Chronic liver disease in Europe

From targets to real world impact: a review of models of care for chronic HBV and HCV in Europe

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Summary

Hepatitis B virus (HBV) and hepatitis C virus (HCV) remain public health threats in the WHO European region, where an estimated 29 million people live with chronic infection and viral hepatitis-related deaths now surpass those from HIV/AIDS and tuberculosis combined. Although effective prevention tools and antiviral treatments reduce the risk of complications, overall mortality has not declined. This Series paper reviews models of care (MoC) implemented between 2015 and 2025, drawing on scientific literature and policy documents to assess regional progress. Simplified testing and treatment, childhood and targeted adult HBV vaccination, harm-reduction programmes, and prison-based interventions have advanced elimination efforts. Pragmatic approaches, including point-of-care testing, decentralised services, and integrated models tailored to key populations demonstrate clear benefits. However, major challenges persist: large undiagnosed populations, regional disparities, inadequate healthcare worker knowledge, and inequities affect at-risk groups. Achieving elimination by 2030 will require accelerated case-finding, broader access to simplified treatment, stronger risk-tailored and vaccination strategies, improved data systems, and renewed commitment.

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Introduction

Global context and targets

In 2016, the World Health Organization (WHO) called for the elimination of viral hepatitis as a public health threat by 2030.[1] Global targets include reducing the incidence of new chronic infections by 90% and hepatitis-related mortality by 65%, compared to the 2015 baseline. Despite the establishment of these targets and the availability of effective prevention, diagnostic, and treatment strategies, viral hepatitis continues to pose a major global health challenge.

The vision for viral hepatitis elimination links to a wider strategy for the development of universal health coverage (UHC) and health security. Priorities centre on integrating essential services into health systems, supporting continuity of care, and aligning disease-specific and health system efforts at policy, programme, and service levels,[2] alongside a broader public health agenda that promotes liver health, and tackles primary liver cancer (hepatocellular carcinoma (HCC)). 'Preventive hepatology' emphasises long-term strategies to prevent infection, limit disease progression, and reduce HCC incidence,[3] incorporating vaccination, screening, lifestyle support, antiviral treatment, harm reduction, and cancer prevention into a coordinated continuum. Curative treatment for hepatitis C virus (HCV) infection, and simplified eligibility criteria for treating hepatitis B virus (HBV) infection have changed the landscape, with the potential to offer therapy to many more people, both to mitigate disease in individuals and to reduce the population reservoir for transmission.

Attainment of many elimination targets is feasible, as demonstrated within the WHO European region (WHO/Europe) by, for example, Iceland.[4,5] However, progress across the region varies, and many gaps and challenges need to be addressed.

Aims and objectives

In this Series paper, we synthesise and describe models of care (MoC) for people living with HBV and HCV in WHO/Europe. A MoC describes how interventions should be delivered, including the processes, organisation and management of services, with the objective of meeting health aims and priorities of the population and improving health system performance.[6]

Interventions for viral hepatitis can operate across the cascade of care (CoC), which incorporates prevention, testing, linkage to care, treatment, and retention in care. Our aim is to report on good practices to inform policy-makers, public health practitioners, and healthcare professionals (HCPs) in designing effective strategies. By mapping and analysing MoC, we provide insights into evidence-based practices that can inform future policy and practice, and identify gaps in research and implementation where further efforts are needed.

Approach

We undertook a systematic literature review to synthesise and critically appraise the available evidence on HBV and HCV MoC in WHO/Europe. However, the wider landscape of this review is presented in a narrative format which also incorporates other literature sources. The detailed description of the methodology is described in Supplementary Material 1.

Epidemiology

The changing burden of chronic HBV and HCV infection in Europe

In WHO/Europe, an estimated 29 million people are living with chronic HBV or HCV.[7] While modelling suggests that incidence has decreased over time, late presentation remains common, with potentially

Key messages

1. Europe can eliminate viral hepatitis with existing tools, but current care models require scaling up and adoption to meet the World Health Organization 2030 targets.
2. Large undiagnosed burdens and inequitable access to prevention, including HBV vaccination, testing, and treatment remain the greatest barriers to elimination.
3. Models of care that decentralise testing and treatment in community, primary care, harm-reduction, and prison settings have improved outcomes.
4. Marked regional differences in healthcare worker capacity and viral hepatitis-related knowledge and attitudes continue to hinder progress in many eastern European and central Asian countries.
5. Stigma and discrimination impede viral hepatitis elimination by discouraging testing, delaying care-seeking, and limiting equitable access to prevention, diagnosis, and treatment services for the populations most affected.
6. Achieving elimination requires rapid scale-up of active case-finding, treatment expansion, accessible harm-reduction services, hepatitis B vaccination, and additional political and financial commitment across Europe.

irreversible liver damage.[8] Reports from European Union/European Economic Area (EU/EEA) countries indicate that between 2% (in Poland) to 17% (in Romania) of individuals living with HBV and from <1% (in Iceland) up to 17% (in Romania) of those with HCV present with decompensated cirrhosis and/or HCC.[9] The 23 EU/EEA countries that consistently report acute HBV cases notified a steady decline between 2014 and 2021 due to the impact of vaccination programmes, although recent data shows a concerning reversal of this trend which may reflect changes in reporting and surveillance practices following the COVID pandemic.[10,11]

Similarly, the incidence of viral hepatitis-related HCC is decreasing, but HCC-related mortality is increasing.[12] In 2021, Europe's 'Beating Cancer Plan'[13] set out specific objectives to reduce cancer-related morbidity and mortality, which includes prevention of cancers caused by HBV and HCV. Liver cancer is the seventh leading cause of cancer-related deaths in WHO/Europe[14] with almost 70% of primary liver cancer deaths being caused by HBV and HCV.[15] Such persistent disease burden highlights a critical paradox: while viral hepatitis is preventable and treatable, it continues to cause substantial morbidity and mortality.

