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National progress towards hepatitis B and C micro-elimination in a high-risk haemodialysis population: The Brunei Darussalam experience

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ABSTRACT

Objective: To evaluate trends in hepatitis B virus (HBV) and hepatitis C virus (HCV) prevalence and incidence among the national haemodialysis (HD) population from 2013 to 2025 and characterize the demographic, clinical, and outcome profiles of affected patients.

Methods: This retrospective observational cohort study utilized data from the Brunei Dialysis and Transplant Registry and the national electronic health record system (BRU-HIMS).

Results: 77 HBV and 50 HCV cases were identified amongst 3080 period prevalent HD patients over the 13-year study period. A sustained decline in both infections was observed, with a more marked reduction in HCV. Overall period prevalence was 2.5% (95% CI 2.1-2.7) for HBV and 1.8% (95% CI 1.4-1.9) for HCV, while cumulative incidence rates were 2.6% (95% CI 1.9-3.2) and 1.1% (95% CI 0.6-1.5), respectively. Patients with incident HCV infection were younger than those with HBV and the general incident HD population. HBV infection was more common among individuals of Chinese ethnicity. Glomerulonephritis was more frequently identified as the primary cause of end-stage kidney disease among infected patients than in the non-infected cohort. Cirrhosis was present in 26% of HBV and 28% of HCV cases. Antiviral therapy uptake was 38% for HBV and 44% for HCV.

Conclusions: HBV and HCV burden among HD patients in Brunei has declined substantially during the study period, supporting progress towards hepatitis elimination. This success appears underpinned by five strategic pillars: centralized registry surveillance, nephrology-led care, stringent infection control measures, nurse-led monitoring, and community support.

KEYWORDS: Haemodialysis; Hepatitis B; Hepatitis C; World Health Organization; Hepatitis B virus; Hepatitis C virus

Summary

Question: What were the trends in hepatitis B virus (HBV) and hepatitis C virus (HCV) among haemodialysis (HD) patients in Brunei Darussalam from 2013 to 2025?

Findings: HBV and HCV burden declined substantially. Period prevalence was 2.5% (95% CI 2.1%-2.7%) for HBV and 1.8% (95% CI 1.4%-1.9%) for HCV, with cumulative incidence of 2.6% and 1.1%, respectively.

Meaning: A five-pillar strategy integrating centralized surveillance, nephrology-led care, stringent infection control, nurse-led monitoring, and community support has supported progress towards the WHO 2030 viral hepatitis elimination targets.

1. Introduction

Brunei Darussalam, a Southeast Asian nation with a population of approximately 400 000, bears a substantial burden of end-

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stage kidney disease (ESKD), with over 80% of affected patients undergoing haemodialysis (HD)[1]. Chronic liver disease (CLD) is also highly prevalent among patients with ESKD, with cirrhosis and non-alcoholic liver disease affecting approximately 5% and 55% of this population, respectively[2]. Chronic hepatitis B (HBV) and hepatitis C (HCV) are key contributors to CLD and confer an elevated risk in HD patients due to factors such as immunosuppression, shared dialysis environments, reuse of consumables, frequent hospital admissions, and exposure to blood transfusions[3]. On a global scale, Khalesi *et al.* found an overall pooled HBV prevalence of 7.32% (95% CI 6.53-8.15) among HD patients based on studies conducted between 1990 and 2022[4]. Similarly, Kenfack *et al.* reported a pooled HCV prevalence of 24.3% (95% CI 22.6-25.9) from studies over the same period[5]. Complications arising from CLD, particularly cirrhosis, are significant contributors to increased mortality among patients receiving HD[2,6].

Globally, the incidence and prevalence of HBV and HCV have declined over recent decades, largely attributable to improved public awareness, expanded screening programmes, preventative vaccinations and advances in antiviral therapies[7,8]. In Brunei, a study involving local healthcare workers reported an HBV prevalence of 1.8% among 5 466 individuals between 2003 and 2013[9]. A recent local study also estimated the prevalence and incidence of diagnosed HCV at 48.7 per 100 000 (0.05%) and 10.6 per 100 000 (0.01%), respectively, between 2013 and 2022[10]. The Coalition for Global Hepatitis Taskforce reported a Markov-model estimated prevalences of 1.35% for chronic HBV and 0.33% for HCV for Brunei in 2022[11], findings that are broadly consistent with earlier HBV data[9] but also suggest a significant underdiagnosis of HCV within the population[10]. An earlier local study from 1990 confirmed a higher burden of hepatitis infection among specific subgroups, particularly patients receiving HD[12], which corroborates with literature evidence[4,5].

