Epidemiology of Viral Hepatitis -2025

Assistant Prof

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OBJECTIVES

- Define the five main viral hepatitis viruses
- Describe transmission routes, acute vs chronic forms
- Present prevalence, incidence, and mortality globally and in Iraq
- Highlight prevention strategies and public health implications

Global Burden: Prevalence & Incidence

- Chronic HBV: est. ~254 million people globally (in 2022) infected with HBV. HCV: Many millions chronically infected; incidence of new infections estimated ~1 million/year globally.
- HAV & HEV: Large numbers of acute infections worldwide, especially in low- and middle-income countries (LMICs).

Global Mortality & Complications

- Chronic HBV and HCV are major causes of liver cirrhosis, liver failure, hepatocellular carcinoma.
- Example: HBV – in 2022 an estimated 1.1 million deaths from HBV-related complications.
- HCV – significant mortality though exact global recent numbers vary; for example ~242,000 deaths from HCV reported by some sources.

Modes of Transmission (by type)

- **–HAV & HEV**: Faeco-oral route, contaminated water/food, poor sanitation/hygiene.
- **HBV**: Perinatal (mother-to-child), early childhood horizontal (in high endemic settings), STI, unsafe injections, blood transfusions???
- **HCV**: Primarily blood-borne — unsafe injections/transfusions, dialysis, sometimes injecting drug use (in some settings).
- **HDV**: Requires HBV infection; same modes as HBV plus co-infection or super-infection.

  Understanding transmission is key to targeted prevention in clinical and community settings.

Natural History & Acute vs Chronic Infection

- HBV: Many infections in infants/children lead to chronic carriage; adults more likely to clear acute infection. Chronic HBV may lead to cirrhosis/hepatocellular carcinoma over decades.
- HCV: High proportion become chronic; silent course, often diagnosed late, progressive liver disease.
- HAV/HEV: Usually acute, self-limited; but HEV can be severe in pregnant women.

Global Risk Factors

- Unsafe medical injections and transfusions.
- High-risk behaviors: for HBV STI, injecting drug use), for HCV (injecting drug use, dialysis, transfusion in unsafe settings).
- Vertical transmission (HBV) where immunisation/PMTCT lacking.
- Poor sanitation/hygiene for HAV/HEV.
- Health-system weaknesses: low vaccination coverage, weak surveillance, insufficient diagnostics.
- Conflict/displacement and refugee movements increase risk (particularly for regions like the Middle East). For example, in Iraq displacement has been cited.

Global Vaccination & Prevention Strategies

- HBV vaccine: Highly effective; many countries include it in childhood immunisation Programmes.
- Safe blood transfusion, injection safety, infection-control practices in medical care.
- HAV vaccine where endemic. HEV prevention includes water/sanitation improvement.
- For HCV: No vaccine yet, so focus is on screening, harm-reduction, treatment as prevention.
- Universal immunisation, safe-health-care practices, education campaigns remain classical tools.

Iraq: Epidemiology of Hepatitis B (HBV) – Incidence Trends

- Ten-year trend (2012–2022): incidence decreased from **9.7 per 100,000 → 3.5 per 100,000**.
- Male predominance: 2012 – males 11.9, females 7.4; 2022 – males 3.9, females 2.6.
- Children 0–4 years: incidence dropped 1.3 → 0.1 per 100,000 (reflecting effective immunisation).
- Age 5–14: incidence peaked ~9.6 per 100,000 in 2014, then dropped to ~1.0 in 2022.
- Interpretation: Expanded Programme on Immunization (EPI) and vaccination significantly reduced pediatric HBV.

Iraq: HBV – Regional/Geographic Variation

- Northern governorates (Kurdistan region): HBV prevalence generally <2%.
- Southern governorates: prevalence historically higher, up to 3–3.5% in some areas.
- Urban vs rural: urban areas generally better vaccination coverage, lower incidence.
- Highlight regional inequalities for targeting interventions.

