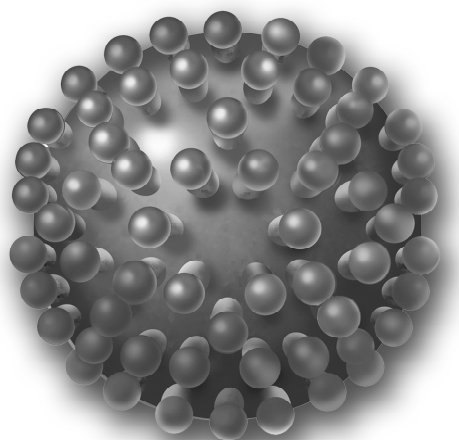


HEPATITIS B IN AUSTRALIA:

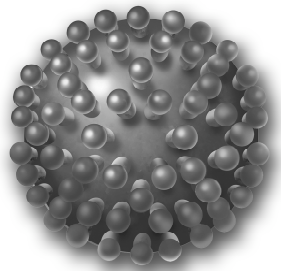
RESPONDING TO A
DIVERSE EPIDEMIC



ACT-HBV™

Advancing the Clinical Treatment of Hepatitis B Virus

HEPATITIS B IN AUSTRALIA: RESPONDING TO A DIVERSE EPIDEMIC



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Hepatitis B in Australia: Responding to a Diverse Epidemic

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1. Executive Summary

Forty years since the discovery of the hepatitis B virus, hepatitis B remains a major global public health challenge. The development of an effective hepatitis B vaccine and subsequent implementation of vaccination programs from the late 1980s, particularly in the perinatal setting, has led to a marked reduction in new infections in many countries. However, the large burden of liver disease from existing chronic hepatitis B, the generally long latency to development of advanced liver disease complications, the lack of infant vaccination programs in many countries, and the limited catch-up vaccination of adolescents and high-risk adults mean that hepatitis B will remain an enormous challenge for many years to come. Worldwide, 400 million people have chronic hepatitis B, with the majority being in the Asia-Pacific region.

In Australia, an estimated 90,000 to 160,000 people have chronic hepatitis B, more than half of whom are people born in highly endemic countries of the Asia-Pacific region. Other high-risk groups include people born in other highly endemic regions, Indigenous people, men who have sex with men, and people who inject drugs. Continued immigration from highly endemic countries, along with inadequate vaccination of individuals at high risk, will add further cases to the already expanding epidemic. The number of deaths among people with chronic hepatitis B and the number of cases of hepatitis B–related liver cancer are rising, despite recent improvements in antiviral therapy. Hepatitis B virus is difficult to eradicate, but available treatments are increasingly able to control replication of the virus and reduce liver disease progression. However, only a small proportion of people with chronic hepatitis B receive specific treatment.

Unlike the case with human immunodeficiency virus infection (HIV) and hepatitis C, there has been no national strategy to advance and guide the public health response to hepatitis B. Such a strategy is urgently required to develop and link initiatives in hepatitis B prevention, treatment, care, and support. In the absence of a national hepatitis B strategy, a group of individuals involved in the public health response to hepatitis B have developed this document to highlight the current burden of the epidemic in Australia. They propose priority action initiatives in a number of key areas: education and prevention; diagnosis, treatment, and support; surveillance; research; and workforce development. This document thus provides valuable information to current and potential stakeholders and will help promote advocacy for, and the basis for development of, a more comprehensive national hepatitis B strategy.

2. Hepatitis B: A Snapshot

- Hepatitis B virus is a virus transmitted in blood, semen, and saliva
- Hepatitis B virus transmission occurs
 - Between mother and child (perinatal)
 - To children through household and other contact
 - Through sexual contact
 - In health care settings
 - Through sharing of injecting equipment
- Between 90,000 and 160,000 people in Australia are chronically infected with hepatitis B virus
- Specific populations most at risk of hepatitis B in Australia are
 - People born in Asia and the Pacific Islands
 - People born in other hepatitis B–endemic regions, such as Africa, the Middle East, and the Mediterranean region
 - People from Indigenous communities
 - People who inject drugs
 - Men who have sex with men
 - People in custodial settings
- Hepatitis B virus was first discovered in 1965 and named the Australia Antigen as a result of its discovery in Australian Indigenous individuals
- Symptoms resulting from acute hepatitis B infection among adults are common, with jaundice occurring approximately 12 weeks after initial infection. Other symptoms of infection, when they occur, include loss of appetite, tiredness, nausea, vomiting, abdominal pain, sore muscles, and joint pain
- Natural history of hepatitis B is complex
 - Perinatal infection
 - Acute symptoms are rare, but 90% of infants develop chronic or lifelong infection
 - The lifetime risk of advanced liver disease for infected infants is 20% to 30%
 - Childhood infection
 - Acute symptoms are uncommon, but 30% of children exposed to hepatitis B develop chronic or lifelong infection
 - The lifetime risk of advanced liver disease for children who develop chronic infection is 20% to 30%
 - Adult and adolescent infection
 - Acute symptoms are common, but there is a less than 5% chance of chronic or lifelong infection
 - The lifetime risk of advanced liver disease among people with chronic infection is 20% to 30%
- The molecular virology of the hepatitis B virus reflects the complex natural history
- Chronic hepatitis B significantly affects quality of life and can lead to death
- Universal hepatitis B vaccination for infants and for people at high risk of infection has been implemented in Australia since 2000
- Treatment for hepatitis B is available for people with chronic hepatitis B who have elevated liver enzymes and activity on liver biopsy. Liver biopsy is required for accessing treatment through the Pharmaceutical Benefits Scheme
- Licensed therapies for hepatitis B treatment are interferon alfa, pegylated interferon alfa-2a, and lamivudine. Adefovir is government funded only for cases where clinical resistance to lamivudine therapy has developed; pegylated interferons are not funded

3. Goal of the Document

Australia urgently needs an improved response to the hepatitis B virus epidemic. The prevalence of the condition is escalating, and complications of the disease, including liver failure and liver cancer, are increasing. Strategies to limit the public health impact of the disease already exist, in the form of vaccination and other prevention initiatives. Antiviral therapy is increasingly successful in controlling established hepatitis B infections and preventing progression of liver disease.

Australia does not have a national strategy for hepatitis B, as it does for the hepatitis C epidemic. In the absence of a stated national strategy, this document has been prepared by a partnership of individuals, each with diverse interests in hepatitis B, to outline the current burden of hepatitis B in Australia from epidemiological, clinical, research, and community perspectives. The goal of this document is to raise public awareness of hepatitis B, develop advocacy for a national strategy, and provide a platform for developing a concerted public health response to this increasingly important epidemic.

4. Objectives of an Effective and Coordinated Response to Hepatitis B

An effective response to the hepatitis B epidemic in Australia will

Reduce hepatitis B transmission and minimise the present and future burden of hepatitis B–related liver disease in the community.

