



Viral Hepatitis Prevention Board

▲ VHPB technical meeting

Addressing Hepatitis A in Europe in 2026 – Challenges, Strategies, and Opportunities

13-14 October 2026

Antwerp, Belgium

DRAFT AGENDA

Background document

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Version: October 2026 – for meeting preparation; not for citation.

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How to use this document

This document helps participants prepare for the meeting. It follows the meeting agenda: each session has its own chapter with the talks, a short background to prepare for the discussion, and the relevant literature with abstracts.

- **Part 1** – meeting information and agenda at a glance.
- **Part 2** – key background: hepatitis A in brief, the WHO position, ECDC and other international resources, monitoring networks and previous VHPB meetings.
- **Part 3** – session-by-session background (Sessions 2–7).
- **Annexes** – global literature by region, the literature search strategy and abbreviations.

Part 1 · Meeting information

Introduction

Hepatitis A virus (HAV) remains a significant, yet often overlooked, public health concern in Europe. Global and regional strategies, such as the WHO goal to eliminate viral hepatitis as a public health threat by 2030, have focused mainly on hepatitis B and C. Although there is no chronic form, HAV continues to cause outbreaks, hospitalisations and disruption, particularly in high-risk populations.

Improved sanitation and declining natural immunity have pushed the age of primary infection upward, increasing the risk of symptomatic disease in adolescents and adults. At the same time, international travel, migration, foodborne transmission and outbreaks among vulnerable groups continue to challenge existing prevention efforts. Hepatitis A is vaccine-preventable and entirely controllable, and deserves renewed attention within the broader hepatitis elimination agenda.

This meeting will assess the current HAV landscape in the WHO European Region, identify gaps in prevention strategies, document the value and impact of HAV vaccines and vaccination, and explore opportunities for coordinated action.

Meeting objectives

1. **Review the current HAV epidemiological landscape, burden of disease and immunity gaps in the WHO European Region.** Analyse trends in incidence, outbreaks and immunity gaps (from lack of vaccination and from waning immunity), highlighting key risk groups and regional disparities.
2. **Discuss transmission risks and diagnosis.** Assess the role of travel, migration and foodborne exposure in shaping HAV risk, and discuss interventions such as risk-based screening, pre-travel vaccination and raising public awareness.
3. **Compare and evaluate national HAV prevention strategies and outcomes.** Examine the impact of universal and targeted vaccination (e.g. food handlers, MSM, teachers, travellers), drawing lessons from country and regional case studies to identify good practices and implementation gaps.
4. **Assess long-term protection.** Review current evidence on the durability of immunity after vaccination.
5. **Promote evidence-based, cost-effective policymaking for HAV prevention.** Highlight health economic evaluations and scientific evidence that can inform national policies, strengthen surveillance and support alignment with WHO viral hepatitis elimination goals.

Expected outcomes

- **Strategic guidelines for effective HAV prevention and vaccination policies**, including identification of immunity gaps
- **Policy-relevant evidence and economic analyses** to support sustainable, data-driven decision-making at national and regional level
- **Strengthened collaboration between policymakers, public health specialists, healthcare professionals and academic researchers**, integrating HAV strategies into broader hepatitis elimination frameworks

Practical information and participants

- **Dates and venue:** 13–14 October 2026, Hof van Liere, University of Antwerp, Antwerp, Belgium (hybrid)
- **Participants (± 50):** public health experts, policymakers, healthcare providers, civil society and academics/experts involved in viral hepatitis prevention and control; VHPB advisors; selected observers

Agenda at a glance

Time	Session / presentation	Speaker
Day 1 – Tuesday 13 October 2026		
Session 1: Opening and objectives of the meeting <i>Chairs: Pierre Van Damme – Sema Mandal</i>		
09:00–09:40	Welcome and introduction of participants; meeting objectives	Greet Hendrickx
Session 2: Viral hepatitis A in 2026 – Epidemiology and surveillance <i>Chairs: Pierre Van Damme – Sema Mandal</i>		
09:40–10:10	Hepatitis A in Europe 2026 – an overview of epidemiology and surveillance systems	Pier Luigi Lopalco
10:10–10:30	HAV emerging challenges	Public Health Authority of the Slovak Republic (TBC)
10:30–10:50	HAV beyond Europe	Noele Nelson
10:50–11:00	Q&A	
11:00–11:30	<i>Coffee break</i>	
Session 3: Hepatitis A surveillance and diagnosis <i>Chairs: Rui Tato Marinho – Noele Nelson</i>		
11:30–11:50	Wastewater monitoring	Remy Schilperoort
11:50–12:05	The role of the EU Reference Laboratory for Public Health on Food- and Water-borne Viruses (EURL-PH-FWDV)	Harry Vennema
12:05–12:25	HAV diagnostic tests – challenges and opportunities	Sema Mandal
12:25–12:45	Q&A	
12:45–13:05	Population-based research on the evidence for vaccination once in a lifetime	Jaime Perez
13:05–14:00	<i>Lunch break</i>	
Session 4: Hepatitis A vaccines <i>Chairs: Sandra Dudareva – Angela Domínguez</i>		
14:00–14:20	Hepatitis A vaccines – update from SAGE	Kassiani Mellou (WHO SAGE, online)
14:20–14:40	Scientific evidence for the use of one dose	Christian Herzog
14:40–15:00	Needs to achieve global immunity through vaccination	Oana Săndulescu
15:00–15:20	Q&A	
15:20–15:50	<i>Coffee break</i>	

Time	Session / presentation	Speaker
Session 5: Economic analysis, health literacy and vaccination willingness <i>Chairs: Thomas Vanwolleghem – Sema Mandal</i>		
15:50–16:10	Impact of hepatitis A vaccination in Spain: evolution of hospitalization	Pere Godoy
16:10–16:30	Viral hepatitis knowledge and awareness	Sandra Dudareva
16:30–16:45	Q&A	
16:45–17:05	Duration of protection	Brian McMahon (online)
17:05–17:45	Interactive discussions: universal vs risk-based vaccination (travel, food handlers); cost-effectiveness analyses; challenges and needs for health literacy and vaccination willingness	
	<i>Closing of Day 1</i>	
Day 2 – Wednesday 14 October 2026		
Session 6: Vaccination and outbreak policies <i>Chairs: Silvia Bino – Sandra Dudareva</i>		
09:00–09:20	Hepatitis A outbreak characteristics: a comparison of regions with different vaccination strategies in Spain	Angela Domínguez
09:20–09:40	Examples of outbreak management: (1) MSM outbreak in Berlin; (2) sexual-transmission outbreak among MSM, Portugal 2023–2024	Ruth Zimmermann (online); Rui Tato Marinho
09:40–10:00	Hepatitis A prevention in the USA depends on routine universal childhood vaccination	Noele Nelson
10:00–10:30	Q&A and interactive discussion on needs for policy change	
10:30–11:00	<i>Coffee break</i>	
Session 7: Group discussion <i>Chairs: Greet Hendrickx</i>		
11:00–12:00	Group debate – lessons learnt: hepatitis A prevention and control recommendations	
12:00–13:30	<i>Lunch break</i>	
Session 8: Summary and closing of the meeting <i>Chairs: Pierre Van Damme</i>		
13:30–14:00	Meeting summary	David FitzSimons
14:00–14:15	Closing of the meeting	

Based on the preliminary agenda of 7 October 2026; subject to change.

Part 2 · Key background

Hepatitis A in brief

HAV is transmitted mainly by the faecal–oral route, either through contaminated food and water or through direct contact with an infectious person, including sexual contact. The incubation period is usually 14–28 days but can be up to 50 days. Young children usually have asymptomatic infection, while older children and adults commonly have symptoms.

Clinical signs (malaise, fatigue, anorexia, vomiting, abdominal discomfort, diarrhoea and jaundice) cannot be told apart from acute hepatitis caused by other viruses. HAV resolves completely in the vast majority of cases, but relapses occur and acute liver failure is rare. The estimated case fatality ratio rises with age: about 0.1% in children under 15, 0.3% at 15–39 years and 2.1% in adults aged 40 and over. Unlike hepatitis B and C, HAV does not cause chronic liver disease. (Source: WHO Water and Environmental Surveillance summary for HAV and HEV.)

Key figures. 159 million new infections and 39,000 deaths worldwide in 2019 (Săndulescu et al., 2026) · EU/EEA 2010–2019: 139,793 notified cases, 3.2 per 100,000, more than 47,000 hospitalisations (Severi et al., 2023) · a paediatric hepatitis A vaccination programme exists in 33 European countries, with large differences in schedules and indications, exceptionally universal mostly risk group vaccination (Effraïmidou et al., 2023) · recommended and free for MSM in 7 of 43 WHO European Region countries (Brandl et al., 2024).

World Health Organization

[WHO fact sheet: Hepatitis A](#) · [Hepatitis A vaccines: WHO position paper, October 2022](#)

(agenda reference, Session 4)

Summary of the WHO position paper (2022)

- **Introduction into national schedules.** Vaccination should be introduced for individuals aged 12 months and older if indicated by (i) an increasing trend of acute hepatitis A, including severe disease, among older children, adolescents or adults; (ii) a change in endemicity from high to intermediate; and (iii) cost-effectiveness considerations.
- **Vaccines.** Inactivated and live attenuated vaccines are safe and highly immunogenic and give long-lasting, possibly lifelong, protection. Inactivated vaccines from different manufacturers, including combined vaccines, are interchangeable. Live attenuated vaccines are licensed from 18 months as a single subcutaneous dose.
- **Schedules.** For children, inactivated vaccine can be given as one or two doses. The interval between two doses is flexible (6 months up to 4–5 years or more, usually 6–18 months). Effectiveness, antibody persistence and modelling data indicate that an off-label single dose is equivalent to two doses in children. For adults over 40, two doses are preferred because evidence for a single dose is insufficient.
- **Strategy by endemicity.** In highly endemic countries, large-scale vaccination is not routinely recommended because of the risk of a paradoxical increase in disease. Countries moving from high to intermediate endemicity should introduce early-childhood vaccination, with catch-up guided by age-specific seroprevalence. In low and very low endemicity settings, targeted vaccination of high-risk groups should be considered. Decisions should be based on age-specific seroprevalence, incidence, morbidity, mortality and economic evaluation, tailored to detect geographical variation.
- **Special populations.** Vaccinate travellers to intermediate or high endemicity areas, MSM, at-risk occupational groups, people who inject drugs, people experiencing homelessness, migrants, refugees, incarcerated persons, and patients with chronic liver disease or HIV. Immunocompromised people should receive two doses. Inactivated vaccine should be considered for pregnant women at risk. Health workers should follow general population recommendations.

- **Outbreaks and prophylaxis.** Single-dose vaccination is recommended in outbreaks. It works best in small, well-defined communities, when started early and when high coverage is achieved. Vaccine has largely replaced immune globulin for pre- and post-exposure prophylaxis. Vaccination should be part of a comprehensive plan including safe water, sanitation and hygiene.

Other WHO resources



- [Hepatitis A Outbreak Toolbox \(updated August 2024\)](#)
- [Hepatitis A: Vaccine-Preventable Diseases Surveillance Standards](#)
- [Water and environmental surveillance summary for HAV and HEV](#)
- [Position paper annexes and GRADE tables \(2022\)](#)

European Centre for Disease Prevention and Control (ECDC)

- [ECDC disease topic: Hepatitis A](#)
- [Rapid Risk Assessment: Multi-country outbreak of hepatitis A in the EU/EEA \(June 2025\)](#) – increase in Austria, Czechia, Hungary and Slovakia between January and May 2025, mainly among adults experiencing homelessness, people who use or inject drugs and people living in poor sanitary conditions with limited access to healthcare; cases also in Roma communities in Czechia and Slovakia ([news release](#)).
- [Communicable Disease Threats Report, week 48 \(22–28 November 2025\)](#) and other reports in the series – weekly updates on active threats, including the multi-country hepatitis A outbreak.
- [Hepatitis A virus in the EU/EEA, 1975–2014 \(2016\)](#)
- [European Food- and Waterborne Diseases and Zoonoses Network \(FWD-Net\)](#) · [TESSy metadata report](#) · [EpiPulse](#) – the European portal for collecting, analysing and sharing infectious disease data for threat detection, risk assessment and outbreak response.

Monitoring networks and other resources

- [HAVNet](#) – global network of hepatitis A reference laboratories sharing molecular and epidemiological data (hosted by RIVM).
- [EU Reference Laboratory for Public Health on Food- and Water-borne Viruses \(EURL-PH-FWDV\)](#)
- US CDC: [Clinical Screening and Diagnosis for Hepatitis A](#) · [National Notifiable Diseases Surveillance System \(NNDSS\)](#)

Previous VHPB meetings on hepatitis A

- 1994 Van Damme P, Thoelen S, Cramm M, De Groote K, Safary A, Meheus A. [Inactivated hepatitis A vaccine: reactogenicity, immunogenicity, and long-term antibody persistence.](#) J Med Virol. 1994 Dec;44(4):446-51. doi: 10.1002/jmv.1890440425. PMID: 7897379.
- [2007, December – Miami, USA: Global hepatitis A meeting.](#) The first global meeting on HAV as a vaccine-preventable disease brought together more than 200 experts from 46 countries. It recommended a stepwise introduction of universal childhood vaccination based on accurate surveillance, documented outbreak control, political support and cost-effectiveness studies ([meeting paper](#)).
- [2009, March – Antwerp, Belgium: Hepatitis A and E: update on prevention and epidemiology.](#) The meeting highlighted the growing public health importance of HAV, particularly in intermediate endemicity regions, and the need for control at global level. FitzSimons D, Hendrickx G, Vorsters A, Van Damme P. Vaccine 2010;28(3):583-8 ([article](#)).
- [2020, June – Virtual VHPB meeting](#) **Hepatitis A vaccination: One dose**

A Global Hepatitis A Meeting

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Supplement of the Journal of Viral Hepatitis is available online

Meeting Programme/abstract book and most presentations are available
CDC, PAHO and UA sponsoring
AASLD Endorsement
EASL Endorsement

Supplement of the Journal of Viral Hepatitis is available online

A Supplement of the Journal of Viral Hepatitis (Volume 15 Issue s2 (October 2008) Special Issue: A Global Hepatitis A Meeting.) containing a meeting summary and 12 country reports is now available online at the **Blackwell Publishing website**
direct accessible for subscribers via: <http://www3.interscience.wiley.com/journal/118000821/home>
The paper version will be distributed begin October 2008

Meeting Programme/abstract book and most presentations are available

Around 200 participants out of 47 different countries participated at the first Global Hepatitis A meeting in Miami, USA, December 2007
The meeting **programme/abstract book** and most presentations are available on the **scientific programme** page.

CDC, PAHO and UA Sponsoring

Beside the University of Antwerp (UA), where the organising secretariat is located, also the Centers of Disease Control and prevention (CDC) and The Pan American Health organisation (PAHO) decided to sponsor the meeting. Thanks to this sponsoring more opinion- and decision makers involved in the control of viral hepatitis could be invited.

AASLD Endorsement

Also The American Association for the Study of Liver Diseases, AASLD, has endorsed this global hepatitis A meeting.

EASL Endorsement

The European Association for the study of the liver, EASL, has endorsed this global hepatitis A meeting.

Please **subscribe to the meeting newsletter** if you want to be informed when new or updated information regarding the outcome of this meeting becomes available.

Call for Abstracts

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Part 3 · Session-by-session background

Session 1 · Opening and objectives of the meeting

Day 1 · 09:00–09:40 · Chairs: Pierre Van Damme – Sema Mandal

Welcome, introduction of participants and presentation of the meeting objectives (Greet Hendrickx). See Part 1 for the objectives and expected outcomes, and Part 2 for the general background.

Session 2 · Viral hepatitis A in 2026 – Epidemiology and surveillance

Day 1 · 13 October 2026 · 09:40–11:00 · Chairs: Pierre Van Damme – Sema Mandal

09:40–10:10	Hepatitis A in Europe 2026 – an overview of epidemiology and surveillance systems	Pier Luigi Lopalco
10:10–10:30	HAV emerging challenges	Public Health Authority of the Slovak Republic (TBC)
10:30–10:50	HAV beyond Europe	Noele Nelson
10:50–11:00	Q&A	

Background in brief

- **Low incidence, high susceptibility.** Between 2010 and 2019, 29 EU/EEA countries reported 139,793 cases (3.2 per 100,000). Six eastern EU countries accounted for more than 60% of cases. Notifications peaked in 2014 and 2017; the 2017 peak was MSM-driven, with males at 74% and a median age of 31 years. More than 47,000 hospitalisations were reported, and annual case fatality stayed below 0.2%. Data on travel, hospitalisation, death and transmission route were suboptimal (Severi et al., 2023).
- **Shift in who gets infected.** Transmission has moved from travellers and children towards MSM and older age groups, and the share of travel-related cases has fallen while domestic cases have risen (Andani et al., 2023). Hospitalisation exceeded 50% at least once in 7 of 11 countries reviewed (Andani et al., 2025).
- **2024–2025 resurgence in central Europe.** ECDC's rapid risk assessment documents a marked increase in Austria, Czechia, Hungary and Slovakia, mainly among people experiencing homelessness, people who use or inject drugs and people with poor access to sanitation and healthcare, including Roma communities (ECDC, 2025).
- **Sexual transmission continues.** In Bucharest, 105 of 191 hospitalised cases in 2022–2023 were MSM, and all patients were unvaccinated (Paun et al., 2026). In Portugal, the 2016–2018 MSM outbreak strain re-emerged in 2023–2024 (Rosendal et al., 2024).
- **Global picture.** There were an estimated 159 million infections and 39,000 deaths in 2019 (Săndulescu et al., 2026). In the USA, person-to-person outbreaks in 37 states in 2016–2023 caused 44,930 cases, with 62% hospitalised and 1% dying; 67% of adult cases had a documented indication for vaccination (Hofmeister et al., 2026).

Literature

Hepatitis A in Europe 2026 – epidemiology and surveillance systems (P.L. Lopalco)

AGENDA REFERENCE Carrillo-Santisteve, P, L Tavošchi, E Severi, S Bonfigli, M Edelstein, E Byström, P Lopalco and ECDC HAV Expert Panel (2017). [Seroprevalence and susceptibility to hepatitis A in the European Union and European Economic Area: a systematic review](#). *Lancet Infect Dis* 17(10): e306–e319.

Why it matters: Listed on the agenda for Session 2 but missing from the draft. Systematic review of age-specific anti-HAV seroprevalence in EU/EEA countries; it is the basis for the country susceptibility profiles used in later ECDC analyses (e.g. Severi et al., 2023).

AGENDA REFERENCE Severi, E, L Tivoschi, P Carrillo-Santistev, T Westrell, G Marrone, J Giesecke and P Lopalco (2023).

Hepatitis A notifications in the EU/EEA, 2010-2019: what can we learn from case reporting to the European Surveillance System?. *Euro Surveill* 28(19).

Background: European Union/European Economic Area (EU/EEA) countries annually report hepatitis A (HepA) notifications to The European Surveillance System (TESSy). Aim: To describe EU/EEA HepA notifications from 2010 to 2019 and identify infection drivers and surveillance improvements. Methods: We analysed demographic, clinical and transmission information of HepA confirmed cases from TESSy. We stratified countries by population susceptibility profile and performed time-series analysis to describe trends in notification rates, sex distribution and travel history. Results: Twenty-nine EU/EEA countries reported 139,793 HepA cases. Six eastern EU countries reported > 60% of these cases. EU/EEA notification rate during the study period was 3.2 cases per 100,000 population (range 2.7-5.6). Notifications peaked in 2014 and 2017, with marked differences in case demographic characteristics. Notification trends varied across different country susceptibility groups. In 2017, the proportion of males (74%) and case median age (31 years) increased steeply, while no changes occurred in 2014. Travel history showed seasonal case peaks following the summer. More than 47,000 hospitalisations were reported. Annual case fatality was < 0.2% for all years. Information on travel history, hospitalisation, death and mode of transmission was suboptimal. Discussion: Apart from some countries in its east, the EU/EEA is characterised by low HepA incidence baseline and susceptible to recurrent large cross-border outbreaks. Analysis of European surveillance data highlighted the need for stronger prevention policies for eastern EU countries, men who have sex with men and travellers. Improving surveillance data-quality will enhance knowledge on food-borne, and travel-related exposures to inform more effective and tailored regional prevention policies.

European Centre for Disease Prevention and Control (2016). **Hepatitis A virus in the EU/EEA, 1975-2014. Stockholm: ECDC.**

Why it matters: ECDC technical report on long-term trends, seroprevalence and susceptibility in the EU/EEA; useful baseline against which the 2010-2019 TESSy data and the 2025 increase can be read.

Andani, A, K Mellou, P Dewda, J Eeuwijk, G Kassianos, P Van Damme and R Steffen (2025). **Evolution and Impact of Hepatitis A Epidemiology in Europe-Systematic Literature Review of the Last 20 Years. *J Viral Hepat* 32(1): e14030.**

While globally hepatitis A (hepA) infections occur in 150 million people annually, European high-income countries now have a low endemicity. However, this results in a more susceptible adult population which is prone to severe illness. To determine current epidemiological characteristics, we performed a systematic literature review to assess the severity of hepA disease in the past two decades in 11 European countries (i.e., Denmark, France, Germany, Greece, Hungary, Italy, the Netherlands, Spain, Sweden, Switzerland and the United Kingdom). Literature search was performed using PubMed and Embase between 1 January 2001 and 14 April 2021. Search terms included the disease (hepA), the 11 selected countries, the term 'outbreaks' and its synonyms, outcomes and terms for hepA virus circulation. In total, 43 records reported data on hepA disease outcomes. Hospitalisation rates varied between the countries, with annual rates exceeding 50% at least once in seven countries. The lowest hospitalisation rates were reported for the Netherlands (<= 32%) and the highest for Greece (>= 81%). Liver failure, haemorrhagic and other complications were rarely reported, and case fatality rates were low (0.03%-0.26%). Our findings are consistent with the trends observed globally. This systematic literature review highlights the need to increase awareness of hepA risks and to strengthen prevention strategies. Continuous monitoring of epidemiological data is crucial to assess which populations would most benefit from prevention, mainly with respect to future vaccination recommendations.

Andani, A, E Bunge, G Kassianos, J Eeuwijk, K Mellou, P Van Damme, P Mukherjee and R Steffen (2023). **Hepatitis A occurrence and outbreaks in Europe over the past two decades: A systematic review. *J Viral Hepat* 30(6): 497-511.**

Hepatitis A (HA) is a vaccine-preventable liver disease with >170 million new cases occurring yearly. In recent outbreaks in the USA, hospitalization and case-fatality ratios were >60% and ~1%, respectively. In Europe, endemicity persists and outbreaks continue to occur. We performed a systematic literature review to understand the changes in HA occurrence in Europe over the past two decades. PubMed and Embase were systematically searched for peer-reviewed articles published between 1 January 2001 and 14 April 2021 using terms covering HA, 11 selected European countries, outbreaks, outcomes and HA virus circulation. Here, we focus on HA occurrence and outbreaks in the five countries with the largest population and the most comprehensive vaccination recommendations: France, Germany, Italy, Spain and the UK; 118 reports included data for these five European countries. Notification rates (<=9.7/100,000 population) and percentages of men among cases (<=83.0%) peaked in 2017. The number of person-to-person-transmitted cases and outbreaks decreased in children but increased in other risk groups, such as men who have sex with men (MSM). Sexually transmitted outbreaks in MSM clustered around 2017. Travel-related outbreaks were few; the proportion of travel-related cases decreased during the past two decades, while the number of domestic cases increased. Despite the existing risk-based vaccination recommendations, HA transmission shifted in proportions from travelers and children to other risk groups, such as MSM and older age groups. Because a substantial proportion of the European population is susceptible to HA, adherence to existing recommendations should be monitored more closely, and enhanced vaccination strategies should be considered.

Van Damme, P, RM Pintó, Z Feng, F Cui, A Gentile and D Shouval (2023). **Hepatitis A virus infection. *Nat Rev Dis Primers* 9(1): 51.**

Hepatitis A is a vaccine-preventable infection caused by the hepatitis A virus (HAV). Over 150 million new infections of hepatitis A occur annually. HAV causes an acute inflammatory reaction in the liver that usually resolves spontaneously without chronic sequelae. However, up to 20% of patients experience a prolonged or relapsed course and <1% experience acute liver failure. Host factors, such as immunological status, age, pregnancy and underlying hepatic diseases, can affect the severity of disease. Anti-HAV IgG antibodies produced in response to HAV infection persist for life and protect against re-infection; vaccine-induced antibodies against hepatitis A confer long-term protection. The WHO recommends vaccination for individuals at higher risk of infection and/or severe disease in countries with very low and low hepatitis A virus endemicity, and universal childhood vaccination in intermediate endemicity countries. To date, >25 countries worldwide have implemented such programmes, resulting in a reduction in the incidence of HAV infection. Improving hygiene and sanitation, rapid identification of outbreaks and fast and accurate intervention in outbreak control are essential to reducing HAV transmission.

Chatziprodromidou, IP, ME Dimitrakopoulou, T Apostolou, T Katopodi, E Charalambous and A Vantarakis (2022). [Hepatitis A and E in the Mediterranean: A systematic review](#). *Travel Med Infect Dis* 47: 102283.

Hepatitis A (HAV) and Hepatitis E (HEV) considered to be major public health threats worldwide. Although, both infections are more common in developing countries, an increased number of HAV and HEV cases have been reported in developed countries. This systematic review analyzes epidemiological profiles of HAV and HEV in the Mediterranean countries. By using PRISMA guideline, we searched for articles from 2010 to 2020 referring HAV and HEV outbreaks from online databases: Scopus, PubMed and Springerlink. From 33265 unique publications initially captured, data was extracted from 101 articles investigating country and year of outbreak, transmission mode, vehicle of infection, mean age and sex of patients, symptoms reported, vaccination applied and diagnostic method. Our results indicate that occurrence of HAV and HEV in Mediterranean countries had increased with main transmission vehicle reported as food or water and transmission point as refugee camps. More results (countries, differences, other characteristics). Thus, public health authorities should give a priority to face up challenges regarding the prevalence of both viruses and control strategies to prevent upcoming outbreaks.

Miguera, M, S Lhomme and J Izopet (2021). [Hepatitis A: Epidemiology, High-Risk Groups, Prevention and Research on Antiviral Treatment](#). *Viruses* 13(10).

The hepatitis A virus (HAV) is a leading cause of acute viral hepatitis worldwide. It is transmitted mainly by direct contact with patients who have been infected or by ingesting contaminated water or food. The virus is endemic in low-income countries where sanitary and sociodemographic conditions are poor. Paradoxically, improving sanitary conditions in these countries, which reduces the incidence of HAV infections, can lead to more severe disease in susceptible adults. The populations of developed countries are highly susceptible to HAV, and large outbreaks can occur when the virus is spread by globalization and by increased travel and movement of foodstuffs. Most of these outbreaks occur among high-risk groups: travellers, men who have sex with men, people who use substances, and people facing homelessness. Hepatitis A infections can be prevented by vaccination; safe and effective vaccines have been available for decades. Several countries have successfully introduced universal mass vaccination for children, but high-risk groups in high-income countries remain insufficiently protected. The development of HAV antivirals may be important to control HAV outbreaks in developed countries where a universal vaccination programme is not recommended.

Majeed, AA, M Sarfraz and AS Butt (2025). [Evolving trends in hepatitis A epidemiology: Shifting patterns, emerging risks, and future strategies](#). *World J Virol* 14(4): 112590.

Hepatitis A, a vaccine-preventable liver infection caused by the hepatitis A virus, is undergoing significant epidemiological shifts worldwide. Traditionally considered a disease of childhood in endemic regions, improved sanitation, economic development, and widespread vaccination have led to a decline in incidence, particularly in developed nations. However, this decline has resulted in a growing population of susceptible adults, increasing the risk of severe outbreaks. Additionally, changes in travel patterns, urbanization, and socioeconomic disparities have altered disease distribution, leading to sporadic outbreaks in low-endemicity regions and a rising burden in certain high-risk populations. This review explores the evolving epidemiology of hepatitis A, emphasizing the transition from endemic childhood infections to adult susceptibility. We examine the impact of changing risk factors, including shifting demographics, increased international travel, and regional disparities in vaccination coverage. Furthermore, the review highlights the emergence of new viral strains and their potential implications for disease control. Updated vaccination policies, including targeted immunization strategies and their role in preventing outbreaks, are also discussed. Given these dynamic changes, continued surveillance and public health preparedness tailored to evolving risk groups are crucial for sustained hepatitis A control. By synthesizing recent epidemiological data and policy updates, this review provides insights into the future of hepatitis A prevention and control, offering guidance for clinicians, researchers, and public health professionals.

Shi, JM, SY Zhou and F Ren (2026). [Bridging virology, public health, and food safety: a comprehensive review of hepatitis A virus](#). *Antonie Van Leeuwenhoek* 119(3).

Hepatitis A virus (HAV) remains a significant global public health concern, particularly as a foodborne pathogen. Despite advances in vaccination and sanitation, HAV continues to cause outbreaks, especially in regions with uneven immunization coverage or inadequate hygiene infrastructure. This review comprehensively examines HAV from virological, clinical, and epidemiological perspectives, highlighting its pathogenesis, transmission routes, genomic diversity, and foodborne risks. We discuss the evolving global epidemiology of HAV, emphasizing the shift from high to low endemicity in vaccinated populations and the emergence of susceptible cohorts in moderately developed regions. The review underscores the challenges in foodborne HAV detection, including the limitations of current methods and the promise of emerging technologies like reverse transcription digital polymerase chain reaction (RT-dPCR) for enhanced sensitivity. Additionally, we summarize emerging antiviral approaches in food safety control, including plant-derived bioactive compounds and edible coatings, for controlling HAV transmission through the food chain. Finally, we present an overview of WHO-recommended vaccination strategies based on endemicity levels-targeted immunization for high-risk groups in low-endemic areas, universal childhood vaccination in moderate-endemic regions, and reliance on naturally acquired immunity in high-endemic zones. Our synthesis aims to bridge gaps between virology, clinical medicine, and food safety, offering insights for interdisciplinary collaboration in HAV prevention and control.

Săndulescu, O, M Matičič, F Garcia, MA Blomé, MU Mondelli, W Irving, S Zidovec-Lepej, A Widell and G Şahin (2025). [Evolving insights into viral hepatitis: Advances, evidence, and expert perspectives from the ESCMID Study Group for Viral Hepatitis \(ESGVH\) - Part 1: hepatitis A, E, and herpesvirus-associated liver diseases](#). *Gems* 15(3): 254-262.

Viral hepatitis remains a global health concern, with growing recognition of the impact of hepatitis A virus (HAV), hepatitis E virus (HEV), and herpesvirus-associated hepatitis, particularly in vulnerable groups. This narrative review from the ESCMID Study Group for Viral Hepatitis (ESGVH) summarizes recent advances and expert perspectives. For HAV, insights into viral evolution, epidemiology, and risk groups underline the preventable nature of severe disease. HEV is increasingly recognized as both a hepatotropic and a systemic pathogen, with expanding knowledge on natural and vaccine-induced immunity. Herpesvirus-associated hepatitis, while rare, poses significant challenges, especially in patients with immunosuppression or during pregnancy, where early suspicion and empirical antiviral

therapy can be lifesaving. Collectively, these evolving insights highlight the importance of strengthened diagnostics, targeted prevention, and tailored management strategies to mitigate the burden of these underappreciated but clinically significant causes of viral hepatitis.

Manageiro, V, R Matos, P Palminha, H Cortes-Martins, B Nunes and R de Sousa (2025). [Tracking epidemiological shifts in hepatitis A in Portugal: a comparison of seroprevalence between two nationwide surveys, 2001 to 2002 and 2015 to 2016.](#) *Euro Surveill* 30(37).

BACKGROUND: Hepatitis A incidence in Portugal declined from 20.1 to 0.4/100,000 population between 1987 and 2023, changing non-vaccinated population susceptibility. This shift has contributed to more frequent outbreaks, including in 2024-25, highlighting the need to enhance surveillance and integrate serological data. AIM: We aimed to describe the exposure profile of the Portuguese population to hepatitis A virus (HAV) over time by estimating and comparing the seroprevalence of hepatitis A in two nationwide surveys. METHODS: Data from two cross-sectional seroprevalence studies performed in 2001-02 and 2015-16 in the population aged ≥ 2 years were analysed. Seroprevalence was weighted for population distribution by age, sex and region, and then analysed by birth cohort (1911 - 2014) and compared using Poisson regression. RESULTS: Overall prevalence of anti-HAV IgG antibodies was 67.3% (95% CI: 64.2-70.3) in 2001-02 ($n = 1,642$) and 56.3% (95% CI: 52.4-60.2) in 2015-16 ($n = 2,052$), showing an 11-percentage-point decline. Birth cohort analysis revealed consistent seroprevalence within each cohort in both surveys, i.e. seroprevalence for the 1981-90 birth cohort was 16.7% and 18.7%, respectively, suggesting that higher seroprevalence is more closely associated with birth cohort (cohort effect) rather than a specific time point. Additionally, we found that individuals aged ≥ 30 years, born before the 1980s, and those with lower education had higher seroprevalence. CONCLUSIONS: The immunological profile of anti-HAV antibodies in the Portuguese population has shifted over the last decades. High susceptibility and shifting age distribution of Hepatitis A-seropositive individuals highlight the need to revise future vaccination strategies in Portugal.

Enkelmann, J, R Kuhnert, K Stark and M Faber (2023). [Hepatitis A seroprevalence, vaccination status and demographic determinants in children and adolescents in Germany, 2014-2017, a population-based study.](#) *Sci Rep* 13(1): 9762.

Children play an important role in hepatitis A virus (HAV) transmission but, due to frequent asymptomatic or mild courses, these infections are underrecognized in routine surveillance. Here, we analyzed hepatitis A (HA) seroprevalence, vaccination status and demographic determinants and estimated previous HAV infections in a cross-sectional population-based study of children and adolescents with residence in Germany 2014-2017, performing weighted univariable and multivariable logistic regression. Of 3567 participants aged 3-17 years, serological results were available for 3013 (84.5%), vaccination records for 3214 (90.1%) and both for 2721 (76.3%). Of 2721 with complete results, 467 (17.2%) were seropositive, thereof 412 (15.1%) with and 55 (2.0%) without previous HA vaccination, indicating previous HAV infection. Seropositivity was associated with age, residence in Eastern states, high socioeconomic status and migration background with personal migration experience. Participants with migration background and personal migration experience also had the highest odds ratios for previous HAV infection. Germany remains a country with very low HA endemicity. The current vaccination recommendations focusing on individuals with a high risk for HAV exposure (e.g. travelers to endemic countries) or severe disease appear appropriate. Migration and travel patterns as well as the endemicity in other countries influence the domestic situation, warranting further monitoring.