Iraq: Epidemiology of Hepatitis C (HCV)

- Prevalence in general population historically low (~0.4% in 2005).
- Higher prevalence among special populations:
  - Hemodialysis patients: up to 17–20% in some centres.
  - Prison populations: 10–12% HCV prevalence (Duhok study).
  - People with past blood transfusions (before screening improvement).
- Implication: HCV remains a public-health priority in high-risk groups; elimination requires targeted screening and treatment.

Iraq: Hepatitis A & E – Acute Infections & Outbreaks

- HAV: Mainly pediatric; incidence fluctuates with sanitation and outbreak occurrence.
- HEV: Rare but severe in pregnant women; linked to water contamination.
- Outbreak reports: Baghdad pediatric hospital reported HAV outbreaks in recent years.
- Prevention: hygiene promotion, water safety, selective vaccination in high-risk settings for HAV.

Iraq: Vaccination Programmes

- HBV vaccine introduced into EPI: 1991; full 3-dose schedule for infants.
- Coverage: >95% in urban areas, 85–90% in rural areas (2022–23 estimates).
- HAV vaccine: Not universally included; sometimes used for outbreak control.
- Traditional public-health insight: Vaccination remains the most effective preventive measure.

Iraq: Prevention Measures Beyond Vaccination

- Blood safety: mandatory HBsAg and anti-HCV screening for blood donors.
- Injection safety: ongoing challenges, but improvements in hospitals and primary care centres.
- Public education: campaigns on hygiene, safe injection, safe sexual practices.
- Water sanitation: improving, but HEV/HAV outbreaks highlight ongoing gaps.
- Harm reduction: limited programs for people who inject drugs (PWID); potential area for expansion.

Iraq: Complications of Viral Hepatitis

- HBV and HCV major contributors to cirrhosis and hepatocellular carcinoma (HCC).
- Estimated HBV/HCV-related cirrhosis/HCC burden: 1–3% of adults with chronic infection develop cirrhosis within 20–30 years.
- Case series and hospital reports indicate HCC incidence is rising among older age who were infected prior to vaccination.
- Implications: Screening and early management essential; highlights importance of historical context.

Iraq: Key Risk Groups

- **Healthcare workers:** Risk of HBV exposure, especially pre-vaccination cohorts.
- **Prisoners:** HBV prevalence up to 7.8%, HCV up to 10.5% (Duhok study).
- **Thalassemia and multi-transfused patients:** Higher risk due to historical transfusion practices.
- **People who inject drugs (PWID):** Limited data, but high-risk globally.
- **Neonates born to HBV-positive mothers:** Vertical transmission remains a concern in unvaccinated or partially vaccinated populations.
- Traditional public health note: Targeting high-risk groups maximizes cost-effectiveness of interventions.

Iraq vs Neighboring Countries (HBV)

- Iraq: 1–3.5% prevalence.
- Iran: 1–2% prevalence.
- Jordan: ~2–4%.
- Saudi Arabia: 1–2%.
- Syria: ~2–5%.

Insight: Iraq’s HBV prevalence is moderate; immunization programs have contributed to downward trends.

Global Targets: WHO Elimination Goals

By 2030:

- 90% reduction in new chronic HBV/HCV infections.
- 65% reduction in viral hepatitis mortality.
- 90% of people diagnosed; 80% treated (for eligible HBV/HCV cases).