The specific objectives include

- Reduced hepatitis B virus transmission through universal infant immunization and immunization of individuals at high risk
- Improved understanding and awareness of risk settings
- Improved access to hepatitis B testing and information
- Further development of an infrastructure for hepatitis B treatment delivery and support services
- Development of hepatitis B prevention, treatment, and care services, designed for populations most affected by hepatitis B, including culturally and linguistically diverse (CALD) and Indigenous communities, men who have sex with men, and people who inject drugs
- Surveillance and monitoring to define levels of hepatitis B incidence, prevalence, liver disease burden, and impact of prevention and treatment strategies
- Improved evidence-based support for prevention and treatment through basic virological, epidemiological, clinical, public health, and social research

5. Hepatitis B in Australia

Summary

- Between 90,000 and 160,000 people in Australia are estimated to have chronic hepatitis B
- Specific populations most at risk in Australia are
 - People born in Asia and the Pacific Islands
 - People born in other hepatitis B–endemic regions
 - People from Indigenous communities
 - People who inject drugs
 - Men who have sex with men
 - People in custodial settings
- More than 40% of acute hepatitis B cases result from unsafe use of injecting drugs
- Between 1991 and 2005, there were approximately 90,000 notifications of hepatitis B cases
- Between 1983 and 1996, the incidence of liver cancer in Australia increased among overseas-born males by 90%
- In New South Wales, deaths among people with notified hepatitis B increased from approximately 100 per year in the mid-1990s to close to 200 per year by 2002
- An estimated 2% of the chronic hepatitis B population are receiving antiviral therapy
- The Australian response to hepatitis B has largely relied on the implementation of universal vaccination of infants and people at high risk of infection
- The impact of the relatively limited public health response to hepatitis B in Australia includes
 - High and increasing numbers of people chronically infected
 - Poor hepatitis B vaccination rates among adolescents and high-risk adults
 - Low numbers of people with chronic hepatitis B infection accessing antiviral therapy
 - A lack of funding provided for virological assessment and monitoring of treatment response

5.1 *Extent of the Australian hepatitis B epidemic*

Estimates of the number of people with chronic hepatitis B in Australia are limited by the quality of epidemiological data. No large-scale population-level studies of hepatitis B prevalence have been undertaken, and notifications of chronic hepatitis B are dependent on levels of hepatitis B testing and reporting. Current estimates rely on antenatal screening data, opportunistic laboratory surveys, and estimates of at-risk populations (with applied estimates of hepatitis B prevalence among these populations).

The number of people with chronic hepatitis B was recently estimated at between 90,000 and 160,000, representing a population prevalence of 0.5% to 0.8%.¹ The major groups affected by hepatitis B in Australia, and the estimated proportions of infected people within each high-risk population, are shown in Figure 1.

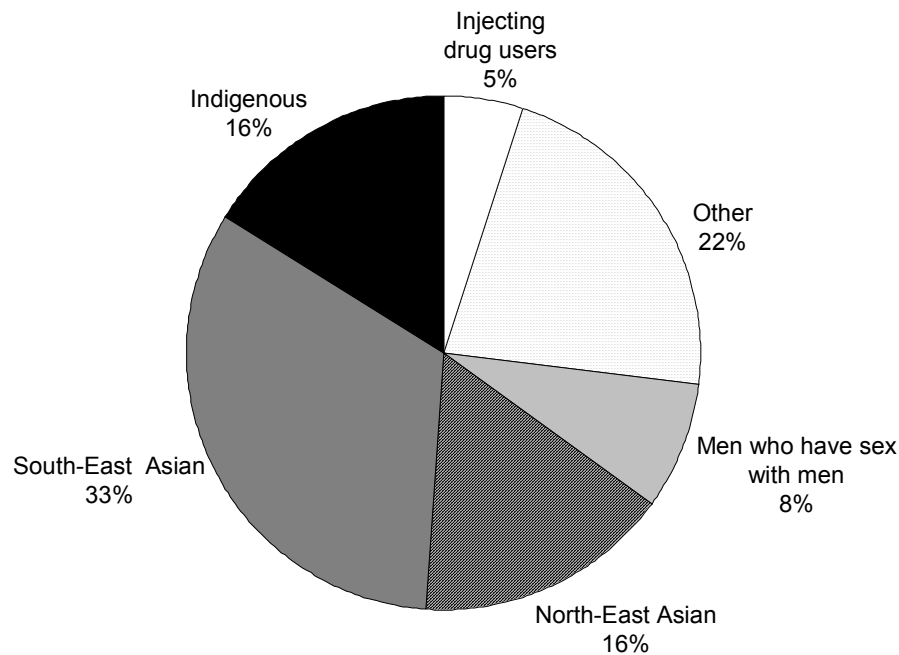


Figure 1. Estimates of chronic hepatitis B distribution in Australia.

The majority of people with chronic hepatitis B in Australia were born overseas, predominantly in countries of the Asia-Pacific region. Immigrants from other high-prevalence regions for hepatitis B, including the Mediterranean region and Africa, also have higher rates of hepatitis B. In addition, second- and third-generation descendants of people with chronic hepatitis B have been at increased risk through ongoing perinatal and horizontal transmission. Other population groups at higher risk of hepatitis B include Indigenous Australians, people engaging in high-risk sexual behaviour, and people who inject drugs.¹ A recent study from a tertiary hospital in Sydney identified the strongest risk factors for hepatitis B infection to be birth in Asia or the Pacific Islands; birth in North Africa, the Middle East, and the Mediterranean region; injecting drug use; household contact with someone diagnosed with hepatitis B; and HIV infection.²

Although people who inject drugs constitute a small proportion of the estimated chronic hepatitis B population, more than 40% of acute hepatitis B cases are attributed to injecting drug use,³ consistent with low levels of vaccine uptake among this high-risk population.⁴

The number of notifications of chronic hepatitis B through public health surveillance systems is shown in Figure 2.⁵ Over the period 1991 through 2005, there have been approximately 90,000 notifications of “unspecified” hepatitis B based on the presence of hepatitis B surface antigen (HBsAg) and the absence of markers of acute hepatitis B, consistent with chronic hepatitis B cases. Over the same period, there have been approximately 4,000 notifications of acute hepatitis B infection.⁵

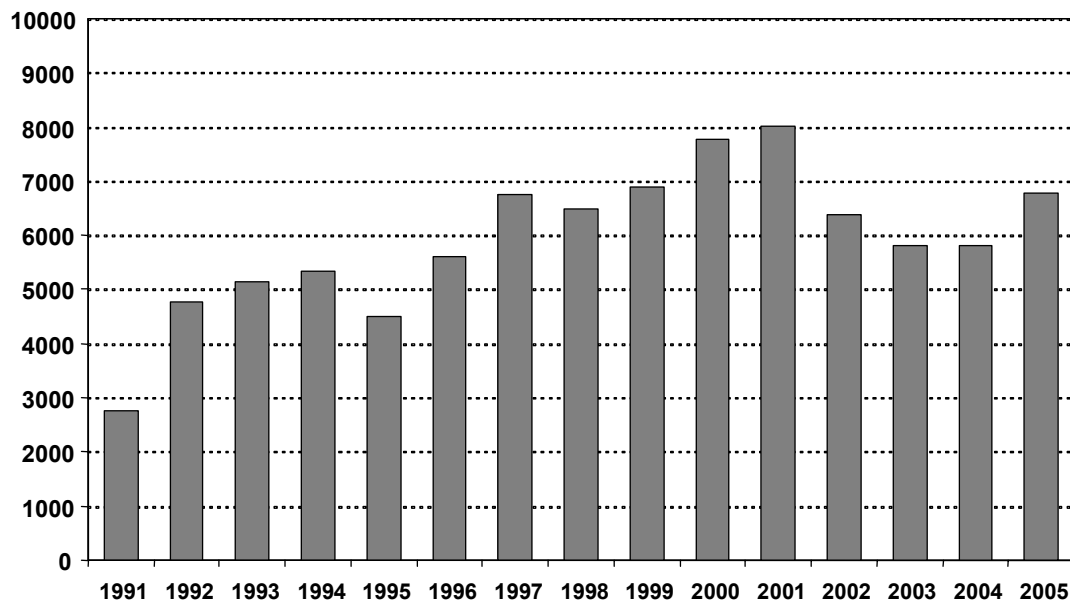


Figure 2. Notifications of chronic hepatitis B to National Notifiable Diseases Surveillance System

Over the period from 1983 to 1985 through 1995 to 1996, the incidence of liver cancer increased among overseas-born males by 90%.⁶ The expanding number of people with chronic hepatitis B and the considerable risk of liver cancer among this population contribute to the increasing numbers of reported cases of liver cancer in Australia, in particular among overseas-born males.

Further evidence of the expanding burden of hepatitis B-related liver disease in Australia has come from a recent linkage study in New South Wales. Notifications of hepatitis B were linked to the New South Wales Cancer Registry and National Death Index. Deaths among people with notified hepatitis B increased from approximately 100 per year in the mid-1990s to close to 200 per year by 2002. People with hepatitis B had a 40% to 90% increased risk of mortality compared to the age- and gender-matched New South Wales population. Although many deaths were unrelated to liver disease, the risks of total liver disease-related and liver cancer-related mortality were 12 and 28 times higher, respectively, than those for the background population (personal communication, Janaki Amin).