In alignment with the World Health Organization's (WHO) 2015 Global Health Sector Strategy, which targets a 90% reduction in new hepatitis infections and a 65% reduction in mortality by 2030, alongside achieving 90% diagnostic coverage and 80% treatment uptake, there has been increasing recognition of the challenges associated with population-wide elimination[13]. As such, micro-elimination within dialysis settings was proposed in 2018 as a pragmatic and resource-efficient approach[14]. In response, Brunei has prioritized targeted strategies to reduce hepatitis transmission in high-risk environments, implementing a series of policy initiatives and strategic interventions to achieve the WHO objectives. A strategic approach anchored on five key pillars was introduced to support micro-elimination efforts: (1) a centralised dialysis registry, (2) transferring onus of care from hepatologist to nephrologist, (3)

strict segregation and single-use dialyser policy, (4) enhanced nurse-led surveillance, and (5) community-based support services.

This study maps the successful micro-elimination path from 2013 to 2025, characterizing the clinical profiles of affected individuals and identifying the strategic enablers that have driven infection rates toward WHO 2030 targets.

2. Methods

2.1. Study design

This is a retrospective observational cohort study designed to describe the clinical patterns and trends of all diagnosed HBV- and HCV-infected patients on HD from 2013-2025.

2.2. Data extraction

Clinical data were obtained from the Brunei Dialysis and Transplant Registry (BDTR)[15] and the Brunei Health Information Management System (BRU-HIMS), a comprehensive one-patient-one-record platform that integrates primary and secondary care data, including laboratory and radiological investigations, with coverage exceeding 99% of the population. BRU-HIMS was first implemented across government healthcare facilities in 2013, which influenced the start date of data collection in this study.

Data extracted from the BDTR included overall prevalence and incidence of ESKD, as well as specific data on HBV- and HCV-infected HD patients including duration of time on HD when still infected and long-term outcomes (death, remission or cured). From BRU-HIMS, data collected included sociodemographic characteristics (date of birth, age at dialysis initiation, sex, ethnicity and etiology of ESKD), treatment for HBV and HCV, and hepatitis-related complications (including cirrhosis, varices, hepatocellular carcinoma and deaths from CLD). In addition, sociodemographic data for incident non-infected ESKD patients from the BDTR were also used to make comparisons with those infected with HBV and HCV.

2.3. Inclusion and exclusion criteria

Inclusion criteria comprised all patients aged ≥ 18 years undergoing HDs with confirmed hepatitis infection, defined by a positive hepatitis B surface antigen (HBsAg) for HBV or hepatitis C antibody (HCV Ab) for HCV. Patients who were known to be hepatitis B core antibody (HBcAb) positive but HBsAg negative were also included.

Exclusion criteria included patients with acute kidney injury requiring temporary haemodialysis, those receiving peritoneal

dialysis or with a kidney transplant, and patients with incomplete clinical data. In addition, patients who were falsely identified as HBsAg positive (*e.g.* recent vaccination or underlying chronic conditions) who became negative upon re-testing were also excluded. Patients who had evidence of past HCV infections (HCV Ab) upon entry to HD program but had no active RNA replications were excluded.

2.4. Definitions

Key definitions used in this study were as follows. Annual prevalence of HBV or HCV was defined as the proportion of patients with confirmed infection among all prevalent HD patients at the end of each calendar year (31 December). Annual incidence was defined as the proportion of newly diagnosed HBV or HCV cases identified at the initiation of dialysis among all incident HD patients within the same calendar year. Period prevalence and cumulative incidence over the study period were calculated as the total number of prevalent or incident HBV or HCV cases, respectively, divided by the total number of prevalent or incident HD patients over the same period.

Seroclearance was defined as previously positive patients who subsequently demonstrated loss of HBsAg or undetectable/negligible HCV RNA. Seroconversion was defined as the new detection of either HBsAg or anti-HCV antibodies. Cirrhosis was defined based on radiological evidence (ultrasound or elastography) and/or the presence of biochemical and clinical features consistent with at least Child–Pugh class A disease. Patients were considered to have received treatment if they had been prescribed antiviral therapy, regardless of treatment adherence or completion. Death due to liver complications was defined as mortality directly attributable to chronic liver disease.

2.5. Data synthesis

To enable comparison with HBV and HCV patients, demographic data (age, sex, race and diagnosis of ESKD) from all incident ESKD patients from 2013 from the BDTR were obtained and evaluated, too.