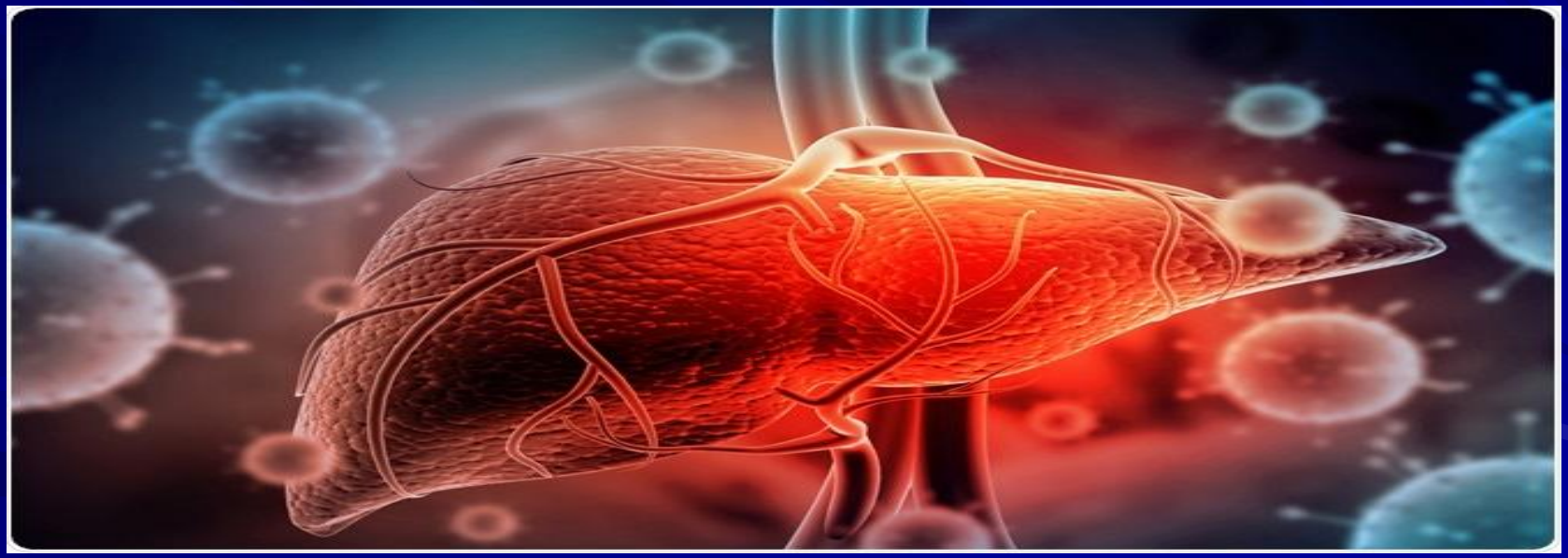
- Iraq aligns with WHO EMRO strategies, but rural coverage and high-risk populations are challenges.

Strategic Roadmap for Iraq (2026–2030)

- **Goals:**
  - 95% HBV vaccination coverage including birth dose.
  - Scale-up HCV treatment in high-risk populations.
  - Improve surveillance and outbreak response.
- **Actions:**
  - Strengthen laboratory capacity.
  - Integrate hepatitis screening into routine primary care.
  - Conduct awareness campaigns.
- **Milestones:** Annual progress reports; WHO EMRO guidance alignment.

Hepatitis A

Hepatitis A (formerly known as "infectious" hepatitis or epidemic jaundice



- PERIOD OF INFECTIVITY :
- The risk of transmitting HAV is greatest from 2 weeks before to 1 week after the onset of jaundice. infectivity falls rapidly with the onset of jaundice
- INFECTIVE MATERIAL : Mainly man's faeces. Blood, serum and other fluids are infective during the brief stage of viraemia.

Host factors

- AGE : more frequent among children than in adults. However
- People from all ages may be infected if susceptible.
- In young children, infections tend to be mild or subclinical
- The clinical severity increases with age.
- The ratio of anicteric to icteric cases
  - Adults is about 1 :3
  - Children, it may be as high as 12: 1

However, faecal excretion of HAV antigen and RNA persists longer in the young than in adults

- SEX : Both sexes are equally susceptible.
- IMMUNITY: Immunity after attack probably lasts for life
- Second attacks have been reported in about 5 %.
- Most people in endemic areas acquire immunity through subclinical infection.
- The lgM antibody appears early in the illness and persists for over 90 days.
- IgG appears more slowly and persists for many years.