Rzymski, P, D Zarębska-Michaluk, A Genowska, P Tyszko, B Strukcinskiene and R Flisiak (2024). [Trends of Hepatitis A Virus Infection in Poland: Assessing the Potential Impact of the COVID-19 Pandemic and War in Ukraine.](#) *Viruses* 16(3).

Hepatitis A virus (HAV) is the most common cause of acute viral hepatitis, which is preventable by vaccination. This study analyzed trends of HAV infections in Poland according to socio-demographic features in the years 2009-2022 and assessed the potential impact of the COVID-19 pandemic (2020-2023) and the migration of war refugees from Ukraine (since February 2022). In 2009-2022, 7115 new cases of HAV infection were diagnosed in Poland, especially among men (66.4%) and in urban areas (77.4%). Infections among men were most common at the age of 25-34 (median rate 0.43 per 10(5)) and in women aged 15-24 (median rate 0.39 per 10(5)). Analysis of the 14-year frequency of HAV infections exhibited three trends, regardless of gender, age, and residence. The infections revealed a downward trend in 2009-2014, increased significantly in 2014-2018, and decreased again after 2018. A particularly rapid increase in HAV infections occurred between March 2017 and February 2018 (median rate 0.79 per 10(5)). The high level of new infections persisted until the beginning of the COVID-19 pandemic, at which point it dropped significantly but did not reach the level recorded before March 2017. During the Omicron SARS-CoV-2 dominance period, the median rate of HAV infections was 0.053 per 10(5), with a four-fold increase being observed from February 2022 (when the migration of war refugees from Ukraine began) to August 2022. The presented results can serve as a reference point for further observations in Central Europe. The HAV epidemiological situation is unlikely to escalate in Poland but requires further monitoring.

Mele, A, L Ferrigno, L Romanò, V Alfonsi, F D'Angelo, S Crateri and ME Tosti (2021). [An update on the epidemiology of hepatitis A in Italy 2015-2019. Data from the surveillance of acute viral hepatitis SEIEVA.](#) *Epidemiol Prev* 45(3): 173-180.

BACKGROUND: hepatitis A is an infective disease whose global diffusion appears to be variable and strictly related to socioeconomic status, hygiene conditions, and access to potable water. During last twenty years, Italy registered a constant decrease of new cases with recurrent epidemic outbreaks. OBJECTIVES: to outline the hepatitis A epidemiological situation in Italy in the five-year period 2015-2019. DESIGN: descriptive study based on cases reported to the National Surveillance System for Acute Viral Hepatitis (SEIEVA). SETTING AND PARTICIPANTS: hepatitis A cases reported to SEIEVA from 2015 to 2019. MAIN OUTCOME MEASURES: hepatitis A incidence, percentages of cases exposed to known risk factors, distribution of cases by vaccination status. RESULTS: during the whole observational period, SEIEVA registered 4,929 type A hepatitis cases. The epidemic curve initially showed a trend with a low incidence level interrupted in August 2016 with the onset of a large epidemic, in the period between August 2016 and December 2017, involving 3,428 cases mostly adult men exposed to homosexual intercourses (MSM). Since January 2018, the trend of the cases has been decreasing even though its level is still higher than the pre-epidemic period. Based on the analysis of the epidemic curve, three periods characterized by different trends in the monthly number of notified cases were identified: January 2015-July 2016 (pre-epidemic period), August 2016-December 2017 (epidemic period), January 2018-December 2019 (post-epidemic period). In the last observation period, cases show different characteristics compared to the previous periods. They are mainly males under 18 years ($p=0.026$), subjects travelling to Morocco (8.9% vs 15.9%; $p<0.001$) or being in contact with an infected person ($p<0.001$). The multivariate analysis confirmed a significantly higher probability for cases notified in the post-epidemic period, compared to the pre-epidemic, to be secondary cases or to have traveled to

Morocco. Compared to the pre-epidemic period and the epidemic period, there was a higher percentage of subjects who received a single dose of anti-hepatitis A vaccine ($p=0.001$). Taking into account only secondary cases reported in the third period, the percentage of cases with incomplete vaccination rises to 31%; in this group, a single dose of the vaccine was administered at a median of 11.5 days before the onset of symptoms. CONCLUSIONS: vaccination is of paramount importance for the prevention of hepatitis A in all risk groups, including adult males exposed to same-sex sexual intercourse and travelers to areas at high-medium endemic level, especially children, as the timeliness in the vaccination of contacts is fundamental and crucial for interrupting the chains of infection. The observed increase in secondary cases and the delay in the administration of doses lead to a reflection on the need for greater promotion of vaccination, but also highlight the critical issues in the organization of vaccination services, mainly in the areas that have reported the greatest number of cases.

Dudareva, S, M Faber, R Zimmermann, CT Bock, R Offergeld, G Steffen and J Enkelmann (2022). [Epidemiology of viral hepatitis A to E in Germany. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 65\(2\): 149-158.](#)

Viral hepatitis A to E describes various infectious inflammations of the liver parenchyma that are caused by the hepatitis viruses A to E (HAV, HBV, HCV, HDV, and HEV). Although the clinical pictures are similar, the pathogens belong to different virus families and differ in terms of pathogenesis, transmission routes, clinical course, prevention, and therapy options. In Germany, there is mandatory reporting according to the Infection Protection Act (IfSG) for direct or indirect laboratory evidence and for suspicion, illness, and death of viral hepatitis. The data are transmitted to the Robert Koch Institute. In this article, on the basis of published studies and notification data, we describe the epidemiology of hepatitis A to E as well as current challenges and prevention approaches. In particular, the latter contains the improvement of existing vaccination recommendations (hepatitis A and B); improvement of access to prevention, testing, and care including therapy with antiviral drugs (hepatitis B, C, and D) and the detection and prevention of foodborne infections and outbreaks; and improvements in the field of food safety (hepatitis A and E).

Medić, S, C Anastassopoulou, T Pustahija, V Petrović, N Dragnić, F Boufidou, A Tsakris and V Šaponjić (2023). [Epidemiological Transition and Strategies for the Control of Hepatitis A in Serbia. Viruses 15\(3\).](#)

BACKGROUND: Improvements in socioeconomic and hygienic conditions during the past decades led to declining hepatitis A (HA) seroprevalence in many countries. Aiming at informing HA vaccination policy, we assessed current epidemiological trends in Serbia by analyzing surveillance data for 2002-2021. METHODS: Data on cases and outbreaks were obtained from the Serbian national surveillance database and descriptively analyzed. HA incidence was calculated in relation to time, patients' residence, and demographics. RESULTS: Overall, 13,679 HA cases and 419 outbreaks were recorded with the highest incidence in the southeast. Downward HA trends were observed, while infant mortality was halved, and gross domestic product based on purchasing power parity (GDP PP) per capita, tripled. The average incidence dropped from 14.8 (95% CI 14.4-15.2)/100,000 in 2002-2006 to 1 (95% CI 0.9-1.1)/100,000 in 2017-2021, while the number of outbreaks decreased (from 174 to 14). Sporadic cases and family clusters living in poor sanitary conditions occurred in recent years. The contact route of transmission was dominant (410/419, 97.9%). The highest average age-specific HA incidence shifted from 5-9 years in 2002-2006 to 10-19 years in 2017-2021. Serbia is transitioning towards very low HA endemicity. Enhanced surveillance and vaccination of high-risk groups are recommended as future public health priorities.

Guerrero-Vadillo, M, M Peñuelas, Á Domínguez, P Godoy, D Gómez-Barroso, N Soldevila, C Izquierdo, A Martínez, N Torner, A Avellón, C Rius and C Varela (2022). [Epidemiological Characteristics and Spatio-Temporal Distribution of Hepatitis A in Spain in the Context of the 2016/2017 European Outbreak. Int J Environ Res Public Health 19\(24\).](#)

The aim of our study was to describe the results of the epidemiological surveillance of hepatitis A infections in Spain in the context of the 2016/2017 European outbreak, particularly of hepatitis A outbreaks reported in the MSM population, incorporating the results of a spatio-temporal analysis of cases. Hepatitis A cases and outbreaks reported in 2016-2017 to the National Epidemiological Surveillance Network were reviewed: outbreaks in which some of the cases belonged to the MSM group were described, and clusters of hepatitis A cases in men and women were analysed using a space-time scan statistic. Twenty-six outbreaks were identified, with a median size of two cases per outbreak, with most of the outbreak-related cases belonging to the 15-44 years-old group. Nearly 85% occurred in a household setting, and in all outbreaks, the mode of transmission was direct person-to-person contact. Regarding space-time analysis, twenty statistically significant clusters were identified in the male population and eight in the female population; clusters in men presented a higher number of observed cases and affected municipalities, as well as a higher percentage of municipalities classified as large urban areas. The elevated number of cases detected in clusters of men indicates that the number of MSM-related outbreaks may be higher than reported, showing that spatio-temporal analysis is a complementary, useful tool which may improve the detection of outbreaks in settings where epidemiological investigation may be more challenging.

Mellou, K, A Chrysostomou, T Sideroglou, M Kyritsi, T Georgakopoulou, S Tsiodras and C Hadjichristodoulou (2020). [Epidemiology of hepatitis A in Greece in the last decade: management of reported cases and outbreaks and lessons learned. Epidemiol Infect 148: e58.](#)

Bardón De Tena, P, ST Tapia Paniagua, JA Vico Sevilla, E Clavijo, E Martínez Manzanares and CM Gonzalez-Domenech (2023). [Unusual Surge of Acute Hepatitis A Cases in 2016 and 2017 in Malaga, Southern Spain: Characterization and Relationship with Other Concurrent European Outbreaks. J Clin Med 12\(20\).](#)

We aimed to describe the Hepatitis A virus (HAV) cases that arose in Malaga (Spain) in 2016 and 2017 when the European Centre for Disease Prevention and Control (ECDC) reported several outbreaks among men who have sex with men (MSM). Therefore, we conducted a retrospective study gathering demographic, clinical, and immunological data from the acute HAV patients attending our hospital between March 2016 and December 2017. Additionally, VP1/P2A region was amplified from serum samples, sequenced, and genotyped. We finally performed a phylogenetic analysis, including the HAV strains from the other European outbreaks. A total of 184 HAV cases were reported, with the highest number in March 2017. The cohort mostly comprised Spaniards (81.0%), males (84.8%), and MSM (72.3%), with a median age of 33.0 years (interquartile range (IQR) = 25.0-43.0). Most patients exhibited symptoms. In addition, a successful amplification and sequencing of the VP1/P2A region was performed in 25 out of 106 serum samples (23.6%). All the sequences belonged to the genotype IA, and 20 were phylogenetically related to VRD_521_2016, first described in the United Kingdom (UK). In

conclusion, HAV cases emerged in Malaga in 2016 and 2017, showing an epidemic character phylogenetically related to the predominant strain first detected in the UK. Characteristics of the cohort were similar to those from the European outbreaks.

Martínez Lozano, H, A Conthe Alonso and R Bañares (2020). [A new pattern in hepatitis A virus infection in an urban population](#). *Rev Esp Enferm Dig* 112(3): 178-182.

Fortea, JI, M Fernandez González, L Samaniego Vega, Á Puente, A Cuadrado, J Cabezas, S Llerena, A Sáez López, J Crespo and E Fábrega (2020). [Epidemiology and clinical course of hepatitis A in Cantabria before and after the epidemic outbreak of June 2016](#). *Rev Clin Esp (Barc)* 220(7): 400-408.

Suárez Gaiche, N, MJ Purriños-Hermida and A Pousa Ortega (2020). [Hepatitis A outbreak in Galicia during 2016-2018](#). *Rev Esp Salud Publica* 94.

Dimitriou, P, GK Nikolopoulos, M Koliou, E Constantinou, C Azina, M Panayiotou and E Christaki (2020). [An Outbreak of Hepatitis A among Young Adult Men in Cyprus](#). *Pathogens* 9(11).

Cieśla, A, M Bociąga-Jasik, J Sieklucki and R Pleśniak (2020). [Epidemiological investigation on hepatitis A virus infection outbreak in the area of Rzeszow city during the years 2017/18](#). *Clin Exp Hepatol* 6(4): 321-326.

Savicka, O, D Dusacka, R Zeltmatis, S Nikisins, I Azina, L Ivancenko, I Tolmane and B Rozentale (2023). [Hepatitis A virus subgenotypes in Latvia, 2008-2021](#). *J Infect Public Health* 16(9): 1462-1470.

BACKGROUND: In Latvia outbreaks of the HAV were observed between 2008 and early 2010 and again in 2017-2018. However, the risks of introducing and spreading infection still exist, as the virus spreads easily when personal hygiene is not followed. METHODS: To determine the spread of HAV subgenotypes in the territory of Latvia the VP1/P2A genomic region of HAV was amplified and sequenced for 259 case serum samples. The study carried out a molecular biological investigation and molecular epidemiological investigation. Demographic data (sex, age), disease data (hepatitis symptoms, hospitalization, vaccination) and epidemiology data (part of the outbreak, possible source of infection, recent travel) were collected. Based on the obtained sequences, the phylogenetic tree was built and analyzed for the homology and belonging to different isolated HAV clusters from other countries. RESULTS: From the obtained data, it was concluded that HAV subgenotype IA had 13 clusters and 12 sporadic cases, HAV subgenotype IB had eight clusters and 11 sporadic cases, HAV subgenotype IIIA had one cluster and nine sporadic cases. It was found that the sources of infection among the investigated cases were different, they were mostly associated with contact with a patient with HAV, travel, as well as between persons who inject drugs and men who have sex with men, and the prevalence of HAV similar sequences was observed in different years. It was concluded that patients with HAV subgenotype IA had the longest hospitalization duration and averaged 9.3 days, while patients with subgenotype IB - 7.3 days, subgenotype IIIA - 7.7 days. Analyzing the data on vaccination, it was found that mostly all were not vaccinated or had an unknown vaccination status. CONCLUSIONS: All of this has led to the conclusion that the application of molecular biological methods of the HAV and a careful analysis of epidemiological data can help to better understand the ways of spreading the infection, investigate local outbreaks, detect cases of imported infection and track the recirculation of the virus.

Savicka, O, R Zeltmatis and J Storozenko (2022). [Molecular epidemiology of hepatitis A outbreaks and sporadic cases, Latvia, 2017 to 2019](#). *Euro Surveill* 27(11).

Background: Hepatitis A is an acute infection of the liver caused by hepatitis A virus (HAV). Molecular detection and typing of the HAV VP1/P2A genomic region is used for genotyping and outbreak investigations. After a large hepatitis A outbreak in Latvia in 2007-08, only sporadic cases were registered until 2017 when a rise in cases occurred. During 2017-19, 179 laboratory-confirmed hepatitis A cases were notified in Latvia. Aim: To investigate the observed increase in hepatitis A cases during 2017 and to determine whether these cases were linked to one another, to risk groups, or to other outbreaks. The majority of HAV samples (69.8%) were typed. Methods: The VP1/P2A genomic region of HAV was amplified and sequenced for 125 case serum samples. Information about hepatitis-related symptoms, hospitalisation, vaccination, a possible source of infection and suspected countries of origin of the virus were analysed for sequenced cases. Results: Most HAV strains were subgenotype IA (n = 77), of which 41 were strains circulating among men who have sex with men (MSM) populations in Europe (VRD_521_2016 (n = 32), RIVM-HAV16-090 (n = 7) or V16-25801 (n = 2)). Forty-four cases were subgenotype IB and four cases subgenotype IIIA. However, other clusters and sporadic cases were detected with or without identifying the epidemiological link. Conclusion: This work represents molecular epidemiological data of hepatitis A cases in Latvia from 2017 to 2019. Molecular typing methods allow identification of clusters for public health needs and establishing links with other outbreaks, and to compare Latvian strains with reported strains from other countries.

Reuter, G, Á Boros and P Pankovics (2023). [Molecular epidemiology and characterization of endemic, epidemic and imported hepatitis A virus \(HAV\) strains in Hungary \(2003-2022\)](#). *Acta Microbiol Immunol Hung* 70(3): 246-251.

Hepatitis A virus (HAV) is one of the most important etiological agents of acute viral hepatitis but comprehensive molecular epidemiological study with chrono-phylogeographical data are not available from Hungary. Between 2003 and 2022, a total of 8,307 HAV infections were registered officially in Hungary of which 400 (4.8%) HAV IgM antibody-positive serum samples were collected countrywide. HAV genomic RNA was successfully detected in 216/400 (54%) sera by RT-PCR subsequently confirmed by sequencing. The complete nucleotide sequences of VP1 region were determined in 32 representative HAV strains. Based on the sequence analysis, 150 (69.4%) strains were characterized as HAV sub-genotype IA and 66 (30.6%) as sub-genotype IB, respectively. Based on the combined epidemiological and molecular data, epidemic, endemic, and imported HAV strains were also characterized. The first two registered countrywide outbreaks started among men-sex-with men (MSM) in 2011 (sub-genotype IA) and 2021 (sub-genotype IB), the continuously circulating endemic/domestic HAV strain (sub-genotype IA) in East Hungary and the travel-related sub-genotype IB strains from Egypt should be highlighted. All HAV strains are deposited in the HAVNET database (<https://www.rivm.nl/en/havnet>). In this 20-year-long comprehensive molecular epidemiological study, we report the genetic characterization and geographic distribution of endemic, epidemic and imported HAV strains for the first time in Hungary with continuous co-circulation of sub-genotypes IA and IB HAV strains

since 2003. These data provide basic information about the HAV situation in the country in an international context and can promote more effective national public health intervention strategies for the prevention of HAV transmissions and infections.

HAV emerging challenges

AGENDA REFERENCE European Centre for Disease Prevention and Control (2025). [Rapid Risk Assessment: Multi-country outbreak of hepatitis A in the EU/EEA \(June 2025\)](#). Stockholm: ECDC.

Why it matters: Agenda reference for 'HAV emerging challenges'. The draft cited only the ECDC news item; the full risk assessment is added here. It covers the increase in Austria, Czechia, Hungary and Slovakia in early 2025, mainly among people experiencing homelessness, people who use or inject drugs and people living in poor sanitary conditions, with cases among Roma communities in Czechia and Slovakia, and sets out recommended actions.

AGENDA REFERENCE Samarasekera, U (2025). [Hepatitis A outbreak in Europe](#). *Lancet Microbe*: 101213.

AGENDA REFERENCE Holt, E (2025). [Hepatitis A outbreak in the Czech Republic](#). *Lancet Infect Dis*.

Paun, A, I Ianache, R Moroti, G Pomohaci, G Tardei, M Youle, S Ruta and C Oprea (2026). [Beyond Foodborne HAV: Sexual Transmission Drives a New Wave of Cases in Romania](#). *Viruses* 18(2).

Background: In 2022, Romania experienced a sharp increase in hepatitis A virus (HAV) infections, with evidence of predominant fecal-oral transmission through sexual contact, raising concern for an outbreak among men who have sex with men (MSM). Methods: We conducted a prospective multicenter study between 1 March 2022 and 1 March 2023 in two tertiary hospitals in Bucharest. HAV infection was defined by a compatible clinical presentation, elevated liver enzymes, and positive anti-HAV IgM serology. Clinical and laboratory characteristics were compared by transmission route and HIV status. Results: A total of 191 patients were diagnosed with HAV, including 105 MSM and 86 with foodborne transmission. All were unvaccinated. Most patients were male (82.2%), with a median age of 30 years (IQR 24-38). MSM were significantly younger and reported higher-risk sexual behaviors, including chemsex and multiple or occasional partners ($p < 0.0001$). Among MSM, 48 (25.1%) were living with HIV, most with preserved immune status and undetectable viral loads. Clinical manifestations were similar across groups, with jaundice being most frequent (89.5%). However, MSM exhibited more severe hepatocellular injury, reflected by higher ASAT and ALAT levels and lower prothrombin concentration, independent of HIV status. MSM were also more likely to have concomitant sexually transmitted infections, including syphilis and mpox ($p < 0.001$). Disease was predominantly mild, although MSM had longer hospital stays. Conclusions: The 2022 HAV surge in Romania was driven by both sexual and foodborne transmission. Targeted HAV vaccination, along with integrated sexual health services and harm-reduction strategies, is essential to prevent future outbreaks.

Neagu, G, V Molagic, SN Benea, I Ianache, E Militaru, I Nedelcu, G Maxim, GA Dumitru, C Oprea and R Moroti (2025).

[Particularities of the Post-Pandemic Hepatitis A Outbreak in a Tertiary Infectious Diseases Hospital in Romania](#). *J Clin Med* 14(12).

Background/Objectives: In addition to classical transmission routes, hepatitis A (HA) outbreaks were, for the first time, linked to sexual activity in the late 1970s, particularly among men who have sex with men (MSM). Since then, outbreaks have continued to emerge globally among adults engaging in high-risk sexual behaviors, reinforcing the ongoing public health significance of this transmission route. Although the COVID-19 pandemic temporarily reduced HA cases, outbreaks reemerged following the relaxation of pandemic measures. This study aims to report the HA outbreak registered at Romania's tertiary infectious diseases hospital during the first half of 2022. Methods: We retrospectively analyzed all HA cases admitted to the National Institute for Infectious Diseases from 1 January to 1 August 2022. Results: Among 51 cases, eight children (under 14) were excluded from further analyses. Of the 43 remaining cases, 37 (86%) were male, with 20/37 (54.05%) identified as MSM. Twenty-two of the males (59.45%) were previously or concomitantly diagnosed with sexually transmitted diseases (STDs), notably syphilis and HIV. A marginal finding: 14 out of 29 patients screened for hepatitis E tested positive for IgM. The MSM patients exhibited significantly higher transaminase levels (ALT median level 3404 U/L IQR 2608-5448 vs. 2066 U/L IQR 1393-3682) and more severe liver impairment (INR median level 1.37 IQR 1.18-1.78 vs. 1.18 IQR 1.11-1.43 compared to non-MSM patients). While direct bilirubin levels were higher in MSM (7.4 mg/dL vs. 5.5 mg/dL), the difference was not statistically significant. Conclusions: An HA outbreak occurred at the beginning of 2022 among Romanian young MSM, with a more severe acute liver injury. High-risk sexual practices may be a potential risk factor for severe HA. This emphasizes the need to screen for STDs in young males with HA and review vaccination policies for at-risk individuals.

Bauer, D, A Farthofer, D Chromy, B Simbrunner, L Steininger, et al. (2021). [Recent outbreaks of severe hepatitis A virus infections in Vienna](#). *Eur J Clin Microbiol Infect Dis* 40(2): 335-344.

To explore the epidemiology and clinical course of hepatitis A virus (HAV) infections at the Vienna General Hospital. We retrospectively identified patients who were tested positive for HAV-IgM at the Vienna General Hospital from Q1/2008 to Q3/2018. Our definition of severe HAV infection was AST and/or ALT $> 5 \times$ above the upper limit of normal (ULN); and liver dysfunction as (i) hepatic encephalopathy or ammonia $> 100 \mu\text{mol/L}$, (ii) coagulopathy with INR > 1.5 , or (iii) jaundice with bilirubin $> 5 \text{ mg/dL}$. A total of 578 HAV-IgM (+) were identified, including 31 (5.4%) and 38 (6.6%) without and with liver dysfunction, respectively. A proportional increase in severe HAV cases with and without liver dysfunction occurred in 2016/2017 with (21.5% vs. 8.0% in the years before; $p < 0.001$). Thirty-seven (53.6%) patients with severe HAV were hospitalized, 6 (9%) required ICU support, and one patient received liver transplantation within 30 days. Patients with severe HAV and liver dysfunction were more often male (60.5 vs. 43.1%, $p = 0.055$) and younger (31.5 vs. 63 years, $p < 0.001$) as compared with other HAV-IgM (+) cases. The observed increase of severe HAV infections in Vienna in 2017 among young males, coincided with a multinational HAV outbreak among MSM. Our data suggests a higher likelihood of severe courses of hepatitis A in MSM. Vaccination against HAV should be recommended for risk groups.

Kelly, D, C O'Hare, P McKeown, F Cianci and S Doyle (2022). [Detection and control of an ongoing international outbreak of hepatitis A among the Irish Traveller community beginning September 2020](#). *Epidemiol Infect* 150: 1-13.

Hepatitis A virus (HAV) infection is a notifiable disease in Ireland, with national coverage of clinical and laboratory surveillance. In December 2020, a cluster of 11 HAV cases among the Irish Traveller community was detected. The outbreak investigation identified 61 total HAV cases from September 2020 to November 2021. Sequenced isolates were sub-genotype IA with identical genome sequence. Case-patients were predominantly aged under 18 (77%), hospitalised (46%) and lived on communal residential sites. Mass onsite HAV vaccination was employed following failure of initial ring vaccination to contain the outbreak. This is the largest outbreak of HAV described in Ireland, involving spillover to the UK and Netherlands. We recommend mass HAV vaccination and tailored communication for outbreak control in migratory subpopulations.

Krumbholz, A, A Marcic, M Valentin, M Schemmerer and JJ Wenzel (2023). [Hepatitis A outbreak in a refugee shelter in Kiel, northern Germany](#). *J Med Virol* 95(11): e29185.

In the spring of 2023, three Ukrainian war refugees from a municipal community shelter and a volunteer caregiver at an affiliated daycare center in Kiel, Germany, were diagnosed with infectious jaundice attributable to a single hepatitis A virus (HAV) subgenotype IA strain. Similar HAV sequences have been observed in Germany and other European countries for several years. One refugee and the volunteer required hospitalization. Four children were asymptotically infected but excreted high levels of HAV ribonucleic acid in the stool. The infections were probably acquired in Germany, but a source could not be determined. The outbreak was contained through vaccination, increased hygiene, and education. The existing HAV vaccination recommendation for refugee shelter staff and volunteers should be consistently implemented.

Mellou, K, T Chrisostomou, T Sideroglou, T Georgakopoulou, et al. (2017). [Hepatitis A among refugees, asylum seekers and migrants living in hosting facilities, Greece, April to December 2016](#). *Euro Surveill* 22(4): 30448.

Addresses the migration dimension of meeting objective 2, which the draft covered only indirectly. It describes HAV in refugee and migrant hosting facilities and the public health response.

Garcia Vilaplana, T, D Leeman, K Balogun, SL Ngui, E Phipps, WM Khan and S Balasegaram (2021). [Hepatitis A outbreak associated with consumption of dates, England and Wales, January 2021 to April 2021](#). *Euro Surveill* 26(20).

We report a national hepatitis A virus (HAV) outbreak linked to the consumption of Medjool dates. Twenty-nine cases of three genetically related sequences have been identified. Epidemiological investigations identified a suspected product (adjusted odds ratio: 47.36; 95% confidence interval: 1.79-1,256.07; $p = 0.021$). Microbiological testing has confirmed the presence of HAV on dates recovered from two cases and the product has been recalled. Date consumption is currently likely to be increased in connection with Ramadan, with potential ongoing contamination risk.

Ruscher, C, M Faber, D Werber, K Stark, J Bitzegeio, K Michaelis, D Sagebiel, JJ Wenzel and J Enkelmann (2020). [Resurgence of an international hepatitis A outbreak linked to imported frozen strawberries, Germany, 2018 to 2020](#). *Euro Surveill* 25(37).

McClure, M, M Kirchner, T Greenlee, et al. (2025). [Investigation of Two Outbreaks of Hepatitis A Virus Infections Linked to Fresh and Frozen Strawberries Imported from Mexico - 2022-2023](#). *J Food Prot* 88(6): 100505.

Foodborne hepatitis A illnesses and outbreaks have been associated with the consumption of ready-to-eat foods contaminated with the feces of person(s) shedding hepatitis A virus (HAV). Outbreaks have been linked to fresh and frozen produce imported from countries where HAV is endemic, hygiene and sanitation are inadequate, or food safety standards are lacking or unenforced. In 2022 and 2023, federal, state, and international partners investigated two multijurisdictional outbreaks of infections involving the same HAV genotype IA strain linked to fresh and frozen organic strawberries sourced from a single grower in Baja California, Mexico. These resulted in 39 reported cases in the U.S. and Canada, 21 hospitalizations, and no reported deaths. The United States Food and Drug Administration (FDA), Canadian Food Inspection Agency, and U.S. state partners conducted traceback investigations for fresh strawberries in 2022, while FDA and U.S. state partners traced back frozen strawberries in 2023. Based on the traceback investigations, implicated strawberries were harvested during the 2022 growing season and sold to fresh and frozen berry markets. During a farm inspection in Mexico in 2023, gaps were observed in agricultural practices that could have contributed to the contamination of strawberries with HAV. FDA did not detect HAV in the two frozen strawberry samples linked to the recalled lots or environmental water samples collected at the implicated grower in 2023; no samples were collected during the 2022 investigation. Indicator organisms associated with human fecal contamination (male-specific coliphage and crAssphg) were detected in environmental water. Challenges in these investigations included limited recall of food exposures, exposures associated with multiple purchase dates, commingling of strawberries within the frozen market supply chains, and complexities with communicating these outbreak investigations to the public.

McClure, M, J Nsubuga, MP Montgomery, E Jenkins, A Crosby, et al. (2022). [A 2019 Outbreak Investigation of Hepatitis A Virus Infections in the United States Linked to Imported Fresh Blackberries](#). *Food Environ Virol* 14(3): 236-245.

Globally, hepatitis A virus (HAV) is one of the most common agents of acute viral hepatitis and causes approximately 1.4 million cases and 90,000 deaths annually despite the existence of an effective vaccine. In 2019, federal, state, and local partners investigated a multi-state outbreak of HAV infections linked to fresh blackberries sourced from multiple suppliers in Michoacán, Mexico. A total of 20 individuals with outbreak-related HAV infection were reported in seven states, including 11 hospitalizations, and no deaths. The Food and Drug Administration (FDA), the Centers for Disease Control and Prevention (CDC), and Nebraska State and Douglas County Health Departments conducted a traceback investigation for fresh blackberries reportedly purchased by 16 ill persons. These individuals reported purchasing fresh blackberries from 11 points of service from September 16 through 29, 2019 and their clinical isolates assessed through next-generation sequencing and phylogenetic analysis were genetically similar. The traceback investigation did not reveal convergence on a common grower or packing house within Mexico, but all of the blackberries were harvested from growers in Michoacán, Mexico. FDA did not detect the pathogen after analyzing fresh blackberry samples from four distributors, one consumer, and from nine importers at the port of entry as a result of increased screening. Challenges included gaps in traceability practices and the

inability to recover the pathogen from sample testing, which prohibited investigators from determining the source of the implicated blackberries. This multi-state outbreak illustrated the importance of food safety practices for fresh produce that may contribute to foodborne illness outbreaks.

O'Neill, C, N Franklin, A Edwards, T Martin, J O'Keefe, K Jackson, N Pingault and K Glasgow (2022). [Hepatitis A outbreak in Australia linked to imported Medjool dates, June-September 2021](#). *Commun Dis Intell* (2018) 46.

Imported, minimally processed food products have been historically associated with several hepatitis A outbreaks in Australia. Here, we report the first known hepatitis A outbreak in Australia linked to consumption of imported fresh Medjool dates. Between June and September 2021, six genetically identical hepatitis A cases were notified in New South Wales and the Australian Capital Territory. All cases reported date consumption during their exposure period. The implicated dates were positive for hepatitis A virus (HAV) by reverse transcription polymerase chain reaction. Rapid detection of this outbreak and the swift implementation of control measures was facilitated by two key factors. Firstly, Australian international border closures implemented in response to the COVID-19 pandemic meant that a common locally-acquired, as opposed to travel-acquired, source for cases was strongly suspected. Secondly, prompt awareness of a hepatitis A outbreak in the United Kingdom (which was found to be associated with date consumption) allowed for early hypothesis generation and investigation. This paper details the epidemiological and microbiological factors involved in this outbreak investigation and the actions taken to mitigate public health risk.

Dencs, Á, A Hettmann, E Barcsay, E Rusvai, E Kozma and M Takács (2024). [Hepatitis A virus subtype IB outbreak among MSM in Hungary with a link to a frozen berry source](#). *Infect Genet Evol* 123: 105622.

Men who have sex with men (MSM) are at high risk of acquiring hepatitis A virus (HAV) and in recent years several HAV outbreaks mostly affecting MSM have been described. These outbreaks were caused by subtype IA strains circulating in this high-risk population. After years of low incidence, an outbreak among MSM in Hungary caused a significant increase in reported HAV infections in 2022. Samples from 224 HAV IgM-positive patients diagnosed in 2022 were tested for HAV RNA and positive samples were genotyped by sequencing. In 171 patients a unique subtype IB virus was detected with 99.8-100% sequence identity in the VP1/P2A junction. It was distinct from previously published strains, but most closely related to an Egyptian isolate. Sequence analysis revealed one dominant and three minor variants based on VP1/P2A. Whole genome sequencing revealed limited variation among these variants, suggesting a recent common origin. Epidemiological data indicated that sexual transmission was driving the outbreak for most of the year, suggested by the high male to female ratio and the large number of coinfections with HIV and other sexually transmitted infections among the patients. The outbreak was also associated with a restaurant cluster, in which one of the variants was detected and frozen berries were implicated as the source of infections. The outbreak strain was also detected in other countries around Europe and remained frequently detectable in Hungary in 2023. This study provides insights into the molecular and epidemiological characteristics of the described HAV outbreak. The results show that sequencing is not only useful in connecting cases to an outbreak, but also helps to clarify the relatedness of detected variants. Prevention strategies focusing on vulnerable communities may reduce the burden of HAV infections in the future.

Fokas, R, Z Anastopoulou, KA Koukouvini, ME Dimitrakopoulou, Z Kotsiri, E Chorti-Tripsa, C Kotsalou, D Tzimotoudis and A Vantarakis (2025). [Long-Term Surveillance of Food Products of Diverse Origins: A Five-Year Survey of Hepatitis A and Norovirus in Greece, 2019-2024](#). *Pathogens* 14(2).

