Chapter 7
Viral Hepatitis

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Viral Hepatitis A, B, C, D, and E in Refugees (Screening and Clinical Considerations)

Where you were born and where you have lived determines most of a refugee's viral hepatitis risk.

Introduction

Refugees, asylees, immigrants, and their families have been born in, or have lived in, regions highly endemic for the various viral hepatitides compared to the developed countries where they relocate. There are a variety of viruses that have an affinity for infecting the human liver, which are communicable and all can lead to acute hepatitis and hepatitis B, C, and D can develop into chronic liver infection. Chronic viral hepatitis B and C cause the majority of liver cancers in the world; it is the sixth most common cancer and third most deadly. The prevalence of each type of hepatitis varies by region and exposure due to poor public health infrastructure (water quality, medical practices, vaccine availability).

Acute hepatitis A and E are the most common types of viral hepatitis and present as a usually mild viral hepatitis. Refugees are infected abroad in the refugee's home country or region and in the refugee camps. It is possible that an asymptomatic young person or a symptomatic older individual with a very recent exposure could arrive as a new refugee. The short incubation and infection cycle, without a chronic phase, combined with the refugee's group immunity, decreases the chance of these becoming significant communicable diseases. Thus, new arrival screening of

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A. Annamalai (ed.), *Refugee Health Care: An Essential Medical Guide*,
DOI 10.1007/978-1-4939-0271-2_7,

refugees for infectious hepatitis A and E is not needed. Hepatitis B has infected about 2 billion worldwide and has a high prevalence estimated at 360 million in the chronically infected phase (hepatitis B surface antigen positive for more than 6 months). It is silent through the immunotolerant phase from birth into adulthood and can be spread sexually and by close contact, thus screening of refugees is indicated [1]. Chronic hepatitis C (CHC) is medically significant with morbidity and mortality similar to chronic hepatitis B (CHB), but is less prevalent than CHB and is mostly spread through percutaneous routes and less through communicable routes. Hepatitis C historically has not been recommended for routine screening. However, with improved and available curative treatment, there is cost benefit of screening refugees from high prevalence countries [2]. Current recommendation is to screen those born during 1945–1965 and those with risk factors, which is similar to guidelines for the general US population. Hepatitis D virus (HDV) infection is dependent on hepatitis B virus for replication and is of much lower prevalence, thus is not considered for screening. HDV is a progressive clinical entity which can be detected in regular clinical follow-up care recommended for all hepatitis B carriers.

Vaccinations for newly arrived refugees, to protect the susceptible, are available for hepatitis A and B. In general, the newly arrived refugees should receive the Advisory Committee on Immunization Practices (ACIP) recommended vaccinations hepatitis A and B for ages ≤18 or those that have risk factors, unless immunity is proven by serology. Most refugees, adults and children, are from hepatitis B endemic areas where the hepatitis B surface antigen (HBsAg) prevalence ≥2 % and those not immune should be vaccinated [3, 4].

In the US, refugee hepatitis B screening protocols and vaccination resources vary between the states, and refugees are free to move between states after arrival, thus clinicians caring for refugees need have awareness that individual refugees may have incomplete screening or need completion of their vaccination series for protection. National guidelines for medical screening and vaccination, including guidelines for viral hepatitis, in newly arrived refugees to the US are developed by the Center for Disease Control and Prevention's Division of Global Migration and Quarantine (CDC/DGMQ) and issued by the Office of Refugee Resettlement (ORR) Domestic Medical Screening Guidelines Checklist and promoted to each state's refugee health program by the Association of Refugee Health Coordinators (ARHC) [4–6].

A summary of the characteristics of viral hepatitides is presented in Table 7.1. The clinical presentation of the acute phase of all hepatitis is similar and shown in Table 7.2.