Modes of transmission

- ***FAECAL-ORAL ROUTE :*** **This is the major route of transmission.**
- **It may occur by direct (person-to-person) contact or indirectly by way of contaminated water, food or milk.**
- **Water-borne transmission, is not a major factor in developed countries, where food-borne outbreaks are becoming more frequent.**

- ***PARENTERAL ROUTE:*** **Hepatitis A is rarely, if ever, transmitted by the parenteral route (i.e., by blood and blood products or by skin penetration through contaminated needles).**
- **This may occur during the stage of viraemia.**
- **This mode of transmission is of minor importance as viraemic stage of infection occurs during prodromal phase and there is no carrier state.**

- ***SEXUAL TRANSMISSION:*** **As a sexually transmitted infection hepatitis A may occur mainly among homosexual men because of oral-anal contact .**
- **Food handlers are not at increased risk for hepatitis A because of their occupation, but are noteworthy because of their critical role in common-source food-borne HAV transmission.**
- **Health care personnel do not have an increased prevalence of HAV infection and nosocomial HAV transmission is rare.**
- **Children play an important role in HAV transmission as they generally have asymptomatic or unrecognized illness.**

Incubation period

- 10 to 50 days (usually 14-28 days}.
- The length of the incubation period is proportional to the dose of the virus ingested .

OUTCOME

Age Group	Clinical Presentation	Complications	Outcome
Children (<6 yrs)	Mostly asymptomatic (70–90%)	Rare	Complete recovery, lifelong immunity
Older children / Adults	Symptomatic (fatigue, jaundice, nausea, anorexia)	Rare fulminant hepatitis (<1%), relapsing hepatitis (5–10%)	Complete recovery, lifelong immunity
Elderly / Chronic liver disease	Often severe symptoms, prolonged jaundice	Higher risk of fulminant hepatitis and cholestatic hepatitis	Usually recover, but mortality risk slightly increased

Hepatitis A Prevention

- General prevention
  - –Water chlorination
  - –Boil water 20 minutes
  - –Wash hands
  - –Avoid contaminated food
  - VACCINATION

Feature	Inactivated HAV Vaccine	Live Attenuated HAV Vaccine
Type	Killed virus	Live attenuated virus
Schedule	2 doses: 0 and 6–18 months	Usually 1 dose
Age	≥12 months (routine)	≥1 year (where available)
Indications	- Routine childhood immunization - Travelers to endemic areas - Chronic liver disease - Occupational risk	- Same as inactivated (availability limited)
Efficacy	>95% after first dose; long-term ≥20 years	Protective after single dose; long-term data variable
Side Effects	Mild: pain, fever, fatigue, headache	Mild: fever, local reaction; very rare severe events
Special Notes	Can be given with other vaccines; IG may be used for post-exposure prophylaxis	Less widely available; long-term immunity good but data less extensive

Hepatitis B

serum hepatitis

- Is an acute systemic infection with major pathology in the liver, caused by hepatitis B virus {HBV) and transmitted usually by the parenteral route.
- Usually, it is an acute self-limiting infection, which may be either subclinical or symptomatic.

Feature	Pattern / Observation
Age	- Highest risk of chronic infection: neonates and children <5 years - Acute symptomatic infection more common in adults - Seroprevalence often increases with age in endemic regions
Sex	- Males often have higher prevalence of chronic infection and HBV-related complications (cirrhosis, HCC) - Infection rates in children generally similar between sexes

RESERVOIR OF INFECTION

- Man is the only reservoir of infection which can be spread either from **carriers** or from **cases.**
- The continued survival of infection is due to the large number of individuals who are carriers of the virus.
- The persistent carrier state has been defined as the presence of HBsAg (with or without HBeAg) for more than 6 months.

Modes of transmission

Parenteral route

Essentially a blood-borne infection.

- Infected blood and blood products through transfusions, dialysis, contaminated syringes and needles, pricks of skin, handling of infected blood, accidental inoculation.
- Accidental percutaneous inoculations .

Perinatal transmission

- HBV carrier mothers to their babies appears to be an important factor for the high prevalence of HBV infection .
- Children born to mothers who are HBeAg-positive become chronically infected.
- Infection of the baby is usually anicteric and is recognized by the appearance of surface antigen between 60-120 days after birth .

Incubation period

- 30 to 180 days. Lower doses of the virus result often in longer incubation period. The average incubation period is about 75 days .

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