This study examines at the prevalence and spread of Hepatitis A Virus (HAV) and norovirus GI/GII in local and imported food products in Greece over a five-year period (2019-2024). A total of two hundred sixty-six food samples were evaluated using obligatory inspections and virus detection procedures, including 202 for Hepatitis A and 64 for Norovirus. High-risk categories analyzed were vegetables 138 (HAV), 17 (NoV), fruits 16 (HAV), 7 (NoV), soft fruits/berries 37 (HAV), 31 (NoV), processed meals 4 (HAV), 4 (NoV), and animal-based products 1 (HAV), 5 (NoV). Viral RNA was isolated using QIAamp Viral RNA Mini Kit and detected using established RT-qPCR procedures that met ISO requirements for high sensitivity and reproducibility. The results demonstrated HAV contamination mostly in vegetables (4.35% positive rate), with sporadic findings in other categories. Norovirus GI/GII was detected primarily in soft fruits/berries, with a category-specific positive rate of 6.45%. A temporal study revealed that HAV peaks in 2020, while Norovirus contaminations were detected in 2021 and 2024. The findings highlight the important need to incorporate viral testing into routine food safety procedures, especially for high-risk product categories. This study establishes a basic framework for public health initiatives that address gaps in foodborne virus surveillance in Greece. The study's ramifications extend to global efforts to monitor and reduce foodborne virus contamination, pushing for higher regulatory requirements and targeted preventative actions.

Hu, X, MG Collier and F Xu (2020). [Hepatitis A Outbreaks in Developed Countries: Detection, Control, and Prevention](#). *Foodborne Pathog Dis* 17(3): 166-171.

The incidence of hepatitis A virus (HAV) infection has been low in developed countries for decades; however, many adults in these countries are susceptible to HAV infection. In recent years, the global trade of food products originating from HAV-endemic countries resulted in HAV outbreaks associated with imported foods in developed countries. This article aims to review the characteristics of selected HAV outbreaks associated with imported food in developed countries during 2012-2018, and discusses improvements in global public health capabilities and new tools for effective detection, control, and prevention of HAV outbreaks.

Nemes, K, S Persson and M Simonsson (2023). [Hepatitis A Virus and Hepatitis E Virus as Food- and Waterborne Pathogens- Transmission Routes and Methods for Detection in Food](#). *Viruses* 15(8).

Foodborne viruses are an important threat to food safety and public health. Globally, there are approximately 5 million cases of acute viral hepatitis due to hepatitis A virus (HAV) and hepatitis E virus (HEV) every year. HAV is responsible for numerous food-related viral outbreaks worldwide, while HEV is an emerging pathogen with a global health burden. The reported HEV cases in Europe have increased tenfold in the last 20 years due to its zoonotic transmission through the consumption of infected meat or meat products. HEV is considered the most common cause of acute viral hepatitis worldwide currently. This review focuses on the latest findings on the foodborne transmission routes of HAV and HEV and the methods for their detection in different food matrices.

Bozkurt, H, KY Phan-Thien, F van Ogtrop, T Bell and R McConchie (2021). [Outbreaks, occurrence, and control of norovirus and hepatitis A virus contamination in berries: A review](#). *Crit Rev Food Sci Nutr* 61(1): 116-138.

Foodborne enteric viruses, in particular HuNoV and HAV, are the most common cause of the berry-linked viral diseases, and outbreaks around the world, and have become an important concern for health authorities. Despite the increased importance of berry fruits as a vehicle for foodborne viruses, there is limited information concerning the fate of foodborne viruses in the berry supply chain from farm to consumer. A comprehensive understanding of berry-associated viral outbreaks - with a focus on contamination sources, persistence, survival, and the effects of current postharvest and processing interventions and practices - is essential for the development of effective preventative strategies to reduce risk of illness. The purpose of this paper is twofold; (i) to critically review the published literature on the current state of knowledge regarding berry-associated foodborne viral outbreaks and the efficiency of berry processing practices and (ii) to identify and prioritize research gaps regarding practical and effective mechanism to reduce viral contamination of berries. The review found that fecally infected food handlers were the predominant source of preharvest and postharvest pathogenic viral contamination. Current industrial practices applied to fresh and frozen berries demonstrated limited efficacy for reducing the viral load. While maintaining best practice personal and environmental hygiene is a key intervention, the optimization of processing parameters (i.e., freezing, frozen storage, and washing) and/or development of alternative processing technologies to induce sufficient viral inactivation in berries along with retaining sensory and nutritional quality, is also an important direction for further research.

Balogun, O, A Brown, KM Angelo, NS Hochberg, ED Barnett, et al. (2022). [Acute hepatitis A in international travellers: a GeoSentinel analysis, 2008-2020](#). *J Travel Med* 29(2).

BACKGROUND: Non-immune international travellers are at risk of acquiring hepatitis A. Although hepatitis A vaccination is recommended for unvaccinated travellers to high or intermediate hepatitis A virus endemicity, compliance with this recommendation is not universal. The main objective was to describe the demographic and travel characteristics of international travellers infected with hepatitis A during travel. METHODS: Available data on travellers with confirmed (positive molecular test) or probable (symptomatic individuals with a single positive IgM test) hepatitis A diagnosed during and after travel from January 2008 to December 2020 were obtained from the GeoSentinel Surveillance Network database. We analysed demographic and travel characteristics of infected travellers. RESULTS: Among 254 travellers with hepatitis A (185 confirmed and 69 probable), the median age was 28 years (interquartile range: 19-40), 150 (59%) were male, and among 54 travellers with information available, 53 (98%) were unvaccinated. The most common reasons for travel included tourism (n = 120; 47%) and visiting friends or relatives (VFR; n = 72; 28%). About two-thirds of VFR travellers with hepatitis A (n = 50; 69%) were younger than 20 years old. Hepatitis A was acquired most frequently in South-Central Asia (n = 63; 25%) and sub-Saharan Africa (n = 61; 24%), but 16 travellers (6%) acquired hepatitis A in regions with low endemicity including Western Europe (n = 7; 3%), the Caribbean (n = 6; 2%) and North America (n = 3; 1%). Median duration from illness onset to GeoSentinel site presentation was ~7 days (interquartile range : 4-14 days). Among 88 travellers with information available, 59% were hospitalized. CONCLUSIONS: Despite availability of highly effective vaccines, travellers still acquire hepatitis A, even when traveling to low-endemicity destinations. Providing pre-departure hepatitis A vaccine to susceptible travellers is crucial to reducing travel-associated hepatitis A and should be offered to all travellers as part of the pre-travel consultation, regardless of destination.

Varoqui, C and F Thollot (2025). [Traveling children: Current situation and compliance with hepatitis A vaccination recommendations](#). *Arch Pediatr* 32(6): 363-367.

CONTEXT: Vaccination of traveling children does not seem to be the primary concern for families when preparing for a trip abroad. Few data concerning the hepatitis A vaccine are available in minors traveling outside France. OBJECTIVES: The present study aimed to assess whether the vaccination recommendation against hepatitis A was followed in the population of children traveling outside of France. The secondary objectives were to explore the reasons for non-compliance with vaccination recommendations and assess the frequency of minors travelling abroad in the study settings. POPULATION AND METHODS: This was a monocentric observational study conducted within a pediatric practice located in the Nancy metropolitan area through the distribution of a questionnaire upon arrival in the waiting room. Inclusion criteria were: age between 1 and 18 years, regular pediatric follow-up within the practice, and absence of language barriers. RESULTS: 477 questionnaires were included, evaluating the proportion of traveling children (outside of France) at 59 % of our population (n = 282). The leading destination remained Western Europe (36 %), but 64 % of children have already traveled to an area where vaccination against hepatitis A before departure is recommended. However, only 10.5 % of patients had received one dose of vaccination before traveling, and only 2.2 % had completed vaccination. The reasons for non-vaccination were a lack of information or a lack of anticipation before departure. After distributing the questionnaire, 101 prescriptions were issued at the parents' request. CONCLUSION: The vaccination recommendations against hepatitis A are not followed in our population of travelling children, with only 10 % of them vaccinated, while 50 % have been travelling to a high-risk country. The reasons for non-vaccination may be multifactorial, but this study also highlights the importance of a preventive period to improve the population's knowledge and help them anticipate their travel plans. Although time-consuming, this prevention was profitable since 101 vaccine doses were prescribed out of 477 questionnaires collected. A display could be put up in the waiting room to draw families' attention to the need to anticipate travel.

HAV beyond Europe

The draft's full regional literature (Africa, Asia, Oceania, Latin America, North America) is kept in Annex A. Papers that fit a specific session have been moved there.

Cao, G, W Jing, J Liu and M Liu (2021). [The global trends and regional differences in incidence and mortality of hepatitis A from 1990 to 2019 and implications for its prevention](#). *Hepatol Int* 15(5): 1068-1082.

: Global Burden of Disease analysis of hepatitis A incidence and mortality by region and age; provides the global burden estimates quoted in recent position papers.

Jacobsen, KH and ST Wiersma (2010). [Hepatitis A virus seroprevalence by age and world region, 1990 and 2005](#). *Vaccine* 28(41): 6653-6657.

Classic WHO-commissioned analysis of the global endemicity shift; underpins the endemicity categories used in the WHO position paper.

Gloriani, NG, SLM de Paz-Silava, RD Allison, Y Takashima and T Avagyan (2024). [The Shifting Epidemiology of Hepatitis A in the World Health Organization Western Pacific Region](#). *Vaccines (Basel)* 12(2).

Within the past few decades, improvement in sanitation and economic growth has driven a changing epidemiology of hepatitis A in the Western Pacific Region (WPR) of the World Health Organization (WHO). In this review, we gathered available published information on hepatitis A epidemiology of the countries in the WPR and reviewed the trends reported in the literature from the years 2000 to 2021. Many countries have shifted from high endemicity to low endemicity. Moreover, the administration of the hepatitis A vaccine among children in recent years has shifted disease susceptibility to the older population. Seroprevalence among children has decreased in most countries, while nearly 100% seropositivity is seen in mid adulthood. This is contrary to the epidemiology seen in previous decades when most children achieved immunity by age ten. This also presents a paradox in that better living conditions have caused more vulnerability to the older age groups who are at higher risk for severe disease. Given these trends, we recommend vaccination of vulnerable populations such as the older age groups and inclusion of the hepatitis A vaccine in government immunization programs.

Murakoshi, K, H Mori, R Prasertbun, S Valenti, D Krokva, D Remez, A Mahittikorn, Y Hadano and T Naito (2025). [Hepatitis A epidemics in Japan, France, and Thailand from 2007 to 2021, highlighting a post-COVID-19 decline](#). *Sci Rep* 15(1): 7228.

Hepatitis A infection is an acute hepatitis disease transmitted through contaminated water, food, and sexual contact, especially among men who have sex with men (MSM). This retrospective cohort study analyzed trends in hepatitis A infection in Japan, France, and Thailand from 2007 to 2021 to investigate varied epidemic trends including the MSM pandemic and the COVID-19 pandemic under different public health conditions. We analyzed annual and monthly number of cases using the national surveillance databases of Japan, France, and Thailand. We statistically evaluated the decrease in hepatitis A after the COVID pandemic. Hepatitis A average incidence in Japan, France, and Thailand was 0.21, 1.79, and 0.75, respectively. Outbreaks were recorded in 2010, 2014, and 2018 for Japan, 2009 and 2017 for France, and 2012 and 2017 for Thailand. In 2012, a hepatitis A outbreak was recorded at an ice manufacturing factory in Thailand. In Japan, in 2014, 80.5% of cases were transmitted by contaminated seafood or water. Hepatitis A increased during 2017-2018 (324% in 2018 Japan, 489% in 2017 France, 166% in Thailand), possibly linked to the global MSM pandemic. After the COVID-19 pandemic, the cases significantly decreased in all three countries ($p < 0.001$). The characteristics of hepatitis A epidemic may reflect the activities of people, including high-risk groups.

(GSK) Badur, S, S Öztürk, M AbdelGhany, M Khalaf, Y Lagoubi, O Ozudogru, K Hanif and D Saha (2022). [Hepatitis A in the Eastern Mediterranean Region: a comprehensive review](#). *Hum Vaccin Immunother* 18(5): 2073146.

INTRODUCTION: With 583 million inhabitants, the Eastern Mediterranean Region (EMR) is a worldwide hub for travel, migration, and food trade. However, there is a scarcity of data on the epidemiology of the hepatitis A virus (HAV). METHODS: The MEDLINE and grey literature were systematically searched for HAV epidemiological data relevant to the EMR region published between 1980 and 2020 in English, French, or Arabic. RESULTS: Overall, 123 publications were extracted. The proportion of HAV cases among acute viral hepatitis cases was high. HAV seroprevalence rate ranged from 5.7% to 100.0% and it was decreasing over time while the average age at infection increased. CONCLUSION: In the EMR, HAV remains a significant cause of acute viral hepatitis. The observed endemicity shift will likely increase disease burden as the population ages. Vaccinating children and adopting sanitary measures are still essential to disease prevention; vaccinating at-risk groups might reduce disease burden even further.

What is the context? Hepatitis A is a viral liver disease caused by the hepatitis A virus. It is generally transmitted by ingestion of contaminated food or water or through contact with an infected person. Disease severity increases with age. Children under 6 years of age are usually asymptomatic, while adults are the most affected. Limited information exists on the number of cases and transmission of hepatitis A in the Eastern Mediterranean region, which includes 21 countries and Palestine, as defined by the World Health Organization. What is new? We performed a literature review to summarize data on hepatitis A disease in the Eastern Mediterranean region over the last 40 years (1980-2020). As information for many countries is scarce or outdated, most of the data is from Egypt, Iran and Saudi Arabia. We found that: Hepatitis A virus is the most common cause of acute viral hepatitis. Hepatitis A exposure varied according to the country's income level. Low- and middle-income countries showed a universal immunity to hepatitis A virus, although this is not the case anymore. What is the impact? Hepatitis A infections have decreased worldwide. Lower exposure to the virus has led to an increase in the susceptible population (including adolescent and adults). Hepatitis A vaccination for children and high-risk groups such as travelers should be considered in the Eastern Mediterranean region.

Hofmeister, MG, S Yin, P Dokpesi, EH Teshale, M Eckert and N Gupta (2026). [Epidemiology and Control of Widespread Community Hepatitis A Outbreaks in 37 U.S. States, 2016-2023](#). *J Viral Hepat* 33(2): e70137.

During 2016-2023, 37 U.S. states experienced hepatitis A outbreaks associated with person-to-person transmission. We sought to describe the epidemiology of the outbreaks and characterise outbreak response efforts over time. We analysed outbreak databases from 37 states, survey responses from 33 states, and hepatitis A case reports from the National Notifiable Diseases Surveillance System for all 50 states and Washington, DC, during August 1, 2016-December 31, 2023. Among 44,930 reported outbreak-associated cases, most occurred among males (62%), non-Hispanic White persons (65%), and those aged 30-49 years (54%); 62% were hospitalised and 1% died. Commonly reported risk factors for HAV infection were drug use (53%) and homelessness or unstable housing (14%). Sixty-seven percent of adults had a documented indication for hepatitis A vaccination. In late 2017, CDC stood up a national incident management system to coordinate communication between outbreak-affected states, facilitate vaccine delivery, and provide technical assistance. States with available data reported administering more than 5.3 million adult hepatitis A vaccines collectively; most states administered vaccines in correctional facilities, local health departments and homeless shelters. Outbreak-associated cases peaked in 2019 and then declined annually. As outbreak response capacity scaled up nationwide, states with later outbreak start dates tended to experience smaller outbreaks than those with earlier start dates. Unprecedented hepatitis A outbreaks were controlled by a robust vaccine response in 37

states. Continued vigilance and providing access to vaccination for recommended populations will be critical to preventing similar outbreaks in the future.

Hofmeister, MG, S Yin, NP Nelson, MK Weng and N Gupta (2023). [Trends and Opportunities: Hepatitis A Virus Infection, Seroprevalence, and Vaccination Coverage-United States, 1976-2020](#). *Public Health Rep*: 333549231184007.

OBJECTIVES: The incidence of hepatitis A declined in the United States following the introduction of hepatitis A vaccines, before increasing in the setting of recent widespread outbreaks associated with person-to-person transmission. We describe the hepatitis A epidemiology in the United States, identify susceptible populations over time, and demonstrate the need for improved hepatitis A vaccination coverage, especially among adults at increased risk for hepatitis A. METHODS: We calculated the hepatitis A incidence rates for sociodemographic characteristics and percentages for risk factors and clinical outcomes for hepatitis A cases reported to the National Notifiable Diseases Surveillance System during 1990-2020. We generated nationally representative estimates and 95% CIs of hepatitis A seroprevalence during 1976-March 2020 and self-reported hepatitis A vaccination coverage during 1999-March 2020 for the noninstitutionalized civilian US population using data from the National Health and Nutrition Examination Survey. RESULTS: Overall, the rate per 100 000 population of reported cases of hepatitis A virus infection in the United States declined 17.3-fold, from 10.4 during 1990-1998 to 0.6 during 2007-2015, and then increased to 2.8 during 2016-2020. The overall hepatitis A seroprevalence in the United States increased from 38.2% (95% CI, 36.2%-40.1%) during 1976-1980 to 47.3% (95% CI, 45.4%-49.2%) during 2015-March 2020. The prevalence of self-reported hepatitis A vaccination coverage in the United States increased more than 2.5-fold, from 16.3% (95% CI, 15.0%-17.7%) during 1999-2006 to 41.9% (95% CI, 40.2%-43.7%) during 2015-March 2020. CONCLUSIONS: Hepatitis A epidemiology in the United States changed substantially during 1976-2020. Improved vaccination coverage, especially among adults recommended for vaccination by the Advisory Committee on Immunization Practices, is vital to stop current hepatitis A outbreaks associated with person-to-person transmission in the United States and prevent similar future recurrences.

Lin, KY, GJ Chen and CC Hung (2026). [Resurgence of acute hepatitis A outbreak: Lessons learned from past success and recurrence](#). *J Formos Med Assoc* 125(3): 258-260.

Session 3 · Hepatitis A surveillance and diagnosis

Day 1 · 13 October 2026 · 11:30–13:05 · Chairs: Rui Tato Marinho – Noele Nelson

11:30–11:50	Wastewater monitoring	Remy Schilperoort
11:50–12:05	The role of the EU Reference Laboratory for Public Health on Food- and Water-borne Viruses (EURL-PH-FWDV)	Harry Vennema
12:05–12:25	HAV diagnostic tests – challenges and opportunities	Sema Mandal
12:25–12:45	Q&A	
12:45–13:05	Population-based research on the evidence for vaccination once in a lifetime	Jaime Perez

Background in brief

- **Wastewater as early warning.** In Amsterdam, passive samplers detected HAV RNA in 25% (22/88) of sewage samples near a school outbreak, matching the outbreak strain. They also picked up a second strain with no notified cases (de Jong et al., 2024). In Alberta (Canada), HAV was found at low levels in half of the municipalities, and for 8 of 9 genotyped clinical episodes a matching sequence appeared in wastewater within two weeks (Weyant et al., 2026).
- **Molecular typing finds outbreaks.** In Sweden (2009–2018), sequence-based typing was needed to identify 15 of 23 potential outbreak signals (Riess et al., 2021). HAVNet provides a shared international sequence database for back-tracing, but data completeness varies (Kroneman et al., 2018).
- **EU laboratory capacity.** The EURL-PH-FWDV (designated 2024) supports harmonised detection and typing of food- and waterborne viruses, including HAV, across EU/EEA public health laboratories.
- **Diagnosis and testing.** Anti-HAV IgM is the standard test. HAV RNA testing supported diagnosis during the 2017 French outbreak and also allows genotyping (Tram et al., 2020). In Spain, HAV testing was integrated into comprehensive viral hepatitis diagnosis in only 38% of hospitals (Cabezas et al., 2026). HAV RNA has been found in blood and plasma donors (Sulkowska et al., 2023; Schoch et al., 2021).
- **Vaccination once in a lifetime.** Among Catalan medical students, documented hepatitis A vaccination had a 98.9% positive predictive value for serological protection (Godoy et al., 2025). In Taiwan, seropositivity was higher after two or more doses than after one dose (98.5% vs 90.1%) (Chang et al., 2025). See also Session 4 (one dose) and Session 5 (duration of protection).

Literature

Wastewater monitoring

de Jong, M, MFS van der Loeff, R Schilperoort, H Vennema, C van der Weijden, J Langeveld, M Welkers, M Prins, AM de Roda Husman, E Fanoy and G Medema (2024). [Use of passive samplers as sewage surveillance tool to monitor a hepatitis A outbreak at a school in Amsterdam, the Netherlands, Oct 2022 - March 2023](#). *BMC Infect Dis* 24(1): 1044.

BACKGROUND: Enteric hepatitis A virus (HAV) infections during childhood are often asymptomatic but may cause severe illness in adults. To improve public health surveillance we assessed the applicability of sewage monitoring during an HAV outbreak at a primary school. METHODS: Between October 19 and December 27, 2022, five symptomatic HAV cases were notified to the Public Health Service Amsterdam; all attended the same primary school. Passive samplers, small absorbent tools, were deployed in sewage near the school from November 14, 2022, to March 22, 2023. The absorbents were subjected to RNA extraction, HAV PCR testing, and, if positive, sequencing. PCR and sequencing were also performed on plasma and feces samples of HAV cases. RESULTS: In 22 out of 88 (25%) of sewage samples, HAV RNA was detected. All HAV-RNA-positive sewage samples until 8 February 2023 were subgenotype 1B, matching the strain detected in all cases. Another strain of HAV (subgenotype 1A) was detected in sewage from 15 February 2023 onwards, without associated cases. CONCLUSIONS: Passive sampler-based sewage monitoring is an effective method to rapidly detect HAV shedding linked to diagnosed cases. It detects unnoticed viral infections and allows monitoring of outbreaks. This suggests that passive sampler-based monitoring is a promising tool supporting the public health response during HAV and other outbreaks.

Weyant, RB, A Ueno, B Waddell, J Lee, T Bhardwaj, et al. (2026). [Wastewater-based surveillance of hepatitis A virus across municipalities and neighbourhoods in Alberta, Canada](#). *Sci Total Environ* 1018: 181421.

BACKGROUND: Hepatitis A virus (HAV) infection is infrequently diagnosed in Canada, and little data are available regarding its epidemiology. Transmitted fecal-orally, HAV is an ideal candidate for wastewater-based surveillance (WBS). We set out to characterize HAV using WBS in a low-prevalence setting. METHODS: This observational study was conducted in the province of Alberta, Canada. Weekly composite wastewater samples were collected from eight municipalities (populations 7909-1,306,784), and eight neighbourhoods within Calgary, the largest city. HAV genomic material was quantified using RT-qPCR targeted on VP1 and sequenced at the VP1/2A junction. HAV case data from Alberta's Public Health Laboratory and population demographics from census data were correlated with wastewater HAV burden. RESULTS: Between July and December 2023, low levels of HAV were detected in wastewater from 50% of the municipalities and 50% of urban neighbourhoods (with 15.4% and 8.3% of samples testing positive, respectively). Wastewater HAV levels correlated with clinical HAV prevalence in larger communities. For genotyped clinical cases, wastewater with a matching VP1/2A sequence within a two-week period was observed for 8/9 episodes (median 6.42 days). Wastewater-measured HAV associated with population size, population density, and immigration from HAV endemic areas. CONCLUSION: HAV was detectable in wastewater of both municipalities and neighbourhoods within a low prevalence setting. Wastewater HAV was associated with population metrics and socioeconomic factors, including immigration. WBS data correlated strongly with clinical disease revealing a minimal burden of undiagnosed infections. This demonstrates the feasibility of HAV WBS and its potential as a public health tool in non-endemic settings.

Weidmann, MD, PW Bryant, L Schoultz, A Jadhav, L Rickerman, DT Hill, DM Lamson, DA Larsen and K St George (2025). [A pilot study to correlate wastewater and clinical surveillance for hepatitis A in New York state](#). *Epidemics* 53: 100867.

The COVID-19 pandemic prompted a rapid expansion of wastewater-based surveillance in New York State (NYS). Pilot studies were initiated in 2023 to assess the use of this system for the surveillance of hepatitis A virus (HAV) and other pathogens of public health interest. A known cause of outbreaks in the US associated with contaminated food products and transmission between injection drug users, HAV is present in feces for weeks before the onset of symptoms. However, the use of wastewater surveillance as an early warning system has not been assessed outside of the outbreak setting. We compare clinical HAV surveillance with quantitative testing of wastewater samples for HAV RNA from four counties in NYS between September 2022 and November 2023, a period of relatively low HAV incidence. There was a significantly higher mean concentration of HAV RNA in wastewater from sewersheds in districts with reported HAV cases, relative to those without (267 vs. 21 gene copies per microliter, $p < 0.05$). For 91 % of HAV cases, HAV RNA was detected in the wastewater from the same county between HAV exposure onset and diagnosis, and new HAV RNA detection in wastewater occurred, on average, 41 days before case diagnosis. Our findings demonstrate that wastewater surveillance may provide early warning of case clusters at the county level in low-incidence settings and may allow for detection of otherwise missed asymptomatic or mild illness. Expansion of testing to include all sewersheds in each county may further improve the sensitivity for identifying locations for targeted HAV intervention.

Chettleburgh, C, H McDougall, V Parreira, L Goodridge and M Habash (2025). [Seasonality of enteric viruses and correlation of hepatitis A virus in wastewater with clinical cases](#). *Sci Total Environ* 967: 178862.

Human adenovirus F41 (HAdV-41), norovirus genogroup II (HNV-GII), rotavirus group A (RVA), and hepatitis A virus (HAV) are responsible for millions of illnesses every year in Canada. Wastewater-based epidemiology is one way to monitor the prevalence of these underreported (HAV) and non-reportable (HAdV-41, HNV-GII, RVA) food and waterborne enteric viruses. In this study, we monitored the presence of these four viruses in wastewater over 16 months from September 2022 until December 2023 using samples from two locations in southern Ontario. Viruses in 286 wastewater samples were concentrated using PEG precipitation and quantified using a multiplex RT-qPCR assay for HAdV-41, HNV-GII, and RVA, and a singleplex RT-qPCR assay for HAV. In agreement with historical clinical data, HNV-GII and RVA had seasonal peaks in wastewater in the winter (HNV-GII, up to $1.09 \times 10(3)$ gene copies (GC)/mL) and spring (RVA, up to $1.20 \times 10(2)$ GC/mL). The concentration of HAdV-41 in wastewater had a significant seasonal peak in the fall of 2022 (up to $4.65 \times 10(4)$ GC/mL) that was not repeated in the fall of 2023. The detection of HAV in 24 of 127 samples was correlated with four clinical cases in one sewershed with a one-week wastewater lead time.

Braunfeld, JB, BL Dao, J Buendia, R Amiling, C LeBlanc, MP Jewell, H Henry, G Cosentino and P Gounder (2025). [Notes from the Field: Genomic and Wastewater Surveillance Data to Guide a Hepatitis A Outbreak Response - Los Angeles County, March 2024-June 2024](#). *MMWR Morb Mortal Wkly Rep* 74(5): 66-68.

Raya, S, S Tandukar, HP Kattel, S Sharma, J Sangsanont, K Sirikanchana, HTT Ngo, JGM Inson, MLD Enriquez, ZF Alam, AS Setiawan, T Setiadi and E Haramoto (2024). [Prevalence of hepatitis A and E viruses in wastewater in Asian countries](#). *Sci Total Environ* 951: 175473.

Hepatitis A and E viruses (HAV and HEV, respectively) remain a significant global health concern despite advancements in healthcare and vaccination programs. Regular monitoring and vaccine efficacy of HAV are still lacking in different countries. This study aimed to investigate HAV and HEV prevalence in developed, developing, and least-developed Asian countries using wastewater as a surveillance tool. A total of 232 untreated wastewater samples were collected from six wastewater treatment plants, a sewage treatment plant, or an open drainage in six countries Nepal ($n = 51$), Indonesia ($n = 37$), Thailand ($n = 30$), Vietnam ($n = 27$), the Philippines ($n = 17$), and Japan ($n = 70$) between April and October 2022. Viruses in wastewater were concentrated by simple centrifugation or polyethylene glycol precipitation method, followed by viral RNA extraction and reverse transcription-quantitative polymerase chain reaction. HAV and HEV RNA were detected in the samples from Nepal (51 % for HAV and 2 % for HEV), Thailand (3 % for both viruses), and Japan (1 % for HAV and 24 % for HEV). Only HAV RNA was found in 11 % of the samples in Indonesia, whereas only HEV RNA was detected in Vietnam and the Philippines, with a positive ratio of 15 % and 12 %, respectively. These results highlighted the geographic variability in HAV and HEV prevalence, underscoring the need for localized public health strategies to address specific viral hepatitis challenges in each country.

Zulli, A, EMG Chan and AB Boehm (2024). [Detection of Hepatovirus A \(HAV\) in wastewater indicates widespread national distribution and association with socioeconomic indicators of vulnerability](#). *mSphere* 9(11): e0064524.

Wastewater-based epidemiology, which seeks to assess disease occurrence in communities through measurements of infectious disease biomarkers in wastewater, may represent a valuable tool for understanding the occurrence of hepatitis A infections in communities. In this study, we measured concentrations of Hepatovirus A (HAV) RNA, in samples from 191 wastewater treatment plants spanning 40 US states and the District of Columbia from September 2023 to June 2024 and compared the measurements with traditional measures of disease occurrence. Nationally, 13.76% of the 21,079 wastewater samples were positive for HAV RNA, and both concentrations and positivity rates were associated with NNDSS hepatitis A case data nationally (Kendall rank correlation coefficient = 0.20, concentrations; and 0.33, positivity rate; both $P < 0.05$). We further demonstrated that higher rates of wastewater HAV detection were positively associated with socioeconomic indicators of vulnerability including homelessness and drug overdose deaths (both $P < 0.0001$). Areas with above average levels of homelessness were 48% more likely to have HAV wastewater detections, while areas with above average levels of drug overdose deaths were 14% more likely to have HAV wastewater detections. Using more granular case data, we present a case study in the state of Maine that reinforces these results and suggests a potential lead time for wastewater over clinical case detection and exposure events. The ability to detect HAV RNA in wastewater before clinical cases emerge could allow public health officials to implement targeted interventions like vaccination campaigns. Despite the existence of a highly effective vaccine for hepatitis A, outbreaks in vulnerable populations remain common. The disease can be asymptomatic or subclinical, and disproportionately impacts populations with inadequate access to healthcare, leading to a severe underestimation of the occurrence of this viral infection. This study investigates the potential for wastewater measurements of biomarkers of the causative agent of hepatitis A (HAV RNA) to provide insights into disease occurrence. Results highlight the potential for wastewater-based epidemiology to be a complementary tool to traditional surveillance for monitoring and controlling HAV transmission.

Fantilli, A, GD Cola, G Castro, P Sicilia, AM Cachi, et al. (2023). [Hepatitis A virus monitoring in wastewater: A complementary tool to clinical surveillance](#). *Water Res* 241: 120102.

Monitoring wastewater is an effective tool for tracking information on trends of enteric viral dissemination. This study aimed to perform molecular detection and genetic characterization of HAV in wastewater and to correlate the results with those obtained from clinical surveillance. Wastewater samples ($n=811$) of the second most populous city in Argentina were collected from the main wastewater treatment plant (BG-WWTP, $n=261$), and at 7 local neighborhood collector sewers (LNCS, $n=550$) during 2017-2022. Clinical samples of acute hepatitis A cases (HA, $n=54$) were also analyzed. HAV molecular detection was performed by real time RT-PCR, and genetic characterization by RT-Nested PCR, sequencing and phylogenetic analysis. RNA-HAV was detected in sewage samples throughout the entire period studied, and detection frequencies varied according to the location and year (2.9% - 56.5%). In BG-WWTP, 23% of the samples were RNA-HAV+. The highest detection rates were in 2017 (30.0%), 2018 (41.7%) and 2022 (56.5%), which coincides with the highest number of HA cases reported. Twenty-eight (28) sequences were obtained (from clinical and sewage samples), and all were genotype IA. Two monophyletic clusters were identified: one that grouped clinical and wastewater samples from 2017-2018, and another with specimens from 2022, evidencing that environmental surveillance might constitute a replica of viral circulation in the population. These findings evidence that WBE, in a centralized and decentralized sewage monitoring, might be an effective strategy to track HAV circulation trends over time, contributing to the knowledge of HAV in the new post-vaccination epidemiological scenarios in Argentina and in Latin America.

Kuodi, P, J Patterson, S Silal, GD Hussey and BM Kagina (2020). [Characterisation of the environmental presence of hepatitis A virus in low-income and middle-income countries: a systematic review and meta-analysis](#). *BMJ Open* 10(9): e036407.

OBJECTIVE: To characterise the environmental presence of hepatitis A virus (HAV) in low- and middle-income countries (LMICs). DESIGN: Systematic review and meta-analysis. DATA SOURCES: EBSCOhost, PubMed, Scopus, ScienceDirect, Clinical Key and Web of Science were searched. Grey literature was sourced by searching the following electronic databases: Open Grey, National Health Research Database and Mednar. ELIGIBILITY CRITERIA FOR INCLUDING STUDIES: Cross-sectional and ecological studies reporting HAV environmental presence and conducted in LMICs between January 2005 and May 2019, irrespective of language of publication. DATA EXTRACTION AND DATA SYNTHESIS: Relevant data were extracted from articles meeting the inclusion criteria, and two reviewers independently assessed the studies for risk of bias. High heterogeneity of the extracted data led to the results being reported narratively. RESULTS: A total of 2092 records were retrieved, of which 33 met the inclusion criteria. 21 studies were conducted in Tunisia, India and South Africa, and the rest were from Philippines, Pakistan, Morocco, Chad, Mozambique, Kenya and Uganda. In Tunisian raw sewage samples, the prevalence of HAV ranged from 12% to 68%, with an estimated average detection rate of 50% (95% CI 25 to 75), whereas HAV detection in treated sewage in Tunisia ranged from 23% to 65%, with an estimated average detection rate of 38% (95% CI 20 to 57). The prevalence of HAV detection in South African treated sewage and surface water samples ranged from 4% to 37% and from 16% to 76%, with an estimated average detection rates of 15% (95% CI 1 to 29) and 51% (95% CI 21 to 80), respectively. Over the review period, the estimated average detection rate of environmental HAV presence appeared to have declined by 10%. CONCLUSION: The quality of included studies was fair, but sampling issues and paucity of data limited the strength of the review findings. PROSPERO REGISTRATION NUMBER: CRD42019119592.