Robust and up to date data on HBV and HCV seroprevalence are available in some countries,[16–18] however many others rely on outdated or non-representative data, due to a lack of data collection frameworks to measure progress accurately and identify coverage gaps. Where empirical data are missing, modelling is being used to quantify incidence, prevalence, and the impact of interventions.[18,19]

The latest modelled estimates report an HBV prevalence of 1.2% in the general population for WHO/Europe in 2022,[20] while a median HBV prevalence of 0.5% was found in a systematic review of serosurveys from 21 EU/EEA/UK countries in 2023.[18] Large geographical differences remain, with country-specific estimates ranging from 0.4% in Spain and UK, to 6.5% in Albania.[21] For HCV, the WHO/Europe regional average prevalence was estimated at 0.9% in 2022.[22]

Vulnerable populations

HBV and HCV prevalence are significantly higher in certain risk-groups compared to the general population, such as migrants. Migration represents a particular challenge for elimination efforts in Europe, as migrants face significant barriers to care, including systemic, linguistic, and cultural barriers.[23] Migration to the region continues to rise, including many migrants from countries with intermediate (>2%) and high (>8%) HBV prevalence (e.g. Pakistan, China and Egypt). Recent estimates report HBV and HCV prevalence among migrants in EU-27 countries of 2.7% and 1.6%.[24]

Higher HBV prevalence is reported among people with incarceration experience (up to 25% in Bulgaria)[25] and among people who use drugs (PWUD), including people who inject drugs (PWID).[18,26] However, recent reports show that HBV prevalence among PWID and people experiencing incarceration has declined, most likely reflecting universal HBV vaccination.[27] Anti-HCV prevalence estimates in PWUD and/or PWID range from 12% in Italy[28] to 57% in Sweden,[29] with HCV-RNA prevalence from 7% in Norway to 67% in Estonia.[26]

While most European countries are making progress towards specific elimination targets across the whole population, if goals are applied specifically to PWID and migrant populations, success is much further from reach.[30,31]

Stigma and discrimination

Stigma and discrimination are increasingly documented in association with chronic viral hepatitis infection.[32] Intersectional stigma experienced by certain groups, including PWID and migrants, may amplify barriers to care. In addition to impacts on wellbeing and mental health, stigma and discrimination can deter testing and care engagement, and may inhibit individuals from sharing their status with partners and families, undermining efforts to scale effective intervention.[32]

Resourcing for elimination

Scale-up of elimination efforts is inhibited by a lack of sufficient and sustainable funding, reflecting inadequate prioritisation, political awareness, and commitment.[33] Unequal distribution of interventions disproportionately affect countries with insufficient social and health protections, like UHC, and ineffective harm reduction programmes. Under-resourced health infrastructure, as evidenced by the estimated 4.1 million HCP shortage projected for WHO/Europe by 2030,[34] coupled with fragmented MoC, contribute to late or missed opportunities for intervention.

Due to differences in epidemiological patterns and resource availability between countries, priorities and interventions vary.[35] While some national strategies target the general population, others place greater emphasis on populations at higher risk, including for HBV vaccination.[36] Despite efforts to reach these groups, services are frequently insufficient.[37,38] In some regions, access to public healthcare services is restricted, particularly for undocumented migrants, and may require complex administrative processes[39] and demand out-of-pocket payment. Efficient use of resources could be enhanced through better linkage to existing expertise and infrastructure. More evidence is needed to investigate the cost-effectiveness, accessibility, and acceptability of such approaches in different settings.

Progress towards viral hepatitis elimination

HBV and HCV prevalence in WHO/Europe were estimated to have dropped from 1.6% and 1.5% in 2015[40] to 1.2% and 0.9% in 2022, respectively.[22] For HCV, the successful widespread roll-out of testing and

treatment[41] in some countries (e.g., Switzerland)[42] is delivering marked prevalence reductions.[43] Of the 46 WHO/Europe countries modelled, 34 had met the HBV target of a prevalence of $\leq$ 0.1% among those aged $\leq$ 5 years by 2022.[20] In several countries with a previously intermediate-high HBV prevalence, antenatal care and sustained high childhood vaccination coverage have resulted in reduction in HBV prevalence and effective control. Recent countries validated for reaching HBV targets include Kyrgyzstan, Moldova, Turkmenistan, and Uzbekistan,[44] joining Georgia, Italy, the Netherlands, and the United Kingdom of Great Britain and Northern Ireland. In some cases, the elimination of vertical transmission (EVT) has been achieved for HBV, evidenced by very low HBsAg prevalence in children (e.g. Greece, Kyrgysztan and Moldova).[45,46] Nonetheless, data availability on EVT varies greatly between countries, limiting insights into overall regional progress.[10] Targets focussing on the whole population, particularly those pertaining to CHB, remain far from being achieved.