Data were entered and managed using Microsoft Excel, and statistical analyses were conducted using R software (version 4.4.2; R Foundation for Statistical Computing, Vienna, Austria). Continuous variables were summarized using means or medians with corresponding standard deviations or interquartile ranges, as appropriate, while categorical variables were presented as frequencies and percentages. One way ANOVA was used to compare the means of continuous variables of three groups. Bivariate associations between categorical variables were assessed using

Pearson's *Chi*-square test or Fisher's exact test where appropriate. A *P*-value <0.05 was considered statistically significant.

2.6. Ethical approval

The study was approved by the Medical Health Research and Ethics Committee, Ministry of Health, Brunei Darussalam on 7/5/2026. The reference for this research is MHREC/MOH/2026/7. The study was also conducted in accordance with the principles of the World Medical Association's Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects.

3. Results

3.1. Longitudinal trends

A total of 104 HBV and 62 HCV infections among HD patients were initially identified between 2013 and 2025 from registry records and ICD-10 coding within the BDTR and Bru-HIMS. Following detailed individual record review, 77 HBV and 50 HCV cases met the predefined research inclusion criteria, including two patients with dual HBV–HCV co-infection. Excluded cases were primarily due to incorrect classification as HD patients (*n*=20) or misclassification of hepatitis infection status (*n*=19). Figure 1 showed the flowchart demonstrating the characteristics and selection process of prevalent and incident HBV and HCV patients.

Amongst 3080 period prevalent HD patients between 2013 and 2025, the overall period prevalence of HBV across the study period was 2.5% (95% *CI* 2.1–2.7). Similarly, the prevalence of HCV was 1.8% (95% *CI* 1.4–1.9), with a more pronounced downward trend (Figure 2). The cumulative incidence rate of HBV was 2.6% (95% *CI* 1.9–3.2), whereas the corresponding incidence for HCV was 1.1% (95% *CI* 0.6–1.5) (Figure 3).

3.2. Clinical and demographic profiles

The mean age at initiation of HD was significantly lower in patients with HCV [(47.06 ± 19.88) years] compared with those with HBV [(59.81 ± 11.58) years] and the overall incident ESKD population [(56.13 ± 13.89) years] (*P*<0.05). Diabetes mellitus (DM) and glomerulonephritis (GN) were the most common causes of ESKD in both groups, although their distribution differed significantly (*P*<0.05). Among HBV patients, DM accounted for 69% of cases and GN for 16%, whereas in HCV patients, DM and GN constituted 38% and 46% of cases, respectively. Cirrhosis was present in 26% of HBV and 28% of HCV patients. Liver-related mortality was