Summary: Viral Hepatitis Screening and Vaccination Recommendations for Refugees

Hepatitis B

Screen all refugees (adults and children) from hepatitis B endemic areas for HBsAg, anti-HBc, and anti-HBs. Vaccinate all unvaccinated children (ages 0–18 years old) for hepatitis B that are susceptible. Vaccinate all susceptible adults for increased

Table 7.1 Viral hepatitis characteristics

	A	B	C	D (requires Hep B Infection)	E
Chronic infection (worldwide prevalence)	No	360 million	170 million	10 million	No[a]
Acute hepatitis phase	Yes	Yes	Yes	Yes	Yes
Mild or asymptomatic	Children	Perinatal–young adult	Most	Coinfection with acute HBV	Children
Severe symptoms	In preexisting chronic liver disease (CLD)	Development of ESLD	Development of ESLD	Superinfection of CHB	In pregnancy
Vaccine preventable	Yes (age 1–18)	Yes (susceptible)	No	No	No
Treatment available	No	Yes	Yes, cure possible	Yes	No
Refugee screening test	No	HBsAg, anti-HBc, anti-HBs	anti-HCV[b]	No	No
Transmission	Fecal/oral	Perinatal (up to 90 %)	Parenteral	Close contacts	Fecal/oral
	Sexual contact	Sexual Contact	Perinatal (6 %)	Parenteral	Perinatal
	Close contacts	Parenteral			
		Close contacts			
Referral[c]	No	Yes	Yes	Yes	No

[a]Hepatitis E can become chronic in persons on immunosuppressive treatments for solid-organ transplant and with HIV

[b]Test those high risk and born during 1945–1965. Positive anti-HCV results are confirmed with HCV RNA testing

[c]Chronic hepatitis B, C, and D should be assessed for disease severity and need for treatment consideration and monitored periodically for progression of liver disease and hepatocellular carcinoma

Table 7.2 Signs and symptoms of acute hepatitis infection from all types of hepatitis

Fever
Fatigue
Decreased appetite
Nausea and emesis
Abdominal pain
Gray-colored stools
Dark-colored urine
Arthralgias
Jaundice
Abnormal lab tests (elevated liver transaminases and bilirubin)

risk for hepatitis B, which includes living in close contact with their community members from endemic hepatitis B areas.

Hepatitis A, D, and E

Routine testing for viral hepatitis A, C, D, or E infection in asymptomatic refugees is not recommended at any age. Refugees with signs or symptoms of disease should receive appropriate diagnostic testing.

Hepatitis C

Routine screening for hepatitis C is similar to guidelines for the general US population. Screen those born during 1945–1965 and those with risk factors. Risk factors include individuals with body art, those who have received blood transfusions or blood products in developing nations, history of intravenous drug use, HIV positive status and children born to hepatitis C-positive mothers [5].

Vaccination for Hepatitis A

ACIP recommends HAV vaccine for all children ages 1–18.

Chronic Hepatitis B

Chronic hepatitis B (CHB) infection is the most concerning hepatitis infection for newly arrived refugees due to high worldwide prevalence in the areas that refugees mostly come from (see Fig. 7.1) and the long-term health risk that 15–25 % will develop end-stage liver disease (ESLD) and/or hepatocellular carcinoma (HCC) [7].

Fig. 7.1 Geographic distribution of chronic hepatitis B virus infection in adults; Reprinted from Vaccine. 30(12). Ott JJ, Stevens GA, Groeger J, Wiersma ST, Global epidemiology of hepatitis B virus infection: new estimates of age-specific seroprevalence and endemicity, pages 2212–9, Copyright (2012) with permission from Elsevier

The WHO estimated in year 2000 at least 600,000 people died due to acute and chronic HBV-associated liver disease [8]. CHB infection is the cause of 53 % hepatocellular carcinomas in the world [9].