La Rosa, G, P Mancini, G Bonanno Ferraro, M Iaconelli, C Veneri, et al. (2020). [Hepatitis A Virus Strains Circulating in the Campania Region \(2015-2018\) Assessed through Bivalve Biomonitoring and Environmental Surveillance](#). *Viruses* 13(1).

Prado, T, MRF Barbosa, RS Araújo, SC Garcia, AJ Melo, AT Galvani, CJ Brandão, RLO Silva and MIZ Sato (2021). [Hepatitis A Outbreaks and Environmental Circulation of Genotype IA Strains in the São Paulo City, 2017-2018](#). *Food Environ Virol* 13(4): 520-527.

Hepatitis A virus (HAV) is the major cause of enterically transmitted infectious hepatitis. Between 2016 and 2017, the number of confirmed cases of hepatitis A virus (HAV) increased from 64 to 786 in São Paulo affecting mainly adults aged between 18 and 39 years (80%) and males (88%). To support epidemiological surveillance, the present study monitored the presence of HAV in urban sewage samples collected bimonthly for 1 year (November 2017-November 2018) in the central region of the city, where most of cases were detected. Sewage samples were concentrated by polyethylene glycol precipitation and HAV RNA was quantified by RT-qPCR. Nucleotide

sequencing targeting the VP1/2A junction region was carried out to genotype the HAV strains. HAV was detected in 76.9% (40/52) of the samples, with a geometric mean viral load of $5.09 \times 10(4)$ ($\pm$ SD $4.51 \times 10(5)$) genome copies (GC/L) (Mauá Street) and $5.27 \times 10(4)$ ($\pm$ SD $1.26 \times 10(6)$) GC/L (Prestes Maia Avenue). Of the 40 positive samples, 8 were typed as HAV subgenotype IA 100% nucleotide (nt) identity with HAV strain VRD_521_2016. Highest homology was obtained with sequences from European countries (Italy, Spain) and Israel, all of which had reported recent HAV outbreaks associated with men who have sex with men. Our results highlight that wastewater surveillance is a useful tool to support investigating HAV outbreaks in the community, including circulating genotypes.

The role of the EURL-PH-FWDV and molecular surveillance

Norwegian Institute of Public Health (NIPH/FHI) (2024). [The European Union Reference Laboratory for Public Health on Food- and Water-borne Viruses \(EURL-PH-FWDV\). Website.](#)

Background for the EURL talk: the EU reference laboratory network for food- and waterborne viruses, designated in 2024, including laboratory protocols for HAV typing.

Kroneman, A, R de Sousa, L Verhoef, MPG Koopmans and H Vennema (2018). [Usability of the international HAVNet hepatitis A virus database for geographical annotation, backtracing and outbreak detection.](#) *Euro Surveill* 23(37).

Background: HAVNet is an international laboratory network sharing sequences and corresponding metadata on hepatitis A virus in an online database. Aim: We give an overview of the epidemiological and genetic data and assess the usability of the present dataset for geographical annotation, backtracing and outbreak detection. Methods: A descriptive analysis was performed on the timeliness, completeness, epidemiological data and geographic coverage of the dataset. Length and genomic region of the sequences were reviewed as well as the numerical and geographical distribution of the genotypes. The geographical signal in the sequences was assessed based on a short common nt stretch using a 100% identity analysis. Results: The 9,211 reports were heterogeneous for completeness and timeliness, and for length and genomic region of the sequences. Some parts of the world were not represented by the sequences. Geographical differences in prevalence of HAV genotypes described previously could be confirmed with this dataset and for a third (1,075/3,124) of the included sequences, 100% identity of the short common sequence coincided with an identical country of origin. Conclusion: Analysis of a subset of short, shared sequences indicates that a geographical annotation on the level of individual countries is possible with the HAVNet data. If the current incompleteness and heterogeneity of the data can be improved on, HAVNet could become very useful as a worldwide reference set for geographical annotation and for backtracing and outbreak detection.

Riess, M, T Enkirsch, L Sundqvist and J Lundberg Ederth (2021). [High impact of molecular surveillance on hepatitis A outbreak case detection in Sweden: a retrospective study, 2009 to 2018.](#) *Euro Surveill* 26(9).

Background. Swedish hepatitis A surveillance includes sequence-based typing, but its contribution to outbreak detection in relation to epidemiological investigations has not been fully evaluated. Aim. To evaluate the role of sequence-based typing in hepatitis A outbreak detection and to describe the hepatitis A epidemiology in Sweden to improve surveillance. Methods. We retrospectively investigated hepatitis A virus sequences of 447 cases notified in Sweden 2009-18. We performed a phylogenetic analysis of evolutionary distances to identify cases with similar virus sequences ($\geq 459/460$ identical nt in the VP1/P2A junction). Unique sequences, dyads and sequence-based clusters (SBCs) were identified. We linked non-sequenced cases by epidemiological information and retrospectively assessed the value of typing for outbreak identification. Results. Fifty-five percent ($n = 542/990$) of the notified hepatitis A cases were referred to the Public Health Agency of Sweden for typing and 447 (45%) were sequenced successfully. Subgenotypes included IA (42.5%, $n = 190$), IB (42.7%, $n = 191$) and IIIA (14.8%, $n = 66$). Phylogenetic analysis identified 154 unique sequences, 33 dyads (66 cases) and 34 SBCs (227 cases). The combination of molecular and epidemiological data revealed 23 potential outbreaks comprising 201 cases. Cases were linked by sequence (59%, $n = 118$), epidemiological data (11%, $n = 23$) or both (30%, $n = 60$). Typing was needed to identify 15 of 23 potential outbreak signals. Conclusion. Sequence-based typing contributed substantially to detecting clustering cases and identifying outbreaks in Sweden. The results show routine sequence-based typing detects outbreaks, promotes timely outbreak investigations and facilitates international collaboration.

Ramachandran, S, GL Xia, Z Dimitrova, Y Lin, M Montgomery, R Augustine, S Kamili and Y Khudyakov (2021). [Changing Molecular Epidemiology of Hepatitis A Virus Infection, United States, 1996-2019.](#) *Emerg Infect Dis* 27(6): 1742-1745.

Hepatitis A virus (HAV) genotype IA was most common among strains tested in US outbreak investigations and surveillance during 1996-2015. However, HAV genotype IB gained prominence during 2016-2019 person-to-person multistate outbreaks. Detection of previously uncommon strains highlights the changing molecular epidemiology of HAV infection in the United States.

Wang, H, W Chen, W Zhou, F Qiu, W Yin, J Cao, P Gao, Q Yuan, M Lv, S Bai and J Wu (2022). [Exploration of a new hepatitis A surveillance system in Beijing, China: based on molecular epidemiology.](#) *BMC Infect Dis* 22(1): 22.

BACKGROUND: The incidence of hepatitis A virus (HAV) infection is low in Beijing, China, but the risk of outbreaks still exists. It is difficult to identify possible sources of infection among sporadic cases based on a routine surveillance system. Therefore, a more effective surveillance system needs to be established. METHODS: The epidemiological data of hepatitis A were obtained from a routine surveillance system. Patients with HAV confirmed at the local hospitals were asked to complete a questionnaire that included additional case information and possible sources of infection. Serum and fecal specimens were also collected for testing HAV RNA by polymerase chain reaction. In addition, the 321-nucleotide segment of the VP1/2A junction region was sequenced to determine the HAV genotype. RESULTS: In 2019, 110 HAV cases were reported in Beijing, with an incidence rate of 0.51/100,000. 61(55.5%) of these patients were male. The greatest proportion of these patients were aged from 30 to 60 years. The rate was lower in suburban and rural areas compared to urban areas. Contaminated food consumption, particularly seafood consumption, was the primary potential source of infection. Among the 16 specimens of confirmed HAV cases that could be sequenced, 93.8% were HAV IA, and 6.3% were HAV IB. In addition, the samples collected from all HAV sequences in this investigation showed 89.4-100% nucleotide homology. Two groups (each with three sporadic cases) showed 100% nucleotide homology. The three sporadic cases in one group had the same possible source of infection: contaminated salad with raw vegetables and seafood. In the other group, the three sporadic cases did not have an epidemiological connection. CONCLUSIONS: In a low HAV prevalent area, such as in Beijing, incorporating molecular epidemiology into the routine

surveillance system could help inform possible clusters of outbreaks and provide support for earlier control of HAV transmission. Nevertheless, increased sampling from detected cases and improved specimen quality are needed to implement such a system.

Hu, X, W Zhou, L Zhang, J Lv, B Yan, Y Zhou, W Hu, Y Dong, B Chen, M Liu, J Cao, F Xu and L Li (2021). [Implementing sequencing-based surveillance in developing countries: findings from a pilot rollout for hepatitis A in China](#). *Ann Transl Med* 9(14): 1119.

BACKGROUND: The emergence of SARS-Cov2 variants has highlighted the need to implement sequencing-based surveillance in developing countries for early response to mutant viruses of concern. However, limited information on how to implement sequencing-based surveillance is available, and the feasibility and performance of this new type of surveillance are still in question. METHODS: To understand the challenges with the implementation and to promote sequencing-based surveillance, we reported findings from a pilot for hepatitis A (HepA) in five sentinel provinces in China as an example of sequencing-based surveillance implementation. The performance of the surveillance system was evaluated by indicators related to acceptability, data quality, simplicity, utility, and timeliness. We use a scale from 1 to 3 was used to provide a score for each aspect. RESULTS: During the pilot, 306 cases of HepA were reported, and 49.79% of samples were available for sequencing. Eleven genomic clusters were found, of which seven clusters were potentially related to a foodborne outbreak oyster based on identical viral sequence and epidemiologic investigations. The greatest strength of the system was its simplicity (Score: 2.63). The acceptability (Score: 2.0) and utility (Score: 2.33) were modest, but data quality (Score: 1.75) and timeliness (Score: 1.75) were the main challenges. CONCLUSIONS: Overall, the system performed satisfactorily and proved to be useful for virological characterization of cases and early outbreak detection, with a great potential for scale-up. Further efforts are required to address financial and human resource constraints and inadequate support among physicians. Education should be given to health care professionals to improve the data quality. The establishment of decentralized surveillance networks can be an approach to improve timeliness for emerging infections.

Gozlan, Y, I Bar-Or, H Volnowitz, E Asulin, R Rich, et al. (2021). [Lessons from intensified surveillance of viral hepatitis A, Israel, 2017 and 2018](#). *Euro Surveill* 26(6).

Introduction: Universal vaccination of toddlers has led to very low hepatitis A (HAV) endemicity in Israel. However, sporadic outbreaks still occur, necessitating better surveillance. Aim: To implement a comprehensive HAV surveillance programme. Methods: In 2017 and 2018, sera from suspected HAV cases that tested positive for anti-HAV IgM antibodies were transferred to the Central Virology Laboratory (CVL) for molecular confirmation and genotyping. Sewage samples were collected in Israel and Palestine and were molecularly analysed. All molecular (CVL), epidemiological (District Health Offices and Epidemiological Division) and clinical (treating physicians) data were combined and concordantly assessed. Results: Overall, 146 cases (78 in 2017 and 68 in 2018, median age 34 years, 102 male) and 240 sewage samples were studied. Most cases (96%) were unvaccinated. In 2017, 89% of cases were male, 45% of whom were men who have sex with men (MSM). In 2018, 49% were male, but only 3% of them were MSM ($p < 0.01$). In 2017, 82% of cases and 63% of sewage samples were genotype 1A, phylogenetically associated with a global MSM-HAV outbreak. In 2018, 80% of cases and 71% of sewage samples were genotype 1B, related to the endemic strain previously identified in Israel and Palestine. Environmental analysis revealed clustering of sewage and cases' sequences, and country-wide circulation of HAV. Conclusions: Molecular confirmation of HAV infection in cases and analysis of environmental samples, combined with clinical and epidemiological investigation, may improve HAV surveillance. Sequence-based typing of both clinical and sewage-derived samples could assist in understanding viral circulation.

Prabdi-Sing, N, V Motaze, J Manamela, K McCarthy and M Suchard (2021). [Establishment of Outbreak Thresholds for Hepatitis A in South Africa Using Laboratory Surveillance, 2017-2020](#). *Viruses* 13(12).

As South Africa transitions from endemic to intermediate endemicity, hepatitis A surveillance needs strengthening to monitor trends in disease incidence and to identify outbreaks. We used passive laboratory-based surveillance data from the National Health Laboratory Services to calculate national hepatitis A incidence and to establish thresholds for outbreaks. Incidence was calculated by age and geographic location. The static threshold used two or three standard deviations (SDs) above the mean hepatitis A incidence in 2017-2019, and a cumulative summation (CuSum2) threshold used three SDs above the mean of the preceding seven months. These thresholds were applied to hepatitis A data for 2020. From 2017 to 2020, the mean incidence of hepatitis A IgM was 4.06/100,000 and ranged from 4.23 to 4.85/100,000 per year. Hepatitis A incidence was highest in the Western Cape province (WCP) (7.00-10.92/100,000 per year). The highest incidence was in the 1-9-year-olds. The incidence of hepatitis A in 2020 exceeded the static threshold in two districts of the WCP: Cape Winelands in January and Overberg district in August. The provincial incidence did not exceed the static and CuSum2 thresholds. District-level analysis using either threshold was sensitive enough to monitor trends and to alert district health authorities, allowing early outbreak responses.

Haddix, M, R Civen, JK Hacker, W Probert, S New, N Green, P Hemarajata and P Gounder (2020). [Use of Molecular Epidemiology to Inform Response to a Hepatitis A Outbreak - Los Angeles County, California, October 2018-April 2019](#). *MMWR Morb Mortal Wkly Rep* 69(26): 820-824.

Minosse, C, F Messina, AR Garbuglia, S Meschi, P Scognamiglio, MR Capobianchi, G Ippolito and S Lanini (2020). [Origin of HAV strains responsible for 2016-2017 outbreak among MSM: Viral phylogenetics in Lazio region](#). *PLoS One* 15(5): e0234010.

Kim, HY, SH Chae and JS Yang (2024). [Surveillance of Hepatitis A Virus and Its Outbreak Status in the Republic of Korea, 2019 to 2022](#). *Jugan Geongang Gwa Jilbyeong* 17(10): 404-417.

Hepatitis A was designated as a statutory notifiable infectious disease in 2000 and has been monitored through sentinel surveillance since 2001. Following the comprehensive revision of the Infectious Diseases Prevention and Management Act in December 2009, the surveillance system was converted to a passive surveillance system in 2011. This report describes domestic hepatitis A outbreaks reported to the Integrated Disease and Health Management System from 2019 to 2022, following a large outbreak of hepatitis A in 2019. During this period, the incidence rate of hepatitis A was highest in the 40-49-year age group, followed by the 30-39-year and 20-29-year age groups. The majority of outbreaks were reported in 2019 and 2021, and the most common source locations were restaurants

(28 outbreaks in 2019, 6 outbreaks in 2021) and side-dish stores (1 outbreaks in 2019, 6 outbreaks in 2021). This indicates the importance of practicing good personal hygiene and food hygiene as preventive measures against hepatitis A infection. In addition, the analysis identified salted clams imported from China as a major source of hepatitis A infection. Therefore, food safety and management systems need to be strengthened and the public should be provided with health information about hepatitis A.

Hepatitis A was designated as a statutory notifiable infectious disease in 2000 and has been monitored through sentinel surveillance since 2001. Following the comprehensive revision of the Infectious Diseases Prevention and Management Act in December 2009, the surveillance system was converted to a passive surveillance system in 2011. This report describes domestic hepatitis A outbreaks reported to the Integrated Disease and Health Management System from 2019 to 2022, following a large outbreak of hepatitis A in 2019. During this period, the incidence rate of hepatitis A was highest in the 40-49-year age group, followed by the 30-39-year and 20-29-year age groups. The majority of outbreaks were reported in 2019 and 2021, and the most common source locations were restaurants (28 outbreaks in 2019, 6 outbreaks in 2021) and side-dish stores (1 outbreaks in 2019, 6 outbreaks in 2021). This indicates the importance of practicing good personal hygiene and food hygiene as preventive measures against hepatitis A infection. In addition, the analysis identified salted clams imported from China as a major source of hepatitis A infection. Therefore, food safety and management systems need to be strengthened and the public should be provided with health information about hepatitis A.

HAV diagnostic tests – challenges and opportunities

See also the CDC resource '[Clinical Screening and Diagnosis for Hepatitis A](#)' in Part 2.

Tram, J, P Le Baccon-Sollier, K Bolloré, J Ducos, AM Mondain, P Pastor, GP Pageaux, A Makinson, PV de Perre and E Tuaillon (2020). [RNA testing for the diagnosis of acute hepatitis A during the 2017 outbreak in France](#). *J Viral Hepat* 27(5): 540-543.

Cabezas, J, A Aguilera, F Garcia Garcia, R Dominguez-Hernandez, A Casado Gomez, N Espinoza-Camac, MA Casado, J Crespo and D Task Force Spanish Group for Comprehensive Hepatitis (2026). [From recommendations to practice – Tracking the national rollout of comprehensive hepatitis diagnosis in Spain](#). *Rev Esp Enferm Dig* 118(1): 4-13.

INTRODUCTION: the comprehensive diagnosis of viral hepatitis is an advance towards its elimination, but not all Spanish hospitals performed this diagnosis in 2022. Our objective was to evaluate the situation of the comprehensive diagnosis after the publication of the guidelines and evaluate the degree of implementation in the centers that responded to both surveys. METHODS: a descriptive cross-sectional study was conducted among 79 hospitals that had participated in the initial survey. They were reinvited to respond via Google Forms (sent 23/12/2024). RESULTS: the response rate was 91 % (72/79). Compared to the previous year, reflex testing increased by 3 %, with notable increases for hepatitis B virus (HBV) (33 %), hepatitis C virus (HCV) (2 %), hepatitis D virus (HDV) (45 %) and dual HBV-HDV (79 %). Anti-HDV and HDV-RNA testing increased by 18 % and 21 %, respectively. Alerts to specialist physicians rose by 24.1 % for HBV and 52.9 % for HDV. Automated appointment systems and referral mechanisms also expanded. Hepatitis A virus (HAV) testing was integrated in 38 % of centers, human immunodeficiency virus (HIV) testing in 50 %, and sexually transmitted infections (STI) testing in 56 %. CONCLUSIONS: awareness and implementation of integrated diagnostics, particularly for hepatitis D, have improved. Nonetheless, further progress is needed to ensure broader coverage and to contribute towards World Health Organization (WHO) elimination goals.

Sulkowska, E, A Masny, A Kalińska, A Kopacz, D Kubicka-Russel, M Marek, M Parczewski, D Radłowski, J Jaroszewicz, A Trzcińska, M Łetowska and P Grabarczyk (2023). [Hepatitis A virus \(HAV\) RNA detection in Polish blood donors and likely transmissions through blood components during the 2017-2019 epidemic](#). *Transfusion* 63(2): 349-359.

BACKGROUND: In Poland, hepatitis A virus (HAV) RNA screening was performed in plasma for fractionation usually immediately before shipment. OBJECTIVE: Our goal was to study epidemiology, rate of transfusion transmitted HAV during epidemic (2017-2019), and viral characteristics of infected plasma donors. STUDY DESIGN AND METHODS: HAV RNA was tested in 1,866,590 donations from 1,210,423 donors using RT-PCR in mini pools of 96 (MP96) or TMA in MP16. Virological characteristics included RNA level (RL), antibody testing, and sequencing. RESULTS: Twenty-one HAV infections were identified (1.13/100,000 donations; 95% confidence interval 95% CI: 0.74-1.72) and (1.73/100,000 donors; 95% CI: 1.35-2.65). The Blood Transfusion Centers were also informed about three donors, who were hospitalized for hepatitis A soon after their blood donation. In addition, we identified a donor, who had reactive result for HAV after receiving HAV vaccination. He tested positive twice 10 days after receiving the first and the second dose. The highest RL was 16 million IU/ml, mean 1,706,905 IU/ml, and median 220 IU/ml. The longest detectable RL lasted for 113 days. HAV-infected donors were seronegative (36%) or IgM positive (64%). We followed up on 12 HAV contaminated blood components issued for transfusion. In two out of seven identified patients viral transmission was confirmed (28.6%). CONCLUSION: Based on our results, we propose a 6 month deferral after HAV infection and 14 days post HAV vaccination. The infectivity rate was below 30%. The HAV RNA testing could be considered as an additional safeguard against HAV transmission at the time of increased incidence of HAV infections in the general population.

Schoch, S, M Wälti, M Schemmerer, R Alexander, B Keiner, et al. (2021). [Hepatitis A Virus Incidence Rates and Biomarker Dynamics for Plasma Donors, United States](#). *Emerg Infect Dis* 27(11): 2718-2824.

The United States is currently affected by widespread hepatitis A virus (HAV) outbreaks. We investigated HAV incidence rates among source plasma donors in the United States since 2016. Serial donations from HAV-positive frequent donors were analyzed for common biologic markers to obtain a detailed picture of the course of infection. We found a considerable increase in incidence rates with shifting outbreak hotspots over time. Although individual biomarker profiles were highly variable, HAV RNA typically had a high peak and a biphasic decrease and often remained detectable for several months. One donor had a biomarker pattern indicative of previous exposure. Our findings show that current HAV outbreaks have been spilling over into the plasma donor population. The detailed results presented improve our comprehension of HAV infection and related public health aspects. In addition, the capture of full RNA curves enables estimation of HAV doubling time.

Kanda, T, R Sasaki-Tanaka, K Ishii, R Suzuki, J Inoue, et al. (2024). [Recent advances in hepatitis A virus research and clinical practice guidelines for hepatitis A virus infection in Japan](#). *Hepatol Res* 54(1): 4-23.

In 2018, there was a hepatitis A outbreak in Japan, and hepatitis A virus (HAV) infection is considered a sexually transmitted disease. In general, patients with hepatitis A should be given attention, and this disease should be prevented more than ever. The Japan Agency for Medical Research and Development (AMED) Hepatitis A and E viruses (HAV and HEV) Study Group has worked on the project to create "Recent Advances in Hepatitis A Virus (HAV) Research and Clinical Practice Guidelines for HAV Infection in Japan". The group consists of expert hepatologists and virologists who gathered at virtual meeting on August 5, 2023. Data about the pathogenesis, infection routes, diagnosis, complications, several factors for the severities, vaccination, and current and future treatments for hepatitis A were discussed and debated for a draft version. The participants assessed the quality of cited studies. The finalized recommendations are presented in this review. The recent advances in HAV research and clinical practice for HAV infection in Japan, have been reviewed by the AMED HAV and HEV Study Group.

McCluskey, JM, 3rd, RA Bockrath and R Jhaveri (2026). [Clinical progress note: Hepatitis A virus](#). *J Hosp Med* 21(3): 294-297.

Despite a decline in hepatitis A virus (HAV) incidence following vaccine introduction, HAV remains a public health concern in the United States. Recent multi-state outbreaks have demonstrated that HAV can re-emerge and highlight inequities in vaccine coverage or access, outbreak response, and in those with social or health risk factors. Continued investment in prevention, particularly vaccination and surveillance, is essential to prevent resurgence. Hospitalization offers a critical opportunity to address these gaps and provide equitable protection for at-risk populations.

de Oliveira, KG, MPA Vasconcelos, JT Ton, et al. (2025). [A Comprehensive Molecular and Serological Investigation of Hepatitis A Virus Among Patients With Suspected Acute Hepatitis: A Brazilian Study](#). *J Med Virol* 97(6): e70449.

Hepatitis A Virus (HAV) infects millions of individuals annually and is a major cause of acute viral hepatitis worldwide. This study aims to (1) assess HAV infection in suspected acute hepatitis patients at public healthcare institutions in Brazil; (2) evaluate the proportion of immunized individuals against HAV; (3) identify HAV genotypes; (4) examine the association between HAV infection and demographic data, as well as exposure to risk factors. This is a prospective, observational multicenter study conducted in primary health services in Brazil from October 2019 to May 2023, involving 1721 patients with suspected acute hepatitis. Acute HAV infection was identified in 108 (6.3%) patients, predominantly in young men (80%) and from South and Southeast regions of Brazil (97%). Anti-HAV IgG, indicating previous exposure or vaccination, was detected in 78.6% of individuals (74% in the South to 91% in the North). Genotype I.A was found in all cases and approximately 450 mutations were identified, most of them in the structural proteins VP1-3. Two viral groups were identified and related to two introductions of the virus: cosmopolitan sequences from North America, South America, and Europe, and a minor group of Brazilian sequences similar to Asian and South American ones. The high incidence of acute HAV infections highlights the need for targeted prevention and vaccination strategies. The characterization of HAV genetic diversity and molecular epidemiology contributes to monitoring and identifying emerging outbreaks.

Population-based research on the evidence for vaccination once in a lifetime

Godoy, P, D Toledo, I Casas, K Colmenares, A Vilella, A Prat, S Mormeneo-Bayo, R Bartolome, M Ibarz, A Dominguez and G Working (2025). [Documented vaccination as proof of immunity compared to serology in medical students](#). *Hum Vaccin Immunother* 21(1): 2556584.

We analyzed immunity to vaccine-preventable diseases and the predictive value of documented vaccination versus serological results for medical students in Catalonia (Spain). Epidemiological study of antibody seroprevalence and vaccination in medical students at four teaching units of medicine. Blood samples were drawn from participants who completed an epidemiology questionnaire. For seven diseases, we calculated the positive predictive value (PPV) percentages (and 95% CI) reflecting the protection afforded by self-reported vaccination histories compared to serology results. We enrolled 146 medical students (participation 25.7%; 146/569), 79.5% (116/146) women, mean (SD) age 22.6 (1.6) years. Most students (84.2%; 123/146) were fully vaccinated, 18 were unaware of their vaccination status, and 5 students were not vaccinated. Of the six overseas students, only three could document their vaccination status (OR = 6.0; 95% CI: 1.1-31.8). In documented vaccination terms, PPVs for immunological protection were high for varicella (100%), COVID-19 (99.1%), hepatitis A (98.9%), and rubella (94.8%), but was substantially lower for measles (90.0%), mumps (85.9%), and hepatitis B (67.2%). The predictive value of documented vaccination history compared to serology as proof of immunity was above 90% for most vaccines except for measles, mumps, and hepatitis B.

Documented vaccination as immunity evidence was studied for seven vaccine-preventable diseases. Positive predictive values were just 90.0% for measles, 85.9% for mumps, and 67.2% for hepatitis B. To administer booster doses as necessary, documented vaccination for measles, mumps, and hepatitis B should be contrasted with serology results.

Chang, KC, MH Chang, HL Chen, JF Wu, WJ Su, YJ Yang, FT Lu, YC Chang and YH Ni (2025). [Secular trend in hepatitis A infection and effect of hepatitis a vaccination: A nationwide surveillance in Taiwan, 2019-2020](#). *J Formos Med Assoc*.

BACKGROUND: Taiwan was endemic for hepatitis A virus (HAV) before the 1980s. Following the introduction of a targeted vaccination program and improved hygiene, the prevalence of HAV significantly declined. In 2018, nationwide HAV vaccination for infants was implemented. We aimed to assess the current seroprevalence under the coverage of universal hepatitis A vaccination. METHODS: A nationwide cross-sectional survey was conducted between 2019 and 2021, including 4717 participants aged 1-60 years. Anti-HAV IgG levels were measured, and vaccination records were reviewed. Geographic and age-specific differences in HAV seroprevalence were analyzed. RESULTS: The seroprevalence of anti-HAV exhibited a bimodal distribution, with the lowest rates observed in individuals aged 31-35 years (7.14 %) and peaks among those under 2 years (89 %) and those over 56 years (89.5 %). Eastern Taiwan, where a targeted vaccination program was implemented for more than 20 years before the introduction of universal vaccination, had a higher seroprevalence compared to non-eastern regions (47.9 % vs. 27.9 %, $P < 0.0001$). Children born after 1995 in eastern Taiwan had higher seropositivity due to the early vaccination program, while children born after 2017 showed similar rates across all regions, reflecting the success of nationwide universal immunization. Receiving two or more doses of HAV vaccine conferred higher seropositivity than one

dose (98.5 % vs. 90.11 %, $P = 0.001$). CONCLUSION: The HAV vaccination program significantly increased seroprotection against HAV in children and young adults. The universal immunization conducted recently reduced the age and geographic disparities in HAV prevalence. Two or more doses of HAV vaccines may provide better protection.

Session 4 · Hepatitis A vaccines

Day 1 · 13 October 2026 · 14:00–15:20 · Chairs: Sandra Dudareva – Angela Domínguez

14:00–14:20	Hepatitis A vaccines – update from SAGE	Kassiani Mellou (WHO SAGE, online)
14:20–14:40	Scientific evidence for the use of one dose	Christian Herzog
14:40–15:00	Needs to achieve global immunity through vaccination	Oana Săndulescu
15:00–15:20	Q&A	

Background in brief

- **WHO position (2022).** Inactivated and live attenuated vaccines are safe and highly immunogenic. For children, a single dose of inactivated vaccine is considered equivalent to two doses. For adults over 40 and immunocompromised people, two doses are preferred. Single-dose vaccination is recommended in outbreaks. In low and very low endemicity settings, risk groups should be vaccinated (see Part 2).
- **One dose works at population level.** Brazil introduced one dose for children aged 12–24 months in 2014. Incidence fell from 3.19 to 0.87 per 100,000, preventing an estimated 14,468 cases in 2015–2018 (Bierrenbach et al., 2021). Argentina has used one dose since 2005 (Vizzotti et al., 2015).
- **Durability of one dose is the open question.** In Tyva (Russian Federation), seroprotection after one dose was 99.4% at 9 years in one cohort but 75.4% at 11 years in another. Incidence was zero from 2016, while HAV still circulated in the environment (Lopatukhina et al., 2024). In Canada, seropositivity three years after one dose ranged from 40% to 78% depending on the schedule, but responses to a challenge dose showed strong immune memory (Febriani et al., 2026).
- **Towards global immunity.** The ESCMID Study Group for Viral Hepatitis proposes universal childhood immunisation, plus catch-up, outbreak-response and high-risk group programmes, as a time-bound route to eliminating and eventually eradicating HAV (Săndulescu et al., 2026).
- **Special populations.** Only 59.7% of people living with HIV responded to a single dose given during the 2017 vaccine shortage (Noël et al., 2021). Responses are also lower in people taking immunosuppressive drugs (Garcia Garrido et al., 2019). This supports two-dose schedules and post-vaccination serology in these groups (see also Tsai et al., 2022).

Literature

Hepatitis A vaccines – update from SAGE

World Health Organization (2022). [Hepatitis A vaccines: WHO position paper - annexes and GRADE tables \(efficacy; long-term protection\)](#). Geneva: WHO / SAGE.

Evidence profiles behind the 2022 WHO recommendations, including single-dose and duration-of-protection evidence. Useful for the SAGE update.

Scientific evidence for the use of one dose

Mayorga, O, S Bühler, VK Jaeger, S Bally, C Hatz, G Frösner, U Protzer, P Van Damme, M Egger and C Herzog (2016). [Single-Dose Hepatitis A Immunization: 7.5-Year Observational Pilot Study in Nicaraguan Children to Assess Protective Effectiveness and Humoral Immune Memory Response](#). *J Infect Dis* 214(10): 1498-1506.

Ott, JJ and ST Wiersma (2013). [Single-dose administration of inactivated hepatitis A vaccination in the context of hepatitis A vaccine recommendations](#). *Int J Infect Dis* 17(11): e939-e944.

Systematic review that informed WHO's acceptance of single-dose schedules; background for the 'one dose' and SAGE talks.

Vizzotti, C, J González, C Rearte, et al. (2015). [Single-dose universal hepatitis A immunization in one-year-old children in Argentina: high prevalence of protective antibodies up to 9 years after vaccination.](#) *Pediatr Infect Dis J.*

: Argentina introduced single-dose universal childhood vaccination in 2005 and is the reference programme for the one-dose strategy; not in the draft.

Febriani, Y, MM Ursu, C Sauvageau, KB Kegbevi, C Quach, M Desjardins, J Bestman-Smith, V Gilca and N Brousseau (2026). [Immune memory assessment three years following a single dose of hepatitis a vaccine at 12, 13 or 19 months of age.](#)

Vaccine 73: 128144.

Introduction: We aimed to evaluate immunological memory after three different single-dose hepatitis A vaccination schedules.

Methods: Children were vaccinated using one of three schedules: 1) Twinrix® Junior at 12 months (Twinrix12); 2) Vaqta® pediatric at 13 months (Vaqta13); or 3) Vaqta® pediatric at 19 months of age (Vaqta19), followed by a challenge dose with Twinrix® Junior three years later. Blood samples were collected before and one month post-challenge dose.

Results: A total of 320 children were included in this analysis. Seropositivity (≥ 20 mIU/mL) three years post-primary vaccination was lower for the Twinrix12 schedule (40.2 %) compared to the Vaqta13 (65.6 %) or Vaqta19 schedules (77.6 %). One month post-challenge dose, the proportion of participants with an anamnestic response was high and similar across the three schedules (Twinrix12: 97.5 %; Vaqta13: 98.4 %; Vaqta19: 96.1 %).

Conclusion: Single-dose hepatitis A vaccination induced a strong immune response across the three schedules. However, further studies are needed to confirm long-term durability and population impact.

Lopatukhina, MA, KK Kyuregyan, AA Karlsen, FA Asadi Mobarkhan, IA Potemkin, VS Kichatova, OV Isaeva, LY Ilchenko, AA Saryglar and MI Mikhailov (2024). [The Immunological and Epidemiological Effectiveness of Pediatric Single-Dose Vaccination against Hepatitis A 9 to 11 Years after Its Implementation in the Tyva Republic, the Russian Federation.](#)

Vaccines (Basel) 12(8).