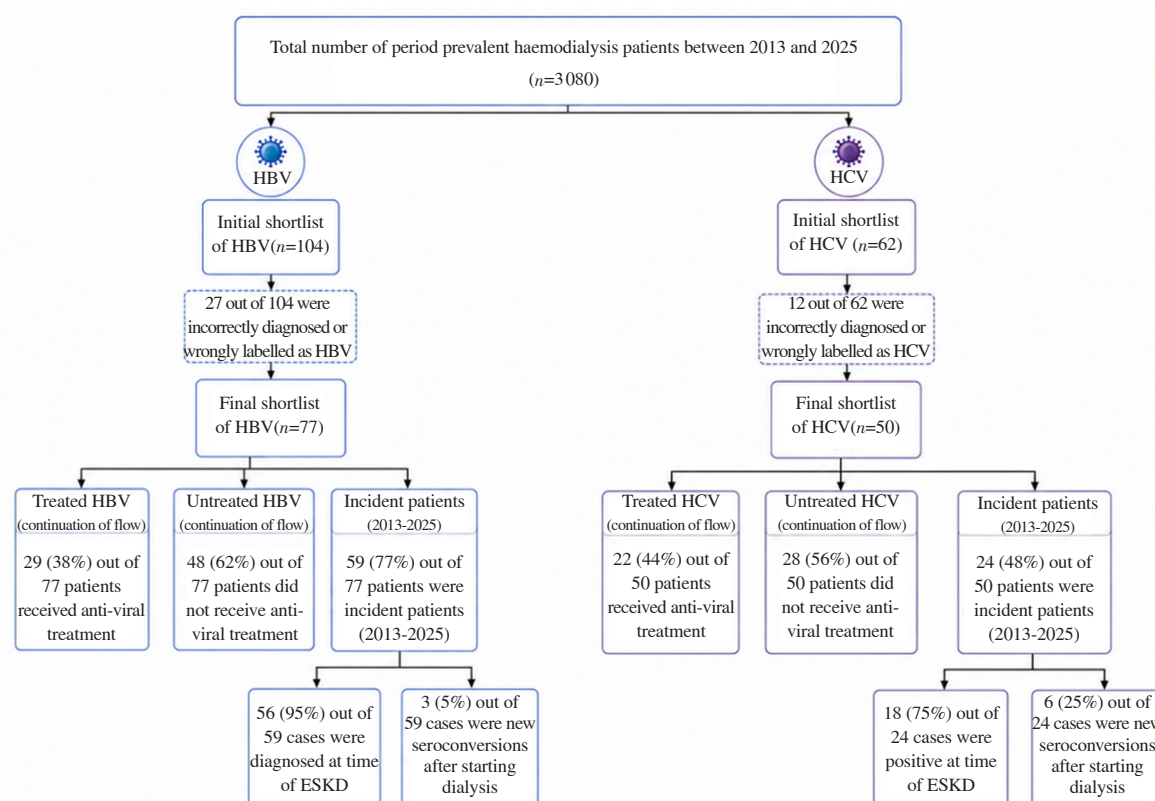


Figure 1. Flowchart demonstrating the characteristics and selection process of prevalent hepatitis B and hepatitis C patients. HBV: hepatitis B virus; HCV: hepatitis C virus; ESKD: end-stage kidney disease.

relatively low but notable, accounting for 4% of deaths in the HBV group and 8% in the HCV group. Ethnicity analysis demonstrated that patients of Chinese origin were significantly more likely to have HBV infection compared with Malays and other ethnic groups. Detailed demographic and clinical characteristics are summarized in Table 1.

Among 59 incident HBV cases, 56 (95%) were diagnosed at the time of ESKD onset, while 3 patients (5%) seroconverted after initiation of HD. In contrast, among 24 incident HCV cases, 6 patients (25%) developed seroconversion following HD initiation.

3.3. Treatment and seroconversion

Antiviral treatment was administered to 29 of 77 HBV patients (38%), most commonly with nucleos(t)ide analogues such as lamivudine and tenofovir. Among HCV patients, 22 of 50 (44%) received treatment, predominantly with direct-acting antivirals (DAAs), particularly sofosbuvir/velpatasvir, which accounted for 43% of treatments over the past eight years. Among untreated HBV patients (62%), the majority were classified as inactive carriers with

Table 1. Demographics of all hepatitis B and hepatitis C cases in haemodialysis patients (2013-2025).

Characteristics	Statistics	All HBV patients (2013-2025) (n=77)	All HCV patients (2013-2025) (n=50)	Registry 2024 (incident patients) (n=239*)
Age at ESKD diagnosis, years, mean $\pm$ SD		59.81 $\pm$ 11.58	47.06 $\pm$ 19.88	56.13 $\pm$ 13.89
Sex	Male	47 (61)	25 (50)	136 (57)
	Female	30 (39)	25 (50)	103 (43)
Diagnosis	Diabetes mellitus	53 (69)	19 (38)	177 (74)
	Glomerulonephritis	12 (16)	23 (46)	28 (12)
	Others	12 (16)	6 (12)	34 (14)
Race	Malay	57 (74)	42 (84)	211 (88)
	Chinese	15 (19)	3 (6)	18 (8)
	Others	5 (6)	5 (10)	10 (4)
Liver complications	Cirrhosis	20 (26)	14 (28)	ND
	Death from liver complications	3 (4)	4 (8)	ND
	No cirrhosis	57 (74)	36 (72)	ND
Treatment initiated/completed	Yes	29 (38)	22 (44)	NR
	No	48 (62)	28 (56)	NR

ND: no data; NR: not relevant. Data are presented as n (%), unless otherwise specified. *239 patients are the comparative incident population of patients starting haemodialysis in 2024 from the Brunei Dialysis and Transplant Registry.