The extent of the current chronic hepatitis B epidemic, with continued high levels of migration from hepatitis B-endemic countries and the relatively slow rate of disease progression, means that increasing levels of hepatitis B-related advanced liver disease (cirrhosis, liver failure, liver cancer) will continue for at least two decades and possibly longer, unless effective therapeutic strategies are implemented broadly. Currently, only an estimated 2% of the total chronic hepatitis B population, and only a small minority of people who would be recommended for treatment, are receiving antiviral therapy.

5.2 Specific populations with hepatitis B

The diversity of the hepatitis B epidemic reflects the increasingly diverse Australian general population. People with, or at risk of, hepatitis B come from a broad cross-section of ethnic and social backgrounds. Several specific populations are at increased risk of hepatitis B and require particular attention and specific strategies for prevention, treatment, and care.

People born in Asia and the Pacific Islands

People born in Asia and the Pacific Islands constitute the majority of people with chronic hepatitis B in Australia.^{1,7} Prevalence of chronic hepatitis B is extremely high in many countries within the Asia-Pacific region, and high levels of immigration from several of these countries over the last four decades have produced the high proportion of overseas-born hepatitis B cases in Australia. High rates of chronic hepatitis B relate to high levels of perinatal and early childhood exposure, from which the majority of individuals progress to chronic infection. The prevalence of hepatitis B in people born overseas is generally consistent with the prevalence in their countries of origin.⁸⁻¹⁰ Table 1 shows the prevalence of hepatitis B in selected countries of the Asia-Pacific region,¹¹⁻¹⁹ indicating the number of

Table 1. Estimates of chronic hepatitis B in selected countries of birth from Asia and the Pacific Islands

Country	Prevalence of chronic hepatitis B in country (%) ¹	Number of Australians born in that country (% of total Australian population) ²	Estimate of chronic hepatitis B ³ among Australians born in that country
China	15	181 987 (0.8)	27 300
Hong Kong	8.8	76 513 (0.4)	6 700
Taiwan	15–20	30 705 (0.2)	5 400
Vietnam	15–20	176 616 (0.7)	30 900
Philippines	12	125 144 (0.5)	15 000
Fiji	10–20	54 949 (0.3)	8 200
India	3.3	128 650 (0.6)	4 200
Malaysia	5.2	97 786 (0.5)	5 100
South Korea	2.8	44 925 (0.2)	1 300

1. Chronic hepatitis B prevalence estimates based on seroprevalence studies in countries of origin
2. Australian Bureau of Statistics, Migration, Australia 3412.0, 2003–2004
3. Estimate of chronic hepatitis B based on prevalence estimate or midpoint of prevalence range, with rounding to closest 100

people in Australia born in these countries²⁰ and a crude estimate of the size of the foreign-born populations with chronic hepatitis B in Australia. These figures show that a large number of people with chronic hepatitis B in Australia were born in China and Vietnam. Despite constituting only approximately 5% of the Australian population, people born in these selected countries of the Asia-Pacific region make up more than 50% of the estimated population in Australia with chronic hepatitis B. Furthermore, the descendants of people with

chronic hepatitis B born in these countries are likely to have been at increased risk of hepatitis B through perinatal (prior to introduction of infant immunization) and horizontal (household) transmission. Thus, the proportion of people of Asian and Pacific Islander ethnic origins who have chronic hepatitis B would be even higher. A liver clinic-based study done in Melbourne found 70% of patients with chronic hepatitis B to be of Asian or Pacific Islander ethnic background.⁷

Seroprevalence studies need to be conducted among selected ethnic populations in Australia. Few such studies have been undertaken. One community-based study documented a chronic hepatitis B prevalence of 9% and 8% among Laotian and Cambodian adult immigrants, respectively.²¹ Most of the hepatitis B-infected participants in the study were unaware of their hepatitis B status.

People born in other hepatitis B-endemic regions

People born in other hepatitis B-endemic regions also have a higher rate of hepatitis B infection than in the general population. These regions include Africa, the Middle East, and the Mediterranean region. People from the Mediterranean region (predominantly Italy, Greece, and Malta) constituted 16% of a Melbourne liver clinic population with chronic hepatitis B.⁷ People from the Mediterranean region who are infected with the hepatitis B virus are more likely to have hepatitis B e antigen (HBeAg)-negative disease (see Natural History section) and more advanced liver disease.⁷

Aboriginal and Torres Strait Islander people

Only 2% of the Australian population are identified as being of Indigenous origin, but they constitute an estimated 16% of the Australian population who has chronic hepatitis B. The prevalence of chronic hepatitis B among Indigenous Australians varies according to place of residence, with estimates varying from 2% for urban Indigenous populations to 8% for rural Indigenous populations.¹ Remote Aboriginal communities are likely to have even higher prevalence rates. Hepatitis B vaccination, including universal infant vaccination, was implemented in many Indigenous Australian communities beginning in the early 1990s. Evaluation of the impact of these programs has been limited, however. “Catch-up” hepatitis B vaccination was implemented for Indigenous children and adolescents in the late 1990s, but coverage appears patchy. Following notification of hepatitis B in several Indigenous teenagers in one Queensland community, a survey of vaccination status among teenagers in the community was undertaken. Only 44% were fully vaccinated, and more than 90% of the incompletely vaccinated teenagers had been infected with hepatitis B, with 26% having chronic infection. Access to hepatitis B treatment and care services is limited, partly because of poor overall access to primary and tertiary health care services in many Indigenous communities.

People who inject drugs

The prevalence of chronic hepatitis B among people who inject drugs is approximately 2%. However, 40% to 50% have been exposed to hepatitis B, and 44% of acute hepatitis B cases are related to injecting drug use.^{1,3}

The relatively low rate of chronic hepatitis B relates to the high proportion of adolescents and adults who clear hepatitis B following exposure. Despite the extremely high risk of hepatitis B exposure among people who inject drugs, only a minority of them have received hepatitis B vaccination.⁴ This is largely the result of an absence of funding for hepatitis B vaccination

programs for people who inject drugs in most areas. In addition, poor access to primary health care services among people who inject drugs, as well as social marginalisation, often make a three-injection course of vaccination over a 6-month period problematic. Strategies such as more-rapid hepatitis B vaccination schedules (e.g., over 6 weeks) have been assessed among people who inject drugs in an attempt to improve uptake.²²

Hepatitis B and hepatitis C share common transmission routes. The majority of people who inject drugs and who have chronic hepatitis B will be co-infected with hepatitis C. Co-infection with hepatitis B and hepatitis C increases the risk of liver disease progression, including progression to cirrhosis and liver cancer, and makes clinical management of both viruses more difficult.

Men who have sex with men

The prevalence of chronic hepatitis B among homosexual men is approximately 2%, although, as with people who inject drugs, rates of hepatitis B exposure in this population are considerably higher.¹ A study done in Sydney found that, among homosexual men without HIV, approximately 20% had evidence of prior hepatitis B exposure. Factors associated with hepatitis B infection are the number of sexual partners, a history of other sexually transmissible infections, and older age.²³ Rates of hepatitis B infection are higher among homosexual men with HIV, of whom approximately 7% have chronic hepatitis B.²⁴

Hepatitis B vaccination uptake rates among men who have sex with men have improved, but a large proportion of young homosexual men remain susceptible to hepatitis B infection.²³ In contrast to people who inject drugs, only a small proportion of homosexual men with chronic hepatitis B will also have co-infection with hepatitis C. On the other hand, a high risk of transmission of hepatitis B and HIV among homosexual men who engage in unprotected sex means that the rates of hepatitis B and HIV co-infection are higher.²⁴ Co-infection with hepatitis B and HIV increases the risk of liver disease progression, particularly for people with advanced immune deficiency.²⁵

People in custodial settings

The prevalence of chronic hepatitis B among prison inmates is 2% to 3%,^{1,26} although rates of prior hepatitis B infection are 30% to 40%.^{26,27} Higher hepatitis B prevalence in custodial settings relates to the high proportion of people who have a history of injecting drug use, as well as to the high proportion of Indigenous people comprising the prison populations. Indigenous prisoners have a particularly high rate of chronic hepatitis B, with levels above 10% in one New South Wales study.²⁶ Lack of public health initiatives in correctional settings, such as hepatitis B prevention and needle and syringe exchange programs, have also contributed to ongoing transmission. Although some prisons offer hepatitis B screening and vaccination for susceptible individuals, this is not a universal practice.