Key identified models of care

Recommendations and approaches for elimination

WHO promotes the standardisation and simplification of approaches to tackle viral hepatitis, but also highlights the need for interventions to be tailored to the local setting and endorses within-country ownership of programmes (Fig. 1). Interventions across WHO/Europe include diverse MoC, ranging from community-based and outreach programmes to hospital-based strategies.[2,47]

The systematic component of our literature review identified 2916 studies (January 2015–September 2025), among which 166 reported on MoC, representing data from 29 countries (Table 1, Supplementary Material 2, Tables S2 and S1). All 166 articles are listed in Supplementary Material. The majority of identified MoC were for HCV (59.0%), with 8.4% being focused on HBV and 10.2% on both. Another 22.3% targeted HBV and/or HCV alongside other conditions including HIV, other sexually transmitted infections, and tuberculosis. 24.1% were based in a hospital and 18.0% in other clinical settings like emergency rooms, primary care, and migrant clinics. Meanwhile, 38.5% were implemented in community-based settings including community pharmacies, non-governmental organisations (NGOs), harm reduction or substance use centres, outreach units, and refugee reception centres. Countries contributing the greatest number of articles were Spain (21.1%), Italy (20.0%), and France (5.6%).

Prevention

The preventive hepatology approach requires scaling up sustainable community-based and decentralised MoC, capitalising on diverse points of contact, such as primary care, pharmacies, substance use services, social integration classes, community centres, or mobile clinics. HBV vaccination, comprehensive harm-reduction services, and EVT strategies can interrupt transmission and reduce long-term morbidity. These strategies should be coupled with information and education on disease transmission, prevention, and early testing. Tailoring messaging to the knowledge, risk profiles, and social contexts of groups at highest risk can enhance awareness, combat stigma, reduce transmission, and promote timely engagement with clinical services.[48]

HBV can be prevented through safe and effective vaccination, including a birth dose and universal infant immunisation schedules, which are complemented by catch-up vaccination for older individuals who are non-immune and at-risk. HBV vaccination is one of the most significant achievements in communicable disease control, often referred to as the world's first "anti-cancer vaccine" due to its impact on reducing HCC.

In WHO/Europe, childhood HBV vaccination has been universally provided in most countries for >20 years, with adulthood vaccination in populations at high risk. However HBV is still not included in the routine childhood vaccination schedule in Denmark, Finland, and Iceland.[36] Among EU/EEA states, as of 2023, coverage for the full three-dose HBV childhood vaccine series ranged from 46% in Lithuania to 99% in Portugal,[36] although coverage declines arose during the COVID pandemic.[49] The WHO target calls for $\geq$95% coverage with the three-dose childhood vaccine series in the European region by 2030; countries falling below this threshold urgently need to strengthen immunisation systems.[50]

Surveys show low vaccination uptake among priority populations, with 45% of MSM participating in the European MSM Internet Survey (EMIS) self-reporting to be fully vaccinated[51] and <46% of migrants receiving an HBV vaccine in six European countries.[52] Barriers, such as difficulty in identifying risk groups,[51] alongside rising vaccine hesitancy and a perceived low risk may contribute to poor coverage.[53] Migrants from intermediate/high prevalence countries may be disadvantaged by low vaccination coverage in their country of origin, and thus warrant particular attention.[54]

Our review identified only a few MoC (9.6%) focussing on HBV vaccination (Fig. 2). MoC describing vaccination implementation were mostly undertaken in Spain (25.0%), Germany, Italy, Kyrgyzstan, and Switzerland (12.5% each). These MoC mostly targeted migrants born in intermediate/high HBV prevalence countries (37.5%), but also PWUD, MSM, people engaged in transactional sex, and HCPs. Vaccinating at-risk adults require broader efforts, alongside prioritising vaccination of all infants.

Among sixteen identified MoC including HBV vaccination, half of the vaccine MoC (50.0%) were

