

# HEPATITIS A

<b>Virology</b>		Picornavirus RNA small No envelope	
<b>Hosts</b>		Natural hosts: Only <b>humans</b> ; Experimental hosts: marmosets, tamarin, owl monkeys and chimpanzees;	
<b>Transmission</b>		<b>Fecal-oral route:</b> person to person, from fecal contamination and oral ingestion; <b>Blood:</b> Viremia 2 weeks before onset to few days after onset; blood transfusion or mother → newborn rare <b>Homosexuals:</b> fecal-oral route, contaminated hands or sexual contact <b>low viral titers:</b> Saliva	
<b>Source of Infection</b>		<b>USA</b> No source identified 44 % Household contact with HAV 24 % Travel to endemic country 6 % Male homosexuals 4 % Child care center contact 15 % Food or water-borne outbreak 5 % Parenteral drug abuse 3 %	
<b>Child Care</b>		Index case usually asymptomatic child; spread occurs before recognition of index case; risk f(# children ≤2 yrs or w diapers)	
<b>Household</b>		Attack rate (household) = 10-20%	
<b>Common source</b>		Shellfish eaten raw /human sewage; Raw fruits, vegetables /water during irrigation or packaging; food /food handler Water from contaminated springs, wells, community supplies	
<b>Blood &amp; body fluids</b>		Transfusions of blood or blood products; injectable drugs users; mother to child at delivery	
<b>Nosocomial</b>		Infected, asymptomatic neonates, children, or adults	
<b>Prevalence ⇒</b>		<b>Adults</b>	<b>Children 0-9</b>
High	90%	90%	
Intermediate	80-90% (1)	20-30%	1-Increase from 10 to 19
Low	30-70%	<10%	
Disappearing	10% (2)	0%	2-Adults >40 prevalence 30%
<b>Incubation</b>		25 to 30 days (15 to 50 days)	
<b>Communicability</b>		Virus in stool 1 week before onset + 1 week of overt disease; week 3: only 30% excrete viruses; 100 million viral particles /ml If no jaundice, peak of highest amino-transferase activity asymptomatic infections, particularly young children most of unknown source; no evidence of chronic excretors	
<b>Definition</b>			
<b>Acute hepatitis</b>		Clinical case: An acute illness with a) discrete onset of symptoms and b) jaundice or elevated serum aminotransferase levels Laboratory criteria: IgM antiHAV positive <b>Confirmed:</b> a case that meets the clinical case definition and is laboratory confirmed or clinical case epi linked to confirmed case <b>Probable:</b> IgM antiHAV positive but does not meet clinical case definition	
<b>Clinical</b>		<b>Asymptomatic infection:</b> 90% children ≤6 years, 40% - 50% children 6-14, 70% - 80% over 14	
<b>Acute Hepatitis B</b>		Prodromal phase: malaise, weakness, anorexia, myalgia and arthralgia, macular rash (30%) Infants and preschool-aged children: Sx = mild, nonspecific symptoms nausea, vomiting, malaise and diarrhea (70%), fever and dark urine (30%) without jaundice Jaundice 70% of symptomatic adults, 10% of children 1-5 and ≤5% in infants	
<b>Duration</b>		Weeks, prolonged or relapsing disease lasting as long as 6 months can occur	
<b>Fulminant hepatitis</b>		2/1,000 among children <5; 25/1,000 cases among adults >40	
<b>Chronic infection</b>		None	
<b>Serology</b>			
<b>Anti-HAV IgM</b>		present at onset; disappears in 4-6 months;	
<b>Anti-HAV IgG</b>		shortly after appearance of IgM-specific titer; persists for life; positive = immune	
<b>Viral isolation</b>		cultures difficult, not routine; Identification of HAV-DNA and polymerase chain reaction testing available not routine	
<b>Time Line</b>			
Clinical		<b>AST / ALT high</b>	
Viremia			
Virus in stools			
AntiHAV-IgM		+	+++
AntiHAV-IgG		±	+
			+++
			+++
			+++
			+++
			++
			++
	4 wks	8 wks	12 wks
			16 wks
			24 wks
			1 yr
			2 yr
			5 yr
			10 yr
<b>PH Lab Testing OK</b>		<b>Symptomatic w epi-link</b> to confirmed case; <b>Suspects:</b> food handlers, HCW, day care employee & attendee, liver disease hi-risk (IV drug abuse, alcohol abuse, other risk) <b>Outbreak situation</b>	
<b>Collection</b>		Whole blood in red-top tube or serum separator tube	
<b>Treatment</b>		Supportive	

<b>Vaccine</b>																																					
Antigens	viral antigens purified from HAV-infected fibroblast cell cultures																																				
Eligibility	Approved for children 2-18 years; adults; <b>Not</b> for infants $\leq 2$ yrs;																																				