US refugee health data on the prevalence of HBsAg in newly arrived refugees between 2006 and 2008 demonstrated 2.8 % overall prevalence, range 0.6–15.5 %, with 95 % confidence range 2.6–3.0 %. The highest prevalence was among refugees from Eritrea (15.5 %), Liberia (12.2 %), Myanmar (12.4 %), Ethiopia (9.1 %), Somalia (8.3 %), and Malaysia (8.8 %). Six other countries (Iran, Iraq, Laos, Russia, Thailand, and Vietnam) were noted to have substantially decreased rates when compared with 1991 prevalence data [10]. Thus, the prevalence is highly variable between countries and over time. Refugees themselves also vary greatly in their socioeconomic status, which correlates with previous risk of exposure, but overall, refugee groups are arriving in the US with disproportionately higher rates of CHB than the US population. The US population has about 1.3–2.2 million infected with CHB and the overall prevalence of CHB infection is less than 1 %, but foreign born account for about 47–70 % of those infected [11]. Antiviral treatment for hepatitis B is available and indicated for those with progressive chronic infection to reduce or postpone the development of end-stage liver disease. Further justification for referral and consideration of antiviral hepatitis B treatments is that the number on a list of liver transplant candidates was significantly reduced by 30 % due to clinical improvement with the institution of antiviral hepatitis B treatment [12]. Despite the need for clinical evaluation and monitoring for CHB, in 2010 the Institute of

Medicine report highlighted that 65 % of all persons with CHB in the US are undiagnosed and only half of those diagnosed receive appropriate care [13, 14].

Transmission of CHB worldwide is 90 % perinatal in the highly endemic areas. Good measures are available to prevent transmission of HBV at delivery that dramatically reduce the new CHB infection rate of infants to HBV-infected mothers, but still in the US, 1,000 babies are born yearly infected with HBV due to lack of pregnancy screening for mothers with CHB [13]. Treatment of newborns born to HBsAg-positive mothers with the hepatitis B immune globulin within 12 h of birth and the three-dose hepatitis B vaccination series is highly effective at breaking the chain of perinatal transmission.

It is important to realize that refugees in the US live their life and marry in their respective ethnic communities which have high prevalence rates of CHB. Testing for lack of protective immunity against hepatitis B while screening for hepatitis B infection in newly arrived refugees from increased prevalence areas will uncover about 30 % of the population that are susceptible and will benefit from the hepatitis B vaccination series [3, 4, 13].

Enhancing the prevention of new cases of hepatitis B in the US, many of which are now attributable to the foreign born, and reduction of morbidity and mortality from hepatitis B for newly arrived refugees can be achieved with initial screening, proper follow-up of those infected, and vaccination of those susceptible.

Refugee Hepatitis B Screening National Guidelines [4–6]

Administer a hepatitis B screening panel including hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs), and hepatitis B core antibody (anti-HBc) to all adults and children (for interpretation see Table 7.3).

Vaccinate previously unvaccinated and susceptible children, 0–18 years of age.

Vaccinate susceptible adults who are at increased risk for HBV infection due to close interaction with their community members that are from endemic areas.

Refer all persons with chronic HBV infection for additional ongoing medical evaluation.

Table 7.3 Interpretation of positive hepatitis B serologic screening tests [16]

Test	Result	Interpretation
HBsAg	Positive	Infection, acute or chronic (CHB if positive for more than 6 months)
		False positive from recent (<1 month) hepatitis B vaccination
	Negative	Not infected, early acute infection, resolving infection or immune
Total anti-HBc	Positive	Becomes positive in acute infection and recovery, then remains positive for life (in recovery or with CHB)
IgM anti-HBc	Positive	Acute HBV infection
	Negative	CHB or never infected or recovered from infection or immune
Anti-HBs	Positive	Protective antibody: indicates immunity from either vaccination or natural infection

Other Hepatitis B Screening Considerations [4]

1. Test children born in the US, not vaccinated as infants, for HBsAg, if parents are from high HBV endemic regions ≥8 %.
2. Any refugee with potential exposure within the last 60 days of hepatitis B testing should have repeat testing in 3–6 months.
3. Testing for hepatitis B should be done regardless of prior hepatitis B vaccination. CHB infection is mostly silent and hepatitis B vaccination would not be protective if they are already infected prior to vaccination.
4. Testing for HBsAg should not be done within 1 month of vaccination; it may lead to a false-positive result.
5. Screen all pregnant women.