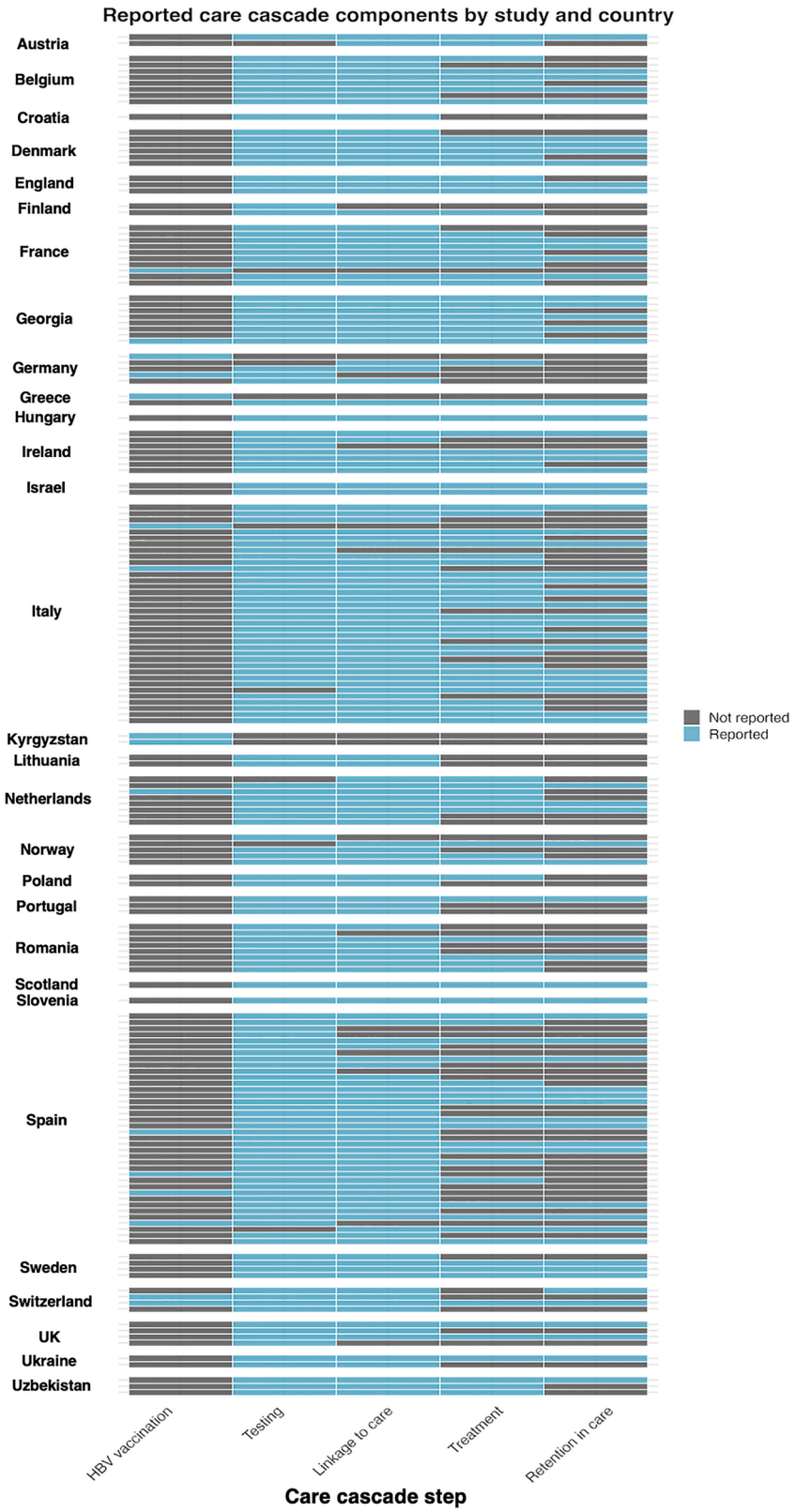

Fig. 1: Heatmap of 166 studies reporting on models of care for HBV and HCV in Europe identified through a systematic review, and reported care cascade component, sorted by country.

	N	%
Publication year		
2015	0	0.0
2016	0	0.0
2017	2	1.2
2018	6	3.6
2019	13	7.8
2020	25	15.1
2021	27	16.3
2022	24	14.5
2023	24	14.5
2024	25	15.1
2025[g]	20	12.0
Country of implementation[a]		
Austria	2	1.1
Belgium	8	4.4
Croatia	1	0.6
Denmark	6	3.3
England	3	1.7
Finland	2	1.1
France	10	5.6
Georgia	8	4.4
Germany	5	2.8
Greece	2	1.1
Hungary	1	0.6
Ireland	7	3.9
Israel	2	1.1
Italy	36	20.0
Kyrgyzstan	2	1.1
Lithuania	2	1.1
Netherlands	8	4.4
Norway	5	2.8
Poland	2	1.1
Portugal	3	1.7
Romania	8	4.4
Scotland	1	0.6
Slovenia	1	0.6
Spain	38	21.1
Sweden	4	2.2
Switzerland	4	2.2
UK	4	2.2
Ukraine	2	1.1
Uzbekistan	3	1.7
Target population		
General population	42	25.3
Migrant/Refugees/Asylum Seekers	25	15.1
Clinical high-risk groups[b]	23	13.9
Mixed population[c]	18	10.8
PWUD	17	10.2
PWID	16	9.6
Incarcerated populations	11	6.6
Sexual/gender minorities	10	6.0
People experiencing homelessness	4	2.4
Setting		
Hospital-based setting[d]	40	24.1
Emergency care	5	3.0
Primary care	13	7.8
Other clinical settings[e]	12	7.2

(Table 1 continued on next column)

(Continued from previous column)

	N	%
Community pharmacy	2	1.2
Community space/NGO	19	11.4
Harm reduction/Addiction centre[f]	22	13.3
Outreach- Mobile unit	19	11.4
Refugee reception centre	2	1.2
Prison	11	6.6
Mail, App, or Phone-based	4	2.4
Other	4	2.4
More than one setting	13	7.8
Target disease		
HBV only	14	8.4
HCV only	98	59.0
HBV and HCV	17	10.2
HBV and/or HCV and other diseases	37	22.3
HBV and other diseases	6/37	16.2
HCV and other diseases	7/37	18.9
HBV and HCV and other diseases	24/37	64.9
Step of the cascade of care		
Testing	154	92.8
HBV vaccination	16	9.6
Linkage to care	151	91.0
Treatment	113	68.1
Retention in care	75	45.2
Total	**166**	**100**

[a]Of the 166 studies, 7 were multi-country. After disaggregating these by country, the total count increased to 180 studies. [b]Clinical high-risk refers to individuals identified through healthcare settings as having elevated risk for HBV/HCV infection due to clinical factors, such as hospitalisation, emergency department attendance, comorbid conditions (e.g., HIV), previous transfusions or invasive procedures, or abnormal liver-related findings. [c]Mixed population includes studies in which the model of care was designed for, or delivered to, multiple key populations (e.g., migrants, PWUD, prisoners, people experiencing homelessness). These interventions served overlapping groups and therefore were categorised as mixed rather than assigned to a single target population. [d]Hospital-based setting includes interventions that have been primarily implemented in secondary and tertiary hospital facilities. [e]Other clinical settings include: migrant health centres, vaccination centres, STI testing facilities, and centres for international health. [f]Harm reduction and addiction centres also include low-threshold settings for needle and syringe provision (NSP), syringe exchange programs, and/or OAT treatment provision. [g]Study publications in this timeframe were included up to September and therefore studies do not include the full year.