Schedules & Dose	Administration IM <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Age</th> <th>Vaccine</th> <th>Antigen dose</th> <th>Vol/dose, mL</th> <th># doses</th> <th>at age..mos</th> </tr> </thead> <tbody> <tr> <td>2-18</td> <td>Havrix</td> <td>360 EL.U.</td> <td>0.5</td> <td>3</td> <td>0, 1, 6-12</td> </tr> <tr> <td>2-18</td> <td>Havrix</td> <td>720 FL.U.</td> <td>0.5</td> <td>2</td> <td>0, 6-12</td> </tr> <tr> <td>2-18</td> <td>Vaqta</td> <td>25 U</td> <td>0.5</td> <td>2</td> <td>0, 6-18</td> </tr> <tr> <td><math>\geq 19</math></td> <td>Havrix</td> <td>1440 EL.U.</td> <td>1.0</td> <td>2</td> <td>0, 6-18</td> </tr> <tr> <td><math>\geq 19</math></td> <td>Vaqta</td> <td>50 U</td> <td>1.0</td> <td>2</td> <td>0, 6-12</td> </tr> </tbody> </table> <p>Havrix antigen in enzyme linked immunoassay units (ELU) Vaqta antigen content in units (U)</p>	Age	Vaccine	Antigen dose	Vol/dose, mL	# doses	at age..mos	2-18	Havrix	360 EL.U.	0.5	3	0, 1, 6-12	2-18	Havrix	720 FL.U.	0.5	2	0, 6-12	2-18	Vaqta	25 U	0.5	2	0, 6-18	$\geq 19$	Havrix	1440 EL.U.	1.0	2	0, 6-18	$\geq 19$	Vaqta	50 U	1.0	2	0, 6-12
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Interchangeability	Completion with same product preferable, but if product given for first dose not known either one may be used; OK to administer simultaneously with other vaccines, but n in a separate syringe & at separate site																																				
PreImmunization test	Depends on prevalence of infection: high prevalence, tests will save on vaccine cost; low prevalence, no test saves lab cost																																				
PostImmunization test	Not indicated in immuno-competent individuals Immunocompromised persons (especially liver disease) justified; low anti-HAV repeat vaccine series																																				
Seroconversion	Havrix 1 dose: 15 days =88%, 30days =99%; 6 months after dose 2 =100%; not affected by ISG at first dose;																																				
Protection	94% after 2 doses, 100% after 3 doses; herd immunity if $\geq 80\%$ of susceptible vaccinated protection likely to occur within few days after first dose of vaccine. Duration of protection: kinetic models suggest 20 years; New York community trial protection up to 4 years																																				
Storage	2-8 °C																																				
Indication	<b>Foreign travel:</b> countries w intermediate or high endemic rates; ISG also acceptable <b>Children <math>\geq 2</math> years in communities with high endemic</b> or periodic outbreaks (e.g. Native Americans or Alaskan Natives) <b>Patients with chronic liver disease</b> <b>Homosexual</b> and bisexual men; Users of injection and illicit <b>drugs</b> <b>Occupational</b> risk of exposure (e.g., handlers of nonhuman primates and persons working with HAV in a laboratory setting)																																				
Optional	Chill care center staff and attendees Custodial care institutions; Hospital personnel; Food handlers; Hemophiliacs: receiving solvent detergent-treated factor concentrates																																				
Post-exposure prophylaxis	$\pm$ IG administration: may inducing protective serum antibody before usual 4-week incubation period																																				
Contraindications	Not if hypersensitivity to vaccine components: alum /phenoxyethanol																																				
Precautions	Pregnancy OK since contains inactivated, purified viral proteins																																				
Adverse reactions	local pain; induration at the injection site;																																				
<b>Immune Globulin</b>																																					
Administration	IM, deltoid or gluteal muscle; $\leq 2$ wks after exposure; For pre-exposure & postexposure prophylaxis deep in large muscle mass; 0.02 mL/kg; max 5 mL in one site in adult or older child; 0.02 mL/kg; max 3 mL in small children and infants Peak serum antibody concentrations at 48 - 72 hours after IG;																																				
Availability																																					
Efficacy	<b>85%</b> effective in preventing symptomatic infection if administered $\leq 14$ days of exposure																																				