Prevention/Vaccination [4]

1. The first vaccination of the series may be done at the time of HBsAg testing; it will not be harmful in HBsAg-positive cases.
2. Some refugee camps in certain countries currently provide some hepatitis B vaccination.

   For example, in the year 2012 for ages 18 and under, hepatitis B vaccination is reported by the CDC as currently being administered in Thailand at the Burma border for Burmese refugees and in Nepal for the Bhutanese/Nepalese refugees [4].
3. Immunizations administered outside the US with written documentation (date, type of vaccination, and the location or name of clinic) and administration intervals at the appropriate age can be accepted as valid, if the schedule was similar to the standard US recommendations (inappropriate age at the time of the previous vaccine is unacceptable).
4. If one or two doses of the hepatitis B vaccine series were given abroad and properly documented, the series should be completed without restarting, continuing with an acceptable US schedule [3, 4]. The minimum intervals are 4 weeks between first and second doses and 8 weeks between second and third doses.

   A positive anti-HBs test after one documented dose of the hepatitis vaccine is not considered protective, and the three-dose series should be completed.
5. Severe malnutrition at the time of the vaccination could impair immune response to some vaccines; revaccination or checking serology for immunity could be considered.
6. Traveling - established refugees frequently will be returning to endemic areas to visiting friends and relatives (VFRs), thus their immune status should be reviewed and susceptible patients vaccinated [15].

Preventive Counseling: Identification of those infected with hepatitis B will lead to increased awareness and the opportunity for counseling to prevent spreading infection by careful hygiene, avoiding alcohol, and assessment of status of all household

contacts and sex partners who may be infected or at risk and in need of protective vaccination.

Clinical/Referral: Confirm immunity to hepatitis A and rule out coinfection with HCV and HIV. Medical referral to gastroenterology or a liver specialist is indicated to assess for ESLD, periodic monitoring for HCC, and consideration of antiviral therapy for progressive liver disease.

Special Considerations for Serology Results

Total Anti-HBc Is the Only Detectable Serologic Marker (No HBsAg or Anti-HBs)

May be due to:

1. Resolving acute infection in the window period of acute hepatitis B (this can be confirmed by testing for IgM anti-HBc).
2. Resolved HBV infection, anti-HBs levels have waned over many years.
3. CHB with undetectable circulating HBsAg titer that has waned to below the cutoff level. This is most likely for populations with a high prevalence of HBV infection or CHB coinfection with HIV or HCV.
4. False positive seen mostly in low prevalence populations with no risk factors for HBV. These individuals are still considered susceptible to HBV.

Further evaluation for examples *2*, *3*, and *4*: Testing a HBV DNA viral load would identify those infected with hepatitis B that need to be followed.

HBsAg and Anti-HBs Are Both Positive

The antibodies are unable to neutralize the circulating virus. These individuals are HBV-infected carriers.

Hepatitis D Coinfection or Superinfection with Hepatitis B

Hepatitis D virus (HDV) requires HBV infection to replicate and infect humans. HDV infection prevalence is estimated to infect at least ten million people worldwide and is more common in some areas of the Middle East, Mediterranean basin, Central Asia, West Africa, the Amazon basin, and some Pacific Islands. Certain indigenous groups from South America appear more susceptible to severe, often fatal HDV acute and chronic infection [17, 18]. HDV infection is decreasing in areas of the world where CHB prevalence rates are decreasing, including the

Mediterranean basin [17]. Refugees with elevated prevalence rates of hepatitis B infection are susceptible to HDV, but specific refugee prevalence data is rare. Low prevalence has been reported in past surveys of HBV-infected Albanian refugees (1 case was detected from 91 HBsAg positive) and Southeast Asian refugees (no HDV detected) [19, 20].

Coinfection of HBV and HDV is an acute, simultaneous, hepatic infection of both viruses that is mild and 95 % of the time it clears. Superinfection of CHB infection with HDV presents as a severe acute hepatitis (Table 7.3) that leads to a chronic hepatitis D in up to 80 % of the cases. Transmission is associated with close personal contact, intravenous drug use, promiscuous sexual activity, and people exposed to unscreened blood and blood products.