***Table 1*: General characteristics of the included studies: publication year, country of implementation, target population, setting, target disease, and step of the cascade of care.**

implemented in clinical settings, 25.0% in community or NGOs, and 12.5% through outreach programmes. Decentralised initiatives included administration of the first vaccine dose in migrant-led community spaces such as churches or mosques in Spain which showed a nearly 90% acceptance.[55] Mobile teams deployed to reach remote areas in Kyrgyzstan[56] vaccinated over 32,000 adults and 483,000 children in two years.

Among MoC reporting HBV vaccine delivery for both children and adults, 75.0% reported uptake of the initial HBV vaccination. Among those targeting children, uptake ranged from 10% via a programme in

Fig. 2: Strategic directions for viral hepatitis elimination in Europe.

Northern Italy[57] to >90% via Georgia's national vaccination programme from 2015 to 2023.[58] Among initiatives targeting adults, a community-based strategy for migrants in Spain led to an 85% uptake.[55] No MoC reported data on coverage of the 3-dose HBV vaccination series. While questions remain around vaccination series completion and long-term follow-up, data suggest promising public health approaches for prioritising vaccination among populations frequently left behind by conventional care pathways.

Testing and treatment

More than half of individuals living with HBV or HCV remain undiagnosed, especially among the most vulnerable populations.[22] National programmes for viral hepatitis testing have been implemented across Europe since 2006[59] capitalising on highly sensitive and specific diagnostic assays for HBV and HCV, which can be multiplexed with diagnostic tests for other conditions, including HIV and syphilis. Decentralisation of blood sample collection (e.g. through capillary dried blood spots (DBS)) and testing (e.g. via serological rapid diagnostic tests (RDTs) and molecular point of care (PoC) assays) have further simplified care pathways. These innovations are recommended by WHO to enhance service delivery, including for tests of HCV cure post-treatment.[60,61] PoC HCV viral load testing reduces time from antibody screening to treatment initiation and increased treatment uptake among vulnerable populations, especially in decentralised test-and-treat programmes.[62] Self-testing is recommended as a complementary strategy,[63] often facilitated through online platforms, improving access when other MoC pose barriers.[64,65]

Our literature search identified 154 (92.8%) MoC focussing on testing for viral hepatitis, with the majority reporting good uptake (74% for HCV; 83% for HBV) (Table 2). These MoC often rely on task sharing between nurses, outreach teams, and peer workers,[64] increasing efficiency and acceptability.[66] Effective implementation requires robust training, quality assurance, data connectivity, and continuous engagement with vulnerable communities.[65]

The release of new HBV guidelines recommending simplified and expanded treatment, globally[67] and in Europe,[68] has propelled improvements in viral hepatitis

Cascade component	HBV N/%	HCV N/%
Total studies included[a]	61 (100%)	146 (100%)
Testing		
Testing uptake—Overall reported	15/61 (24.6%)	25/146 (17.1%)
Average % testing uptake	82.5%	74.0%
>50% testing uptake	14/15 (93.3%)	19/25 (76.0%)
HBV DNA/HCV RNA testing performed—Overall	5/61 (8.2%)	29/146 (19.9%)
≥90% viral load testing performed	Not available	16/29 (55.2%)
Linkage to care & Treatment		
Engaged with specialist care—Overall reported	18/61 (29.5%)	Not applicable[b]
≥80% engagement with specialist care	7/18 (38.9%)	Not applicable[b]
Treatment initiation—Overall reported	5/61 (8.2%)	82/146 (56.2%)
≥80% treatment initiation	2/5 (40.0%)	41/82 (50.0%)
Treatment completion—Overall reported	Not applicable	43/146 (29.5%)
≥80% treatment completion	Not applicable	32/43 (74.4%)
Retention in Care/Cure		
Overall reported retention/cure	2/61 (3.3%)	68/146 (46.7%)
≥80% SVR12-24 achieved	Not applicable	50/68 (73.5%)
Vaccination (HBV only)		–
Testing to determine status (anti-HBc)	16/61 (26.2%)	Not applicable
1st dose received (among eligible)	5/16 (31.3%)	Not applicable
Overall reported uptake	12/16 (75.0%)	Not applicable
≥80% uptake	2/12 (16.7%)	Not applicable
Completion of full vaccination	2/16 (12.5%)	Not applicable
≥80% completion	0/2 (0%)	Not applicable

[a]The total number of unique studies reported in Table 1 does not equal the sum of HBV- and HCV-specific studies in Table 2 because some studies reported outcomes for both infections. [b]Engagement and linkage to care for HCV was evaluated using the indicators on treatment initiation and completion.