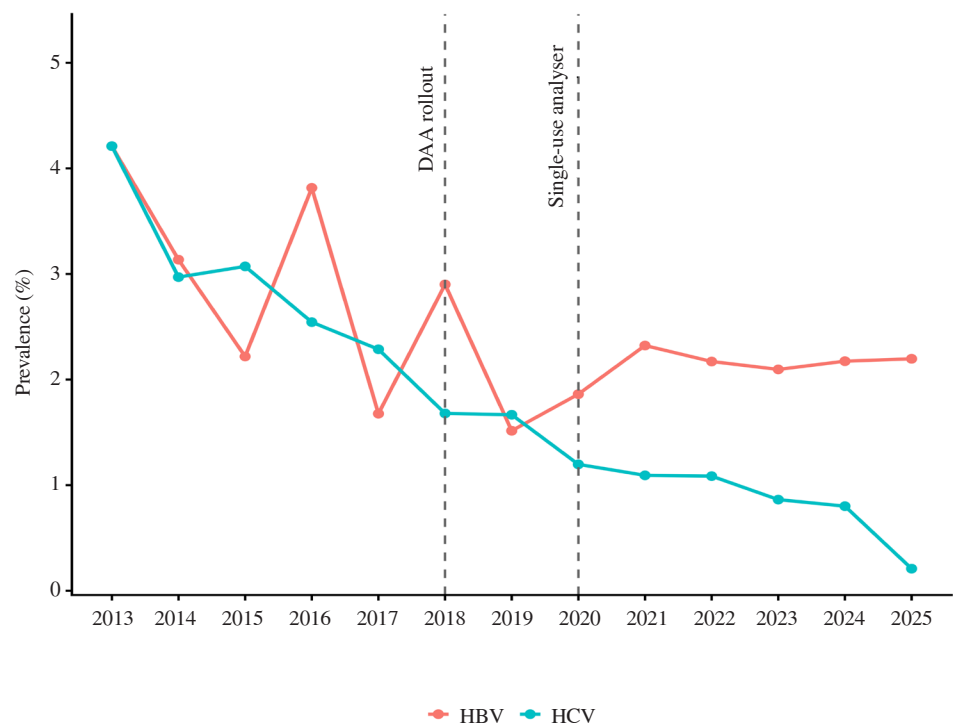


Figure 2. Prevalence (%) trends of HBV and HCV infections (2013-2025) that highlights the impact of DAA for HCV treatment (2018) and single-use dialyser policy (2020) in Brunei Darussalam. HBV: hepatitis B virus; HCV: hepatitis C virus; DAA: direct-acting antiviral.