Indications	<b>Household and sexual contacts:</b> as soon as possible after exposure; Not if $\geq 2$ weeks after last exposure <b>Newborn infants of HAV-infected mothers:</b> IG (0.02 mL/kg) to infant if mother's symptoms 2 wks < delivery > 1 wk <b>Child care center staff employees, children, and household contacts:</b> HAV infection confirmed in child or adult employee all children $\geq 2$ and toilet trained $\rightarrow$ IG for employees in contact with index case + children in same room as index case children not yet toilet trained $\rightarrow$ IG for all employees and all enrolled children in the facility; 6 wks after last case, IG for new employees & children Onset $\geq 3$ wks $\rightarrow$ all employees, all children, HH contacts of children in diapers HAV in $\geq 3$ families $\rightarrow$ all employees, all children, HH contacts of children in diapers <b>Institutions for custodial care with outbreak:</b> residents and staff in close personal contact with infected patients <b>Consumers of food prepared by infected food handlers; colleagues of infected food handlers</b> <b>Schools;</b> use if transmission within school setting documented; consider vaccine if high risk <b>Hospital</b> personnel caring for patients is not indicated routinely, unless an outbreak is occurring Symptomatic for HAV Isolated IgA deficiency; severe thrombocytopenia; coagulation disorders; allergy to thimerosal;																																				
Not indicated																																					
Live virus vaccine	Not live viral vaccine for 5 weeks of administration; no ISG administration for 2 weeks after live virus vaccine																																				
<b>Disinfection</b>																																					
	Stable in environment; Resistant to heat inactivation (resisting 60°C 1 hr); resist partially pasteurization; resistant to free chlorine w organic matter; resist free chlorine levels of 0.5ppm in water infectious in the feces for over 2 weeks; Inactivated by sodium hypochlorite at 2% or glutaraldehyde																																				

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<b>PUBLIC HEALTH</b>	
<b>Case Management</b>	
<b>Food preparation</b>	Heat at 85-90 °C (185-195 °F) for 4 mn or steamed for 90 seconds Educational programs for food handlers; Immunization of foodhandlers rarely done
<b>Day Care centers</b>	
<b>Immunization pgm</b>	See Vaccine
<b>Surveillance</b>	
	<b>Report;</b> Fill CDC Form; verify lab tests (particularly IgM positive and not IgG or total anti-HAV; <b>Exposure Hx:</b> Contact w hepatitis pt; travel outside US; parenteral drug use; close contact w baby /young child home /work; employment in food services or health care; shellfish consumption <b>Vaccine &amp; serologic testing Hx:</b>
<b>Exclusion</b>	
	<b>Day care, Food handler:</b> exclude until jaundice onset +1 wk, or sx onset +2 wks or until IG prophylaxis program initiated Colleagues of food handlers who did not receive ISG until 30 days after last case among food handlers Day care employee who did not receive ISG until 30 days after last case identified
<b>Isolation Precaution</b>	<b>Contact</b> (Enteric precaution)
<b>Case management</b>	
	1-Refer to PMD for case management; 2-Investigate source of disease; 3-Test & counsel contacts; 4-ISG /Vaccine for susceptible contacts;
<b>Source Investigtn</b>	Personal contact; MSM Sexual partner; Occupational exp at nursery, pre-school, daycare;
<b>Ctc investigation</b>	List household contacts + any other w significant exposure (food handler, day care, poor hygiene etc.) Other cases in outbreak
<b>Food handler</b>	Remove from suspect of HAV until lab test result; Exclusion if confirmed; Contact food service sanitarian; Hygiene practices; Work history (direct handling, type of food, raw or cooked, before /after cooking, dates and times →2 wks before onset);
<b>Child care center</b>	Remove from suspect of HAV until lab test result; Exclusion if confirmed; determine if outbreak situation
<b>Household Contact</b>	Education; All household contacts should be evaluated and if susceptible, immunized.
<b>Information</b>	Hepatitis Hotline of the Hepatitis Branch, CDC at 1-888-4HEP-CDC (or 1-888-443-7232) National Immunization Program, CDC Information Hotline at 1-800-232-2522; CDC Hepatitis Branch website at <a href="http://www.cdc.gov/ncidod/diseases/hepatitis/">http://www.cdc.gov/ncidod/diseases/hepatitis/</a> CDC National Immunization Program website at <a href="http://www.cdc.gov/nip">http://www.cdc.gov/nip</a>