Many barriers to effective clinical management of chronic hepatitis B exist within custodial settings. Liver biopsy is problematic to organise, as inmates often have to be transferred to another prison for the procedure. Availability of specialist hepatitis clinic services is limited, although several clinics have been established in New South Wales that predominantly manage hepatitis C. Furthermore, most custodial sentences are short term; custodial populations have high rates of turnover, and follow-up of individuals after their release is poor.

5.3 The socio-cultural context of hepatitis B

Infection with hepatitis B virus occurs within a broader context of access to health care provision as it exists in communities that are often marginalised from generalist health services. Epidemiological information, as presented in previous sections of this document, reveals the diversity of the population groups within the community who are at greater risk of transmission and of the effects of hepatitis B infection.

This diversity presents specific challenges to implementing a comprehensive and inclusive response to hepatitis B, particularly in the development of health promotion options and models for patient management.

People from culturally and linguistically diverse backgrounds

Ethnicity is strongly associated with almost every measure of health and disease. Unfortunately, the literature on the extent of knowledge about hepatitis B within Australian communities of CALD backgrounds is limited.

Ethnicity in Australia is strongly associated with underlying low socio-economic status. Social exclusion and isolation affect the health status of ethnic groups, some of whom are also coping with prior hardships. Both language difficulties and certain health beliefs and practices significantly influence health literacy, including access to health services.

CALD communities vary considerably in terms of socio-economic status, cultural background, and religious beliefs and practices. English language proficiency also varies, with approximately 20% of people from CALD backgrounds being unable to speak English well or at all.²⁸

In the United States, hepatitis B knowledge among Vietnamese immigrants has been found to be generally poor; one study showed that only 28% had ever heard of hepatitis B virus vaccination.²⁹ Further, while a majority of the immigrants associated hepatitis B with liver cancer and death, only a minority knew that infection could be lifelong.

People from CALD backgrounds also differ in their understanding of hepatitis-related physiology (e.g., the function of the liver, the role of the blood in hepatic disease) and in their rates of acceptance of and adherence to treatment protocols. Differences in these understandings affect prevention and treatment of hepatitis B in these communities. Factors affecting an understanding of hepatitis B include

- Understanding of body fluids and of blood, as this affects understanding of risk behaviour and viral transmission
- Different interpretations of “hepatitis” and “liver disease”
- Confusion between differing types of hepatitis
- The importance of the liver and its role within traditional medical modalities, as this affects the willingness of people from CALD communities to access treatment
- Lack of knowledge about being tested, including the test procedure itself and the implications of test results
- Shame
- Lack of information in a person’s own language
- Reluctance to see a general practitioner of the person’s own language background

- Preference for complementary and traditional medicines
- Issues with disclosure and confidentiality within specific communities, particularly concerning the use of interpreters and the use of family members as interpreters

Hepatitis B is complex, and the translation of often technical information into languages and concepts understood by people from CALD backgrounds can be difficult. This was reflected in a study done among a Cambodian community in the United States.³⁰ Cambodian hepatitis B pamphlets written in Khmer, the principal Cambodian language, used the term “liver disease” (*rauk tlaam*), or “swollen liver disease” (*rauk hoem tlaam*) as the translated expression of “hepatitis B.” When the translators were asked why *rauk tlaam* was chosen as the appropriate Khmer translation for hepatitis, they explained that this phrase best captures the organ damage expressed by the word “hepatitis,” as derived from the Greek. The distinction “B” was routinely dropped and considered unnecessarily confusing. When the Cambodian subjects’ comprehension of these terms was measured, however, the authors found that *rauk tlaam* was a meaningless phrase to 82% of the respondents and that Cambodian refugees often do not associate liver disease with hepatitis B virus, only with heavy alcohol use. This study suggests that it is important for health care professionals to understand the contextual significance of medical language for people from CALD backgrounds.

Aboriginal and Torres Strait Islanders

Indigenous populations suffer a huge burden of ill health and disease, requiring health services to respond to multiple and competing priorities. The Indigenous population lives within a context of greater morbidity and mortality than experienced by the broader Australian community, including high death rates in early to middle adulthood. Life expectancy at birth for Indigenous populations is 59.4 years for men and 64.8 years for women, in comparison to 77.8 years for men and 82.8 years for women in the general community.

The National Aboriginal and Torres Strait Islander Sexual Health and Blood Borne Virus Strategy 2005–2008 identifies access to local primary health care as the foundation of a functioning health care system. The response to hepatitis B within Indigenous communities should be seen in a broader context of lack of access to generalist health services.

The National Aboriginal and Torres Strait Islander Sexual Health and Blood Borne Virus Strategy 2005–2008 provides a broad understanding of the contexts that affect access to health care services by Aboriginal and Torres Strait Islanders. These include

- Lack of provision of, and access to, health services in rural and remote communities
- Poor linkages within various parts of the health system
- Inappropriate and inadequate knowledge and skills among health professionals for addressing the health issues of Aboriginal and Torres Strait Islanders
- Communication difficulties associated with language preferences, as well as poor levels of sensitivity to the requirements of verbal and non-verbal communication with Aboriginal and Torres Strait Islanders
- Experiences of direct and systematic discrimination

Other issues affecting the provision of health services specifically for Aboriginal and Torres Strait Islanders include cultural diversity and variation within Aboriginal and Torres Strait Islander communities themselves, involving cultural practices, language, living circumstances, and the variety of environments in which Aboriginal and Torres Strait Islander people live (e.g., urban, regional, rural, and remote communities). Health access for Aboriginal and

Torres Strait Islanders is also affected by issues of distance, isolation, inadequate transport, and lack of healthcare infrastructure. All of these factors are significant in their capacity to compromise people's access to adequate primary health care.

Indigenous communities are disproportionately represented within correctional settings: in 2002, 20% of all prisoners were Indigenous Australians. These settings are acknowledged as an independent risk factor for the transmission of blood-borne viruses including hepatitis B because of the high prevalence and the lack of effective prevention interventions. A high proportion of prisoners are injecting drug users, both outside and inside correctional settings, and there is evidence that correctional settings provide an important point for initiation into injecting drug use itself for Indigenous people.

A report by the Aboriginal Health and Medical Research Council, *Increasing Access to Services in New South Wales for Aboriginal People at Risk of Contracting or Who Have Blood Borne Infection* (2004), describes hepatitis B as "endemic" in Indigenous communities and highlights the limited resources available to assist health workers in promoting the importance of hepatitis B testing and vaccination. In assessing the risk of blood-borne viral infection to Indigenous communities in New South Wales, the report identifies additional risk factors. These include

- High proportion of youth in the Indigenous population
- High levels of incarceration
- Mobility of Indigenous people
- Low level of knowledge of blood-borne viruses
- Increase in injecting drug use
- High level of sexually transmissible infections
- High level of violence in some Indigenous communities
- Practices such as non-sterile tattooing and body piercing

Men who have sex with men

The term "men who have sex with men" is used by default in the context of hepatitis B, because of a lack of research that would allow this population group to be more specifically targeted. Men who have sex with men are not homogeneous; the group encompasses homosexually active men who self-identify as gay or who are attached to the gay community, as well men who do not experience attachment to the gay community. The group has great diversity in major aspects of their lives, including cultural background, attachment to gay community and identity, economic status, and living arrangements.