HDV enhances the severity of acute and chronic hepatitis B. The mortality and fulminant hepatitis rates are tenfold higher than in CHB infection alone [17].

Screening: Routine testing is not recommended for HDV in newly arrived refugees.

Prevention: There is no HDV vaccine. HBV vaccination will protect those not infected with hepatitis B from HDV infection but cannot protect the estimated 360 million CHB carriers worldwide from HDV infection susceptibility [1].

Clinical: Referral to a liver specialist is indicated for a refugee if HDV is suspected (a concerning clinical presentation is a progressive appearing or severe hepatitis B infection). Serology testing antibody to HDV (total anti-HDV) is clinically available. Select antiviral treatments for hepatitis B may have an effect in HDV infection. Liver transplantation is an option for ESLD and fulminant hepatitis caused by HDV.

Hepatitis C

Hepatitis C virus (HCV) infection is a clinically mild chronic liver infection that over several decades of time causes cirrhosis and hepatocellular carcinoma. Most with HCV are asymptomatic and may be unaware of their infection until chronic liver disease complications develop. The world prevalence is 2.2–3 % or about 130–170 million people are chronically infected worldwide [21–23]. The highest country rates for HCV antibody seroprevalence (not confirmed infections) are found in Rwanda (17 %), Egypt (15 %), Cameroon (12.5 %), Bolivia (11.2 %), Burundi (11.1 %), Guinea (10.7 %), Mongolia (10.7 %), Libya (7.9 %), and Zimbabwe (7.7 %) [22]. HCV prevalence rates vary within countries, for example, Egypt has a confirmed active HCV infection prevalence rate of 10 % (7 % in urban and 12 % in rural areas) and Pakistan's average seroprevalence rate is 3.0 % with regions ranging on average from 1.8 to 4.3 % [24, 25]. The high rates in Egypt have been traced to use of contaminated needles during a rural campaign to eradicate schistosomiasis in the Nile River basin [24]. Historically refugee screening for asymptomatic HCV has not occurred, especially across all the diverse refugee groups. It has not been thought to be cost-effective in the past. Even though HCV infection has clear clinical significance as a major chronic disease at the individual level, it is not a major communicable disease threat to public health when compared with tuberculosis,

hepatitis B, or syphilis. In the absence of screening data, newly arriving refugee groups can only be estimated to have similar HCV prevalence rates to the regions and countries that they originated from. HCV prevalence rates are below 2 % in North America, Europe, and Australia which accept many of the relocated refugees from around the world [22, 23].

HCV transmission in developing countries where most refugees originate is mainly through non-sterile and unsafe medical procedures from injections, equipment, and blood products. In developed countries, transmission is caused by intravenous drug users (IUD) sharing needles and previously by contamination of blood or serum products. Perinatal transmission of HCV occurs at a rate of 5–6 % and health care needle stick from an HCV infected patient has a 1.8 % infection rate. Although sexual contact (not monogamous) increases risk, it is a low rate compared to IUD. HCV is detected in breast milk, but breast-feeding is not associated with increased risk [26].

The clinical course of hepatitis C infection has an acute hepatitis phase that in most is asymptomatic. In the less than 30 % of those that symptoms occur, after an incubation period of 2 weeks to 6 months, it is indistinguishable from other acute hepatitis syndromes (Table 7.2) and lasts less than a month. Chronic HCV infection persists in about 75–85 % of those infected, and over two decades of chronic HCV infection, up to 20 % develop cirrhosis and about 1.5 % go on to develop hepatocellular carcinoma [23]. Chronic HCV infection is more progressive with moderate alcohol intake, infection at older age, coinfection with HIV, and in Egyptians with schistosomiasis [27–29].

Screening: Routine screening for HCV infection in refugees is similar to the general population.