Table 2: **Proportion of studies identified from a systematic literature review reporting HBV and/or HCV cascade of care indicators in European countries.**

awareness, care access, and interventions.[35] Effective and well-tolerated antiviral treatment for HBV comprises nucleos(t)ide analogues (NA) for long-term viral suppression, while for HCV, outcomes have improved with advances in access to and, affordability of, curative pan-genotypic direct-acting antiviral (DAA) therapy.[69] However, many European countries restrict NA and DAA prescription to specific medical specialities, hindering access. In contrast, Australia allows all physicians to prescribe DAAs, with around 50% of all prescriptions now issued by primary care practitioners.[70]

HBV and/or HCV testing of all adults, at least once, could enhance progress towards elimination, diagnosing 90% by 2030.[68] Cost-effectiveness depends on population prevalence, but health-economics studies are lacking in Europe. A recent US study found universal adult HBsAg screening to be cost-saving at an overall population prevalence of 0.24% undiagnosed HBV infections, which may be similar in some European settings.[71] A test-all approach applied in an Italian setting for the 'baby boomer' cohort during COVID-19 vaccination found only 7/7219 tested were anti-HCV positive.[72] Until European cost-effectiveness analyses are performed, resources should primarily continue to target interventions in groups at the highest risk.

Harm reduction

WHO has called for investment in harm reduction services,[2] which include sterile needle and syringe distribution, opioid agonist treatment (OAT), and sexual health services (e.g. condom distribution).[73] Although not broadly available across Europe, data on uptake of harm reduction services indicates higher success with OAT targets (60.1%), compared to needle and syringe distribution (29.4%).[26] Decentralised MoC targeting PWUD can be successfully implemented in harm reduction services (Supplementary Material 2; Figure S2). These MoC have proven effective, increasing testing, linkage to care and treatment, and also providing broad prevention opportunities.[74] PWUD are a key population for HCV elimination (19.8% of MoC in our review). Programmes implemented alongside the formal public health system create opportunities to further strengthen linkage and continuity of care in non-stigmatising environments.[75]

Elimination of vertical transmission

WHO regional 2030 elimination targets include 95% of newborns receiving a timely birth dose HBV vaccine and 95% HBV screening coverage during pregnancy in the European region.[2] Universal antenatal screening, post-exposure prophylaxis, and timely newborn vaccination constitute effective prevention strategies, which are generally widely and effectively implemented across the region.[76] In EU/EEA countries, rates of HBV vertical transmission are low (ranging from 0 to 1.8%). Based on data reported to ECDC, several countries have reported 0% vertical transmission, including Denmark, Greece, Hungary, the Netherlands, and Norway.[10] However, the source of these estimates varies across countries and there are data gaps, particularly where national registries are not in place.

Among 10 EU/EEA countries reporting birth dose vaccination coverage for infants born to mothers living with HBV in 2024, all of them achieved the WHO 2025 interim target of 90%.[36] Only one MoC was related to this target, screening pregnant women and their partners for HCV at antenatal clinics in Sweden, finding 0.4% prevalence of HCV viraemia.[77] It is likely that the low reporting on HBV vertical transmission for the European region is due to the already robust and effective peripartum intervention programmes in place, such that there is little motivation for new research. New and innovative MoC for EVT continue outside Europe, where prevalence of infection is high and vertical transmission is the primary transmission route for HBV.

Micro-elimination

Micro-elimination describes targeted, achievable reductions in infection within clearly defined risk-populations.[78] HCV micro-elimination strategies using novel approaches, such as PoC tests or self-testing, have been adopted to accelerate diagnosis, treatment uptake,

and sustained transmission reductions,[47] and can be effective in a broad range of settings, from geographical areas[79] to enclosed environments.[80] Micro-elimination can also be applied to vulnerable groups at high risk, such as PWID[81] and high risk populations accessing sexual health services, where there is a specific opportunity to offer screening, HBV vaccination, and education.

Infection control and blood safety

Contamination of transfusion products and medical equipment have historically contributed to serious outbreaks of viral hepatitis; elimination targets include goals for 100% safe blood donation and safe injections.[1] As a result of universal implementation of protocols and EU standards for screening blood donation,[82] targets for blood donation have been met and maintained in the EU. Ongoing quality assurance and data to confirm maintenance of targets is nevertheless required.

Targeted programmes for high-risk groups

Some European countries with high migration rates,[83] have developed targeted initiatives for migrants and refugees; a high proportion of such MoC were implemented in Italy (20.0%) and Spain (21.1%) (Supplementary Material; Figure S3). The participation of community health workers (CHWs) from the same countries of origin as these migrants has proven crucial in improving communication, removing cultural barriers, and increasing testing uptake.[55]

Around a fifth of studies (19.8%) in our literature search described MoC focussing on PWUD and/or PWID. Community-based harm reduction organisations, pharmacies, and drug treatment services have been successful in providing easy-to-access testing for PWUD.[84,85] Mobile units that visit shelters for people experiencing homelessness, harm reduction centres, and social service institutions can reach and diagnose vulnerable populations and facilitate prompt and simplified linkage to care.[86]

Providing universal, opt-out screening in prisons and detention centres, combined with follow-up treatment when indicated, enhances continuity of care and supports national elimination strategies.[87] These strategies exemplify micro-elimination success,[88] including in the largest prison in the United Kingdom, with 100% of inmates being offered HCV testing and 90% accepting it[89] and a comprehensive program in Catalonia with testing and treatment rates supporting the projected elimination of HCV.[90] Despite the existence of policy, implementation of HCV treatment in prisons is suboptimal in many EU countries.[91]

Hospital- and laboratory-based screening programmes

Simplified laboratory algorithms can accelerate diagnoses by reducing the number of visits required to confirm diagnosis.[92] These include reflex testing for HCV or HBV viraemia and anti-hepatitis D virus (HDV) antibodies upon a positive anti-HCV or HBsAg result,[93] respectively. This should be combined with comprehensive HBV and HCV evaluation,[94] alongside other relevant health screening where indicated.