The HIV epidemic in Australia has had its greatest impact on gay men. While HIV sero-conversion rates have decreased, the transmission of HIV remains the primary focus of health promotion targeting men who have sex with men. Significant activity has focused on the development of health promotion literacy, particularly in fostering understanding among men who have sex with men about HIV transmission. Men who have sex with men have adopted a broad range of strategies to reduce the risk of HIV transmission, including withdrawal before ejaculation, "strategic positioning" (being the active or passive partner), negotiated safety, and assumptions of positive serostatus.

This literacy is not evident for other blood-borne viruses, such as hepatitis B. There appears to be little focus on preventing transmission of hepatitis B within this population.

The serious consequences of hepatitis B among gay men were acknowledged in a report entitled *Towards a National Strategy for HIV/AIDS Health Promotion for Gay and Other Homosexually Active Men*, issued by the Commonwealth of Australia in 1998. Little activity in Australia has been undertaken to address the issue. The report recommended developing an annual sexual health check-up program for men who have sex with men, but there is no evidence of this having been implemented.

The Australian National Council on AIDS and Related Diseases reported in 1999 that cost is a major barrier to vaccination uptake among men who have sex with men, more critical than awareness of risk. When hepatitis B vaccine was provided free of charge at the Sydney Sexual Health Centre, overall uptake immediately increased by 86%; uptake among homosexual and bisexual men increased by 117%.³¹

The epidemiological data from international studies is similar to that from Australia, showing low hepatitis B vaccination access and uptake among men who have sex with men. A systematic review of studies of hepatitis B vaccination among men who have sex with men³² found several predictors of uptake. These include

- Younger age and higher education level
- Knowledge of the vaccine
- Access to health care, including having a regular source of health care
- Level of “outness” regarding same-sex orientation, including honesty with health care providers
- Behavioural factors, including sexual and drug-use behaviour such as condom use, limited number of sexual partners, and never injecting drugs
- Psychosocial variables, including attitude towards vaccination, social norms surrounding vaccination, and perceived vulnerability to hepatitis B infection

In the United States, a study exploring acceptance of hepatitis B vaccination among men who have sex with men residing in Birmingham, Alabama, reported that these individuals had low levels of perceived susceptibility to infection, poor knowledge of hepatitis B, and a perception that health care providers were uncomfortable discussing same-sex sexual behaviour. Participants also did not identify benefits to hepatitis B vaccination; they had poor health care access, mistrusted federally supported vaccination efforts, and felt that messages emphasizing HIV prevention may have hampered their receptivity to health messages in general.³³

People who inject drugs

An estimated 100,000 Australians regularly inject drugs, and an additional 175,000 are involved in occasional injecting without dependence or social isolation.³⁴ People who inject drugs experience discrimination on the basis of their injecting drug use, particularly within health care settings. This results in poor levels of general health, which may be compounded by other social problems such as poverty, unemployment, and poor access to housing, welfare, and other support services. These issues affect the capacity or willingness of people who inject drugs to prioritise health issues, particularly with reference to conditions such as chronic viral hepatitis, in which the initial impact is generally silent and the potential, longer-term disease complications have little immediate relevance within the broader social context.

Levels of knowledge about hepatitis B are poor among people who inject drugs. These people are generally not aware of hepatitis B vaccination.⁴ Misconceptions regarding infection status are also very common.³⁵ Rates of hepatitis B vaccination are low, and hepatitis B testing rates

are particularly low among people who inject drugs who have never been in drug treatment. Hepatitis B screening and vaccination programs targeting people who inject drugs have been only partially successful. New strategies are needed.

In the context of hepatitis C, people who inject drugs are more likely to report having been refused medical treatment and having experienced discrimination from their doctor, family, and friends. Such discrimination negatively affects their health. People who inject drugs also report lower levels of post-test counselling.³⁶

The stigma relating to injecting drug use increases the level of marginalisation for populations who already have reduced access to health services. This particularly applies to people from CALD backgrounds and Indigenous people who are also injecting drug users.

Poor knowledge of blood-borne viruses has been reported among people who inject drugs from CALD backgrounds in Australia, particularly among those of Asian origins. This is coupled with low rates of testing for blood-borne viruses, high levels of risk behaviour, and high levels of hepatitis C and hepatitis B exposure.^{37,38}

In Indigenous populations, the rates of injecting drug use are higher than those found within the broader population. The Australian Needle and Syringe Program Survey National Data Report, 1999–2003, found an increase in the proportion of injecting drug users identified as Indigenous, rising from 5% in 1995 to 8% in 2003. Factors affecting Indigenous people who inject drugs include

- Lack of access to culturally appropriate blood-borne virus prevention education and primary health services, particularly in rural and remote areas
- Discrimination and stigmatisation associated with injecting drug use, both within and outside of Indigenous communities
- Concerns regarding confidentiality in health care settings
- Lack of support and capacity of health services to address the large number of health issues that are of more pressing and immediate social and legal concerns than hepatitis B prevention

5.4 The public health response to hepatitis B

Australia's public health response to hepatitis B has been limited, having concentrated primarily on universal infant hepatitis B vaccination. Coordinated national responses to infection with HIV and hepatitis C, two other major blood-borne viruses, have linked prevention, treatment, and care strategies, but this integration has been lacking for hepatitis B. No dedicated funds have been assigned for hepatitis B research or program development in the community sector.

Australia's committed public health response to HIV and hepatitis C involves a partnership among Commonwealth and State and Territory Governments, federally-funded research institutions (covering basic, clinical, and epidemiological and social research), clinical networks, and a strong commitment from the community sector supported through dedicated government funds.

This partnership approach, particularly in the area of HIV, has made Australia an internationally recognised leader in the control of blood-borne viruses. Specific strategies such as

the introduction of harm-reduction programs for people who inject drugs have saved many lives and have been highly cost-effective. Public health responses to HIV and hepatitis C in Australia have been implemented at the national level through strategies conducted by the Commonwealth Government, five in the case of HIV/AIDS since the mid-1980s, and two in the case of hepatitis C since 1999. Various committees coordinate advice on implementing the national HIV and hepatitis C strategies: the Commonwealth Government's Ministerial Advisory Committee on AIDS, Sexual Health and Hepatitis (MACASHH) and three subcommittees (HIV/Sexual Health, Hepatitis C, Indigenous). Coordination of strategies for reducing the impact of HIV and hepatitis C is overseen by the Intergovernmental Committee on AIDS, Hepatitis C and Related Diseases (IGCAHRD).

For hepatitis B, the major public health contributions include

- Screening of blood donors and the blood supply for hepatitis B
- Screening of antenatal women for hepatitis B
- Universal infant hepatitis B vaccination
- Hepatitis B vaccination for some high-risk groups, such as health care workers and people with high-risk sexual behaviour or contacts
- Licensing and funding of hepatitis B treatments (interferon, lamivudine, adefovir) through the PBS highly specialised drug S100 scheme

As a result of the relatively limited public health response to hepatitis B in Australia, the following conditions exist:

- High numbers of people chronically infected
- Poor hepatitis B vaccination rates among adolescents and high-risk adults
- Low numbers of people with chronic hepatitis B infection who are receiving antiviral therapy
- Lack of funding provided for virological assessment and monitoring of treatment response (HBV DNA levels). (Similar assays for virological monitoring of HIV and hepatitis C were funded soon after development and demonstration of their importance in clinical management.)