Screening recommendations for hepatitis C virus chronic infection has evolved based on:

1. A more recent cost-benefit analysis by the Canadian Collaboration for Immigrant and Refugee Health—*Screening for hepatitis C infection: Evidence review for newly arriving immigrants and refugees*— recommended screening for hepatitis C antibody in all immigrants and refugees arriving in Canada originating from countries with an expected prevalence of ≥3 % and referral for all positive cases [2].
2. The Center for Disease Control (CDC) has issued national guidelines to screen all persons born during 1945–1965 as this age group has a hepatitis C prevalence rate of 3.25 % [30], which is higher than the overall prevalence rate of 1.0–1.5 %. Refugees designated to be relocated to the US have a path to US citizenship and are in the group recommended for screening based on their birthdate. Testing could be further considered for refugees when HCV infection prevalence rates in their country of origin are as high or higher than the US prevalence rates that are the basis for the CDC guidelines.
3. Treatments for chronic hepatitis C are improving with higher rates of cure >50 % and the potential for less of the side effects that currently limit treatment.

Prevention: There is no vaccination. Alcohol should be avoided. Illicit intravenous drug users should be offered treatment referrals or should use sterile injection

equipment and not share needles. Physicians should discuss limiting and monitoring drugs that affect the liver. Safe sex practices should be endorsed. Although breast-feeding has not been associated with increased transmission, it should be avoided with cracked or bleeding nipples.

Clinical Testing and Referral: Clinical testing is indicated for those born during 1945–1965 and with risk factors for hepatitis C infection: former and present IUD, children born to HCV-positive mothers, refugees that have ever received blood products or clotting factor in a developing nation or those exposed to potentially unsafe medical injections and procedures in developing countries, HIV infection, history of tattooing or body piercing, history of multiple sex partners or sexually transmitted diseases, and in the work-up of abnormal liver function tests.

Test for antibody to HCV (anti-HCV) and if positive, HCV RNA detection is used to confirm the infection and rule out a false-positive result. Referral for those known to be infected by HCV is made to a gastroenterologist or liver specialist for evaluation of chronic liver disease for consideration of potentially curative treatment and hepatocellular carcinoma surveillance screening. Coinfection with HIV or hepatitis B should be ruled out and serology for hepatitis A immunity evaluated.

Hepatitis A

Hepatitis A virus (HAV) is the most highly prevalent acute viral hepatitis worldwide. HAV is shed through feces. The most common transmission is the fecal oral route from the contamination of water to the food supply. It can also be transmitted through sexual (oral/anal) contact. Most refugees are from areas in the underdeveloped world that are intermediate or highly endemic for HAV (see Fig. 7.2) and were exposed due to poor water sanitation. In HAV highly endemic areas, 90 % have been infected by the age of 10 years [31]. HAV infection is a self-limited infection in most children and usually lasts less than 2 months, but in about 10 % of cases, prolonged or relapsing symptoms can last 6–9 months. Symptoms and signs of acute hepatitis (Table 7.2) are more likely with increased age [32]. Most adult refugees were infected as children and have lifelong immunity. Unvaccinated children and young adults from areas with good water sanitation may be susceptible to HAV infection, including some urban middle class individuals from underdeveloped countries. In general, lower-income regions correlate with high hepatitis A endemicity and low susceptibility, and high-income regions and countries have low prevalence rates of hepatitis A virus infection and higher susceptibility. Intermediate-wealth regions correlate with intermediate HAV prevalence and susceptibility [33].

Screening: Routine testing for HAV infection in refugees is not recommended at any age.

Vaccination: ACIP recommends HAV vaccine for all children ages 1–18 [34].