Sample pooling can increase the cost-effectiveness of screening,[95] albeit with the risk of reducing sensitivity. In primary care, risk-based screening remains the most widely used strategy, but systematic testing of people with abornmal liver enzymes may increase case finding.[96] Opportunistic screening among emergency department attenders has revealed prevalence rates three times higher than in the general population in Spain,[97] and can be cost-effective.[98] Reports from Italy and the UK also support its inclusion as a routine practice.[99,100] However, concerns remain surrounding linkage to care of vulnerable populations diagnosed in emergency care.

Decentralisation

In HCV, the paradigm has shifted towards decentralised, test-and-treat MoC[101] that reduce pre-treatment barriers and deliver accessible therapy. The European Association for the Study of the Liver (EASL) highlights simplified care pathways[102] with minimal laboratory requirements, and the feasibility of task-sharing among non-specialist care providers.[103]

Pharmacist-led community MoCs demonstrate that treatment decentralisation is feasible and effective. In Scotland, a trial comparing pharmacy-based DAA initiation with standard referral demonstrated significantly improved treatment uptake and a non-inferior sustained virological response (SVR) rate.[104] Regional implementation further validated these findings, with SVR rates maintained, and reinfection surveillance embedded within harm-reduction networks.[84] Community-based treatment in harm-reduction centres enhances engagement, satisfaction, and continuity of care in PWID. However, a larger scale-up of testing in community pharmacies in England was not successful, in part, due to reported stigma,[105] highlighting that models must be adapted to local contexts and preferences.

Decentralised HBV care is supported by EASL guidelines[69] but has evolved more slowly and presents greater challenges.[55] Decentralisation requires simplified risk stratification, and clear algorithms for treatment initiation. WHO HBV guidelines[67] advocate for HBV-DNA and anti-HDV reflex testing, same-day rapid diagnostic testing, and practical support for people living far from treatment centres. HBV MoC reported linkage to care in less than a third of cases for HBV (29.5%) with only 38.9% of these reporting a care engagement rate >80% after referral.

Care linkage for HBV can draw on lessons from HCV, but careful modifications will be needed to address the unique needs of people living with HBV, as therapeutic decisions require long-term monitoring of viral replication, liver biochemistry and liver health. Community-based HBV outreach screening initiatives

Panel 1: **Policy and practice recommendations for viral hepatitis elimination in Europe.**

Policy, Governance and Health Systems Strengthening
- Align national hepatitis strategies with WHO viral hepatitis elimination targets.
- Address legal, administrative and structural barriers that limit access to healthcare services among underserved groups.
- Secure adequate and sustained financing for viral hepatitis services, from prevention to treatment, including outreach and surveillance programmes.
- Address local inequities in capacity and resources.

Accessible, Integrated and Person-Centred Service Delivery
- Expand decentralisation of services, especially models implemented in primary care, prison settings, harm reduction centres, community pharmacies, and through outreach programmes.
- Adopt simplified diagnostic, care and treatment pathways, with an emphasis on point-of-care testing, reflex testing, and expedited referral and vaccination pathways.
- Facilitate task-shifting to expand healthcare workforce capacity to provide prevention, testing and treatment services.
- Provide culturally sensitive and linguistically adapted support services (e.g., community health workers, mediators) to access, navigate and utilise health services in a timely manner.
- Integrate viral hepatitis services with services for other communicable and non-communicable diseases, enabling simultaneous delivery of prevention, testing and treatment services.

Strengthening Surveillance, Monitoring, and Innovation
- Strengthen surveillance systems, ensuring systematic and standardised data collection across the cascade of care across different settings.
- Use harmonised core indicators for monitoring purposes.
- Promote innovation in service provision, including the use of telemedicine and mobile service delivery.
- Implement accountability mechanisms to track progress at national and regional levels.

have demonstrated high linkage to care rates[34,106] and reduced the time to assessment by a specialist.[107]

Retention in care

Data on the later stages of the HBV and HCV CoC remain limited; effective models must ensure mechanisms for long-term follow-up and continuity, particularly for ongoing assessment and monitoring for HBV. For HCV, systems must support completion of DAA therapy and documentation of SVR, in addition to ensuring longer-term engagement of individuals with advanced liver disease who require sustained monitoring and HCC surveillance.

Without sustained linkage to care, early gains in testing and linkage to care risk being undermined by avoidable morbidity and mortality. Retention in care is more commonly reported among HCV MoC than HBV. While almost half (46.6%) of HCV MoC reported SVR, only 3.3% of HBV MoC quantitatively reported retention in care beyond initial linkage, spotlighting challenges in long-term HBV care engagement.[107] Importantly, HCV MoC which cover the whole care cascade have translated into significant progress, with the majority (74.4%) reporting >80% of participants completing treatment.