Since 2012, universal single-dose HAV vaccination in children aged 3 years and older has been implemented in the Tyva Republic, a region of the Russian Federation. The aim of this prospective non-interventional observational single-center study was to determine the immunological and epidemiological effectiveness of single-dose vaccination against hepatitis A 9 to 11 years after its implementation. The anti-HAV IgG antibodies were determined in two independent cohorts of children who were vaccinated with a single dose of monovalent pediatric inactivated vaccine (HAVRIX®) 720 EU in Tyva in 2012 and recruited 9 years (Year 9 Cohort) and 11 years (Year 11 Cohort) after immunization. The seroprotection rates defined as anti-HAV antibody concentrations ≥ 10 mIU/mL reached 99.4% (95% CI: 98.2-99.9% 501/504) in the Year 9 Cohort, but decreased significantly to 75.4% (95% CI: 73.0-77.6% 1006/1335) in the Year 11 Cohort ($p < 0.0001$). The anti-HAV geometric mean concentrations decreased from 1446.3 mIU/mL (95% CI: 1347.1-1545.4 mIU/mL) in the Year 9 Cohort to 282.6 mIU/mL (95% CI: 203.8-360.8, $p < 0.0001$) in the Year 11 Cohort. The HAV vaccination program resulted in zero rates of hepatitis A incidence in the Tyva Republic since 2016. However, the limited monitoring of HAV RNA in sewage and environmental samples demonstrated the ongoing circulation of both the regional epidemic strain of HAV genotype IA and another genotype IA strain imported recently from other parts of the Russian Federation, probably due to subclinical infections in non-vaccinated children under 3 years of age. Taken together, these data indicate the effectiveness of the single-dose HAV vaccination strategy but suggest the need to expand the vaccination program to include children aged 12 months and older to achieve maximum effectiveness.

Bierrenbach, AL, Y Choi, PM Batista, FB Serra, CI Parellada, GS Julian, K Nakajima and T Moreira (2021). [The Impact of an Inactivated Hepatitis A Vaccine with One Dose in Brazil: A Retrospective Time-Series.](#) *Vaccines (Basel)* 9(4).

BACKGROUND: In 2014, a recommended one-dose of inactivated hepatitis A vaccine was included in the Brazilian National Immunization Program targeting children 12-24 months. This decision addressed the low to intermediate endemicity status of hepatitis A across Brazil and the high rate of infection in children and adolescents between 5 and 19 years old. The aim of the study was to conduct a time-series analysis on hepatitis A incidence across age groups and to assess the hepatitis A distribution throughout Brazilian geographic regions. METHODS: An interrupted time-series analysis was performed to assess hepatitis A incidence rates before (2010-2013) and after (2015-2018) hepatitis A vaccine program implementation. The time-series analysis was stratified by age groups while a secondary analysis examined geographic distribution of hepatitis A cases. RESULTS: Overall incidence of hepatitis A decreased from 3.19/100.000 in the pre-vaccine period to 0.87/100.000 ($p = 0.022$) post-vaccine introduction. Incidence rate reduction was higher among children aged 1-4 years old, with an annual reduction of 67.6% in the post-vaccination period against a 7.7% annual reduction in the pre-vaccination period ($p < 0.001$). Between 2015 and 2018, the vaccination program prevented 14,468 hepatitis A cases. CONCLUSION: Our study highlighted the positive impact of a recommended one-dose inactivated hepatitis A vaccine for 1-4-years-old in controlling hepatitis A at national level.

Mikhailov, MI, MA Lopatukhina, FA Asadi Mobarhan, LY Ilchenko, TV Kozhanova, OV Isaeva, AA Karlsen, IA Potemkin, VS Kichatova, AA Saryglar, ND Oorzhak and KK Kyuregyan (2020). [Universal Single-Dose Vaccination against Hepatitis A in Children in a Region of High Endemicity](#). *Vaccines (Basel)* 8(4).

Espul, C, H Cuello, I Lo Castro, C Bravo, Y Thollot, J Voznica, C Vigne and L Coudeville (2020). [Statistical modeling alongside observational data predicts long-term immunogenicity of one dose and two doses of pediatric hepatitis A vaccine in the Mendoza province of Argentina](#). *Vaccine* 38(7): 1715-1722.

Zhang, Z, X Zhu, Y Hu, M Liang, J Sun, Y Song, Q Yang, H Ji, G Zeng, L Song and J Chen (2017). [Five-year antibody persistence in children after one dose of inactivated or live attenuated hepatitis A vaccine](#). *Hum Vaccin Immunother* 13(6): 1-6.

Zhang, X, J An, A Tu, X Liang, F Cui, H Zheng, Y Tang, J Liu, X Wang, N Zhang and H Li (2016). [Comparison of immune persistence among inactivated and live attenuated hepatitis A vaccines 2 years after a single dose](#). *Hum Vaccin Immunother* 12(9): 2322-2326.

Guo, Y, L Zhang, D Feng, S Zhao, Q Liu, J Xu, M Lu, J Li, Y Zhang and W Guo (2020). [The impact of universal live attenuated hepatitis A vaccines in Henan, China, 2005-2018](#). *Int J Infect Dis* 93: 163-167.

Sun, X, F Wang, H Zheng, N Miao, Q Yuan, F Cui, Z Yin, G Zhang and H Levine (2018). [The impact of expanded program on immunization with live attenuated and inactivated Hepatitis A vaccines in China, 2004-2016](#). *Vaccine* 36(10): 1279-1284.

Chen, GJ, HY Sun, KY Lin, SM Hsieh, YC Chuang, et al. (2023). [A Randomized Clinical Trial of 1-Dose vs Accelerated 2-Dose Schedule for Hepatitis A Virus \(HAV\) Revaccination Among People With Human Immunodeficiency Virus Who Were Nonresponders or Had Seroreversion After Primary HAV Vaccination](#). *Clin Infect Dis* 77(4): 529-536.

BACKGROUND: For people with human immunodeficiency virus (PWH) who have no serological responses to their primary hepatitis A virus (HAV) vaccination or have seroreversion after successful primary vaccination, the optimal revaccination strategy remains unclear. METHODS: In this open-label, randomized clinical trial, PWH who tested negative for anti-HAV antibodies after receiving a standard 2-dose series of primary HAV vaccination were enrolled and assigned in a 1:1 ratio to receive either 1 dose (the 1-dose group) or 2 doses of HAV vaccine administered 4 weeks apart (the 2-dose group). Serological response rates and anti-HAV antibody titers were compared at weeks 24 and 48. RESULTS: Of the 153 participants (77 in the 1-dose group and 76 in the 2-dose group), the overall serological response rates at week 48 after revaccination were similar between the 2 groups (2- vs 1-dose, 80.2% vs 71.4%, $P = .20$). However, anti-HAV antibody titers were consistently higher in the 2-dose group than in the 1-dose group. In subgroup analysis, PWH who were nonresponders to primary HAV vaccination were significantly more likely to mount a serological response after 2-dose HAV revaccination (68.4% vs 44.1%, $P = .038$). No severe adverse events were reported throughout the study. CONCLUSIONS: Two-dose HAV revaccination administered 4 weeks apart yielded similar serological responses as 1-dose revaccination among PWH who were nonresponders or had seroreversion after primary HAV vaccination. The 2-dose revaccination schedule generated significantly higher anti-HAV antibody titers and was more likely to elicit serological responses at week 48 among PWH who were nonresponders to primary HAV vaccination. Clinical Trials Registration. NCT03855176.

Liao, Z, XW Feng, XE Liu, YS Zhou, HR Wen, SH Peng, YX Zhang, B Xu, H Zhuang and HY Chen (2017). [Immune response to one booster dose of inactivated hepatitis A vaccine in college students](#). *Zhonghua Liu Xing Bing Xue Za Zhi* 38(5): 625-628.

Espul, C, HH Cuello, A Saravia, ME Vargas, C Bravo, C Augard and L Coudeville (2026). [Long-Term Antibody Persistence After Hepatitis A Vaccination in Healthy Toddlers: Insights from Modeling](#). *Infectious Diseases and Therapy* 15(2): 527-538. (<Go to ISI>://WOS:001636988300001)

Introduction: Argentina was the first South American country to adopt a single-dose hepatitis A vaccine for 1-year-old children, replacing the standard two-dose regimen in the immunization program in 2005. Here, we assessed the long-term persistence of anti-hepatitis A virus (HAV) antibodies following vaccination. Methods: A cohort of healthy toddlers from Mendoza, Argentina, who received one ($N = 436$) or two ($N = 108$) doses of the inactivated HAV vaccine (Avaxim (R) 80U Pediatric), were followed for up to 15 years post-vaccination to assess the persistence of anti-HAV antibodies. Three assays were used to measure anti-HAV antibody concentrations, depending on commercial availability. At year 15 follow-up, 161 and 48 participants who received one and two vaccine doses, respectively, without additional booster, remained in the study. Using all available data, we modeled long-term antibody persistence to project immunity to 40 years after vaccination. Antibody persistence was predicted using a hierarchical model that estimated both participant- and group-specific antibody decay, accounting for assay changes over time and natural boosting from virus exposure. Results: At year 15, anti-HAV antibody geometric mean concentrations (GMCs) were 73.7 (95% CI 65.0-83.6) mIU/ml and 291.1 (95% CI 226.1-375.0) mIU/ml among those who received one and two vaccine doses, respectively, and all remained seroprotected. Of the four model specifications tested, the log-logistic model with natural boosting provided the best fit to the observed antibody GMCs and seroprotection rates. At 40 years post-vaccination, GMCs were predicted to be 51.8 (95% CI 36.8-75.1) mIU/ml and 134.7 (95% CI 84.5-221.1) mIU/ml after one and two vaccine doses, respectively, with seroprotection rates of 94% (95% CI 89-98) and 93% (95% CI 88-97). Conclusions: The HAV vaccine, Avaxim (R), administered as one- or two-dose schedule, elicited long-lasting immunity in children, with a single dose sufficient to ensure long-term protection.

Needs to achieve global immunity through vaccination

Săndulescu, O, S Mantovani, AM Roque-Afonso, G Sahin, AK Rajan, M Altındış, VD Miron, S Küçükkaya and MU Mondelli (2026). [Achieving global immunity against hepatitis A through universal vaccination: a position paper from the European](#)

Society of Clinical Microbiology and Infectious Diseases Study Group for Viral Hepatitis. *Clin Microbiol Infect* 32(3): 416-426.

Hepatitis A virus (HAV) remains a preventable cause of acute viral hepatitis, with an estimated 159 million new infections and 39 000 deaths in 2019. Although improved care and hygiene reduced deaths, global incidence rose by approximately 4%, driven by increased symptomatic cases and population growth. The availability of safe and highly immunogenic vaccines and the absence of chronic carriage make HAV uniquely amenable to global eradication. SCOPE: This position paper, developed by the European Society of Clinical Microbiology and Infectious Diseases Study Group for Viral Hepatitis, analysed current epidemiology, vaccine performance, economic evidence, and operational experience to articulate a time-bound strategic framework for eradicating HAV through universal childhood immunisation supplemented by targeted catch-up, outbreak-response, and high-risk group programmes. METHODS: A comprehensive literature search was conducted in PubMed databases from inception to May 2025. The search strategy incorporated explicit terms related to HAV and vaccine effectiveness, implementation, and public health outcomes. The methodology adhered to established standards for developing evidence-based recommendations that were evaluated and refined through expert panel discussions within the European Society of Clinical Microbiology and Infectious Diseases Study Group for Viral Hepatitis, ensuring methodological transparency, accuracy, and alignment with current scientific evidence. QUESTIONS ADDRESSED BY THE POSITION PAPER AND RECOMMENDATIONS: To evaluate vaccine effectiveness, the following primary outcomes were considered: HAV infection rates, seroconversion rates, long-term immunogenicity, safety outcomes, outbreak control effectiveness, cost-effectiveness, barriers to vaccine implementation, strategies to enhance vaccine availability and uptake, and overall public health impact. Drawing on lessons from countries that have reduced hepatitis A by >95%, this document proposes policy actions to overcome barriers related to vaccine cost, production capacity, programme logistics, and vaccine hesitancy. The paper concludes that with concerted political commitment and incremental scale-up of vaccine supply, the global elimination of hepatitis A as a public health threat, and its eventual eradication, is achievable within a defined time frame.

Herzog, C, K Van Herck and P Van Damme (2021). Hepatitis A vaccination and its immunological and epidemiological long-term effects - a review of the evidence. *Hum Vaccin Immunother* 17(5): 1496-1519.

Hepatitis A virus (HAV) infections continue to represent a significant disease burden causing approximately 200 million infections, 30 million symptomatic illnesses and 30,000 deaths each year. Effective and safe hepatitis A vaccines have been available since the early 1990s. Initially developed for individual prophylaxis, HAV vaccines are now increasingly used to control hepatitis A in endemic areas. The human enteral HAV is eradicable in principle, however, HAV eradication is currently not being pursued. Inactivated HAV vaccines are safe and, after two doses, elicit seroprotection in healthy children, adolescents, and young adults for an estimated 30-40 years, if not lifelong, with no need for a later second booster. The long-term effects of the single-dose live-attenuated HAV vaccines are less well documented but available data suggest they are safe and provide long-lasting immunity and protection. A universal mass vaccination strategy (UMV) based on two doses of inactivated vaccine is commonly implemented in endemic countries and eliminates clinical hepatitis A disease in toddlers within a few years. Consequently, older age groups also benefit due to the herd protection effects. Single-dose UMV programs have shown promising outcomes but need to be monitored for many more years in order to document an effective immune memory persistence. In non-endemic countries, prevention efforts need to focus on 'new' risk groups, such as men having sex with men, prisoners, the homeless, and families visiting friends and relatives in endemic countries. This narrative review presents the current evidence regarding the immunological and epidemiological long-term effects of the hepatitis A vaccination and finally discusses emerging issues and areas for research.

Buti, M, P Bonanni, N Ladeb, G Papatheodoridis, M Fruhwein, C James, JW Ward, V Vetter, P Cacciatore, D Kesters, P Dewda and P Van Damme (2025). Toward elimination of hepatitis A and B in Europe: vaccination successes, challenges, and opportunities. *Expert Rev Vaccines* 24(1): 373-383.

INTRODUCTION: Hepatitis B and hepatitis A are vaccine-preventable infections of global concern. Hepatitis B virus (HBV) and hepatitis A virus (HAV) vaccines available in Europe are underutilized in some age groups. While most European countries implemented childhood HBV universal routine vaccination (URV), vaccination coverage among adults remains low. Low HAV vaccination coverage among high-risk populations due to variable national vaccination policies, low awareness of vaccination benefits, and other barriers, increases the risk for outbreaks. AREAS COVERED: We discuss the awareness of hepatitis B and hepatitis A burden in different populations in Europe, vaccination recommendations, successes, challenges, and opportunities for their implementation. EXPERT OPINION: Awareness of at-risk populations and HBV/HAV vaccination recommendations should be raised among healthcare providers and the general population to increase access to vaccination. Increasing awareness that HBV vaccination contributes to reduction in the incidence of hepatocellular carcinoma can motivate adults to get vaccinated. Adult HBV URV may be considered in Europe, as in the United States, pending cost-effectiveness assessment at national levels. HAV vaccination recommendations should be updated and expanded to all at-risk persons. National HBV/HAV targets and vaccination strategies should be actively promoted to accelerate the elimination of viral hepatitis in Europe.

Hepatitis B and hepatitis A virus (HBV and HAV) infections cause liver inflammation (hepatitis), with potentially severe disease requiring hospitalization. Chronic HBV infection may lead to liver damage and liver cancer. HAV infection can be life-threatening, particularly in older individuals or those with preexisting liver conditions. High HAV prevalence in certain countries increases infection risk for travelers and can trigger outbreaks. Unvaccinated persons, particularly those with risk exposures (e.g. travelers, men who have sex with men, or people who inject drugs), are at increased risk of infection with HBV or HAV. Vaccines against HBV and HAV with an acceptable safety profile and demonstrated effectiveness are available. However, people are often unaware of the risks of infection and the lifelong benefits of vaccination against HBV and HAV. Both patients and clinicians should be made aware of the severity of these infections, the risk of liver cancer from chronic hepatitis B, and how vaccines may help preventing threats to health from HAV and HBV infection. While most European countries have introduced universal childhood HBV vaccination, unvaccinated adults remain at risk for HBV infection later in life. Routine adult HBV vaccination could be considered in Europe, as in the United States, to better guarantee reaching risk populations and ensure protection before exposure to these infections. HAV vaccination recommendations differ across European countries. Overall, the policies and recommendations should be updated and harmonized across countries to ensure persons at risk are offered with a possibility to protect themselves with HBV and HAV vaccination.

Mwaijande, SE and GE Mpogolo (2023). [Modeling the Transmission Dynamics of Hepatitis A with Combined Vaccination and Sanitation Mitigation](#). *Comput Math Methods Med* 2023: 1203049.

A mathematical model for the Hepatitis A Virus (HAV) epidemiology with dual transmission mechanisms is developed and presented. The model considers vaccination and sanitation as mitigation strategies. The effective reproductive number was derived and employed to study the stability of the model. Using Routh's stability criteria, the local stability of a disease-free equilibrium was determined, whereas the global stability of the endemic equilibrium was attained through a suitable Lyapunov function. Furthermore, bifurcation analysis is carried out using the centre manifold theory to ascertain its nature and implication for disease control. It was revealed that the model exhibits a forward bifurcation indicating the possibility of disease eradication when the effective reproduction number is kept below unity. Numerical results indicate that infection rates decrease quantitatively when at least one control measure is effectively implemented. It was deduced that combining vaccination and sanitation yields even fewer cases, making it the best alternative for eliminating Hepatitis A (HA) infection from the community. A sensitivity analysis was conducted to ascertain the parameters of the strong influence that could significantly affect the system. It was revealed that constant recruitment and vaccination coverage were the most critical parameters affecting the system. In addition, the study found that direct transmission plays an essential role in the occurrence of HA infection. In contrast, indirect transmission contributes marginally but significantly to the prevalence of HA infection.

Badur, S, S Öztürk, A Ozakay, M Khalaf, D Saha and P Van Damme (2021). [A review of the experience of childhood hepatitis A vaccination in Saudi Arabia and Turkey: implications for hepatitis A control and prevention in the Middle East and North African region](#). *Hum Vaccin Immunother* 17(10): 3710-3728.

In most countries of the Middle East and Northern African (MENA) region, a high hepatitis A virus (HAV) endemicity has been documented. Few others, such as Saudi Arabia and Turkey, are transitioning from high to intermediate endemicity. There is a paucity of recently published HAV disease burden that could be useful to inform or strengthen relevant national hepatitis A vaccination policy and other prevention strategies in the region. This review summarizes information on HAV epidemiology before and after the implementation of a childhood hepatitis A vaccination program in Saudi Arabia and Turkey. In both countries, a clear shift in the age of first HAV exposure has been documented, with more homogeneous trends across regions in Saudi Arabia compared to Turkey. Utilizing the experience of Saudi Arabia and Turkey with hepatitis A vaccination, countries in the region are encouraged to foster discussions on potential vaccination strategies suitable for their own setting.

Vaccine response in special populations (HIV, immunosuppression)

Lin, KY, YC Huang, MH Huang, TY Tsai, GJ Chen, YS Huang, SH Huang, HY Sun and CC Hung (2026). [Hepatitis A to E in People with HIV: A Virus-Specific Review of Prevention and Treatment](#). *Infect Dis Ther* 15(2): 391-415.

People with HIV (PWH) are disproportionately affected by viral hepatitis as a result of overlapping transmission routes, reduced vaccine immunogenicity, altered disease progression, and unique therapeutic considerations under HIV-related immunosuppression. Although the scale-up of antiretroviral therapy (ART) and direct-acting antivirals (DAAs) has significantly improved outcomes, viral hepatitis remains a major cause of liver-related morbidity and mortality in this population. This virus-specific review summarizes current knowledge and recent advances in the epidemiology, vaccination, and treatment strategies for hepatitis A through E (i.e., hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus (HDV), and hepatitis E virus (HEV); HAV-HEV) among PWH. HAV has re-emerged in community outbreaks among men who have sex with men (MSM), with prolonged or atypical presentations in people who are immunocompromised, underscoring the need for improved vaccination coverage and durable immunity. HBV coinfection remains the most clinically significant challenge, requiring lifelong dual-active ART and raising persistent concerns about poor vaccine response and long-term protection. HCV has become curable with DAAs, yet reinfection-particularly among MSM and people who inject drugs-remains a major barrier to microelimination. HDV, though less prevalent, causes severe liver disease and now has promising targeted therapies under clinical use or investigation. HEV is increasingly recognized as an underdiagnosed pathogen and potentially chronic infection in people who are immunocompromised, with limited diagnostic availability and global accessibility to effective vaccine. Effective hepatitis prevention and treatment in PWH must address the immunologic, clinical, and virologic nuances of each virus. Integrated models of care that combine HIV and hepatitis services are essential to improving long-term liver health, reducing disparities, and advancing toward global goals of viral hepatitis elimination.

Tsai, PH, MS Tsai, YH Chiang, CY Shih, CY Liu, YC Chuang and CJ Yang (2022). [Effectiveness of hepatitis A vaccination among people living with HIV in Taiwan: Is one dose enough?](#). *J Microbiol Immunol Infect* 55(1): 18-25.

BACKGROUND: Single dose hepatitis A virus (HAV) vaccine had been proven its efficacy in immunocompetent but not immunocompromised hosts. We aim to investigate the effectiveness of one dose versus 2 doses HAV vaccine among people living with HIV (PLHIV). METHOD: We conducted a 1:1 single center retrospective case-control study for PLHIV in Northern Taiwan. Case patients were those who received single dose HAV vaccine and controls were those who completed standard 2 doses HAV vaccine. Nationwide campaign of single dose HAV vaccine had been practiced for high risk population including PLHIV and those who had newly diagnosed sexually transmitted diseases. RESULTS: During February 2016 and December 2017, 90 cases received single dose HAV vaccine provided while the other 90 age-matched controls received 2 doses vaccine were enrolled. We found more injection drug users (22.22% vs. 1.11%, $p < 0.0001$), more co-infection with viral hepatitis C (28.89% vs. 5.56%, $p < 0.0001$), and history of syphilis infection (56.67% VS 30%, $p = 0.0003$) in single dose group than 2 doses group. Seroconversion rate at one year was significantly higher in 2 doses group (97.78% vs 56.67%, $p < 0.0001$). Among single dose group, people with hepatitis B or C virus co-infection (HBV: $p = 0.02$, aOR: 0.03, 95% CI: 0.002-0.55; HCV: $p = 0.002$, aOR: 0.22, 95% CI: 0.08-0.58) were less likely to achieve seropositivity, while those who had higher CD4 count at baseline and one year, had better response to vaccine. CONCLUSION: Two doses HAV vaccine is necessary among PLHIV to achieve sustained seroresponse rather than single dose.

Lin, KY, SM Hsieh, HY Sun, YC Lo, WH Sheng, YC Chuang, A Cheng, SC Pan, GJ Chen, CC Hung and SC Chang (2018). [Serologic responses and effectiveness of hepatitis A vaccination among human immunodeficiency virus-positive individuals during the outbreak of acute hepatitis A](#). *Hepatology* 68(1): 22-31.

Noël, L, R Tubiana, A Simon, MA Valantin, R Palich, C Blanc, C Katlama, AG Marcelin, V Calvez and E Todesco (2021). [Low immune response rate of HIV-infected patients to a single injection of hepatitis A vaccine](#). *Infect Dis Now* 51(1): 94-96.

OBJECTIVES: We aimed to evaluate the immune response of HIV-1 positive patients to a single injection of HAV vaccine in a context of vaccine shortage during the 2017 European outbreak. METHODS: We retrospectively enrolled all HIV-1 positive patients vaccinated by a single injection of HAV vaccine Vaqta 50®. HAV serology was performed before and >30 days after the vaccine injection. RESULTS: Among the 73 patients, HIV-1 viral load was ≤50 copies/mL in 93.2% of the cases. Medians of CD4 and median ratio of T CD4/CD8 cells were 658/mm³ and 0.9, respectively. A low immune response rate (59.7%) was observed among the patients. Responders had a significantly higher CD4/CD8 cell ratio than non-responders. CONCLUSIONS: A serologic control should be recommended in this population in the event of a single injection vaccination schedule. During routine follow-up, and prior to any untoward event, physicians should assess the vaccination coverage of HIV-infected patients.

Garcia Garrido, HM, AM Veurink, M Leeflang, R Spijker, A Goorhuis and MP Grobusch (2019). [Hepatitis A vaccine immunogenicity in patients using immunosuppressive drugs: A systematic review and meta-analysis](#). *Travel Med Infect Dis* 32: 101479.

Lin, KY, HY Sun, YS Huang, WD Liu, SM Hsieh, SH Huang, GJ Chen and CC Hung (2023). [Durability of serologic responses to inactivated hepatitis A virus vaccination among people living with HIV following acute hepatitis A outbreak: a 5-year follow-up study](#). *Emerg Microbes Infect* 12(2): 2239946.

Serologic responses to hepatitis A virus (HAV) vaccination may wane among immunocompromised populations. To evaluate the long-term seroresponses to 2-dose HAV vaccination, we retrospectively included people living with HIV (PLWH) who had achieved seroconversion within 12 months after vaccination at a university hospital during an outbreak of acute hepatitis A between 2015 and 2017. PLWH included in the study received either Havrix or Vaqta. The seroresponses were evaluated 60 months after the second dose of vaccination and estimated by the intention-to-treat (ITT) with last-observation-carried-forward (LOCF) and per-protocol (PP) analyses. Overall, 986 PLWH (median age, 34 years and CD4 count, 587 cells/μL) were included. The rates of PLWH with persistent seroprotection at month 60 of vaccination were 90.7% (894/986) and 97.4% (748/768) in the ITT with LOCF and PP analyses, respectively. PLWH with persistent seroprotection had achieved higher peak anti-HAV IgG titers after vaccination and had a slower decline in antibody levels compared with those with seroreversion. In the multivariable analysis, seroreversion at month 60 was associated with a higher body-mass index (per 1-kg/m² increase, AOR, 1.10; 95% CI, 1.04-1.17), lowest-ever CD4 count (per 10-cell/μL increase, AOR 0.98; 95% CI, 0.97-1.00), plasma HIV RNA <200 copies/ml at vaccination (AOR, 0.28; 95% CI, 0.14-0.59), and having received Vaqta as the first dose of HAV vaccination (AOR, 0.44; 95% CI, 0.27-0.70). The seroprotection against HAV remained high in the long-term follow-up among PLWH on antiretroviral therapy after 2-dose HAV vaccination. Regular monitoring of seroresponses and timely administration of HAV vaccines are warranted to maintain seroprotection.

DeGroot, NP, CL Mattson, Y Tie, JT Brooks, S Garg and J Weiser (2018). [Hepatitis A virus immunity and vaccination among at-risk persons receiving HIV medical care](#). *Prev Med Rep* 11: 139-144.

Koibuchi, T, M Koga, T Kikuchi, T Horikomi, Y Kawamura, LA Lim, E Adachi, T Tsutsumi and H Yotsuyanagi (2020). [Prevalence of Hepatitis A Immunity and Decision-tree Analysis Among Men Who Have Sex With Men and Are Living With Human Immunodeficiency Virus in Tokyo](#). *Clin Infect Dis* 71(3): 473-479.

Lin, JJ, YT Lee and HJ Yang (2020). [Factors associated with hepatitis A virus infection among HIV-positive patients before and after implementation of a hepatitis A virus vaccination program at a medical centre in central Taiwan](#). *Sex Health* 17(3): 239-246.

Session 5 · Economic analysis, health literacy and vaccination willingness

Day 1 · 13 October 2026 · 15:50–17:45 · Chairs: Thomas Vanwolleghem – Sema Mandal

15:50–16:10	Impact of hepatitis A vaccination in Spain: evolution of hospitalization	Pere Godoy
16:10–16:30	Viral hepatitis knowledge and awareness	Sandra Dudareva
16:30–16:45	Q&A	
16:45–17:05	Duration of protection	Brian McMahon (online)
17:05–17:45	Interactive discussions: universal vs risk-based vaccination (travel, food handlers); cost-effectiveness analyses; challenges and needs for health literacy and vaccination willingness	

Background in brief

- **Hospital burden.** In Spain (2000–2021), the cumulative hepatitis A hospitalisation incidence was 8.84 per million. Men were hospitalised more than women (RR 2.38). Stays over 7 days were associated with age 60 or older (aOR 5.09), cirrhosis (aOR 6.11) and HIV or HBV co-infection (Domínguez et al., 2025).
- **The economic evidence is mixed.** Outbreak-related healthcare and surveillance costs per million population were 1.75 times higher in Spanish regions without universal childhood vaccination than in Catalonia (Plans-Rubió et al., 2024). Yet a dynamic model found universal infant vaccination not cost-effective from the Spanish NHS perspective (Valcarcel-Nazco et al., 2023). Differences in perspective, outbreak costs and herd effects deserve discussion.
- **Knowledge and coverage gaps among MSM.** In EMIS-2017 (113,884 MSM, 43 countries), 68% had basic viral hepatitis knowledge, ranging from 50% to 80% by country (Burdi et al., 2024). Only 48% reported ever being vaccinated against hepatitis A. Vaccination was recommended and free for MSM in just 7 of 43 countries, and uptake was higher where it was (aOR 2.22) (Brandl et al., 2024).
- **Long-term protection.** In Alaska, 81% of participants still had protective anti-HAV levels 25 years after childhood vaccination, so no booster is needed at 25 years (Ramaswamy et al., 2021). One dose given during outbreaks stopped transmission within 4–8 weeks, but data beyond 25 years are lacking (Balta et al., 2026). In a European adult cohort, 20 years of data and modelling point to long-term persistence after two doses (Theeten et al., 2015).

Literature

Impact of hepatitis A vaccination in Spain: evolution of hospitalization– and economic analyses

Domínguez, A, N Torner, N Soldevila, C Varela, M Guerrero-Vadillo, M Peñuelas, A Avellón, E Borràs, A Martínez, P Plans, C Pericas, C Rius and P Godoy (2025). [Hepatitis A in Spain: Evolution of hospitalization in the period 2000-2021](#). *PLoS One* 20(9): e0332317.

BACKGROUND: Hepatitis A is an acute disease of the liver caused by the hepatitis A virus (HAV). Chronic liver disease, other viral hepatitis coinfections, and age over 50 years are the main host factors associated with an increased risk of complications. We investigated the evolution of hepatitis A hospitalizations and in-hospital deaths during 2000-2021 in Spain according to demographic characteristics, presence of other sexually transmitted infections, and vaccination strategy (universal or risk-group vaccination). **METHODS:** Using data from the Spanish National Health System's Minimum Basic Data Set, we calculated age-standardized cumulative hospitalization incidence and 95% confidence interval (CI), factors associated with hospital stay, and hospitalization deaths. Adjusted OR (aOR) values were calculated using a multivariate logistic regression model. **RESULTS:** The Spanish cumulative hospitalization incidence for hepatitis A over the 22-year period was 8.84 per 1 000 000 globally and 12.54 and 5.26 per 1 000 000 for men and women, respectively (RR = 2.38; 95% CI: 2.28-2.50). Median length of stay was 4 days (range 0-85). Factors associated with hospitalization >7 days were age groups 40-59 and ≥60 years (aOR 1.58; 95% CI: 1.37-1.82 and aOR 5.09; 95% CI: 4.01-6.47, respectively), cirrhosis (aOR 6.11; 95% CI: 2.59-14.43), and presence of HIV and HBV (aOR 1.65; 95% CI: 1.15-2.38 and 2.01; 95% CI: 1.03-3.63, respectively). In-hospital deaths were associated with age ≥ 60 years (aOR 35.23; 95% CI: 11.12-111.58), hospitalization >7 days (aOR 4.37; 95% CI: 1.80-10.58), cirrhosis (aOR 8.84; 95% CI: 2.37-32.99), and HCV infection (aOR 8.66; 95% CI: 1.57-47.87). The cumulative hospitalization incidence was lower in regions

implementing universal vaccination (RR 0.79; 95% CI: 0.75-0.84). CONCLUSION: Results of studies based on characteristics of hospitalized hepatitis A cases taking into account the existing prevention policies can be useful to have a better knowledge about its evolving epidemiology and to improve the prevention and control of the disease.

Plans-Rubió, P, C Pericas, AM Avellon, C Izquierdo, A Martínez, N Torner, A Martínez, E Borrás, F Roig, P Godoy and C Rius (2024). [Healthcare and Epidemiological Surveillance Costs of Hepatitis A Outbreaks in Spain in Regions with and without Universal Hepatitis A Vaccination of Children during 2010-2018](#). *Vaccines (Basel)* 12(6).

The aim of this study was to evaluate and compare hepatitis A outbreak-associated healthcare and epidemiological surveillance costs in Spain in two types of autonomous regions during 2010-2018: (1) regions with a prevention strategy based on universal hepatitis A vaccination of children and vaccination of high-risk population groups (Catalonia) and (2) regions with a prevention strategy based on vaccinating high-risk population groups (Castile and Leon, Murcia, Navarra, Community of Madrid, Community of Valencia). Healthcare costs were determined based on the resources used to treat hepatitis A outbreak-associated cases and hospitalizations. Epidemiological surveillance costs were calculated from the resources used during surveillance activities. The ratios for total, healthcare and epidemiological surveillance costs (regions without universal hepatitis A vaccination of children vs. Catalonia) were used to compare the two hepatitis A prevention strategies. From 2010 to 2018, the total, healthcare and epidemiological surveillance costs per million population were 1.75 times (EUR 101,671 vs. EUR 58,032), 1.96 times (EUR 75,500 vs. EUR 38,516) and 1.34 times greater (EUR 26,171 vs. EUR 19,515) in regions without universal hepatitis A vaccination of children than in Catalonia, respectively. The ratios tended to increase over time during 2010-2018. In 2015-2018, total, healthcare and epidemiological surveillance costs per million population were 2.68 times (EUR 69,993 vs. EUR 26,158), 2.86 times (EUR 53,807 vs. EUR 18,825) and 2.21 times greater (EUR 16,186 vs. EUR 7333) in regions without universal hepatitis A vaccination of children than in Catalonia, respectively. These findings suggest that universal hepatitis A vaccination of children could reduce hepatitis A outbreak-associated costs.

Valcarcel-Nazco, C, E Sanroma-Ramos, L Garcia-Perez, RJ Villanueva-Mico, C Burgos-Simon and J Mar (2023). [Cost-effectiveness of universal childhood vaccination against hepatitis A in Spain: a dynamic approach](#). *Gac Sanit* 37: 102292.