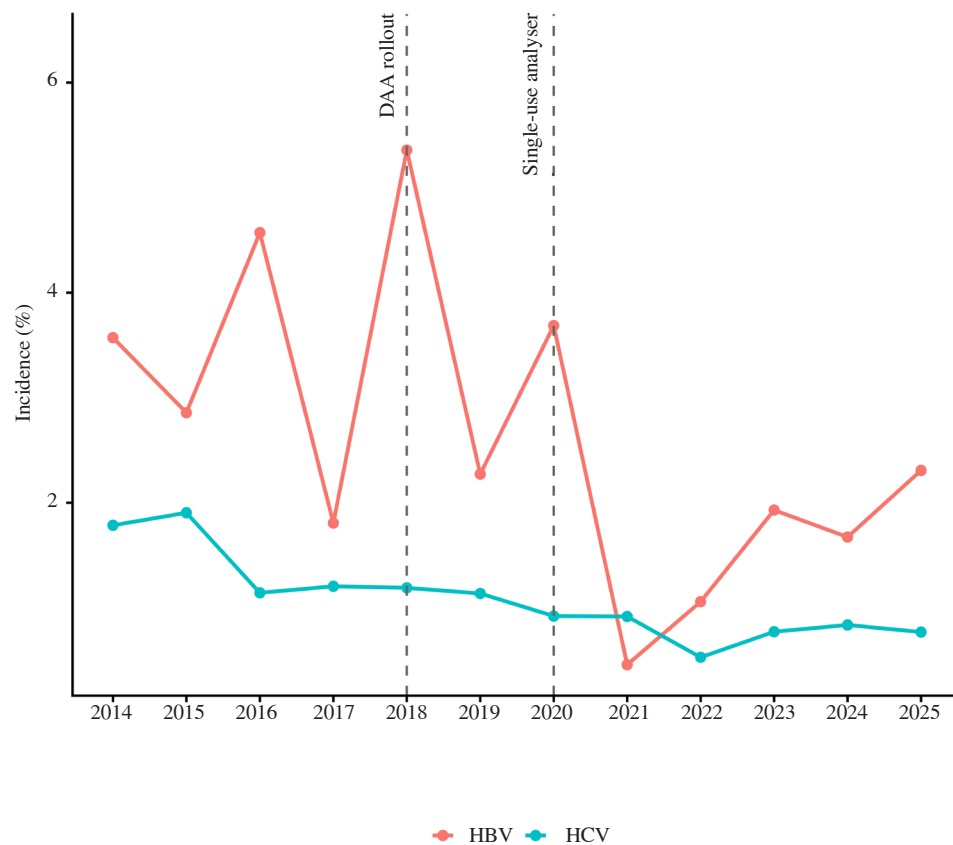


Figure 3. Incidence (%) trends of HBV and HCV infections (2014-2025) amongst prevalent patients that highlights the impact of DAA for HCV treatment (2018) and single-use dialyser policy (2020) in Brunei Darussalam. HBV: hepatitis B virus; HCV: hepatitis C virus; DAA: direct-acting antiviral.

low viral load ($n=29$, 60%). Other reasons included treatment refusal or loss to hepatology follow-up ($n=16$, 33%), and spontaneous seroclearance (HBsAg negativity) in a small proportion ($n=3$, 6%). Similarly, among untreated HCV patients (56%), most had declined treatment or were lost to follow-up ($n=19$, 68%), while 9 patients (32%) achieved spontaneous seroclearance (HCV RNA negativity). Details of antiviral treatment regimens are summarized in Table 2.

Table 2. Types of treatment received by hepatitis B and hepatitis C patients.

Antiviral agent	n (%)
HBV ($n=29$)	
Lamivudine	14 (48)
Tenofovir	9 (31)
Entecavir	6 (21)
Adefovir	2 (7)
Emtricitabine	1 (3)
HCV ($n=22$)	
Sofosbuvir/Velpatasvir	9 (41)
Pegylated interferon	7 (32)
Ribavirin + pegylated interferon	4 (18)
Other regimens	3 (14)
Glecaprevir/Pibrentasvir	2 (9)

HBV: hepatitis B virus; HCV: hepatitis C virus.

4. Discussion

This study demonstrates Brunei Darussalam's encouraging trajectory toward hepatitis micro-elimination within the HD population through coordinated strategic measures anchored by the five-pillars model, with successful alignment with the WHO hepatitis global elimination initiative. A sustained decline in both HBV and HCV infections was observed over the past decade, with a more pronounced reduction in HCV incidence and prevalence. Amongst 3 080 prevalent patients between 2013 and 2025, the period prevalence of HBV (2.5%) and HCV (1.8%) was higher than estimated community prevalence rates of 1.35% and 0.33%, respectively, as reported by the Coalition for Global Hepatitis Taskforce[11]. The reported cumulative incidence of HBV (2.6%) and HCV (1.1%) were also significantly higher than the reported community rates of 0.2%-0.8% for HBV and 0.5%-1.7% for HCV in the country[16]. This disparity is expected, given the increased vulnerability of HD patients to blood-borne infections and perhaps, more significantly for HBV patients due to the lack of definitive curative regimen to eliminate HBV entirely. Importantly, these consistent downward trends align with the WHO's hepatitis elimination targets, reflect the measurable impact of coordinated national strategies.

The demographic profile of patients with HBV and HCV infection differed from that of the non-infected HD population in several key aspects. Notably, infected HCV patients were significantly

younger at the time of ESKD diagnosis, suggesting a potential contributory role of chronic viral infection in accelerating kidney disease progression. In addition, a higher proportion of HBV (16%) and particularly HCV (46%) patients had GN as the primary cause of ESKD, compared with 12% in the overall dialysis cohort. This observation may reflect the direct pathogenic effects of these viruses in inducing glomerular injury, as well as the possibility that patients with GN are more likely to receive long-term immunosuppressive therapy, thereby increasing susceptibility to viral infections. The stronger association between HCV and GN in this cohort is consistent with existing literature, which demonstrates a higher propensity for HCV, compared to HBV, to induce immune complex-mediated glomerular diseases, including mesangioproliferative GN, often in the context of mixed cryoglobulinaemia[17,18]. Supporting this, a study in a Chinese cohort of 2 435 infected patients reported a higher prevalence of chronic kidney disease among individuals with HCV (22.1%) compared to those with HBV (14.3%)[19]. Our findings reinforce the necessity of early viral screening in GN patients to mitigate accelerated renal decline.