6. Overview of Hepatitis B

Summary

- Hepatitis B virus was first discovered in 1965 and named the Australia Antigen as a result of its discovery in Australian Indigenous populations
- Hepatitis B virus is found in blood, semen, and saliva
- Hepatitis B virus transmission occurs
 - From mother to infant (perinatal)
 - To children through household and other hepatitis B contacts
 - Through sexual contact
 - In health care settings, including through contaminated needles or blood products
 - Through sharing of injecting equipment.
- Symptoms resulting from acute hepatitis B virus infection among adults are common, with jaundice occurring approximately 12 weeks after initial infection. Symptoms of infection, when they occur, include loss of appetite, tiredness, nausea, vomiting, abdominal pain, sore muscles, and joint pain
- Natural history of hepatitis B is complex
 - Perinatal infection
 - Acute symptoms are rare, but 80% to 90% of infants develop chronic or lifelong infection
 - The lifetime risk of advanced liver disease occurring for infected infants is 20% to 30%
 - Childhood infection
 - Acute symptoms are uncommon; 30% of children exposed to hepatitis B develop chronic or lifelong infection
 - The lifetime risk of advanced liver disease for children who develop chronic infection is 20% to 30%
 - Adult and adolescent infection
 - Acute symptoms are common, but there is a less than 5% chance of chronic or lifelong infection
 - The lifetime risk of advanced liver disease among people with chronic infection is 20% to 30%
- Chronic hepatitis B significantly affects quality of life and can lead to death
- Universal hepatitis B vaccination for infants has been implemented in Australia
- Treatment for hepatitis B is available for people with chronic hepatitis B who have elevated liver enzymes and evidence of disease activity on liver biopsy. Liver biopsy is required for accessing treatment through the Pharmaceutical Benefits Scheme
- Licensed therapies for treatment are interferon alfa, pegylated interferon alfa-2a, lamivudine, and adefovir. Adefovir is government funded only for cases where clinical resistance to lamivudine therapy has developed; pegylated interferons are not funded

Hepatitis B is a major global pandemic, involving an estimated 400 million people living with chronic hepatitis B, 2 to 4 million hepatitis B–related deaths per year, and ongoing high levels of hepatitis B virus transmission in many countries. Hepatitis B is endemic in several regions, with the Asia-Pacific region representing the largest proportion of global disease burden.

Australia has a particular historical link to hepatitis B: the antigen now known as the hepatitis B surface antigen (HBsAg), when first discovered in 1965 by Dr. Baruch Blumberg, was

named the Australia Antigen. It was so named because HBsAg was initially detected in the serum of Australian Indigenous individuals.

Over the 40 years since the discovery of the Australia Antigen, many crucial developments have been made in hepatitis B prevention and treatment.

1965	Discovery of Australia Antigen
1967–1970	Discovery of the hepatitis B virus and its link to acute and chronic hepatitis
1972	Introduction of HBsAg assay to screen blood donors
1970s	Evaluation of the first hepatitis B vaccines
1976	Interferon reported to have activity against hepatitis B
1981	Randomized trial evidence for safety and efficacy of commercial hepatitis B vaccine
1982	First HBV vaccine licensed (initially recommended for high-risk adults)
1982	Development of cell-culture and small-animal models for hepatitis B replication
1988	Universal hepatitis B antenatal testing introduced in the United States
1991	Universal infant hepatitis B immunization introduced in the United States
1992	Interferon alfa licensed for treatment of chronic hepatitis B
1998	Lamivudine licensed for treatment of chronic hepatitis B

6.1 Hepatitis B transmission and virology

Hepatitis B virus is a blood-borne and sexually transmitted virus. The virus is transmitted either through percutaneous (puncture of skin) or mucosal exposure to contaminated blood or body fluids. Serum, semen, and saliva have been shown to be infectious to hepatitis B.

Hepatitis B transmission occurs

- From mother to infant (perinatal)
- To children through household and other hepatitis B contacts
- Through sexual contact
- In health care settings, including through contaminated needles or blood products
- Through sharing of injecting equipment.

The risk of hepatitis B virus infection among infants of HBsAg-positive and HBeAg-positive mothers is approximately 80% for those who do not receive post-exposure immunoprophylaxis.

Under conditions of exposure, the hepatitis B virus enters the liver via the bloodstream. The liver is the major site of hepatitis B viral replication.

The hepatitis B virus belongs to a family of viruses called *hepadnaviridae*. Hepatitis B is a DNA virus that uses reverse transcription as a means of copying its DNA genome (Figure 3). Under normal circumstances, viral infection and subsequent replication within the liver cells (hepatocytes) do not lead to cell death. This contrasts with HIV, which directly kills the infected cell, the CD4 lymphocyte. The liver damage associated with acute or chronic hepatitis B occurs as a result of attempts by the host's immune response to remove the virus from infected liver cells. The major target of the host's immunological response is the hepatitis B e antigen (HBeAg), a soluble protein secreted by the virus into the bloodstream.

Antiviral drugs such as nucleoside analogues inhibit hepatitis B virus replication by blocking the polymerase reverse transcription enzyme. During antiviral therapy, drug-resistance mutations can be found to emerge as a consequence of inadequate suppression of virus replication, resulting in the failure of the drug to treat the disease. Thus, prevention of resistance requires the adoption of therapeutic approaches that effectively control virus replication.

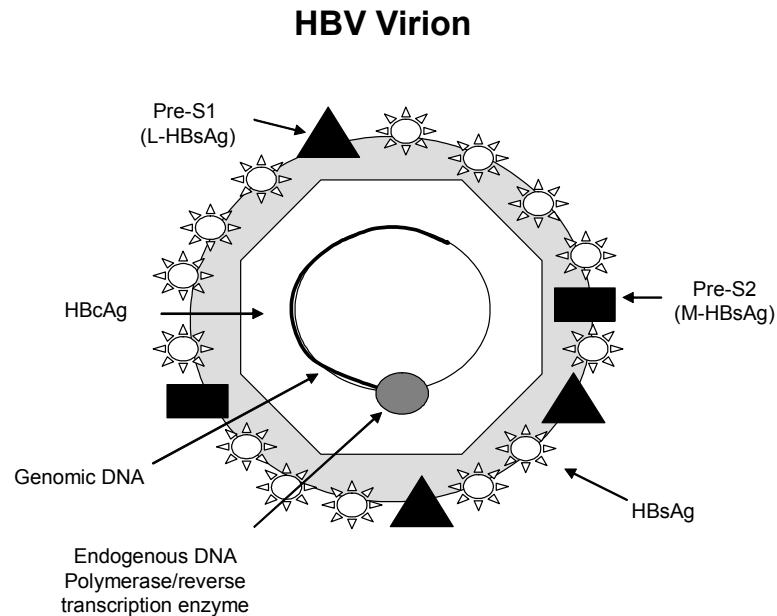


Figure 3. The hepatitis B virus: its structure and antigenic components.

6.2 Natural history of hepatitis B

The natural history of hepatitis B is heterogeneous, dependent on several factors. A major factor influencing the natural history of hepatitis B is the age of the individual at exposure: the vast majority of infants who become infected through perinatal exposure develop chronic hepatitis B, while only a minority of people infected through exposure at older ages progress to chronic infection. This has particular relevance in Australia, considering the large numbers of Asian-born Australians who were infected with hepatitis B virus through presumed perinatal exposure in their countries of birth (Table 2).

Table 2. Impact of age at exposure on natural history of hepatitis B.

	Perinatal	Childhood	Adolescent/Adult
Acute symptoms	Rare	Uncommon	Common (30%–50%)
Chronic infection	80%–90%	30%	<5%
Immune tolerant phase	Prolonged	Variable	Short
Risk of advanced liver disease (% of exposed)	20%–30%	5%–10%	1%–2%
Risk of advanced liver disease (% of chronic)	20%–30%	20%–30%	20%–30%
Australian population groups	Asian born	Pacific Island born; Mediterranean, Middle East, and African born; Indigenous	Injecting drug users; homosexual men

Acute hepatitis B

Acute hepatitis B develops 8 weeks (range, 6 to 12 weeks) following exposure to the hepatitis B virus. Acute hepatitis B is marked by serological (HBsAg, anti-HBc IgM, HBV DNA) and biochemical (elevated liver enzymes such as alanine aminotransferase [ALT] and aspartate aminotransferase [AST]) evidence of infection. Sensitive HBV DNA assays are often able to detect virus in the initial 2 to 3 weeks, and HBsAg is detected on average 4 weeks following exposure. Acute hepatitis B can be either symptomatic or asymptomatic. Symptomatic hepatitis is rare in the perinatal setting but is relatively common in adult-acquired infection. Development of acute symptoms such as jaundice occurs approximately 12 weeks following exposure, and mortality from development of acute liver failure occurs in 1% of cases. Progression to chronic infection (persistence of infection for more than 6 months as measured by serum HBsAg) varies from 90% among perinatally exposed (and unvaccinated) infants, to 30% among children age <5 years, to <5% for older children and adults. There is no specific or approved treatment for acute hepatitis B.