OBJECTIVE: To evaluate the cost-effectiveness of infant universal vaccination against hepatitis A in Spain. METHOD: Using a dynamic model and decision tree model, a cost-effectiveness analysis was performed to compare three vaccination strategies against hepatitis A: non-vaccination strategy versus universal childhood vaccination of hepatitis A with one or two doses. The perspective of the study was that of the National Health System (NHS) and a lifetime horizon was considered. Both costs and effects were discounted at 3% per year. Health outcomes were measured in terms of quality adjusted life years (QALY) and the cost-effectiveness measure used was the incremental cost-effectiveness ratio (ICER). In addition, deterministic sensitivity analysis by scenarios was performed. RESULTS: In the particular case of Spain, with low endemicity for hepatitis A, the difference in health outcomes between vaccination strategies (with 1 or 2 doses) and non-vaccination are practically non-existent, terms of QALY. In addition, the ICER obtained is high, exceeding the limits of willingness to pay from Spain (euro22,000-25,000/QALY). The deterministic sensitivity analysis showed that the results are sensitive to the variations of the key parameters, although in no case the vaccination strategies are cost-effective. CONCLUSIONS: Universal infant vaccination strategy against hepatitis A would not be a cost-effective option from the NHS perspective in Spain.

Gountas, I, SE Talbird, J Carrico, C Cook, A Skroumpelos, E Boutselakou, G Trimis, A Michos, I Pavlopoulou, G Bencina and U Sabale (2025). [The public health and economic impact of the Greek pediatric national immunization program](#). *Expert Rev Vaccines* 24(1): 924-935.

BACKGROUND: Vaccines are one of the most effective healthcare tools to prevent morbidity and mortality from infectious diseases. RESEARCH DESIGN AND METHODS: A decision tree model was used to evaluate the public health and economic impact of the Greek pediatric national immunization program (NIP) over the lifetime of the 2022 Greek birth cohort. The model included nine Greek NIP routine vaccines for children aged 2 months to 11 years, targeting 14 vaccine-preventable diseases: diphtheria, hepatitis A, hepatitis B, Haemophilus influenzae type B, measles, meningococcal disease, mumps, pertussis, pneumococcal disease, poliomyelitis, rotavirus, rubella, tetanus, and varicella. The outcomes (discounted 3% annually) included estimated disease cases and deaths averted, life-years (LYs) and quality-adjusted life-years (QALYs) gained, total costs averted (2022 euros), and benefit-cost ratios (BCR) from healthcare-sector and societal perspectives. RESULTS: The Greek pediatric NIP prevented 447,221 disease cases and 242 deaths, resulting in 6,682 LYs and 9,741 total QALYs gained for the 2022 birth cohort. Costs averted were euro23.2 million (BCR = 1.3) from the healthcare-sector perspective; costs averted from the societal perspective were euro201.4 million (BCR = 3.1), plus euro514.0 million in value of QALYs gained (BCR = 8.5). CONCLUSION: The Greek pediatric NIP provides extensive public health and economic benefits for Greece by reducing morbidity and mortality from vaccine-preventable diseases.

Immunization programs are essential public health measures used by countries to reduce vaccine-preventable diseases. This study is the first to estimate the public health and economic impact of the Greek pediatric national immunization program (NIP). The analysis adapted a previously published model to include nine vaccines (targeting 14 vaccine-preventable diseases) from the Greek pediatric NIP for children aged 2 months to 11 years. The number of cases and deaths over the lifetime of Greek children born in 2022 was calculated by applying disease and death rates with or without a NIP to the 2022 birth cohort. Our results show that continuous implementation of the Greek pediatric NIP is estimated to prevent 447,221 cases of disease, avert 242 deaths, and save over euro200 million in costs. Taking into account vaccination program costs, reduced treatment expenses, reduced work loss, improved quality-of-life, and fewer deaths, every euro1 invested in immunizations is projected to yield euro8.5 in societal cost-savings. The continued investment in the Greek pediatric NIP will not only prevent illness and death from vaccine-preventable diseases but also provide economic benefits for Greece.

Luyten, J, S Van de Sande, K de Schrijver, P Van Damme and P Beutels (2012). [Cost-effectiveness of hepatitis A vaccination for adults in Belgium](#). *Vaccine* 30(42): 6070-6080.

GSK Curran, D, M de Ridder and T Van Effelterre (2016). [The impact of assumptions regarding vaccine-induced immunity on the public health and cost-effectiveness of hepatitis A vaccination: Is one dose sufficient?](#). *Hum Vaccin Immunother* 12(11): 2765-2771.

Horn, EK, O Herrera-Restrepo, AM Acosta, A Simon, B Jackson and E Lucas (2024). [The Burden of Hepatitis A Outbreaks in the United States: Health Outcomes, Economic Costs, and Management Strategies](#). *J Infect Dis* 230(1): e199-e218.

BACKGROUND: Hepatitis A (HepA) vaccines are recommended for US adults at risk of HepA. Ongoing United States (US) HepA outbreaks since 2016 have primarily spread person-to-person, especially among at-risk groups. We investigated the health outcomes, economic burden, and outbreak management considerations associated with HepA outbreaks from 2016 onwards. METHODS: A systematic literature review was conducted to assess HepA outbreak-associated health outcomes, health care resource utilization (HCRU), and economic burden. A targeted literature review evaluated HepA outbreak management considerations. RESULTS: Across 33 studies reporting on HepA outbreak-associated health outcomes/HCRU, frequently reported HepA-related morbidities included acute liver failure/injury (n = 6 studies of 33 studies) and liver transplantation (n = 5 of 33); reported case fatality rates ranged from 0% to 10.8%. Hospitalization rates reported in studies investigating person-to-person outbreaks ranged from 41.6% to 84.8%. Ten studies reported on outbreak-associated economic burden, with a national study reporting an average cost of over \$16 000 per hospitalization. Thirty-four studies reported on outbreak management; challenges included difficulty reaching at-risk groups and vaccination distrust. Successes included targeted interventions and increasing public awareness. CONCLUSIONS: This review indicates a considerable clinical and economic burden of ongoing US HepA outbreaks. Targeted prevention strategies and increased public awareness and vaccination coverage are needed to reduce HepA burden and prevent future outbreaks.

Batdorf, SJ, MG Hofmeister, TC Surtees, ED Thomasson, SM McBee and NJ Pauly (2021). [Estimated Medicaid Costs Associated with Hepatitis A During an Outbreak - West Virginia, 2018-2019](#). *MMWR Morb Mortal Wkly Rep* 70(8): 269-272.

Hepatitis A is a vaccine-preventable disease caused by the hepatitis A virus (HAV). Transmission of the virus most commonly occurs through the fecal-oral route after close contact with an infected person. Widespread outbreaks of hepatitis A among persons who use illicit drugs (injection and noninjection drugs) have increased in recent years (1). The Advisory Committee on Immunization Practices (ACIP) recommends routine hepatitis A vaccination for children and persons at increased risk for infection or severe disease, and, since 1996, has recommended hepatitis A vaccination for persons who use illicit drugs (2). Vaccinating persons who are at-risk for HAV infection is a mainstay of the public health response for stopping ongoing person-to-person transmission and preventing future outbreaks (1). In response to a large hepatitis A outbreak in West Virginia, an analysis was conducted to assess total hepatitis A-related medical costs during January 1, 2018-July 31, 2019, among West Virginia Medicaid beneficiaries with a confirmed diagnosis of HAV infection. Among the analysis population, direct clinical costs ranged from an estimated \$1.4 million to \$5.6 million. Direct clinical costs among a subset of the Medicaid population with a diagnosis of a comorbid substance use disorder ranged from an estimated \$1.0 million to \$4.4 million during the study period. In addition to insight on preventing illness, hospitalization, and death, the results from this study highlight the potential financial cost jurisdictions might incur when ACIP recommendations for hepatitis A vaccination, especially among persons who use illicit drugs, are not followed (2).

Hofmeister, MG, S Yin, MV Aslam, EH Teshale and PR Spradling (2020). [Hepatitis A Hospitalization Costs, United States, 2017](#). *Emerg Infect Dis* 26(5): 1040-1041.

Samant, S, E Chen, C Carias and SA Kujawski (2024). [Healthcare resource utilization and costs associated with hepatitis A in the United States: a retrospective database analysis](#). *J Med Econ* 27(1): 1046-1052.

AIM: To investigate hepatitis A-related healthcare resource use and costs in the US. METHODS: The Merative Marketscan Commercial Claims and Encounters database was retrospectively analyzed for hepatitis A-related inpatient, outpatient, and emergency department (ED) claims from January 1, 2012 to December 31, 2018. We calculated the hepatitis A incidence proportion per 100,000 enrollees, healthcare resource utilization, and costs (in 2020 USD). Results were stratified by age, gender, and select comorbidities. RESULTS: The overall hepatitis A incidence proportion was 6.1 per 100,000 enrollees. Among individuals with ≥1 hepatitis A-related claim, the majority (92.6%) had ≥1 outpatient visit related to hepatitis A; 9.1% were hospitalized and 4.2% had ≥1 ED visit. The mean (standard deviation SD) length of hospital stay was 5.2 (8.1) days; the mean (SD) number of outpatient and ED visits were 1.3 (1.3) and 1.1 (0.6), respectively. The incidence proportion per 100,000 was higher among adults than children (7.5 vs. 1.5), individuals with HIV than those without (126.7 vs. 5.9), and individuals with chronic liver disease than those without (143.6 vs. 3.8). The total mean (SD)/median (interquartile range, IQR) per-patient cost for hepatitis A-related care was \$2,520 (\$10,899)/\$156 (\$74-\$529) and the mean cost of hospitalization was 18.7 times higher than that of outpatient care (\$17,373 vs. \$928). LIMITATIONS: The study data included only a commercially insured population and may not be representative of all individuals. CONCLUSIONS: In conclusion, hepatitis A is associated with a substantial economic burden among privately insured individuals in the US.

Hepatitis A is an acute liver infection caused by the hepatitis A virus. In the US, safe and effective vaccines for hepatitis A have been available since 1996. Vaccination recommendations include children (all children aged 12–23 months and previously unvaccinated children aged 2–18 years old) and adults at risk of infection or severe disease (e.g. international travelers, men who have sex with men, persons experiencing homelessness, persons with chronic liver disease or persons with HIV infection). Since 2016, the US has experienced person-to-person outbreaks of hepatitis A, primarily affecting unvaccinated individuals who use drugs or are experiencing homelessness. To better understand the impact of hepatitis A in the US, we assessed healthcare resource use and costs in 15,435 patients with hepatitis A from 2012 to 2018 in the Merative Marketscan Commercial Claims and Encounters database. We found that slightly more than 6 per 100,000 enrollees had hepatitis A from 2012 to 2018 and the number of people treated for hepatitis A per 100,000 was highest for people living with HIV or with chronic liver disease. The majority (92.6%) of people reported at least an outpatient visit, 9.1% were hospitalized, and 4.2% had an emergency department visit. The average cost for hepatitis A-related care was \$2,520 per patient and was 18.7 times higher for hospitalized patients (\$17,373) than for patients treated in outpatient care (\$928). Our results are limited by the

generalizability of the dataset, which is a convenience sample of private insurance claims, and are therefore unlikely to capture groups at high-risk for hepatitis A, such as individuals experiencing homelessness. In conclusion, hepatitis A leads to considerable healthcare costs for privately insured individuals in the US.

Wasuwanich, P, JM So, S Rajborirug and W Karnsakul (2024). [Hepatitis A hospitalisations in the United States and risk factors for inpatient mortality: A nationwide population study, 1998-2020](#). *J Viral Hepat* 31(2): 88-95.

Hepatitis A virus infections in the United States have been declining; however, recent widespread outbreaks have brought the disease back into the spotlight. We aim to describe the epidemiology of hepatitis A hospitalisations from 1998 to 2020 in the United States and investigate risk factors for inpatient mortality. We utilised the National Inpatient Sample database and identified hepatitis A-related hospitalisations using ICD-9 and ICD-10 diagnosis codes. Demographic and clinical data including death, coinfections, comorbidities and pregnancy status were extracted. Data were analysed by logistic and Poisson regression. We identified a total of 213,681 hepatitis A-related hospitalisations between 1998 and 2020, with hospitalisation rates ranging between 22.4 per 1,000,000 and 62.9 per 1,000,000. Between 1998 and 2015, the hospitalisation rate for hepatitis A was decreasing (IRR = 0.98; 95% CI: 0.97-0.98; $p < .001$); however, between 2015 and 2020, it increased overall (IRR = 1.22; 95% CI: 1.21-1.23; $p < .001$). The overall inpatient mortality rate was 2.7%. Age ≥ 55 years (OR = 1.84; 95% CI: 1.41-2.40; $p < .001$), alcoholic cirrhosis (OR = 2.53; 95% CI: 1.64-3.90; $p < .001$), ascites (OR = 2.65; 95% CI: 1.86-3.78; $p < .001$), hepatorenal syndrome (OR = 9.04; 95% CI: 5.93-13.80; $p < .001$), heart failure (OR = 1.76; 95% CI: 1.29-2.39; $p < .001$), pulmonary hypertension (OR = 2.02; 95% CI: 1.28-3.19; $p = .003$) and malignant neoplasm (OR = 1.75; 95% CI: 1.25-2.45; $p = .001$) were associated with increased odds of mortality. Tobacco use disorder (OR = 0.52; 95% CI: 0.38-0.70; $p < .001$) was associated with decreased odds of mortality. None of the hepatitis A-associated hospitalisations involving pregnant women resulted in death. Hepatitis A hospitalisations initially declined but increased rapidly after 2015. Certain risk factors can be used to predict prognosis of hospitalised patients.

Zhang, XS, JJ Ong, L Macgregor, TG Vilaplana, ST Heathcock, M Mindlin, P Weatherburn, F Hickson, M Edelstein, S Mandal and P Vickerman (2022). [Transmission dynamics of the 2016-18 outbreak of hepatitis A among men who have sex with men in England and cost-effectiveness analysis of vaccination strategies to prevent future outbreaks](#). *Lancet Reg Health Eur* 19: 100426.

BACKGROUND: Despite being vaccine-preventable, hepatitis A virus (HAV) outbreaks occur among men who have sex with men (MSM). We modelled the cost-effectiveness of vaccination strategies to prevent future outbreaks. METHODS: A HAV transmission model was calibrated to HAV outbreak data for MSM in England over 2016-2018, producing estimates for the basic reproduction number ($R(0)$) and immunity levels (seroprevalence) post-outbreak. For a hypothetical outbreak in 2023 (same $R(0)$ and evolving immunity), the cost-effectiveness of pre-emptive (vaccination between outbreaks among MSM attending sexual health services (SHS)) and reactive (vaccination during outbreak among MSM attending SHS and primary care) vaccination strategies were modelled. Effectiveness in quality-adjusted life-years (QALYs) and costs were estimated (2017 UK pounds) from a societal perspective (10-year time horizon; 3% discount rate). The incremental cost-effectiveness ratio (ICER) was estimated. FINDINGS: $R(0)$ for the 2016-2018 outbreak was 3.19 (95% credibility interval (95%CrI) 2.87-3.46); seroprevalence among MSM increased to 70.4% (95%CrI 67.3-72.8%) post-outbreak. For our hypothetical HAV outbreak in 2023, pre-emptively vaccinating MSM over the preceding five-years was cost-saving (compared to no vaccination) if the yearly vaccine coverage rate among MSM attending SHS was $< 9.1\%$. Reactive vaccination was also cost-saving compared to no vaccination, but was dominated by pre-emptive vaccination if the yearly vaccination rate was $> 8\%$. If the pre-emptive yearly vaccination rate fell below this threshold, it became cost-saving to add reactive vaccination to pre-emptive vaccination. INTERPRETATION: Although highly transmissible, existing immunity limited the recent HAV outbreak among MSM in England. Pre-emptive vaccination between outbreaks, with reactive vaccination if indicated, is the best strategy for limiting future HAV outbreaks. FUNDING: NIHR.

Patterson, J, S Cleary, JM Norman, H Van Zyl, T Awine, S Mayet, B Kagina, R Muloiwa, G Hussey and SP Silal (2024). [Modelling the Cost-Effectiveness of Hepatitis A in South Africa](#). *Vaccines (Basel)* 12(2).

The World Health Organization (WHO) recommends the consideration of introducing routine hepatitis A vaccination into national immunization schedules for children ≥ 1 years old in countries with intermediate HAV endemicity. Recent data suggest that South Africa is transitioning from high to intermediate HAV endemicity, thus it is important to consider the impact and cost of potential routine hepatitis A vaccination strategies in the country. An age-structured compartmental model of hepatitis A transmission was calibrated with available data from South Africa, incorporating direct costs of hepatitis A treatment and vaccination. We used the calibrated model to evaluate the impact and costs of several childhood hepatitis A vaccination scenarios from 2023 to 2030. We assessed how each scenario impacted the burden of hepatitis A (symptomatic hepatitis A cases and mortality) as well as calculated the incremental cost per DALY averted as compared to the South African cost-effectiveness threshold. All costs and outcomes were discounted at 5%. For the modelled scenarios, the median estimated cost of the different vaccination strategies ranged from USD 1.71 billion to USD 2.85 billion over the period of 2023 to 2030, with the cost increasing for each successive scenario and approximately 39-52% of costs being due to vaccination. Scenario 1, which represented the administration of one dose of the hepatitis A vaccine in children < 2 years old, requires approximately 5.3 million vaccine doses over 2023-2030 and is projected to avert a total of 136,042 symptomatic cases IQR: 88,842-221,483 and 31,106 IQR: 22,975-36,742 deaths due to hepatitis A over the period of 2023 to 2030. The model projects that Scenario 1 would avert 8741 DALYs over the period of 2023 to 2030; however, it is not cost-effective against the South African cost-effectiveness threshold with an ICER per DALY averted of USD 21,006. While Scenario 3 and 4 included the administration of more vaccine doses and averted more symptomatic cases of hepatitis A, these scenarios were absolutely dominated owing to the population being infected before vaccination through the mass campaigns at older ages. The model was highly sensitive to variation of access to liver transplant in South Africa. When increasing the access to liver transplant to 100% for the baseline and Scenario 1, the ICER for Scenario 1 becomes cost-effective against the CET (ICER = USD 2425). Given these findings, we recommend further research is conducted to understand the access to liver transplants in South Africa and better estimate the cost of liver transplant care for hepatitis A patients. The modelling presented in this paper has been used to develop a user-friendly application for vaccine policy makers to further interrogate the model outcomes and consider the costs and benefits of introducing routine hepatitis A vaccination in South Africa.

Patterson, J, S Cleary, SP Silal, GD Hussey, A Enoch, S Korsman, E Goddard, M Setshedi, WC Spearman, BM Kagina and R Muloiwa (2022). [A retrospective study assessing the clinical outcomes and costs of acute hepatitis A in Cape Town, South Africa](#). *BMC Infect Dis* 22(1): 45.

BACKGROUND: While some evidence has been demonstrated the cost-effectiveness of routine hepatitis A vaccination in middle-income countries, the evidence is still limited in other settings including in South Africa. Given this, the evidence base around the cost of care for hepatitis A needs to be developed towards considerations of introducing hepatitis A vaccines in the national immunisation schedule and guidelines. OBJECTIVES: To describe the severity, clinical outcomes, and cost of hepatitis A cases presenting to two tertiary healthcare centers in Cape Town, South Africa. METHODS: We conducted a retrospective folder review of patients presenting with hepatitis A at two tertiary level hospitals providing care for urban communities of metropolitan Cape Town, South Africa. Patients included in this folder review tested positive for hepatitis A immunoglobulin M between 1 January 2008 and 1 March 2018. RESULTS: In total, 239 folders of hepatitis A paediatric patients < 15 years old and 212 folders of hepatitis A adult patients. Formula: see text 15 years old were included in the study. Before presenting for tertiary level care, more than half of patients presented for an initial consultation at either a community clinic or general physician. The mean length of hospital stay was 7.45 days for adult patients and 3.11 days for paediatric patients. Three adult patients in the study population died as a result of hepatitis A infection and 29 developed complicated hepatitis A. One paediatric patient in the study population died as a result of hepatitis A infection and 27 developed complicated hepatitis A, including 4 paediatric patients diagnosed with acute liver failure. The total cost per hepatitis A hospitalisation was \$1935.41 for adult patients and \$563.06 for paediatric patients, with overhead costs dictated by the length of stay being the largest cost driver. CONCLUSION: More than 1 in every 10 hepatitis A cases (13.3%) included in this study developed complicated hepatitis A or resulted in death. Given the severity of clinical outcomes and high costs associated with hepatitis A hospitalisation, it is important to consider the introduction of hepatitis A immunisation in the public sector in South Africa to potentially avert future morbidity, mortality, and healthcare spending.

Dankwa, EA, CA Donnelly, AF Brouwer, R Zhao, MP Montgomery, MK Weng and NK Martin (2021). [Estimating vaccination threshold and impact in the 2017-2019 hepatitis A virus outbreak among persons experiencing homelessness or who use drugs in Louisville, Kentucky, United States](#). *Vaccine* 39(49): 7182-7190.

BACKGROUND: Between September 2017 and June 2019, an outbreak of hepatitis A virus (HAV) occurred in Louisville, Kentucky, resulting in 501 cases and 6 deaths, predominantly among persons who experience homelessness or who use drugs (PEH/PWUD). The critical vaccination threshold ($V(c)$) required to achieve herd immunity in this population is unknown. We investigated $V(c)$ and vaccination impact using epidemic modeling. METHODS: To determine which population subgroups had high infection risks, we employed a technique based on comparing the proportion of cases arising before and after the epidemic peak, across subgroups. We also developed a dynamic deterministic model of HAV transmission among PEH/PWUD to estimate the basic reproduction number ($R(0)$), herd immunity threshold, $V(c)$ and the effect of timing of the vaccination intervention on epidemic and economic outcomes. RESULTS: Of the 501 confirmed or probable cases, 385 (76.8%) were among PEH/PWUD. Among PEH/PWUD and within the general population, homelessness was a significant risk factor for infection in the initial stages of the outbreak (odds ratios for homeless versus not homeless: 2.62; 95% confidence interval (CI): 1.62-4.25 for PEH/PWUD and 2.39; 95% CI: 1.51-3.78 for all detected cases). Our estimate for $R(0)$ ranges between 2.85 and 3.54, corresponding to an estimate of 69% (95% CI: 65-72) for herd immunity threshold and 76% (95% CI: 72%-80%) for $V(c)$, assuming a vaccine with 90% efficacy. The observed vaccination program was estimated to have averted 30 hospitalizations (95% CI: 19-43), associated with over US\$490 000 (95% CI: \$310 000-700 000) in hospitalization cost. Greater impact was observed with earlier and faster vaccination implementation. CONCLUSIONS: Vaccination coverage of at least 77% is likely required to prevent outbreaks of HAV among PEH/PWUD in Louisville, assuming a 90% vaccine efficacy. Proactive hepatitis A vaccination programs among PEH/PWUD will maximize health and economic benefits of these programs and reduce the likelihood of another outbreak.

Xie, C, JM Fenkel, DL Halegoua-DeMarzio, JM Civan, DM Tholey, et al. (2021). [Acute Liver Failure Requiring Liver Transplantation due to Acute Hepatitis A Virus Infection](#). *Case Rep Transplant* 2021: 5159934.

INTRODUCTION: Hepatitis A infection (HAV) is generally characterized by an acute icteric illness or may have a subclinical self-limited course, although rarely, can result in fulminant hepatitis and death. In 2019, the City of Philadelphia declared a public health emergency due to an HAV outbreak. We are reporting a series of four cases of acute liver failure (ALF) requiring liver transplantation (LT) due to acute HAV. METHODS: Chart review and case descriptions of four patients with acute HAV-related ALF who were expeditiously evaluated, listed as Status 1A, and who underwent LT between August 2019 and October 2019 at Thomas Jefferson University Hospital. RESULTS: All four patients presented with acute hepatocellular jaundice and had a positive HAV IgM, and all other causes of ALF were excluded. All four cases met the American Association for the Study of Liver Diseases (AASLD) criteria for ALF. Three of the four cases met King's College Criteria of poor prognosis for nonacetaminophen-induced ALF. All four patients underwent successful LT and were discharged six to twelve days postoperatively. One patient died of disseminated *Aspergillus* infection five months after LT, while the others have had excellent clinical outcomes shown by one-year follow-ups. All four explants had remarkably similar histological changes, revealing acute hepatitis with massive necrosis accompanied by a prominent lymphoplasmacytic inflammatory infiltrate and bile ductular proliferation. CONCLUSION: Although rare, patients presenting with acute HAV need close monitoring as they may rapidly progress to ALF. Early referral to a transplant center afforded timely access to LT and yielded overall good one-year survival. Widespread HAV vaccination for high-risk individuals is an essential strategy for preventing disease and curbing such future outbreaks.

Viral hepatitis knowledge and awareness

AGENDA REFERENCE Burdi, S, M Brandl, U Marcus, E Duffell, E Severi, A Mozalevskis, K Ruutel, A Dorre, AJ Schmidt and S Dudareva (2024). [Viral hepatitis knowledge and vaccination awareness among men who have sex with men \(MSM\) in 43 countries of the WHO European Region: results from the European MSM Internet Survey, EMIS-2017](#). *Euro Surveill* 29(45).

Background Recent hepatitis A virus outbreaks in Europe affecting men who have sex with men (MSM) and ongoing hepatitis B virus transmission among MSM underscore the ongoing need for viral hepatitis prevention in this population. Aim: To describe viral hepatitis knowledge and associated factors among MSM in the WHO European Region to inform targeted prevention.

Methods In the European MSM Internet Survey (EMIS-2017), basic knowledge was defined as correctly identifying at least 4 of 5 statements about viral hepatitis and vaccination. We described basic knowledge by country. In a multilevel logistic regression model, we estimated adjusted odds ratios (aOR) with 95% confidence intervals (CI) for having basic knowledge and explanatory variables: sociodemographic characteristics, history of hepatitis C and/or HIV diagnosis, sexual orientation disclosure at last sexually transmitted infections (STI) test and outness.

Results Of 113,884 participants across 43 WHO European Region countries, 68% demonstrated basic knowledge, ranging from 50% in Israel to 80% in the Netherlands. Basic knowledge was significantly associated with older age (≥ 40 years vs < 25 years, aOR: 2.9, 95% CI: 2.7-3.0), a history of hepatitis C and/or HIV diagnosis (aOR: 1.8, 95% CI: 1.7-1.9) and sexual orientation disclosure at last STI test (aOR: 1.3, 95% CI: 1.2-1.3), among other factors.

Conclusions We found a knowledge disparity regarding viral hepatitis and hepatitis vaccination awareness among MSM across Europe, highlighting a need to address these gaps. A non-judgemental, accepting climate that allows individuals attending medical services to safely disclose their sexual orientation is fundamental to enable healthcare professionals to target information and preventative measures more effectively.

Brandl, M, AJ Schmidt, U Marcus, E Duffell, E Severi, A Mozalevskis, A Kivite-Urtane, M An der Heiden and S Dudareva (2024). [Self-reported hepatitis A and B vaccination coverage among men who have sex with men \(MSM\), associated factors and vaccination recommendations in 43 countries of the WHO European Region: results from the European MSM Internet Survey, EMIS-2017](#). *Euro Surveill* 29(45).

Background: Hepatitis A and B vaccinations are recommended for men who have sex with men (MSM), given their increased risk of infection. However, data on vaccination programmes are scarce. **Aim:** To use information on vaccination recommendations and vaccine uptake among MSM in the WHO European Region to guide prevention. **Methods:** From a large pan-European MSM Internet Survey (EMIS-2017), we analysed data on self-reported hepatitis A and B vaccination status by age, education, financial coping, settlement size, outness (disclosure of sexual behaviour), migration history and diagnosis with hepatitis C or HIV, using multivariable logistic regression. Additionally, we collected information on national hepatitis A and B vaccination recommendations. **Results:** We present data of 113,884 MSM, median age 36 years (IQR: 27-47). Vaccination for hepatitis A and B was recommended and free for MSM in 7 and 18 of 43 countries, respectively. Of all respondents, 48% ($n = 50,966$) reported ever being vaccinated against hepatitis A, and 53% ($n = 56,889$) against hepatitis B. Odds for being vaccinated against hepatitis A increased with outness ('out to (almost) all' aOR: 1.78, 95% CI: 1.72-1.85 vs 'out to none') and were higher in countries where vaccination was recommended and free for MSM (aOR: 2.22, 95% CI: 1.29-3.82 vs 'no recommendation'). Results for hepatitis B were similar (outness: aOR: 1.81, 95% CI: 1.75-1.88 and MSM-specific vaccination recommendation: aOR: 2.44, 95% CI: 1.54-3.85). **Conclusion:** Large proportions of MSM in Europe remain vulnerable to hepatitis A and B, despite available vaccination. Implementation of MSM-specific vaccination recommendations and greater efforts to improve the societal climate for MSM are needed to address gaps in vaccine coverage.

Shamarina, D, M Sluga-O'Callaghan, G Kassianos, A Marijam, V Dave, E Davenport, A Andani, D Curran, P Dewda and R Steffen (2023). [Knowledge, Attitudes, and Practices of European Healthcare Professionals towards Hepatitis A and Hepatitis B Vaccination in at-Risk Adults](#). *Vaccines (Basel)* 11(11).

Despite the occurrence of several hepatitis A (hepA) and hepatitis B (hepB) outbreaks in Europe in the last few decades, not all European countries have implemented hepA and hepB vaccinations in their national immunization programs, especially for adults at risk for hepA and/or hepB infection, such as men who have sex with men or patients with chronic liver disease. Currently, little is known on the attitudes of European healthcare professionals (HCPs) towards hepA and hepB vaccinations for at-risk adults. We conducted an online survey among HCPs in Germany, Spain, and the United Kingdom to assess their awareness of and adherence to their national hepA and hepB vaccination guidelines for at-risk adults. Among the 698 HCPs who took the survey, most (91.1%) were familiar with their national vaccination recommendations and always followed them or followed them most of the time when advising or prescribing hepA or hepB vaccines. Major and moderate barriers for recommending or administering such vaccines were the non-disclosure of risk factors by the patient (53.0-57.6%) and the patient's lack of motivation or knowledge about the risk of the disease (50.3-52.9%). These results may help inform strategies to improve and accelerate hepA and hepB vaccination in European at-risk adults.

Maltezos, HC, M Tseroni, I Drositis, MN Gamaletsou, DM Koukou, et al. (2022). [Vaccination coverage rates and attitudes towards mandatory vaccinations among healthcare personnel in tertiary-care hospitals in Greece](#). *Expert Review of Vaccines* 21(6): 853-859. (<Go to ISI>://WOS:000782306000001)

Objectives: Our aim was to estimate vaccination and susceptibility rates against vaccine-preventable diseases among healthcare personnel (HCP) in eight hospitals.

Methods: Cross-sectional survey.

Results: A total of 1284 HCP participated (physicians: 31.3%, nursing personnel: 36.6%, paramedical personnel: 11.1%, administrative personnel: 13.2%, supportive personnel: 7.3%). Vaccination rates were 32.9% against measles and mumps, 38.1% against rubella, 5.7% against varicella, 9.2% against hepatitis A, 65.8% against hepatitis B, 31.8% against tetanus-diphtheria, 7.1% against pertussis, 60.2% against influenza, and 80.1% against COVID-19. Susceptibility rates were as follows: 27.8% for measles, 39.6% for mumps, 33.4% for rubella, 22.2% for varicella, 86.3% for hepatitis A, 34.2% for hepatitis B, 68.2% for tetanus-diphtheria, and 92.9% for pertussis. Older HCP had higher susceptibility rates against mumps, rubella, varicella, hepatitis A, hepatitis B, tetanus-diphtheria, and pertussis (p-values < 0.001 for all). Mandatory vaccinations were supported by 81.85% of HCP.

Conclusions: Although most HCPs supported mandatory vaccinations, significant vaccination gaps, and susceptibility rates were recorded. The proportion of susceptible HCP to measles, mumps, rubella, and varicella has increased in the past decade, mostly because of reduction in acquired cases of natural illness. Vaccination programs for HCP should be developed. A national registry to follow HCP's vaccination rates is urgently needed.

Reynolds, GL, HH Nguyen, S Singh-Carlson, DG Fisher, A Odell and P Xandre (2016). [Application of the Extended Health Control Belief Model to Predict Hepatitis A and B Vaccinations](#). *Public Health Nurs* 33(5): 430-439.

BACKGROUND: Adult vaccination compliance rates vary according to sample and type of vaccine administered (influenza, pneumococcal). This study looked at vaccination of a community sample of low-income, minority adults. METHODS: Nurses offered free vaccination for hepatitis A and B in the form of the combined Twinrix vaccine to adults on a walk-in basis. In addition to dosing information, participants completed the Risk Behavior Assessment, the Coping Strategies Indicator and the Cardiovascular Risk Assessment. Skaff's extended Health Belief Model was used as the theoretical framework. Count regression was used to model receipt of one, two, or three doses. RESULTS: The majority of participants were male with a mean age of 40 years. The distribution of doses was: 173 individuals (27.6%) received one dose only, 261 (41.7%) received two doses, and 191 (30.5%) received three doses of vaccine. The multivariate count regression model including being male, having previously been told by a health care provider that one has syphilis, having severe negative emotions, and perceived social support were associated with participants' receiving fewer doses of hepatitis vaccine. A greater problem-solving score was associated with a higher number of vaccine doses received. CONCLUSION: Despite free vaccinations offered in an easily accessible community setting, the majority of participants failed to complete the hepatitis vaccine series. More effort is needed to get adult men to participate in hepatitis vaccination clinics. Additional research is necessary to understand barriers other than cost to adults receiving vaccination.

Oren, E, L Martinez, RE Hensley, P Jain, T Ahmed, I Purnajo, A Nara and MH Tsou (2020). [Twitter Communication During an Outbreak of Hepatitis A in San Diego, 2016-2018](#). *Am J Public Health* 110(S3): S348-s355.

Objectives. To examine how and what information is communicated via social media during an infectious disease outbreak. Methods. In the context of the 2016 through 2018 hepatitis A outbreak in San Diego County, California, we used a grounded theory-based thematic analysis that employed qualitative and quantitative approaches to uncover themes in a sample of public tweets (n = 744) from Twitter, a primary platform used by key stakeholders to communicate to the public during the outbreak. Results. Tweets contained both general and hepatitis A-specific information related to the outbreak, restatements of policy and comments critical of government responses to the outbreak, information with the potential to shape risk perceptions, and expressions of concern regarding individuals experiencing homelessness and their role in spreading hepatitis A. We also identified misinformation and common channels of content driving themes that emerged in our sample. Conclusions. Public health professionals may identify real-time public risk perceptions and concerns via social media during an outbreak and target responses that fulfill the informational needs of those who seek direction and reassurance during times of uncertainty.