Another notable finding in this study is the higher predisposition to HBV infection among patients of Chinese ethnicity, consistent with earlier observations reported in 1990[12]. In our cohort, 19% of all HBV patients were of Chinese background, compared with 6% of HCV patients and 8% of all incident ESKD patients nationally. Although there are currently no national data describing the ethnic distribution of HBV in the non-ESKD population, community-based data from Malaysia—whose population shares a similar ethnic composition—demonstrated a higher prevalence of chronic HBV among Chinese individuals (2.25%) compared with Malays (0.74%) and other ethnic groups (0.98%)[20]. This disparity is most likely attributable to historical epidemiological factors rather than genetic susceptibility. In particular, high rates of mother-to-infant (perinatal) transmission in earlier decades, coupled with endemicity within migrant communities originating from Southern China, have contributed to sustained intergenerational transmission. Additional sociocultural and environmental factors may also have played a role in maintaining higher transmission rates within these populations[21]. These findings suggest that while national elimination strategies are successful, sub-population screening remains a vital component of the micro-elimination framework.

In this study, cirrhosis was observed in 26% and 28% of patients with HBV and HCV over their lifetime on HD, respectively; however, direct comparisons with similar HD populations remain limited in the literature. A meta-analysis with 320 777 ESKD patients showed that the prevalence of cirrhosis was between 2%-11%; with 35% and 32% of patients caused by HBV and HCV respectively[22]. In the general population, the reported lifetime risk of cirrhosis ranges 4%-40% for HBV[23,24] and 20%-25% for HCV[25,26].

The wider variability observed in HBV is likely attributable to the heterogeneous spectrum of disease, ranging from inactive carrier states to active hepatitis, whereas HCV typically follows a more predictable, time-dependent progression. Evidence from HD populations suggests a substantially elevated risk of cirrhosis among infected patients compared to non-infected patients. A meta-analysis reported significantly increased odds of cirrhosis in HD patients with HBV and HCV, with odds ratios of 13.47 and 7.05, respectively, compared to non-infected HD counterparts[22].

Advances in antiviral therapy over the past decade, including disease-suppressive treatments for HBV and curative therapies for HCV, have significantly transformed clinical management and may partly explain the global decline in infection prevalence[27]. Despite these advances, global treatment coverage remains suboptimal, with only an estimated 3% of individuals with chronic HBV and 20% of those with chronic HCV receiving treatment by 2022[28,29]. In our cohort, treatment uptake was higher but remained incomplete, with 38% and 44% of patients with HBV and HCV, respectively, receiving therapy, despite the availability of universal healthcare and access to medical treatment. Among HBV patients, a substantial proportion were classified as inactive carriers with low or negligible viral loads and therefore did not meet treatment criteria at baseline. In contrast, the impact of the 2018 DAA rollout was particularly profound. This is demonstrated by 75% of eligible patients with HCV (12 out of 16) were successfully treated and subsequently de-isolated in HD centers. This high success rate, supported by Brunei's universal healthcare and centralized funding, suggests that the "treatment as prevention" model is highly effective in the dialysis setting. The increased availability of curative HCV treatment is expected to contribute to further decline of HCV-infected patients in our future cohort.

Seroconversion rates within HD units were low, with only three cases of HBV and six cases of HCV identified, during the study period. This outcome reflects the cumulative impact of rigorous infection control practices and heightened clinical awareness over the past two decades. All seroconversion events were considered to be community-acquired, with no definitive evidence of nosocomial transmission within dialysis centres. This represents a marked improvement compared to earlier data. A local study conducted in 2008, prior to the routine segregation of infected patients, reported that 10 out of 22 HCV cases were seronegative at the initiation of dialysis, suggesting acquisition of infection following commencement of HD[30]. In contrast, since the implementation of our current strategic framework in 2018, only two HCV seroconversions have been identified after dialysis initiation, and neither case was linked to transmission within the dialysis facilities. These results underscore the success of the nationwide "Single-Use" dialyzer policy and patient segregation in virtually eliminating the

risk of healthcare-associated viral spread.

The reduction in HBV and HCV burden in our population has been achieved through coordinated strategic measures anchored on five key pillars, which could be replicable in countries with similar settings: (1) a centralised dialysis registry, (2) nephrology-led hepatitis care, (3) strict segregation and single-use dialyser policy, (4) enhanced nurse-led surveillance, and (5) community-based support services.

Central registry: All HD centres report patients' hepatitis status every six months, enabling continuous surveillance, early detection of incident cases, and timely intervention. Non-compliance may trigger regulatory action. Newly identified cases generate alerts to clinicians, facilitating prompt management and contact tracing within dialysis cohorts. Vaccination status is monitored to ensure adequate coverage and rapid response to potential exposure. Integration with electronic health records allows centralised surveillance and coordinated system-wide action, improving control of blood-borne infections.