Chronic hepatitis B

Chronic hepatitis B occurs when infection with the hepatitis B virus persists. Chronic disease is marked by ongoing serological evidence of infection and variable liver inflammation. Persistence of HBsAg for longer than 6 months has traditionally defined chronic hepatitis B or the hepatitis B “carrier” state. However, the natural history of chronic hepatitis B is highly variable, often marked by alternating stages of disease inactivity and activity and by lack of linearity in relation to liver disease progression.

The patterns of the main serological markers of hepatitis B infection during acute and chronic infection are shown in Table 3.

Table 3. Serological markers of hepatitis B during acute and chronic infection

Marker	Acute Hepatitis B	Chronic Hepatitis B
HBsAg	Positive, disappears	Positive, persists
HBV DNA	Positive, disappears	High or low, persistent
Anti-HBc (IgM)	Positive, high titre	Low titre or negative
Anti-HBc (Total)	Positive	Positive
HBeAg	Positive, disappears	Positive or negative
Anti-HBs	Appears on recovery	Usually negative

Chronic hepatitis B can be categorized into four phases (Figure 4).

1. *Replicative/Immune tolerant phase* — This phase is associated with high serum viral load (HBV DNA), HBeAg positivity, low levels of liver inflammation, generally normal liver enzyme levels, and a low risk of liver disease progression. In individuals infected in infancy or early childhood, this phase can last for 20 to 30 years.
2. *HBeAg clearance phase* — Characteristics of this phase are declining but fluctuating levels of serum HBV DNA, loss of HBeAg and development of anti-HBe antibody (HBeAg seroconversion), moderate-to-high levels of liver inflammation and liver enzymes, and often rapid liver disease progression. This phase can be protracted and associated with clinical hepatitis flares, including development of jaundice. Many individuals remain HBeAg positive and have highly active liver disease for many years, if not indefinitely. However, others progress to HBeAg-negative chronic hepatitis B, which is not a different disease than HBeAg-positive chronic hepatitis B but, rather, a later stage or phase of the same disease. Individuals with HBeAg-negative chronic hepatitis B have lower HBV DNA levels than do their HBeAg positive counterparts, and they are older and have more advanced liver disease.

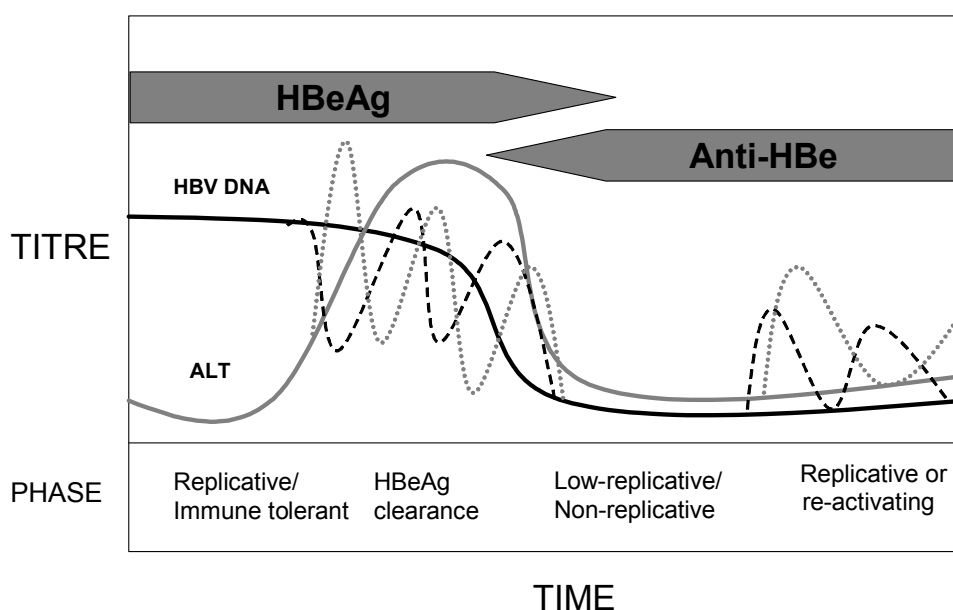


Figure 4. Natural history of chronic hepatitis B.

3. *Low-replicative/Non-replicative phase* — Individuals with a short (or successful) HBeAg clearance phase generally enter this phase, which is associated with undetectable to low levels of serum HBV DNA, persistently normal liver enzyme levels (low levels of liver inflammation), minimal liver damage, and a low risk of advanced liver disease. Individuals in this category need to be distinguished from those with persistently normal liver enzyme levels but high serum HBV DNA levels and HBeAg positivity, who are in the earlier, immune tolerant phase of infection.
4. *Replicative or re-activating phase* — Some individuals who have been in the low-replicative/non-replicative phase can “re-activate” their hepatitis B. Re-activated disease is associated with increasing HBV DNA levels, usually HBeAg negativity, elevated serum enzymes levels, and the potential for further liver disease progression. Immune suppression, such as produced by steroid therapy or chemotherapy, can lead to hepatitis B re-activation.

The major clinical features related to liver disease progression are the level of serum HBV DNA, the degree of liver inflammation, and the duration of active disease. Thus, an individual who has high serum HBV DNA levels (>100,000 IU/mL) and ongoing elevated ALT values, with or without active disease on liver biopsy, is at high risk of progression to advanced liver disease.

The ability of individuals with hepatitis B to undergo natural immune clearance, albeit over a highly variable time period, is a unique feature of the disease. An individual with HBeAg-positive chronic hepatitis B can undergo HBeAg seroconversion, characterized by loss of HBeAg and development of anti-HBe antibody. This can be followed by HBsAg seroconversion, with loss of HBsAg and development of anti-HBs antibody. This natural, or spontaneous, HBsAg seroconversion occurs at a rate of approximately 1% per year and signifies a subsequently extremely low risk of liver disease progression.

Although many HBeAg-positive individuals seroconvert to anti-HBe on the way to natural control of chronic hepatitis B (including low to undetectable levels of HBV DNA and normal liver enzyme levels), many others develop a pre-core or basic core promoter variant of the hepatitis B virus that does not produce HBeAg. These individuals develop anti-HBe antibodies, but they have HBV DNA detectable in serum and ongoing active disease, often with relatively lower HBV DNA levels than those seen in individuals with HBeAg-positive disease. These individuals are in the phase designated as HBeAg-negative chronic hepatitis B (see Figure 4).

The variable natural history of hepatitis B has particular relevance for the Australian population. The majority of people with chronic hepatitis B in Australia have been born in Asian countries and have been exposed to hepatitis B in the perinatal setting. In contrast, although the risk of exposure to hepatitis B is extremely high among people who inject drugs and among men who have sex with men, only a small minority of these two at-risk populations later develop chronic hepatitis B, because adult exposure carries a relatively low risk of progression from acute to chronic infection.

6.3 Treatment of chronic hepatitis B

The goals of hepatitis B treatment are to eliminate or permanently suppress replication of the virus and reduce the patient’s risk of progressing to advanced liver disease and the development of complications (liver failure, liver cancer). The two major drug classes used in

treatment are the interferons and the nucleoside analogues. Some of the key features of these therapies are outlined in Table 4.

Although both groups of agents are able to suppress hepatitis B virus replication, reduce liver inflammation, and reduce the risk of liver disease progression, generally less than 5% of people can fully “control” their hepatitis B infection, even with treatment. True control requires loss of HBsAg and development of anti-HBs antibody. However, a larger proportion of people (20% to 35%) will have normal liver function tests and ongoing viral suppression following 1 to 2 years of therapy and a period off therapy. Other people will not sustain control of hepatitis B virus replication off therapy and will have ongoing liver inflammation; these individuals will require long-term treatment to continue to reduce the risk of liver disease progression, since the risk of development of liver disease is directly related to ongoing viral replication.