Felner, JK, T Kieu, A Stieber, H Call, D Kirkland, A Farr and JP Calzo (2020). ["It's Just a Band-Aid on Something No One Really Wants to See or Acknowledge": A Photovoice Study with Transitional Aged Youth Experiencing Homelessness to Examine the Roots of San Diego's 2016-2018 Hepatitis A Outbreak](#). *Int J Environ Res Public Health* 17(13).

San Diego, California is consistently ranked among regions with the highest rates of homelessness in the United States. From 2016 to 2018, San Diego experienced an unprecedented outbreak of hepatitis A virus (HAV), largely attributed in media and public health discourse to the region's growing population of people experiencing homelessness. Little attention, however, was devoted to examining the experiences and needs of this population, particularly transitional aged youth (TAY, aged 18-24) experiencing homelessness who may have been uniquely affected by the outbreak. This community-based participatory research study leveraged diverse qualitative methods, principally photovoice, to explore how the social and built environment shapes health among TAY experiencing homelessness in San Diego, how these environments may have contributed to the HAV outbreak, and TAY's perceptions of HAV-related public health interventions. Emergent findings include stigmatization of TAY and other people experiencing homelessness, interventions that failed to address root causes of the outbreak, and interactions with housing-related and other social support resources that limit rather than support economic and social mobility. Findings have implications for understanding how media and public discourse, public health interventions, and availability and delivery of resources can contribute to and perpetuate stigma and health inequities faced by TAY experiencing homelessness.

Buechler, CR, A Ukani, R Elsharawi, J Gable, A Petersen, M Franklin, R Chung, J Bell, A Manly, N Hefzi, D Carpenter and R Bryce (2020). [Barriers, beliefs, and practices regarding hygiene and vaccination among the homeless during a hepatitis A outbreak in Detroit, MI](#). *Heliyon* 6(3): e03474.

Appropriate hygiene practices and vaccine acceptance are key factors impacting the health of homeless individuals. A recent outbreak of hepatitis A in Michigan, especially impacting Detroit, prompted us to investigate the practices and attitudes of Detroit's homeless population toward hygiene measures and vaccinations, as well as barriers to such resources. We developed a questionnaire as a means to collect our data, and participants were interviewed at shelters and soup kitchens. While the majority of participants adhered to healthy hygiene practices, approximately 89% reported barriers to accessing public showers. More than half the participants (64%) reported receiving their hepatitis A vaccine prior to the study, while 23% reported previously refusing or hesitating to receive vaccinations. Despite an overall favorable adherence to hygiene practices, substantial barriers are yet to be overcome. Moreover, active measures should be taken to establish higher levels of trust between providers and the homeless to encourage vaccine acceptance.

Fleetwood, J (2021). [Ethical considerations for mandating food worker vaccination during outbreaks: an analysis of hepatitis A vaccine](#). *J Public Health Policy* 42(3): 465-476.

A widespread global outbreak of Hepatitis A virus (HAV) has prompted regulations in a few cities in the United States (US) mandating HAV vaccination of food service workers. This Viewpoint considers the global impact of HAV, analyzes ethical issues pertinent to recent mandatory vaccination regulations and the core values of public health. It explores the health and rights of stakeholders and ethical criteria for mandatory vaccination that could be applied globally with the ethical codes of the World Health Organization and the American Public Health Association. The goal is to help create ethical guidance for determining under what conditions, and for what populations, should regulations be created requiring vaccination for a communicable disease.

Hofmeister, MG, MK Weng, D Thoroughman, ED Thomasson, S McBee, MA Foster, J Collins, C Burkholder, RJ Augustine and PR Spradling (2021). [Prevalence of indications for adult hepatitis A vaccination among hepatitis A outbreak-associated cases, Three US States, 2016-2019](#). *Vaccine* 39(44): 6460-6463.

BACKGROUND: Safe and effective hepatitis A vaccines have been recommended in the United States for at-risk adults since 1996; however, adult vaccination coverage is low. METHODS: Among a random sample of adult outbreak-associated hepatitis A cases from three states that were heavily affected by person-to-person hepatitis A outbreaks, we assessed the presence of documented Advisory Committee on Immunization Practices (ACIP) indications for hepatitis A vaccination, hepatitis A vaccination status, and whether cases that were epidemiologically linked to an outbreak-associated hepatitis A case had received postexposure prophylaxis (PEP). RESULTS: Overall, 74.1% of cases had a documented ACIP indication for hepatitis A vaccination. Fewer than 20% of epidemiologically linked cases received PEP. CONCLUSIONS: Efforts are needed to increase provider awareness of and adherence to ACIP childhood and adult hepatitis A vaccination and PEP recommendations in order to stop the current person-to-person hepatitis A outbreaks and prevent similar outbreaks in the future.

Bukhsh, MA, R Thyagarajan, B Todd, NW Chen, L Qu and L Swaminathan (2022). [An electronic medical record-based intervention to improve hepatitis A vaccination rates in the emergency department during a regional outbreak](#). *BMJ Open Qual* 11(4).

BACKGROUND: In response to the severe hepatitis A outbreak that occurred in Michigan between August 2016 and September 2019, our multihospital health system implemented an electronic medical record (EMR)-based vaccination intervention across its nine emergency departments (EDs). The objectives were to explore the impact of this intervention on increasing vaccination rates among high-risk individuals and to assess the barriers to use of a computerised vaccine reminder system. METHODS: All patients who were 18 years or older were screened using an electronic nursing questionnaire. If a patient was at high risk based on the questionnaire, an electronic best practice advisory (BPA) would trigger and give the physician or advanced practice provider the option to order the hepatitis A vaccine. We explored the vaccination rates in the 24-month preintervention and the 18-month intervention periods. We then administered a survey to physicians, advanced practice providers and nurses evaluating their perceptions and barriers to use of the EMR intervention. RESULTS: During the preintervention period, 49 vaccines were ordered (5.5 per 100 000 patient visits) and 32 were administered (3.6 per 100 000 patient visits). During the intervention period, 574 865 patient visits (74.3%) were screened. 2494 vaccines (322 per 100 000 patient visits) were ordered, and 1205 vaccines (155 per 100 000 patients visits) were administered. Physicians and advanced practice providers were initially compliant with the BPA's use, but compliance declined over time. Surveys revealed that the major barrier to use was lack of time. CONCLUSIONS: EMR screening tools and BPAs can be used in the ED as an effective strategy to vaccinate high-risk individuals. This may be translatable to outbreaks of other vaccine-preventable illnesses like influenza, measles or SARS-CoV-2. Providing ongoing education about the public health initiative and giving feedback to physicians, advanced practice providers and nurses about tool compliance are needed to sustain the improvement over time.

Kaigh, C, A Blome, KE Schreyer and M Healy (2020). [Emergency Department-based Hepatitis A Vaccination Program in Response to an Outbreak](#). *West J Emerg Med* 21(4): 906-908.

Moon, AM, JA Borgerding, RG Hauser, E Lowy, M Chartier, MM Maier, T Morgan, A Ruege, J Weber and LA Beste (2022). [Robust Hepatitis A Vaccination Response Within the United States Veterans Health Administration in the Wake of State Outbreaks](#). *Am J Public Health* 112(7): 990-994.

We assessed hepatitis A (HepA) vaccine receipt among susceptible individuals in outbreak and matched nonoutbreak states. Difference-in-differences models and multivariable logistic regression were used to compare HepA vaccination rates in these states. In the postoutbreak year, there was a 112% increase in HepA vaccinations in outbreak states versus a 6% decrease in nonoutbreak states. Differences persisted in our multivariable model (adjusted odds ratio = 2.53; 95% confidence interval = 2.45, 2.61). HepA vaccination rates increased dramatically in outbreak states, but many individuals susceptible to hepatitis A virus remain unvaccinated. (*Am J Public Health*. 2022;112(7):990-994. <https://doi.org/10.2105/AJPH.2022.306845>).

Burrell, S, LA Vodstrcil, CK Fairley, A Kilner, CS Bradshaw, MY Chen and EPF Chow (2020). [Hepatitis A vaccine uptake among men who have sex with men from a time-limited vaccination programme in Melbourne in 2018](#). *Sex Transm Infect* 96(2): 110-114.

Vechi, HT, MB Bay, CHS Freitas, J Sant'anna, C Brites and KC Lima (2024). [Factors associated with hepatitis A susceptibility among men who have sex with men using HIV pre-exposure prophylaxis in Northeastern Brazil: A cross-sectional study](#). *PLoS One* 19(3): e0301397.

Hepatitis A virus (HAV) infection has disproportionately affected more men who have sex with men (MSM), occurring in outbreaks, despite being vaccine-preventable. We determined the prevalence and factors associated with HAV susceptibility among cisgender MSM on HIV pre-exposure prophylaxis (PrEP) in Northeastern Brazil. From September 30, 2021 to June 19, 2023, 282 cisgender MSM receiving HIV PrEP were enrolled into this cross-sectional study. Sociodemographic and clinical information were collected. Blood samples were collected for screening of sexually transmitted infections (STIs) and serum samples were tested for IgM and total anti-HAV antibodies. Non-reactive results for total anti-HAV antibodies were found in 106 of 282 (37.6%) participants. Factors associated with HAV susceptibility included age <30 years (prevalence ratio PR: 2.02; 95% confidence interval 95% CI: 1.61-2.53), having health insurance (PR: 1.39; 95% CI: 1.19-1.64), sex only with cisgender men (PR: 1.52; 95% CI: 1.23-1.89), non-steady partner (PR: 1.20; 95% CI: 1.01-1.43) and no lifetime history of STIs (PR: 1.25; 95% CI: 1.03-1.53). Identifying clinical correlates of HAV susceptibility in key populations is a fundamental step towards development of public policy focused on prevention, especially following the recent hepatitis A outbreak in Brazil.

Duration of protection

AGENDA REFERENCE Balta, VA, BJ McMahon, K Moore, T Stevenson and HM Scobie (2026). [Thirty years of hepatitis A epidemiology and vaccine studies: A narrative review of lessons learned in Alaska](#). *Ann Epidemiol* 120: 110108.

Hepatitis A virus (HAV) is an RNA virus transmitted by fecal-oral contamination. HAV is usually asymptomatic in young children who shed the virus, leading to infection in susceptible adults who develop symptomatic hepatitis. This article reviews the epidemiology of HAV infection in Alaska and results of hepatitis A vaccine (HepA) studies conducted in Alaska, including evidence that routine early childhood HepA vaccination can eliminate transmission in an area that previously experienced repeat outbreaks. Historically, Alaska had periodic large HAV outbreaks. Alaska was the site of both Phase 3 and 4 clinical trials of the HepA vaccine, one of which demonstrated that only one dose of HepA vaccine administered to susceptible persons in communities experiencing an active outbreak could stop transmission in 4-8 weeks. Evidence indicates that the HepA vaccine offers protection for at least 25 years for most individuals, however, data on the durability of immunity beyond this period is lacking, particularly among people vaccinated as young children. We discuss future considerations for continued control of hepatitis A in Alaska.

AGENDA REFERENCE Ramaswamy, M, D Bruden, LD Nolen, E Mosites, M Snowball, NP Nelson, M Bruce and BJ McMahon (2021). [Hepatitis A vaccine immunogenicity 25 years after vaccination in Alaska](#). *J Med Virol* 93(6): 3991-3994.

The hepatitis A vaccine is recommended for all children greater than or equal to 1 year of age, however, the duration of vaccine protection is unknown and protection through adulthood is crucial to prevent symptomatic hepatitis later in life. We report on 25 years of follow-up of a cohort of Alaska Native individuals who were vaccinated in early childhood. We assessed the duration of vaccine protection by calculating the geometric mean concentration and proportion of participants with protective levels of IgG antibody to hepatitis A virus (anti-HAV) (≥ 20 mIU/mL) every 2 to 3 years. We estimated the amount of time until the anti-HAV dropped below protective levels using survival analyses. At 25 years, 43 of the original 144 participants were available, mean anti-HAV levels were 91.5 mIU/mL, and 35 (81.4%) had protective levels of anti-HAV. Using data from all persons and all time points, a survival analysis estimated 78.7% of participants had protective levels of anti-HAV at 25 years. The high level of protective antibodies in this cohort indicate that supplemental doses of hepatitis A vaccine are not needed 25 years after completion of the vaccine series.

Theeten, H, K Van Herck, O Van Der Meeren, P Crasta, P Van Damme and N Hens (2015). [Long-term antibody persistence after vaccination with a 2-dose Havrix \(inactivated hepatitis A vaccine\): 20 years of observed data, and long-term model-based predictions](#). *Vaccine* 33(42): 5723-5727.

European adult cohort with 20 years of follow-up and model-based predictions of lifelong protection; complements the Alaska data in the 'Duration of protection' talk.

Van Damme, P, G Leroux-Roels, P Suryakiran, N Folschweiller and O Van Der Meeren (2017). [Persistence of antibodies 20 y after vaccination with a combined hepatitis A and B vaccine](#). *Hum Vaccin Immunother* 13(5): 972-980.

Long-term persistence data for the combined HAV/HBV vaccine widely used for travellers and risk groups in Europe.

Plumb, ID, LR Bulkow, MG Bruce, TW Hennessy, J Morris, K Rudolph, P Spradling, M Snowball and BJ McMahon (2017). [Persistence of antibody to Hepatitis A virus 20 years after receipt of Hepatitis A vaccine in Alaska](#). *J Viral Hepat* 24(7): 608-612.

Raczniak, GA, LR Bulkow, MG Bruce, CL Zanis, RL Baum, MM Snowball, KK Byrd, UM Sharapov, TW Hennessy and BJ McMahon (2013). [Long-term immunogenicity of hepatitis A virus vaccine in Alaska 17 years after initial childhood series](#). *J Infect Dis* 207(3): 493-496.

Raczniak, GA, TK Thomas, LR Bulkow, SE Negus, CL Zanis, MG Bruce, PR Spradling, EH Teshale and BJ McMahon (2013). [Duration of protection against hepatitis A for the current two-dose vaccine compared to a three-dose vaccine schedule in children](#). *Vaccine* 31(17): 2152-2155.

Spradling, PR, LR Bulkow, SE Negus, C Homan, MG Bruce and BJ McMahon (2016). [Persistence of seropositivity among persons vaccinated for hepatitis A during infancy by maternal antibody status: 15-year follow-up](#). *Hepatology* 63(3): 703-711.

Plumb, ID, PP Gounder, LD Nolen, SC Massay, L Castrodale, J McLaughlin, M Snowball, C Homan, NP Nelson, R Singleton, MG Bruce and BJ McMahon (2021). [Vaccination Status of Alaska Native Persons With Hepatitis A Virus Infection-Alaska, 1996-2018](#). *Clin Infect Dis* 72(12): 2212-2214.

Following increases in reported cases of hepatitis A, we assessed the impact of hepatitis A vaccine in Alaska Native persons. During 1996-2018, only 6 cases of hepatitis A were identified, all in unvaccinated adults. Populations can be protected against hepatitis A by achieving sufficient vaccination coverage over time.

Session 6 · Vaccination and outbreak policies

Day 2 · 14 October 2026 · 09:00–10:30 · Chairs: Silvia Bino – Sandra Dudareva

09:00–09:20	Hepatitis A outbreak characteristics: a comparison of regions with different vaccination strategies in Spain	Angela Domínguez
09:20–09:40	Examples of outbreak management: (1) MSM outbreak in Berlin; (2) sexual-transmission outbreak among MSM, Portugal 2023–2024	Ruth Zimmermann (online); Rui Tato Marinho
09:40–10:00	Hepatitis A prevention in the USA depends on routine universal childhood vaccination	Noele Nelson
10:00–10:30	Q&A and interactive discussion on needs for policy change	

Background in brief

- **Universal vs risk-group strategies in Spain.** Outbreak incidence was lower in regions with universal vaccination (16.04 vs 20.76 per million; RR 0.77). In those regions more outbreaks were imported, and MSM and people aged 15–44 were less often the index case (Domínguez et al., 2021).
- **MSM outbreaks: rapid, targeted action works.** In Berlin (2016–2018; 222 cases), only 32.7% of surveyed MSM were fully vaccinated before 2017. Targeted measures raised monovalent vaccine uptake among males by 164%, compared with 7% elsewhere in Germany (Zimmermann et al., 2021). Portugal saw the 2016–2018 multi-country strain return in 2023–2024 (Rosendal et al., 2024; Ndumbi et al., 2018).
- **The US model.** The USA recommends routine vaccination of all children aged 12–23 months. Adult indications were broadened (ACIP, 2020) after widespread outbreaks among people who use drugs and people experiencing homelessness, which were controlled through more than 5.3 million adult doses given in jails, shelters and health departments (Nelson et al., 2020; Hofmeister et al., 2026).
- **Targeted groups under debate.** These include food handlers (Trucchi et al., 2025; Kim et al., 2022), migrants and children visiting friends and relatives (Petrignani et al., 2009), and the ethics of mandating vaccination (Fleetwood et al., 2021).

Literature

Hepatitis A outbreak characteristics in Spanish regions with different strategies

AGENDA REFERENCE Domínguez, A, C Varela, N Soldevila, C Izquierdo, M Guerrero, et al. (2021). [Hepatitis A Outbreak Characteristics: A Comparison of Regions with Different Vaccination Strategies, Spain 2010-2018](#). *Vaccines (Basel)* 9(11).

We compared the cumulative incidence and characteristics of hepatitis A outbreaks in two groups of Spanish autonomous regions according to whether a universal or risk group vaccination strategy was followed. Outbreaks between 2010 and 2018 were analyzed. The cumulative incidence rate of outbreaks was estimated and compared by estimating the rate ratio (RR). The characteristics of the outbreaks and those of the first cases were compared. Adjusted OR (aOR) were calculated using a multivariate logistic regression model. Outbreak incidence was 16.04 per million persons in regions with universal vaccination and 20.76 in those with risk-group vaccination (RR 0.77; 95%CI 0.62-0.94). Imported outbreaks accounted for 65% in regions with universal vaccination and 28.7% in regions with risk-group vaccination (aOR 3.88; 95%CI 2.13-7.09). Adolescents and young adults aged 15-44 years and men who have sex with men were less frequently the first case of the outbreak in regions with a universal vaccination strategy (aOR 0.54; 95%CI 0.32-0.92 and 0.23; 95%CI 0.07-0.82, respectively). The cumulative incidence rate of outbreaks was lower in regions with universal vaccination. In all regions, independently of the vaccination strategy, activities to vaccinate persons belonging to high-risk groups for infection should be emphasized.

Jose Alvarez Garcia, F, A Iofrio de Arce, J Alvarez Aldean, E Garrote Llanos, L Lopez Granados, ML Navarro Gomez, V Pineda Solas, I Rivero Calle, J Ruiz-Contreras, I Salamanca de la Cueva, P Serrano Marchuet and P en representacion del Comité Asesor de Vacunas e Inmunizaciones de la Asociación Española de (2026). [Vaccination and immunization schedule of the Pediatric Spanish Association: 2026 recommendations](#). *An Pediatr (Engl Ed)* 104(1): 504051.

The 2026 Vaccination and Immunization Schedule recommended by the Spanish Association of Pediatrics (AEP) for children, adolescents and pregnant women residing in Spain includes the following new features: introduction of routine vaccination against hepatitis A with a single-dose schedule at 12–15 months; universal vaccination against influenza in children from 6 months and adolescents up to 17 years of age; catch-up vaccination and reengagement campaigns added to the routine immunization schedule and a new table featuring the vaccinations recommended for specific chronic diseases or risk conditions. The following recommendations from the 2025 schedule,

among others, are maintained: immunization with nirsevimab in infants younger than 6 months, or up to 12 months in the case of preterm infants born before 35 weeks of gestation and up to 24 months in children with risk factors; routine vaccination against meningococcal disease (MenB in infancy starting at 2 months and at 12 years, plus booster doses for those vaccinated in childhood with 4CMenB; MenACWY at 4 months, 12 months and 12 years); advancing the second doses of MMR and varicella vaccines to 24 months and the Tdap at 10-12 years; and vaccination against SARS-CoV-2 for children older than 6 months with risk factors. During pregnancy, vaccination with Tdap and against influenza and COVID-19 is indicated. Vaccination against RSV in pregnant women is available, although not funded, as it is not currently approved as a public health strategy.

Effraimidou, E, DC Cassimos, S Medic, M Topalidou, M Theodoridou and HC Maltezou (2023). [Vaccination programs for children aged up to 18 years in Europe, 2020](#). *J Child Health Care* 27(3): 336-350.

Although all European countries have vaccination policies for children, there are no comprehensive studies of pediatric vaccination programs in Europe. We studied vaccination programs for children in Europe. Vaccinations against diphtheria, tetanus, pertussis, poliomyelitis, Haemophilus influenzae type b, hepatitis B, measles, mumps, rubella, and influenza existed in 42 countries, against human papilloma virus in 41 countries, and against pneumococcus in 40 countries. In addition, the following vaccinations existed: against tuberculosis (35 countries), hepatitis A (33), meningococcus A, C, W, Y (30), rotavirus and varicella (28 countries each), meningococcus B (24), tick-born encephalitis (22), and meningococcus C (16). Mandatory vaccinations are implemented in 21 countries, mainly against diphtheria, tetanus, pertussis, poliomyelitis, H. influenzae type b, hepatitis B, measles, mumps, rubella, tuberculosis, and pneumococcus. There are significant differences among pediatric vaccination programs in Europe regarding number, schedules, indications, and regulatory frame (recommended or mandatory vaccinations). A consensus-based vaccination program for all children is needed.

Examples of outbreak management

AGENDA REFERENCE Zimmermann, R, M Faber, S Dudareva, P Ingiliz, H Jessen, et al. (2021). [Hepatitis A outbreak among MSM in Berlin due to low vaccination coverage: Epidemiology, management, and successful interventions](#). *Int J Infect Dis* 103: 146-153.

OBJECTIVES: To describe the characteristics of a large hepatitis A virus (HAV) outbreak among men who have sex with men (MSM) in Berlin and to assess the impact of measures implemented. **METHODS:** Cases of laboratory-confirmed, symptomatic HAV infection notified in Berlin, Germany between August 2016 and February 2018 were analysed using routine and enhanced surveillance data including genotyping results. Several studies involving different groups of participants were conducted to further investigate the outbreak, including surveys on knowledge and practices of HAV vaccination among physicians and vaccination coverage and determinants of vaccination status among MSM. The measures implemented were categorized by target group in a Gantt chart. To assess their impact, health insurance data on HAV vaccination uptake were analysed, comparing Berlin and other federal states. **RESULTS:** During the outbreak period, a total of 222 cases were reported (of which 91 were sequence-confirmed), with a peak in case numbers in January 2017. Physicians were aware of the existing vaccination recommendations, but vaccination coverage among 756 MSM was low, with 32.7% being completely vaccinated and 17.3% being incompletely vaccinated before 2017. HAV vaccination before 2017 was associated with being born in Germany (odds ratio 2.36) and HIV-positive (odds ratio 1.80). HAV monovalent vaccination uptake increased by 164% from 2016 to 2017 among males in Berlin, compared to 7% in other federal states. **CONCLUSIONS:** Multiple measures targeting the MSM community, physicians, and public health to increase HAV vaccination uptake were successfully implemented. To prevent future HAV outbreaks, we recommend monitoring vaccination coverage among MSM, promoting awareness of existing recommendations among physicians, and ensuring access for foreign-born and young MSM.

AGENDA REFERENCE Rosendal, E, S von Schreeb, A Gomes, S Lino, B Grau-Pujol, et al. (2024). [Ongoing outbreak of hepatitis A associated with sexual transmission among men who have sex with men, Portugal, October 2023 to April 2024](#). *Euro Surveill* 29(21).

An outbreak of hepatitis A is ongoing in Portugal, with 71 confirmed cases from 7 October 2023 to 24 April 2024. Most cases are male, aged 18-44 years, with many identifying as men who have sex with men (MSM) and reported as suspected sexual transmission. Phylogenetic analysis identified the subgenotype IA, VRD 521-2016 strain, last observed in an MSM-associated multi-country outbreak in 2016 to 2018. We wish to alert colleagues in other countries to investigate potential similar spread.

Ndumbi, P, GS Freidl, CJ Williams, et al. (2018). [Hepatitis A outbreak disproportionately affecting men who have sex with men \(MSM\) in the European Union and European Economic Area, June 2016 to May 2017](#). *Euro Surveill* 23(33): 1700641.

Reference description of the 2016-2018 multi-country MSM outbreak (including the VRD_521_2016 strain that re-emerged in Portugal in 2023-2024). Essential context for Session 6.

Beebejaun, K, S Degala, K Balogun, et al. (2017). [Outbreak of hepatitis A associated with men who have sex with men \(MSM\), England, July 2016 to January 2017](#). *Euro Surveill* 22(5): 30454.

Early national description of the 2016-2017 MSM outbreak and the response in England, complementing the Berlin and Portugal case studies.

Eurosurveillance (2017). [Special issue: Hepatitis A \(collection of 2016-2017 outbreak reports\)](#). *Eurosurveillance*.

Compilation of European reports on the 2016-2017 outbreaks among MSM; convenient single source for outbreak-management comparisons.

Nicolay, N, M Le Bourhis-Zaimi, A Lesourd, M Martel, AM Roque-Afonso, S Erouart, M Etienne and N Ndeikoundam Ngangro (2020). [A description of a hepatitis A outbreak in men who have sex with men and public health measures implemented in Seine-Maritime department, Normandy, France, 2017](#). *BMC Public Health* 20(1): 1441.

Bogdanić, N, J Begovac, L Močibob, Š Zekan, I Grgić, J Ujević, O Đaković Rode and S Židovec-Lepej (2022). [Hepatitis A Outbreak in Men Who Have Sex with Men Using Pre-Exposure Prophylaxis and People Living with HIV in Croatia, January to October 2022](#). *Viruses* 15(1).

The hepatitis A virus (HAV) is a highly hepatotropic virus transmitted mainly via the fecal-oral route. The purpose of this study is to describe a prolonged HAV outbreak in HIV-infected men who have sex with men (MSM) and pre-exposure prophylaxis (PrEP) users in Croatia in 2022. Croatia has a centralized system of HIV care and the PrEP service is only available at the University Hospital for Infectious Diseases (UHID), Zagreb. We reviewed all MSM living with HIV and MSM PrEP users at UHID and identified those diagnosed with HAV between January and October 2022. During this period, a total of 1036 MSM living with HIV and 361 PrEP users were followed, and 45 (4.4%) and 32 (8.9%) were diagnosed with HAV, respectively. Most cases were diagnosed in mid-February. A total of 70.1% (726/1036) MSM living with HIV and 82.3% (297/361) PrEP users were susceptible to HAV. Sequencing information was available for 34 persons; in all cases the HAV subtype 1A was found. Our findings indicate that both MSM living with HIV and HIV-uninfected PrEP users are vulnerable to HAV infection and might be a potential source for a more widespread HAV epidemic.

Bazzardi, R, E Dore, M Ciccozzi, A Lai, M Pisanu, S Babudieri and I Maida (2020). [Outbreak of acute hepatitis A associated with men who have sex with men \(MSM\) in North Sardinia 2017-2018](#). *J Infect Dev Ctries* 14(9): 1065-1070.

Martin, A, L Meddeb, JC Lagier, P Colson and A Menard (2020). [Hepatitis A outbreak in HIV-infected patients in Southeastern France: questions and responses?](#). *Epidemiol Infect* 148: e79.

Hernández Bustabad, A, D Morales Arráez, A González, A de Vera, F Díaz-Flores, M Lecuona Fernández, JL Gómez-Sirvent, A Avellón Calvo and M Hernández-Guerra (2020). [Sexual behaviour and poor hygiene are related to recent hepatitis a virus community outbreaks](#). *Rev Esp Enferm Dig* 112(6): 448-455.

Wensley, A, E Smout, SL Ngui, K Balogun, P Blomquist, M Edelstein, R Greenwood, S Coles, K Ingold, L Sargeant, M Gent, S Padfield and GJ Hughes (2022). [An outbreak of hepatitis A virus infection in a secondary school in England with no undetected asymptomatic transmission among students](#). *Epidemiol Infect* 151: e6.

In June 2019 the Health Protection Team in Yorkshire and Humber, England, was notified of cases of hepatitis A virus (HAV) infection in staff at a secondary school. Investigation revealed that an earlier case worked as a food handler in the school kitchen. Indirect transmission through food from the canteen was considered the most likely route of transmission. Cases were described according to setting of exposure. Oral fluid was obtained from students for serological testing. Environmental investigations were undertaken at settings where food handling was considered a potential transmission risk. Thirty-three confirmed cases were linked to the outbreak. All of those tested (n = 31) shared the same sequence with a HAV IB genotype. The first three cases were a household cluster and included the index case for the school. A further 19 cases (16 students, 3 staff) were associated with the school and consistent with indirect exposure to the food handler. One late onset case could not be ruled out as a secondary case within the school and resulted in vaccination of the school population. Five cases were linked to a bakery where a case from the initial household cluster worked as a food server. No concerns about hygiene standards were noted at either the school or the bakery. Oral fluid samples taken at the time of vaccination from asymptomatic students (n = 219, 11-16 years-old) showed no evidence of recent or current infection. This outbreak included household and foodborne transmission but limited (and possibly zero) person-to-person transmission among secondary school students. Where adequate hygiene exists, secondary transmission within older students may not occur.

Itaki, M, M Endo, H Asakura, M Nagashima, Y Somura, A Takahashi, A Kayebeta, I Takahashi and Y Yahata (2025). [Hepatitis A outbreak among men who have sex with men, Shinjuku, Japan, 2018](#). *Western Pac Surveill Response J* 16(1): 1-10.

OBJECTIVE: In 2018, the Shinjuku City Department of Health detected excess cases of hepatitis A virus (HAV) infection. The objectives of this investigation were to characterize the outbreak, identify transmission routes among inpatient cases and make recommendations to control and prevent HAV infection among men who have sex with men. METHODS: Information about cases of HAV infection was collected from the National Epidemiological Surveillance for Infectious Diseases system and inpatient interviews conducted by public health nurses in 2018. RESULTS: There were 131 HAV cases in 2018. Of these, 98% (129/131) were male, of whom 81% (105/129) were men who have sex with men. Hospitalization was required for 40 cases (31%). The age groups with the highest proportion of cases were 30-39 and 40-49 years (each 34%; 44/131). Two cases (2%) had received the second dose of the HAV vaccine, but only 10 days before symptom onset; all others had received no doses. The sequence type subgroup 13, an R1VM-HAV-16-090-like strain, was seen in 51 cases (39%). Of the 40 hospitalized cases, 21 (53%) participated in an interview conducted using a semistructured questionnaire. Altogether, of 21 cases, 12 (57%) had coinfection with HIV, 13 (62%) had casual sexual contact within the preceding 2 months and 10 (48%) had used social networking services (SNS) to find a sexual partner. DISCUSSION: In Shinjuku, this outbreak almost exclusively affected the population of men who have sex with men. The detected outbreak strain has previously been reported in outbreaks among men who have sex with men in China, Taiwan (China) and Europe. For HAV prevention, the most important measures are raising awareness of the risk of HAV as a sexually transmitted infection via SNS and promoting immunization at the appropriate time.

Saito, R, A Imamura and H Nishiura (2021). [Assessing countermeasures during a hepatitis A virus outbreak among men who have sex with men](#). *Theor Biol Med Model* 18(1): 19.

BACKGROUND: A hepatitis A epidemic occurred among men who have sex with men (MSM) in Japan in 2017-2018. In this study, we employ a parsimonious mathematical model to epidemiologically investigate the dynamics of infection, aiming to evaluate the effectiveness of campaign-based interventions among MSM to raise awareness of the situation. METHODS: A mathematical model describing a mixture of human-to-human transmission and environmental transmission was fitted to surveillance data. Taking seasonally varying environmental transmission into account, we estimated the reproduction number of hepatitis A virus during the course of

epidemic, and, especially, the abrupt decline in this reproduction number following campaign-based interventions. RESULTS: The reproduction number prior to the countermeasures ranged from 2.6 to 3.1 and then began to decrease following campaign-based interventions. After the first countermeasure, the reproduction number decreased, but the epidemic remained supercritical (i.e., $R(t) > 1$). The value of $R(t)$ dropped well below one following the second countermeasure, which used web articles to widely disseminate information about the epidemic risk. CONCLUSIONS: Although the effective reproduction number, $R(t)$, changes because of both intrinsic and extrinsic factors, the timing of the examined countermeasures against hepatitis A in the MSM population was consistent with the abrupt declines observed in $R(t)$. Even without vaccination, the epidemic was brought under control, and risky behaviors may have been changed by the increase in situation awareness reached through web articles.

Honda, M, H Asakura, T Kanda, Y Somura, T Ishii, et al. (2021). [Male-Dominant Hepatitis A Outbreak Observed among Non-HIV-Infected Persons in the Northern Part of Tokyo, Japan](#). *Viruses* 13(2).

Recently, we experienced an outbreak of acute hepatitis A virus (HAV) infection between 2018 and 2020. Herein, we describe this male-dominant HAV infection outbreak observed among non-human immunodeficiency virus (HIV)-infected persons in the northern part of Tokyo, Japan. Clinical information was collected from patient interviews and from medical record descriptions. In the present study, 21 patients were retrospectively analyzed. A total of 90.4 and 33.3% of patients were males, and men who have sex with men (MSM), respectively. The total bilirubin levels and platelet counts tended to be lower in the MSM group than in the non-MSM group. C-reactive protein (CRP) levels tended to be higher in acute liver failure (ALF) patients than in non-ALF patients. Prolonged cholestasis was observed in one patient (4.8%). We also found that 18 HAV isolates belonged to HAV subgenotype IA/subgroup 13 (S13), which clustered with the HAV isolate (KX151459) that was derived from an outbreak of HAV infection among MSM in Taiwan in 2015. Our results suggest that the application of antivirals against HAV, as well as HAV vaccines, would be useful for the treatment and prevention of severe HAV infection.

Parrón, I, C Planas, P Godoy, S Manzanera-Laya, A Martínez, MR Sala, S Minguell, N Torner, M Jané and A Domínguez (2017). [Effectiveness of hepatitis A vaccination as post-exposure prophylaxis](#). *Hum Vaccin Immunother* 13(2): 423-427.