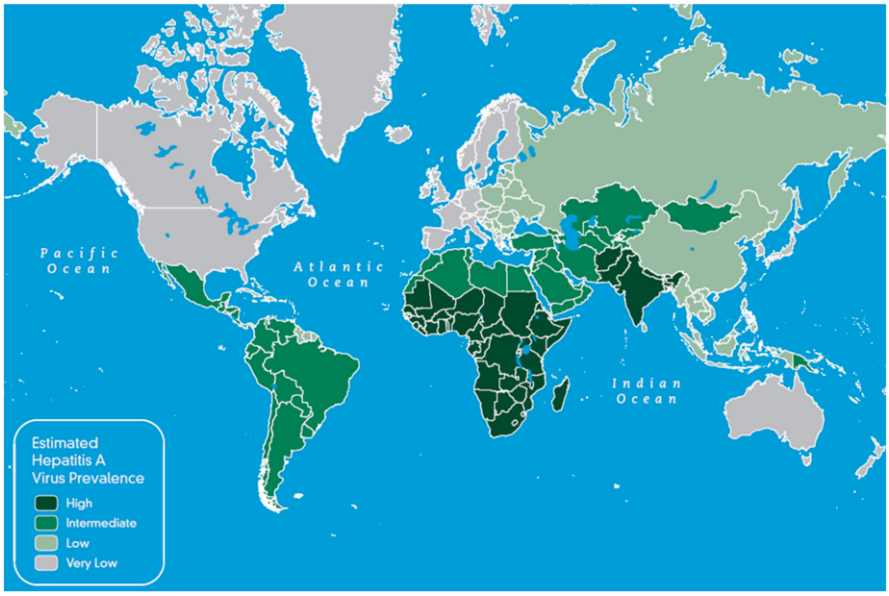

Fig. 7.2 Geographic distribution of hepatitis A endemicity. *Source*: CDC Travelers Health. Chapter 3. Infectious diseases related to travel. Hepatitis A. 2012

Hepatitis A serology (total anti-HAV IgG) to test for immunity is cost-effective, if the two-dose hepatitis A vaccination is being considered in adult refugees from regions of prevalence >33 % [34, 35].

Established refugee travelers are likely to be visiting friends and relatives (VFRs) in highly endemic areas. For unvaccinated VFRs <20 years old, serology testing or vaccination can be done. In VFRs age ≥20, it is cost-effective to check serology and vaccinate if susceptible [15].

In refugees with chronic liver disease, including CHB and CHC, hepatitis A immunity should be checked and susceptible individuals vaccinated.

Other Prevention: Access to sanitary water and avoidance of close contact or careful hygiene measures when in close contact with infected individuals.

Clinical: Supportive care and testing for IgM Anti-HAV serology for refugees with acute hepatitis signs and symptoms. HAV does not have a chronic phase.

Hepatitis E

Hepatitis E virus (HEV) liver infection is usually an acute mild self-limited infectious hepatitis. HEV infection is very common in developing countries due to fecally contaminated drinking water. Epidemics of HEV infection occur after

natural disasters including flooding that causes water contamination, in overcrowded temporary housing, refugee camps, and across South and Central Asia, Southeast Asia, Africa, the Middle East, and Mexico [36]. High-risk groups according to the WHO include international travelers to regions of the world where HEV is endemic and refugees residing in overcrowded temporary camps following catastrophes, especially in Sudan, Somalia, Kenya, and Ethiopia [37].

Acute HEV infection incubation usually ranges from 15 to 60 days with acute hepatitis symptoms that more likely occur in older adolescents and young adults. It is usually asymptomatic in children. Most people recover completely. Pregnant women are most likely to experience severe hepatitis symptoms including fulminant hepatitis and death. HEV infection is different than HAV in that high mortality rates up to 30 % have been reported among pregnant women in some geographic areas [38]. Chronic infection may occur in HIV and in solid-organ transplant recipients on immunosuppression [39, 40]. In the US, returning travelers from endemic areas are most likely to be affected.

Screening: No screening for refugees is recommended for HEV infection.

Prevention: No vaccination is available. HEV infection is preventable by improving sanitation and water purity.

Clinical: HEV infectious hepatitis should be considered in a new arrival from an HEV endemic area (<3 months) with potential exposure and acute hepatitis symptoms (Table 7.2) and in whom other acute hepatitis syndromes (A, B, and C) have been ruled out. There is no FDA-approved test for HEV in the US. HEV testing (IgM and IgG antibodies to HEV and PCR assay for HEV RNA) can be requested from the CDC Division of Viral Hepatitis Laboratory for clinical evaluation [41]. Treatment is supportive, with hospitalization for fulminant hepatitis and severe illness in pregnancy.

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