Nephrology-led hepatitis care: Nephrologists lead initiation and management of antiviral therapy, including DAAs, thereby minimizing treatment delays by bypassing traditional hepatology referral barriers. A 2018 national policy provides full funding for DAA therapy, monitoring, and follow-up for all HCV patients, streamlining referrals and aligning care with routine dialysis testing. Dialysis nurses coordinate clinical monitoring and safety assessments, with complex cases escalated to hepatology or infectious disease specialists. Long-term follow-up remains within nephrology services to ensure longitudinal continuity and treatment adherence.

Segregation and single-use dialyser Policy: Brunei extends segregation to both HBV and HCV patients, contributing to negligible dialysis-related seroconversion. Infected patients are managed by designated staff to minimize transmission risk. A nationwide single-use dialyser policy introduced in 2020, following a fatal *Ralstonia* outbreak in 2018[31], standardized infection control practices across all HD patients and minimize cross-infections in the units. By moving away from dialyzer reuse, the program has effectively eliminated a primary vector for cross-infection, ensuring a high-fidelity safety environment for the entire hemodialysis population.

Enhanced nurse-led surveillance: HD patients undergo systematic liver function testing and viral serology screening. To maintain robust immunological protection, patients anti-HBs levels below the predefined protective threshold (<100 mIU/mL) are promptly referred for booster vaccination. Any reactive serology triggers immediate reflex confirmatory testing (HCV RNA or HBV DNA), accompanied by interim segregation to prevent potential transmission. In the event of an unexpected seroconversion, nurses

initiate an immediate look-back investigation, screening all patients on the same dialysis shift and identified close contacts. Additionally, surveillance is extended to mitigate 'occult' HBV risks, with HBsAg-negative/anti-HBc-positive patients undergoing HBV DNA testing during high-risk clinical windows, including transplant candidacy or periods of intense immunosuppression.

Community-based hepatitis support services: A robust multi-agency network provides the psychological and financial scaffolding necessary to sustain long-term clinical outcomes. By leveraging hospital services, government initiatives, and charitable funding, Brunei has created a safety net that addresses the social determinants of health impacting the ESKD population. These support services, including professional counselling, transport assistance, and caregiver support are instrumental in bridging the 'last mile' of care. By linking patients directly to welfare networks and community platforms, this holistic approach has significantly improved healthcare equity, treatment adherence, and overall care engagement within the dialysis cohort.

Although this study benefits from national registry data, several limitations must be acknowledged. First, given the retrospective nature of the study, the exact timing of hepatitis diagnosis relative to the initiation of dialysis was not always documented prior to 2013. However, the integration of the Bru-HIMS system has significantly improved data capture for the latter two-thirds of the study period. Second, a proportion of patients demonstrated suboptimal adherence to hepatology follow-up. To mitigate this, our "five-pillars" model now incorporates nurse-led surveillance and community support to bridge gaps in care engagement. Third, while our data captures over 99% of the government-treated population, patients managed exclusively in private settings or those moving early to transplantation may be underrepresented. Lastly, clinical surveillance frequencies between 2020 and 2022 were likely affected by COVID-19-related healthcare disruptions. Despite this, the centralized registry continued to function, providing a robust baseline for our longitudinal analysis.

In conclusion, this study demonstrates a sustained decline in the prevalence and incidence of HBV and HCV among HD patients in Brunei Darussalam from 2013 to 2025, with a more pronounced reduction observed in HCV, consistent with the WHO's hepatitis elimination targets. Notably, the near-elimination of nosocomial seroconversion and the high DAA treatment success rate of 75% among eligible HCV patients suggest that Brunei's HD population is on track to meet the WHO 2030 targets of 90% reduction in new infections and 80% treatment uptake, with HCV micro-elimination within dialysis units appearing within reach. These findings highlight that micro-elimination of HBV and HCV in high-risk populations is achievable through coordinated, multi-stakeholder strategies involving policymakers, hepatologists, and nephrologists.

This national framework offers a scalable blueprint for other regions striving to meet WHO 2030 elimination goals.

Conflict of interest statement

None of the authors declare any conflict of interest.

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Authors' contributions

JT and VHC conceptualized the study and performed the initial literature search. SLK and JT collected and collated data for analysis. JT performed the statistical analysis and wrote the first draft of the paper. All the other authors contributed, revised and approved the final manuscript. All authors confirm that there are no mistakes, duplicates and inconsistency with main text and corresponding legends in the figures and tables

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