Challenges and systemic barriers

Knowledge and resource gaps

Gaps in the health workforce, limited training, and a lack of awareness among HCPs, contributes to missed opportunities for prevention and diagnosis. A study conducted among >200 HCPs in Montenegro revealed inadequate knowledge levels.[108] Similarly, nursing students in Turkey had only moderate knowledge scores.[109] Research from Kyrgyzstan and Uzbekistan revealed substantial awareness gaps among both the public and HCPs, hindering testing uptake and subsequent therapy.[110,111] In contrast, among almost 700 HCPs in Germany, high levels of awareness and knowledge (91.1%) on HBV vaccination practices and recommendations were reported,[112] highlighting regional differences. A study across six European countries reported high levels of awareness of national viral hepatitis strategies (80% and 73% for HBV and HCV guidelines, respectively), yet revealed uneven availability of training programmes for HCPs.[113] Notably, despite being a key target group, data on HBV vaccination programmes and coverage among HCPs appear to be scarce.[114] These gaps and regional disparities can lead to critical limitations in implementing adequate and timely interventions.

Civil society engagement

WHO has identified community engagement and peer support, including addressing stigma and discrimination, as a key component of HBV and HCV elimination. Peer supporters and peer navigators can build trust, reduce stigma, and increase engagement with viral hepatitis testing, care and treatment,[2] which is especially important for marginalised groups; enhanced treatment

adherence has been demonstrated.[115] However, MoC that incorporate community co-design and peer support need to be further evaluated and scaled up.

Consistency of implementation and data collection

A major barrier to coordinated regional progress is the lack of consistent national and international adoption of these programmes, and limited availability and consistency of reporting on key indicators. Community outreach, education of the public and HCPs, and collaboration with local organisations can help increase awareness and reduce barriers. Without systematic monitoring and standardised data collection, it is difficult for national programmes to assess impact, identify gaps, allocate resources effectively, or evaluate which MoC yield the best outcomes in different populations.

Although most European countries have national hepatitis programmes or elimination strategies in place,[116] operational challenges such as fragmented health information systems, insufficient funding for collecting the data needed, and the lack of clear accountability frameworks continue to impede progress. These challenges are not evenly distributed across the region, with frameworks typically more advanced in Western Europe, while countries in Eastern Europe and Central Asia face greater structural and resource constraints, potentially with disproportionate detriment to key populations at higher risk. Strengthening the capacity of health information systems to collect and report data on a routine basis across care settings would provide the foundation necessary for evidence-based decision-making.

Looking ahead

Consideration of MoC to address HBV and HCV together faces intrinsic difficulties given that the populations affected, scale of the health threat, and available and relevant approaches and interventions vary. Nevertheless, global targets set out to tackle viral hepatitis collectively, and joining up approaches between these infections, and other chronic conditions (both infectious and NCD) is an aspiration for efficient, accessible, and cost-effective service delivery (Panel 1).[117] This is reflected in the literature, where MoC often combine HBV and HCV, alongside HIV and/or other sexually transmitted infections. While recognising that HDV also requires urgent attention, we have not included MoC specifically focussing on HDV in this review when part of an HBV MoC. While we took a systematic approach to identifying published papers, our search will not have picked up grey literature.

MoC may increasingly be altered by new innovations. For example, in the HBV therapeutic field, there is progressive investment in approaches that aim to deliver functional cure, alongside development of long-acting antiviral therapy (extended release formulations of tenofovir and entecavir). Enhanced use of HBV biomarkers, while not yet part of routine recommendations, can support personalised risk-assessment, monitoring, and therapeutic decision-making (such as quantitative HBsAg, HBcrAg, viral sequencing/genotyping) in a move towards more individualised interventions.[118] For HCV, preventive vaccination would be a major change to the public health field with substantial impacts on achieving and maintaining elimination.[119]

Search strategy and selection criteria

We conducted a systematic literature review to synthesise and critically appraise the available evidence on models of care (MoC) for hepatitis B (HBV) and hepatitis C (HCV) in the WHO European Region. The broader context of the review is presented narratively, integrating additional relevant literature, and a detailed description of the methodology is provided in Supplementary Material 1. References for this article were identified by three independent reviewers, using Rayyan software, through searches on PubMed (MEDLINE) and grey literature sources, including reports and policy documents from the World Health Organization (WHO) and European Centre for Disease Prevention and Control (ECDC). The search was limited to materials carried out and published between 2015 and 2025 (September). Articles, guidelines, reports, and policy documents were screened, if available in English. Eligible sources addressed viral hepatitis B (HBV) and C (HCV) care models within the WHO European region, which includes 53 countries. Special attention was given to literature focused on screening, linkage to care, access to treatment, and HBV vaccination strategies. The final reference list was selected based on the cascade of care to monitor progress towards WHO 2030 elimination targets and align with this paper's objectives.

Conclusion

The evidence and evolving guidelines for the management of chronic viral hepatitis converge on a common message: prevention and care must be tailored by setting and supported by political and economic investment to decentralise services when required, combining simplified protocols, and person-centred navigation to achieve equitable and sustainable elimination across the European region. Countries have the tools to eliminate viral hepatitis as a public health threat by 2030, but a multi-stakeholder commitment to scale up implementation is needed.

Contributors

CAP, PCM, and TV developed the outline of the review with substantial input from AN and co-authors. CAP, AN, AV carried out the literature review with oversight and query resolution by PCM and TV. CAP, AN, ED, EM, PV, SD, SL, AV, JC, XF, USG, DR-S, AA, RH, TV, AND PCM developed text for the first draft of the review and CAP, PCM, TV, and AN made substantial edits to subsequent versions of the review. All authors reviewed, contributed to, and approved the final version of the manuscript.

Data sharing statement

Data extracted for this review are available as Supplementary Material and additional requests for information will be made available to researchers upon reasonable request to the corresponding author.

Declaration of interests

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.lanepe.2026.101712.

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