to the community at large. Notably, 1 adoptee-associated case was a food-handler and the source of 2 secondary cases of hepatitis A in a group home. As part of public health investigations surrounding the 10 adoptee-associated cases, the MDH recommended PEP for at least 161 individuals as a result of exposure to a hepatitis A–infected adoptee or an adoptee-associated case.

Although the ACIP recommends vaccination for travelers to endemic areas, the 2 cases identified in our review with a history of international travel in addition to contact with an international adoptee were not vaccinated. Six additional cases of hepatitis A could have been prevented if the 2009 ACIP recommendations to vaccinate close contacts of international adoptees had been followed; these 6 cases, including 2 secondary cases, were close personal contacts of an adoptee (household relatives or nonhousehold relatives) or secondary cases exposed to close personal contacts of an adoptee. The 2009 ACIP recommendations for vaccination of close personal contacts of international adoptees from endemic areas, however, would not have prevented 2 cases that were identified as associated through workplace exposures with hepatitis A–infected adoptees.

Hepatitis A vaccination rates in the general population remain low. Less than half of children 19 to 35 months of age in 2009 were appropriately vaccinated, despite the ACIP’s 2006 recommendations for universal vaccination of children at 1 year of age. The prevalence of hepatitis A vaccination among adults in the United States also remains low, with an estimated 12% of 18- to 49-year-olds in 2007 having received 2 doses. Data on the hepatitis A cases and their contacts in our review support these national immunization data. For example, in the 2 child care facilities attended by 3 hepatitis A–infected adoptees described here, 14 (82%) of the 17 child contacts were not vaccinated and had no known history of hepatitis A, although 8 children were younger than 1 year of age, the recommended minimum age for vaccination. In addition, only 3 (50%) of 6 child care providers exposed in these 2 facilities had previous immunity.

A limitation of the surveillance data used in this report is that it only includes hepatitis A–infected individuals reported to the MDH, which represent the minimum number of hepatitis A–infected adoptees and associated cases. At this time, not every international adoptee is screened for hepatitis A, and some hepatitis A–infected adoptees are never identified or reported. In addition, a question about

**DISCUSSION**

The risk of infectious disease transmission from internationally adopted children has been well established. Screening international adoptees for infectious diseases such as tuberculosis, hepatitis B, human immunodeficiency virus, syphilis, and ova and parasites is recommended by the American Academy of Pediatrics.

To gain a better understanding of the risk associated with exposure to internationally adopted children, we identified all recent adoptees in Minnesota who were diagnosed with hepatitis A from January 1, 2006, to December 31, 2009. Twelve cases of hepatitis A were reported in Minnesota during this time period. Eight of these cases were among international adoptees and associated contacts. At this time, not every internationally adopted child in Minnesota is screened for hepatitis A infection. Although reliable hepatitis A immunization data are not available, the prevalence of hepatitis A vaccination among adults in the United States also remains low, with an estimated 12% of 18- to 49-year-olds in 2007 having received 2 doses. Data on the hepatitis A cases and their contacts in our review support these national immunization data. For example, in the 2 child care facilities attended by 3 hepatitis A–infected adoptees, 14 (82%) of the 17 child contacts were not vaccinated and had no known history of hepatitis A, although 8 children were younger than 1 year of age, the recommended minimum age for vaccination. In addition, only 3 (50%) of 6 child care providers exposed in these 2 facilities had previous immunity.

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contact with international adoptees was added to Minnesota’s public health investigation interview for hepatitis A cases beginning in 2008, which may have increased the likelihood of identifying cases associated with international adoptees in the 2 later years (2008 and 2009) of the 3-year period of this review. Hepatitis A cases also may not report contact with a recent adoptee during their interview if the contact is casual or occurred only infrequently. Even with the inclusion of a question about this type of contact in 2008 and 2009, there may be a difference in reporting of contact with an adoptee between close personal contacts and other contacts.

The 10 cases of hepatitis A associated with recent international adoptees in Minnesota that are described in this review, along with previously published cases, indicate that exposure to hepatitis A–infected adoptees is an important risk factor for hepatitis A. In particular, asymptomatic yet infectious hepatitis A–infected adoptees may not be identified. The potential for transmission from hepatitis A–infected adoptees to contacts in the community remains until vaccination rates in the general population increase.

Based on the findings of this review, we advise incorporating a total anti-HAV antibody test into the infectious disease screening currently offered for new adoptees from countries where hepatitis A is considered by the Centers for Disease Control and Prevention to be endemic. Children who are found to be positive for total anti-HAV should be tested for IgM anti-HAV to evaluate for recent infection. If an adoptee tests positive for IgM anti-HAV, PEP should be considered for the adoptee’s close contacts. Determining a period of infectiousness is difficult for asymptomatic hepatitis A cases. The IgM anti-HAV remains positive for up to 6 months after infection. Because young children may shed virus for 10 weeks to 6 months, however, PEP for contacts may be warranted based on a positive IgM anti-HAV result. Considerations regarding PEP for an adoptee’s contacts should include the age of the adoptee, the kind of exposure, and the length of time the HAV IgM-positive adoptee has been in the United States.

CONCLUSIONS
International adoptees often come from areas where hepatitis A is endemic, and these children may be infected with hepatitis A and infectious yet be asymptomatic. Clinicians should be aware of the ACIP’s 2009 guidelines for hepatitis A vaccination of close personal contacts of international adoptees in addition to travelers to endemic areas and universal vaccination of children. Because of the risk of transmission of hepatitis A from international adoptees, clinicians should counsel those seeking to adopt international adoptees regarding the need for vaccination among those who will have close personal contact with the adoptee. In addition, clinicians and public health professionals should be aware of the potential for community-based transmission of hepatitis A associated with international adoptees and carefully evaluate new cases of hepatitis A for history of contact with an international adoptee. Because most hepatitis A–infected young children will not have overt symptoms with hepatitis A infection, we recommend that clinicians include hepatitis A among the screening tests offered to international adoptees from endemic areas.

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