Kareem, N, K Al-Salahat, FG Bakri, Y Rayyan, A Mahafzah and M Sallam (2021). [Tracking the Epidemiologic Shifts in Hepatitis A Sero-Prevalence Using Age Stratification: A Cross-Sectional Study at Jordan University Hospital](#). *Pathogens* 10(9).

The study of hepatitis A virus (HAV) epidemiology and sero-prevalence has important public health implications. Changes in the epidemiology of hepatitis A can result in a larger pool of susceptible persons in countries with improved sanitation and hygienic conditions if vaccination is not provided. The aim of this study was to investigate the prevalence of HAV immunoglobulin G (IgG) in Jordan. In addition, we aimed to identify the potential differences in HAV sero-prevalence based on age, among other variables. We recruited the study participants at Jordan University Hospital in Amman, Jordan, during October 2020-June 2021. Assessment of participants' socio-demographic variables was done using a paper-based questionnaire. Testing for HAV IgG was based on a competitive enzyme linked immunosorbent assay (ELISA). The study population comprised 360 individuals with a median age of 18 years. The overall sero-prevalence of HAV in our study sample was 38.3%. Divided by age, the sero-prevalence of HAV was 8.2%, 12.3%, and 20.8% among individuals aged 10 years or less, 15 years or less, and 30 years or less, respectively. The estimated age at mid-population immunity was between 21 and 30 years. Besides age, individuals residing outside the Central region of Jordan had a significantly higher HAV sero-prevalence. Additionally, the use of filtered municipal water was associated with a lower sero-prevalence of HAV compared with the use of unfiltered municipal water among individuals aged 15 years or less. The results of this study suggest an intermediate to low endemicity of HAV in Jordan. An epidemiologic shift of HAV sero-prevalence with a declining rate of positivity for HAV IgG was noticed in this study. This highlights the importance of the recently introduced HAV vaccination in Jordan. Future research to evaluate the public health benefits of HAV vaccination in Jordan is recommended.

Hepatitis A prevention in the USA depends on routine universal childhood vaccination

AGENDA REFERENCE Nelson, N, Ward, J (2026). [Hepatitis A prevention in the USA depends on routine universal childhood vaccination](#). *The Lancet Online first April 22, 2026*

Nelson, NP, MK Weng, MG Hofmeister, KL Moore, M Doshani, S Kamili, A Koneru, P Haber, L Hagan, JR Romero, S Schillie and AM Harris (2020). [Prevention of Hepatitis A Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, 2020](#). *MMWR Recomm Rep* 69(5): 1-38.

Foster, MA, MG Hofmeister, S Yin, MP Montgomery, MK Weng, M Eckert, NP Nelson, J Mermin, C Wester, EH Teshale, N Gupta and LA Cooley (2022). [Widespread Hepatitis A Outbreaks Associated with Person-to-Person Transmission - United States, 2016-2020](#). *MMWR Morb Mortal Wkly Rep* 71(39): 1229-1234.

Hepatitis A is a vaccine-preventable disease typically acquired through fecal-oral transmission. Hepatitis A virus (HAV) infection rates in the United States declined approximately 97% during 1995-2015 after the introduction and widespread pediatric use of hepatitis A vaccines (1). Since 2016, hepatitis A outbreaks have been reported in 37 states, involving approximately 44,650 cases, 27,250 hospitalizations, and 415 deaths as of September 23, 2022 (2). A report describing early outbreaks in four states during 2017 noted that most infections occurred among persons reporting injection or noninjection drug use or experiencing homelessness; this finding signaled a shift in HAV infection epidemiology from point-source outbreaks associated with contaminated food to large community outbreaks associated with person-to-person transmission (3). CDC analyzed interim data from 33 outbreak-affected states to characterize demographic, risk factor, and clinical outcome data from 37,553 outbreak-associated hepatitis A cases reported during August 1, 2016-December 31, 2020. Among persons with available risk factor or clinical outcome information, 56% reported drug use, 14% reported experiencing homelessness, and 61% had been hospitalized; 380 outbreak-associated deaths were reported. The most effective means to prevent and control hepatitis A outbreaks is through hepatitis A vaccination, particularly for persons at increased risk for HAV infection (4). The epidemiologic shifts identified during these outbreaks led to a 2019 recommendation by the Advisory Committee on Immunization Practices (ACIP) for vaccination of persons experiencing homelessness and reinforcement of existing vaccination recommendations for persons who use drugs (4). Substantial progress in the prevention and control of hepatitis A has been made; the

number of outbreak-affected states has been reduced from 37 to 13 (2). Increased hepatitis A vaccination coverage, particularly through implementation of successful, nontraditional vaccination strategies among disproportionately affected populations (5), is needed to continue progress in halting current outbreaks and preventing similar outbreaks in the future.

Hofmeister, MG and N Gupta (2023). [Preventable Deaths During Widespread Community Hepatitis A Outbreaks - United States, 2016-2022](#). *MMWR Morb Mortal Wkly Rep* 72(42): 1128-1133.

Hepatitis A is acquired through the fecal-oral route and is preventable by a safe and effective vaccine. Although hepatitis A is generally mild and self-limited, serious complications, including death, can occur. Since 2016, widespread hepatitis A outbreaks have been reported in 37 U.S. states, primarily among persons who use drugs and those experiencing homelessness. Nearly twice as many hepatitis A-related deaths were reported during 2016-2022 compared with 2009-2015. CDC analyzed data from 27 hepatitis A outbreak-affected states that contributed data during August 1, 2016-October 31, 2022, to characterize demographic, risk factor, clinical, and cause-of-death data among 315 outbreak-related hepatitis A deaths from those states. Hepatitis A was documented as an underlying or contributing cause of death on 60% of available death certificates. Outbreak-related deaths peaked in 2019, and then decreased annually through 2022. The median age at death was 55 years; most deaths occurred among males (73%) and non-Hispanic White persons (84%). Nearly two thirds (63%) of decedents had at least one documented indication for hepatitis A vaccination, including drug use (41%), homelessness (16%), or coinfection with hepatitis B (12%) or hepatitis C (31%); only 12 (4%) had evidence of previous hepatitis A vaccination. Increasing vaccination coverage among adults at increased risk for infection with hepatitis A virus or for severe disease from infection is critical to preventing future hepatitis A-related deaths.

Hofmeister, MG, KN Ly, S Yin and PR Spradling (2024). [Evolving Characteristics of Decedents With Hepatitis A Listed as a Cause of Death, United States, 2011-2021](#). *J Viral Hepat* 31(12): 783-794.

Hepatitis A is a vaccine-preventable disease that typically causes mild illness. Hepatitis A outbreaks associated with person-to-person transmission have been widespread in the United States since 2016. We used public-use US Multiple Cause of Death data to compare characteristics and listed comorbidities among decedents with hepatitis A-listed deaths during non-outbreak (2011-2015) and outbreak (2017-2021) periods and assessed the median age at death among decedents with and without hepatitis A-listed deaths during the outbreak period. From the non-outbreak period to the outbreak period, hepatitis A-listed deaths more than doubled (from 369 to 801), while the hepatitis A-listed age-adjusted mortality rate increased 150% ($p < 0.001$). When compared with the non-outbreak period, hepatitis A-listed decedents during the outbreak period were more frequently male, aged 18-49 years, non-Hispanic White, died in an inpatient setting, and had hepatitis A listed as their underlying cause of death. The median age at death for hepatitis A-listed decedents was significantly younger during the outbreak period overall and among females (62 and 66 years, respectively) compared with the non-outbreak period (64 and 72 years, respectively, $p < 0.001$). During the outbreak period, median age at death for hepatitis A-listed decedents was 14 years younger than decedents without hepatitis A listed. Compared with the general US population, decedents with hepatitis A listed on the death certificate died at younger ages during 2017-2021. Efforts are needed to improve hepatitis A vaccination coverage among adults recommended for hepatitis A vaccination to prevent additional premature hepatitis A deaths.

Hofmeister, MG, J Xing, MA Foster, RJ Augustine, C Burkholder, J Collins, S McBee, ED Thomasson, D Thoroughman, MK Weng and PR Spradling (2021). [Hepatitis A Person-to-Person Outbreaks: Epidemiology, Morbidity Burden, and Factors Associated With Hospitalization-Multiple States, 2016-2019](#). *J Infect Dis* 223(3): 426-434.

BACKGROUND: Since 2016, the United States has experienced person-to-person hepatitis A outbreaks unprecedented in the vaccine era. The proportion of cases hospitalized in these outbreaks exceeds historical national surveillance data. METHODS: We described the epidemiology, characterized the reported increased morbidity, and identified factors associated with hospitalization during the outbreaks by reviewing a 10% random sample of outbreak-associated hepatitis A cases in Kentucky, Michigan, and West Virginia-3 heavily affected states. We calculated descriptive statistics and conducted age-adjusted log-binomial regression analyses to identify factors associated with hospitalization. RESULTS: Participants in the random sample ($n = 817$) were primarily male (62.5%) with mean age of 39.0 years; 51.8% were hospitalized. Among those with available information, 73.2% reported drug use, 14.0% were experiencing homelessness, 29.7% were currently or recently incarcerated, and 61.6% were epidemiologically linked to a known outbreak-associated case. Residence in Michigan (adjusted risk ratio aRR = 1.8), being a man who has sex with men (aRR = 1.5), noninjection drug use (aRR = 1.3), and homelessness (aRR = 1.3) were significantly ($P < .05$) associated with hepatitis A-related hospitalization. CONCLUSIONS: Our findings support current Advisory Committee on Immunization Practices recommendations to vaccinate all persons who use drugs, men who have sex with men, and persons experiencing homelessness against hepatitis A.

Hofmeister, MG, J Xing, MA Foster, RJ Augustine, C Burkholder, J Collins, S McBee, ED Thomasson, D Thoroughman, MK Weng and PR Spradling (2021). [Factors Associated With Hepatitis A Mortality During Person-to-Person Outbreaks: A Matched Case-Control Study-United States, 2016-2019](#). *Hepatology* 74(1): 28-40.

BACKGROUND AND AIMS: During 2016-2020, the United States experienced person-to-person hepatitis A outbreaks that are unprecedented in the vaccine era, during which case-fatality ratios reported by some jurisdictions exceeded those historically associated with hepatitis A. APPROACH AND RESULTS: To identify factors associated with hepatitis A-related mortality, we performed a matched case-control study (matched on age ± 5 years and county of residence in a 1:4 ratio) using data collected from health department and hospital medical records of outbreak-associated patients in Kentucky, Michigan, and West Virginia. Controls were hepatitis A outbreak-associated patients who did not die. There were 110 cases (mean age 53.6 years) and 414 matched controls (mean age 51.9 years); most cases (68.2%) and controls (63.8%) were male. Significantly ($P < 0.05$) higher odds of mortality were associated with preexisting nonviral liver disease (adjusted odds ratio aOR, 5.2), history of hepatitis B (aOR, 2.4), diabetes (aOR, 2.2), and cardiovascular disease (aOR, 2.2), as well as initial Model for End-Stage Liver Disease (MELD) score ≥ 30 (aOR, 10.0), aspartate aminotransferase (AST)/alanine aminotransferase (ALT) ratio > 2 (aOR, 10.3), and platelet count $< 150,000/\mu\text{L}$ (aOR, 3.7) among hepatitis A outbreak-associated patients in the independent multivariable conditional logistic regression analyses (each model adjusted for sex). CONCLUSIONS: Preexisting liver disease, diabetes, cardiovascular disease, and initial MELD score ≥ 30 , AST/ALT ratio ≥ 1 , and platelet count $< 150,000/\mu\text{L}$ among hepatitis A patients were independently associated with higher odds of mortality. Providers should be vigilant for such features and have a low threshold to escalate care and consider consultation for liver transplantation. Our findings support the recommendation of the Advisory

Committee on Immunization Practices to vaccinate persons with chronic liver disease, though future recommendations to include adults with diabetes and cardiovascular disease should be considered.

Hofmeister, MG, A Asher, CM Jones, RJ Augustine, C Burkholder, J Collins, MA Foster, S McBee, D Thoroughman, ED Thomasson, MK Weng and PR Spradling (2022). [Prevalence and Types of Drugs Used Among Hepatitis A Patients During Outbreaks Associated with Person-to-Person Transmission, Kentucky, Michigan, and West Virginia, 2016-2019](#). *J Appalach Health* 4(1): 51-60.

BACKGROUND: People who use drugs are at increased risk for hepatitis A virus infection. Since 1996, the Advisory Committee on Immunization Practices has recommended hepatitis A vaccination for people who use drugs. Since 2016, the U.S. has experienced widespread hepatitis A outbreaks associated with person-to-person transmission. PURPOSE: To describe the prevalence of drug use, route of use, and drugs used among hepatitis A outbreak-associated patients. METHODS: State outbreak and medical records were reviewed to describe the prevalence, type, and route of drug use among a random sample of 812 adult outbreak-associated hepatitis A patients from Kentucky, Michigan, and West Virginia during 2016-2019. Differences in drug-use status were analyzed by demographic and risk-factor characteristics using the X (2) test. RESULTS: Among all patients, residents of Kentucky (55.6%), Michigan (51.1%), and West Virginia (60.1%) reported any drug use, respectively. Among patients that reported any drug use, methamphetamine was the most frequently reported drug used in Kentucky (42.3%) and West Virginia (42.1%); however, opioids were the most frequently reported drug used in Michigan (46.8%). Hepatitis A patients with documented drug use were more likely ($p<0.05$) to be experiencing homelessness/unstable housing, have been currently or recently incarcerated, and be aged 18-39 years compared to those patients without documented drug use. IMPLICATIONS: Drug use was prevalent among person-to-person hepatitis A outbreak-associated patients, and more likely among younger patients and patients experiencing homelessness or incarceration. Increased hepatitis A vaccination coverage is critical to prevent similar outbreaks in the future.

Hagan, LM, MP Montgomery, PL Lauro, M Cima, G Stringer, et al. (2023). [Recent Incarceration Among Individuals Infected With Hepatitis A Virus During Person-to-Person Community Outbreaks, United States, 2016-2020](#). *Public Health Rep* 138(4): 619-624.

OBJECTIVES: Although many people who are incarcerated have risk factors for hepatitis A virus (HAV) infection, the proportion of hepatitis A cases among people with a recent incarceration is unknown. We examined the relationship between recent incarceration and HAV infection during community-based, person-to-person outbreaks to inform public health recommendations. METHODS: The Centers for Disease Control and Prevention surveyed health departments in 33 jurisdictions reporting person-to-person HAV outbreaks during 2016-2020 on the number of outbreak-associated cases, HAV-infected people recently incarcerated, and HAV-associated hospitalizations and deaths. RESULTS: Twenty-five health departments reported 18 327 outbreak-associated hepatitis A cases during January 11, 2016-January 24, 2020. In total, 2093 (11.4%) HAV-infected people had been recently incarcerated. Of those with complete data, 1402 of 1462 (95.9%) had been held in a local jail, and 1513 of 1896 (79.8%) disclosed hepatitis A risk factors. Eighteen jurisdictions reported incarceration timing relative to the exposure period. Of 9707 cases in these jurisdictions, 991 (10.2%) were among recently incarcerated people; 451 of 688 (65.6%) people with complete data had been incarcerated during all ($n = 55$) or part ($n = 396$) of their exposure period. CONCLUSIONS: Correctional facilities are important settings for reaching people with risk factors for HAV infection and can also be venues where transmission occurs. Providing HAV vaccination to incarcerated people, particularly people housed in jails, can be an effective component of community-wide outbreak response.

Qureshi, NS, AJ Villatoro, NDT Tran, SJ Herrera, SP Judge, L Fang, SO Henderson and KA Stanley (2024). [Hepatitis A Exposure Response and Outbreak Prevention in a Large Urban Jail - Los Angeles County, California, May-July 2023](#). *MMWR Morb Mortal Wkly Rep* 73(6): 131-134.

Correctional settings provide a high-risk environment for hepatitis A transmission because of the high proportion of homelessness and injection drug use among persons who are incarcerated. On May 30, 2023, Los Angeles County Department of Public Health informed the Communicable Disease Surveillance and Control (CDSC) unit of the Los Angeles County Jail system that a symptomatic incarcerated person had received a positive test result for acute hepatitis A. Upon learning the next day that the patient was a food handler, CDSC staff members identified 5,830 potential contacts of the index patient, 1,702 of whom had been released from the jail. During June 1-12, a total of 2,766 contacts who did not have a documented history of hepatitis A serology or vaccination that could be confirmed from the electronic health record or state immunization registry were identified. These persons were offered hepatitis A vaccination as postexposure prophylaxis; 1,510 (54.6%) accepted vaccination. Contacts who were food handlers without confirmed evidence of immunity and who declined vaccination were removed from food-handling duties for the duration of their potential incubation period. No additional cases were identified. Identifying contacts promptly and using immunization and serology records to ensure rapid delivery of postexposure prophylactic vaccine can help prevent hepatitis A transmission during exposures among incarcerated populations.

Zellmer, L, L Peters and RS Silva (2021). [Hennepin County Adult Detention Center's Response to a 2019 Hepatitis A Outbreak in Minnesota](#). *Am J Public Health* 111(5): 839-841.

Hennepin County Adult Detention Center (Jail) is Minnesota's largest jail. In August 2019, the Minnesota Department of Health declared a statewide hepatitis A outbreak. Within three days, Hennepin County Jail Health Services made significant changes to vaccination protocols that increased vaccination rates from 0.6% to 7.1% among detainees, who have a greater risk of contracting hepatitis A. We highlight the opportunity for jails to develop sustainable public health interventions in the setting of community outbreaks.

Peak, CM, SS Stous, JM Healy, MG Hofmeister, Y Lin, S Ramachandran, MA Foster, A Kao and EC McDonald (2020).

[Homelessness and Hepatitis A-San Diego County, 2016-2018. Clin Infect Dis 71\(1\): 14-21.](#)

Kang, M, SF Horman, RA Taplitz, B Clay, M Millen, A Sitapati, FE Myers, EC McDonald, SR Abeles, DR Wallace, S Stous and FJ Torriani (2020). [Public Health Role of Academic Medical Center in Community Outbreak of Hepatitis A, San Diego County, California, USA, 2016-2018. Emerg Infect Dis 26\(7\): 1374-1381.](#)

DuPre, N, L Blair, S Moyer, EF Cook, B Little and J Howard (2020). [Hepatitis A Outbreaks Associated With the Opioid Epidemic in Kentucky Counties, 2017-2018. Am J Public Health 110\(9\): 1332.](#)

Brouwer, AF, JL Zelner, MC Eisenberg, L Kimmins, M Ladisky, J Collins and JNS Eisenberg (2020). [The Impact of Vaccination Efforts on the Spatiotemporal Patterns of the Hepatitis A Outbreak in Michigan, 2016-2018. Epidemiology 31\(5\): 628-635.](#)

Helmick, MJ, CB Morrow, JH White and P Bordwine (2023). [Widespread Community Transmission of Hepatitis A Virus Following an Outbreak at a Local Restaurant - Virginia, September 2021-September 2022. MMWR Morb Mortal Wkly Rep 72\(14\): 362-365.](#)

Hepatitis A is a vaccine-preventable liver infection caused by the hepatitis A virus (HAV); it is transmitted through ingestion of food or drink that has been contaminated by small amounts of infected stool, or through direct contact, including sexual contact, with a person who is infected (1). After years of historically low rates of hepatitis A in the United States, the incidence began increasing in 2016, with outbreaks characterized by person-to-person HAV transmission among persons who use drugs, persons experiencing homelessness, and men who have sex with men (2,3). As of September 2022, 13 states were experiencing outbreaks, including Virginia (3). In September 2021, the Roanoke City and Alleghany Health Districts (RCAHD) in southwestern Virginia investigated an outbreak of hepatitis A. The outbreak, which resulted in 51 cases, 31 hospitalizations, and three deaths, was associated with a food handler who was infected. After the outbreak, the community experienced ongoing person-to-person transmission of HAV, predominantly among persons who use injection drugs. As of September 30, 2022, an additional 98 cases had been reported to RCAHD. The initial outbreak and community transmission have exceeded US\$3 million in estimated direct costs (4,5). This report describes the initial outbreak and the ongoing community transmission of HAV. Increasing vaccination coverage among persons with risk factors for hepatitis A infection is important, including among those who use drugs. Strengthening community partnerships between public health officials and organizations that employ persons with risk factors for acquisition of HAV could help to prevent infections and outbreaks.

Samala, N, W Abdallah, A Poole, H Shamseddeen, SA V, SO E, KR Patidar and R Vuppalanchi (2021). [Insight into an acute hepatitis A outbreak in Indiana. J Viral Hepat 28\(6\): 964-971.](#)

Hepatitis A virus (HAV) infection causes an acute enteric hepatitis associated with substantial morbidity and mortality, particularly in older individuals. Incidence of HAV infection is low in the United States, mostly related to consumption of contaminated food. Starting in 2017, Indiana reported a large HAV outbreak. We sought to characterize the risk-exposures, clinical features and outcomes of HAV and examine the differences based on underlying cirrhosis and age. Adults ≥ 18 years diagnosed with HAV between January 2017 and April 2019 at two large healthcare systems in Indiana were identified. Demographic data, risk-exposures, clinical features, laboratory data and clinical outcomes were collected for analysis. The HAV cohort constituted 264 individuals with mean age of 41-years, 62% male and 94% Caucasian. Risk-exposures identified were illicit drug use (74%), food-borne (15%), person-to-person (11%) and incarceration (11%). Mortality rate was 2%, acute liver failure (ALF) was seen in 4% and acute on chronic liver failure (ACLF) was seen in 30% (6 of 20 with underlying cirrhosis). Admission MELD score was the only factor associated with ALF OR = 1.17 (1.08-1.2), $p < 0.0001$, on multivariable logistic regression analysis. Higher proportion of individuals with underlying cirrhosis developed acute kidney injury (AKI) (26% vs. 9%, $p = 0.03$), ascites (45% vs. 11%, $p < 0.0001$) and hepatic encephalopathy (35% vs. 4%, $p < 0.0001$). In conclusion, illicit drug use was the predominant risk-exposure in the current HAV outbreak, which was associated with 2% mortality rate, and those with cirrhosis had worse outcomes (AKI, ascites and HE), of whom 30% developed ACLF.

Reichenbach, ZW, C Hogan, G Piech, S Shah, T Lambrou, M Radcliffe, A Kiani and L Peng (2021). [Characterization of a hepatitis a outbreak in underserved urban tertiary safety net hospitals. Ann Epidemiol 64: 111-119.](#)

Outbreaks of Hepatitis A, caused by the Hepatitis A Virus (HAV), remain a worldwide health concern. We conducted a retrospective chart review to characterize patients with acute HAV during an outbreak at our urban tertiary care center to better characterize patients infected with HAV. We searched our electronic records for patients with positive HAV IgM antibodies during a period of outbreak in Philadelphia, May 2017-December 2019. Characteristics of patients were recorded. We searched an equal period of time prior to the outbreak, September 2014-April 2017, to compare the two patient populations. During the outbreak we diagnosed 205 cases of acute HAV compared to just 23 during an equal time period prior to the onset of the outbreak. When compared to the results reported by the public health department for 2019, this accounted for 39.9% of patients documented in the city. A history of drug use was found in 49.4% of our patients while 19.5% of patients were homeless. Our analysis of homelessness and drug usage among documented cases of HAV during the outbreak period mirrored data reported by the city. Further, our analysis found that 7 zip codes accounted for 60% of our patients. Biochemical measures of liver function were higher in patients examined during the outbreak.

Brennan, J, H Mullins, K Tobey, C Jones, MA Kainer, M Fiscus, S May, JR Dunn, W Schaffner and TF Jones (2021). [Nosocomial hepatitis A outbreak among healthcare workers and patients in a community hospital during an ongoing statewide outbreak. Infect Control Hosp Epidemiol 42\(2\): 139-141.](#)

OBJECTIVE: The Tennessee Department of Health (TDH) investigated a hepatitis A virus (HAV) outbreak to identify risk factors for infection and make prevention recommendations. DESIGN: Case series. SETTING: Community hospital. PARTICIPANTS: Healthcare workers (HCWs) or patients with laboratory-confirmed acute HAV infection during October 1, 2018-January 10, 2019. METHODS: HCWs with suspected or confirmed hepatitis A infections were interviewed to assess their exposures and activities. Patient medical records and hospital administrative records were reviewed to identify common exposures. We conducted a site investigation to assess knowledge of infection control practices among HCWs. Serum specimens from ill persons were tested for HAV RNA by polymerase chain reaction (PCR)

and genotyped. RESULTS: We identified 6 HCWs and 2 patients with laboratory-confirmed HAV infection. All cases likely resulted from exposure to a homeless patient with a history of recreational substance use and undiagnosed HAV infection. Breaches in hand hygiene and use of standard precautions were identified. HAV RNA was detected in 7 serum specimens and all belonged to an identical strain of HAV genotype 1b. CONCLUSIONS: A hepatitis A outbreak among hospital patients and HCWs resulted from exposure to a single patient with undiagnosed HAV infection. Breakdowns in infection control practices contributed to the outbreak. The likelihood of nosocomial transmission can be reduced with proper hand hygiene, standard precautions, and routine disinfection. During community outbreaks, medical providers can better prevent ongoing transmission by including hepatitis A in the differential diagnosis among patients with a history of recreational substance use and homelessness.

Kuehn, BM (2022). [Shifting Hepatitis A Epidemiology Requires Renewed Vaccination Efforts](#). *Jama* 328(18): 1800.

Targeted vaccination policies: food handlers and migrants

Trucchi, C, F Del Puente, C Piccinini, M Roveta, M Sartini and ML Cristina (2025). [Determining the burden of foodborne hepatitis A spread by food handlers: suggestions for a targeted vaccination?](#). *Front Public Health* 13: 1617004.

INTRODUCTION: Hepatitis A virus (HAV) remains a significant foodborne pathogen, particularly when food handlers serve as the source of contamination. Its high infectivity and environmental persistence allow the virus to survive on hands, surfaces, and food, facilitating widespread transmission even from a single distribution point. METHODS: This systematic review, Prospero registration number: CRD420250651930, analyzed 32 studies reporting HAV outbreaks linked to food handlers to assess whether vaccination could be an effective preventive strategy. RESULTS: Most outbreaks occurred in North America and Europe, with index cases almost exclusively identified among food workers. Outbreak sizes varied, though the majority involved fewer than 50 cases. DISCUSSION: Studies highlighted critical challenges, including underreporting, asymptomatic cases, and delayed interventions. Control measures largely relied on immunoglobulin administration, while vaccination was rarely implemented and showed poor adherence among food service staff. Although economic analyses were limited and sometimes inconclusive, some evidence suggested potential healthcare savings from prevention efforts. Considering HAV's high transmissibility and the difficulty of timely outbreak detection, targeted vaccination of food handlers—especially those in high-risk settings or seasonal employment—emerges as a promising method of biological risk management in food industries. These considerations could support food industries in considering vaccination as a tool to prevent foodborne HAV transmission.

Fallucca, A, V Restivo, MC Sgariglia, M Roveta and C Trucchi (2023). [Hepatitis a Vaccine as Opportunity of Primary Prevention for Food Handlers: A Narrative Review](#). *Vaccines (Basel)* 11(7).

The hepatitis A virus (HAV) is still a leading cause of viral hepatitis worldwide. After a long incubation period, the clinical manifestations range from asymptomatic infection to acute liver failure. The severity of the disease increases with age and pre-existing liver disease. The transmission is mainly via person-to-person contact or ingestion of contaminated food or water. Food contamination can occur at any step of the food chain, especially when infected people handle not-heated or otherwise-treated food. HAV is endemic in low-income countries because of poor sanitary and sociodemographic conditions. The populations of developed countries are highly susceptible, and large outbreaks occur when HAV is introduced from endemic countries due to globalization, travel, and movement of foodstuffs. HAV prevention includes hygiene practices, immunoglobulins, and vaccination. Safe and effective inactivated and live attenuated vaccines are available and provide long-term protection. The vaccine targets are children and subjects at increased risk of HAV exposure or serious clinical outcomes. This review discusses the critical role of food handlers in the spread of HAV and the opportunity for food industry employers to consider food handler immunization a tool to manage both food safety in compliance with HACCP principles and food operators' biologic risk.

Shenoy, B, A Andani, S Kolhapure, A Agrawal and J Mazumdar (2022). [Endemicity change of hepatitis A infection necessitates vaccination in food handlers: An Indian perspective](#). *Hum Vaccin Immunother* 18(1): 1868820.

In the last two decades, outbreaks due to the foodborne hepatitis A virus (HAV) have been frequently reported in India, with adolescents and adults primarily affected. In India, most food handlers are adolescents and young adults who might be exposed to unsatisfactory environmental conditions and poor water quality. This increases the risk of HAV infection and consequently compounds the risk of HAV transmission from food handlers to susceptible populations. Given the shift in hepatitis A endemicity from high to intermediate levels in India, implementing the vaccination of food handlers has become important as it can also contribute to the elimination of hepatitis A in India. This narrative review makes a case for hepatitis A immunization of food handlers in India considering the growing food industry, evolving food culture, and the substantial burden caused by hepatitis A outbreaks.

PLAIN LANGUAGE SUMMARY What is the context? Hepatitis A disease is a common form of viral hepatitis and is transmitted through contaminated food and water or through close contact with an infected person. The virus withstands high temperature and can survive on surfaces for long periods of time. In India, the burden of hepatitis A has shifted from children to adolescents and adults who are more vulnerable to infection. They present a high risk of complications, often requiring hospitalization. The prevention of the disease has often been neglected, inadequate safety measures for the preparation of food (via food handlers) is a known risk factor for the transmission of hepatitis A. What is new? Our review highlights the relationship between food handling and hepatitis A infection among adolescents and adults in India. The lack of knowledge of food safety regulations and hygiene measures among food handlers and the organizations that guide them may contribute to the spread of hepatitis A. What is the impact? Sanitation efforts, awareness and educational programs for food are needed to help reduce the transmission of hepatitis A virus and disease, yet these measures alone may not be sufficient. Vaccination among high-risk populations such as food handlers can prevent hepatitis A infection and its complications as well as transmission.

Kim, HS, JL Torres and A Baffoe-Bonnie (2022). [Time to Reconsider Hepatitis A Vaccination in Food Handlers: Are We Seeing More Outbreaks and Severe Disease?](#). *Open Forum Infect Dis* 9(7): ofac185.

The risk for secondary infection from hepatitis A-infected food handlers to patrons is deemed as low. Thus, hepatitis A vaccination is not specifically recommended for persons who handle food in the absence of other risk factors in the United States. We describe an ongoing

food handler-associated hepatitis A outbreak in southwest Virginia and recommend policy changes that will incentivize food industry employers to embrace broader food handler hepatitis A vaccination.

Petrignani MWF, Kroneman A, van Hunen R, Vennema H, Koopmans M (2009). [Too early to stop immigrant vaccination programmes](#). *Eur J Public Health* Oct;19(5):454. doi: 10.1093/eurpub/ckp101.

Suijkerbuijk, AW, JE van Steenbergen, GJ Sonder, R Lindeboom and Y Doorduyn (2010). [Response to 'Too early to stop immigrant vaccination programmes'](#). *Eur J Public Health* 20(1): 7.

Session 7 · Group discussion: lessons learnt

Day 2 · 14 October 2026 · 11:00–12:00 · Chair: Greet Hendrickx

The group debate will turn the evidence presented into hepatitis A prevention and control recommendations. Each group may use the questions from Sessions 2–6. A suggested division:

Possible Topics that can be discussed:

- **Surveillance and diagnosis:** minimum surveillance dataset; role of genotyping and wastewater surveillance; seroprevalence data needed to map immunity gaps; diagnostic access.
- **Vaccination strategy:** universal childhood vs risk-based vaccination; one vs two doses; catch-up; adults over 40 and immunocompromised people; evidence and cost-effectiveness thresholds for change.
- **Outbreak preparedness and response:** outbreak response package, post-exposure prophylaxis, vaccine supply and stockpiles, cross-border coordination (EpiPulse, EURL, HAVNet).
- **Reaching underserved and at-risk groups:** MSM, people who use drugs, people experiencing homelessness, Roma communities, migrants and travellers visiting friends and relatives, food handlers; health literacy, free vaccination and outreach.

Session 8 · Summary and closing of the meeting

Day 2 · 13:30–14:15 · Chair: Pierre Van Damme ·

Meeting summary: David FitzSimons

Annex A · Literature search strategy

The literature in the draft background document came from PubMed searches by the VHPB Scientific Office:

- ((Hepatitis A[Title]) OR (HAV[Title])) AND ((epidemiology[Title/Abstract]) OR (outbreak[Title/Abstract])) – 2020 to present (searched 16/03/2026)
- (Hepatitis A vaccination[Title/Abstract]) AND (One dose[Title/Abstract]) / (Hepatitis A[Title/Abstract]) AND (One dose[Title/Abstract]) – 2016 to present (searched 07/04/2026)
- Additional targeted searches on risk groups, duration of protection and outbreak management

For this version, the literature was reorganised by agenda session. The references cited in the meeting agenda were checked against the draft, and key missing sources (marked “ADDED REFERENCE”) were added. Duplicates were removed. Some older references in the draft (mainly 2016–2020) have no abstract; they are listed with a link to the source.

Annex C · Abbreviations

anti-HAV	Antibodies against hepatitis A virus (IgM: recent infection; IgG: past infection or vaccination)
ACIP	Advisory Committee on Immunization Practices (USA)
aOR	Adjusted odds ratio
CDC	US Centers for Disease Control and Prevention
ECDC	European Centre for Disease Prevention and Control
EMIS	European MSM Internet Survey
ESCMID	European Society of Clinical Microbiology and Infectious Diseases
EURL-PH-FWDV	EU Reference Laboratory for Public Health on Food- and Water-borne Viruses
FWD-Net	Food- and Waterborne Diseases and Zoonoses Network
HAV	Hepatitis A virus
HAVNet	Hepatitis A Lab Network
MSM	Men who have sex with men
NIP	National immunisation programme
PEP	Post-exposure prophylaxis
PWID / PWUD	People who inject drugs / people who use drugs
SAGE	WHO Strategic Advisory Group of Experts on Immunization
TESSy	The European Surveillance System
VHPB	Viral Hepatitis Prevention Board
WBS	Wastewater-based surveillance