Hepatitis B treatment is indicated for people who are classified as being in a stage of hepatitis B characterized by increased activity. Individuals who are considered for treatment generally have

- Liver inflammation as demonstrated by elevated liver enzymes (e.g., ALT/AST) or activity on liver biopsy (or both) *and*
- Relatively high levels of HBV DNA in serum (above 10,000 IU/mL).

Individuals in other stages (e.g., with persistently normal liver function tests) require ongoing monitoring for detection of increased disease activity.

Liver biopsy staging of disease is generally considered an essential tool for clinical management. Individuals who have greater disease activity and liver damage are more strongly recommended for treatment. In fact, a pre-treatment liver biopsy is required for access to therapies through the Australian Commonwealth Government Highly Specialised Drug S100 Scheme for the treatment of chronic hepatitis B. Licensed therapies for hepatitis B treatment are interferon alfa and pegylated interferon alfa-2a, and also lamivudine, adefovir, and entecavir. However, government funding is not available as yet for pegylated interferons and entecavir, and it is only available for adefovir in cases where clinical resistance to lamivudine therapy has been demonstrated.

Table 4. Summary of major features of interferon and nucleoside therapy.

	Interferon Therapy	Nucleoside Therapy
Mechanism of action	Immune system enhancement	Directly blocks replication
Licensed agents	Conventional interferon alfa Pegylated interferon alfa-2a	Lamivudine Adefovir Entecavir
Duration of therapy	4 – 12 months	>12 months
Predictors of response	High ALT level Low HBV DNA level Low HBeAg level	High ALT level Low HBV DNA level
Major limitations	Toxicity	Resistance, particularly with monotherapy

Monitoring for the response to chronic hepatitis B treatment consists of regular liver function tests (every 3 months) and hepatitis B serological tests (every 3 to 6 months, particularly in individuals who are HBeAg positive). Monitoring of virological response through regular (every 3 months) viral load (HBV DNA) assessment is also generally done, although such monitoring is currently not covered by the Medicare rebate system (costs are covered by individual hospital clinics and State public health reference laboratories).

Currently, treatment for hepatitis B involves the use of a single agent (monotherapy), either an interferon or a nucleoside. Monotherapy, however, has been associated with sub-optimal responses and high levels of drug resistance (particularly with ongoing nucleoside therapy). These limitations, plus the development of new antiviral agents, provide the rationale for adopting new therapeutic strategies, especially combination therapy. Combination therapy has clearly been shown to be superior in the management of HIV and hepatitis C infections. Early combination-therapy studies in hepatitis B have indicated reduced rates of drug resistance, providing optimism regarding the potential for combination strategies to control hepatitis B.^{39,40}

7. Priority Action Areas

The sub-optimal public health response to hepatitis B in Australia and the expanding epidemic of infection and liver disease highlight the need for concerted action in several areas. This action needs to target populations most at risk of infection with hepatitis B.

Action requires a range of coordinated activities to reduce the impact of hepatitis B on people already infected and on those who are affected by hepatitis B in the broader Australian community. Evidence from other national public health responses in Australia shows that having a national strategy document greatly enhances the response of government leadership to the call to action. A strategy document needs to address certain key issues.

Any national strategy to reduce the impact of hepatitis B infection needs to be consistent with the guiding principles established for other, similar national strategies, including adoption within the Ottawa Charter for Health Promotion. This charter defines health promotion as the process of enabling people to increase control over their health and thereby improve their health. To be included within the charter, a health promotion strategy must include activity in five areas:

- Building healthy public policy
- Creating supportive environments
- Strengthening community action
- Developing personal skills
- Re-orienting health services

7.1 *Prevention and education*

Hepatitis B infection is preventable. The introduction of universal hepatitis B vaccination in the 1990s should have nearly eradicated perinatal transmission in Australia, and, over the succeeding decades, it has markedly reduced acquired infections among adolescents and young adults. However, projections for the next 5 to 10 years indicate that the number of people with hepatitis B is likely to increase, for the following reasons:

- Continued immigration from high-prevalence countries, some of which have limited or no hepatitis B vaccination programs
- Ongoing transmission among people who inject drugs, people with high-risk sexual behaviour, and partners of people with hepatitis B virus infection (particularly if undiagnosed)
- Sub-optimal prevention programs among Indigenous Australians.

Priority action areas for prevention and education, with particular emphasis on communities most at risk of hepatitis B infection, include

- Increased public awareness of hepatitis B, including risk factors for transmission and measures for prevention
- Increased awareness of risks related to hepatitis B among specific groups
 - Communities of CALD backgrounds
 - Indigenous Australians
 - People who inject drugs
 - Men who have sex with men

- The development of specific hepatitis B education and prevention strategies, plus support services, for at-risk communities, including people already infected with the hepatitis B virus and those who are affected by the disease in an ancillary manner
- Implementation of programs designed specifically to reduce hepatitis B transmission among at-risk populations
- Evaluation of the coverage and impact of universal hepatitis B vaccination programs on perinatal and early childhood infection
- Evaluation of the impact of hepatitis B vaccination programs among Indigenous communities
- Development of strategies for hepatitis B vaccination of marginalised high-risk populations, including people who inject drugs and Indigenous communities
- Increased rates of hepatitis B testing among at-risk individuals
- Implementation of hepatitis B prevention and education in custodial settings
- Training of medical and allied health practitioners to provide education and counselling to people with hepatitis B and those at risk of infection

7.2 Diagnosis, treatment, and support

Testing for, and diagnosis of, hepatitis B are crucial aspects of the public health response. The potential for stigma is great, and discrimination negatively affects people's access to health care services. The natural history of hepatitis B infection is complex. Many people with hepatitis B have low literacy and English proficiency. Even health care professionals may have a poor understanding of hepatitis B transmission, its natural history, and diagnostic markers. Many barriers exist to effective testing, counselling, and diagnosis. The lack of national testing guidelines for hepatitis B further hinders effective testing and diagnosis.

Despite the fact that an estimated 90,000 to 160,000 people in Australia have chronic hepatitis B, relatively few are currently receiving treatments that could reduce the risk of morbidity and mortality. Several factors probably contribute to the low levels of hepatitis B treatment uptake. These include

- Poor understanding of hepatitis B among affected communities and primary care practitioners
- Low rates of hepatitis B testing among some high-risk groups
- Asymptomatic nature of chronic hepatitis B infection for the majority of people
- Low risk of liver disease progression and lack of treatment efficacy in some clinical groups (e.g., those with persistently normal liver function tests)
- Requirement that liver biopsy be done in order to obtain government-funded treatment
- Concerns about antiviral drug resistance, particularly with lamivudine, the only approved nucleoside therapy for first-line treatment
- Toxicity of interferon-based therapy
- Limited infrastructure for delivery of treatment, particularly in rural and remote areas

Priority action areas for diagnosis, treatment, and support include

- Development of a national hepatitis B testing policy
- Development of a monograph describing the clinical management of hepatitis B, to be distributed to all primary care practitioners and other health care professionals
- Establishment of community hepatitis clinics, particularly in areas with large Asian and Indigenous communities
- Exploration of the feasibility for primary care physicians to prescribe hepatitis B treatments, particularly in areas with limited access to specialist care
- Improved understanding of the barriers to hepatitis B testing and treatment uptake
- Expansion of hepatitis B testing, counselling, and treatment services in custodial settings
- Funding of hepatitis B viral load assays for diagnosis and monitoring of treatment efficacy
- Investigation of the cost-effectiveness of hepatitis B resistance testing

7.3 Surveillance

Measuring the extent of the hepatitis B epidemic is integral to evaluation of the current public health response and the development of future strategies. The difficulties encountered in estimating the current incidence and prevalence of hepatitis B in Australia highlight the need for improved surveillance mechanisms.

Acute and chronic hepatitis B infection cases are routinely notified through public health surveillance systems in all Australian States and Territories. Limited demographic information on these cases is then forwarded to the Commonwealth Government's National Notifiable Diseases Surveillance System (NNDSS) for collation and national reporting. The incidence of acute hepatitis B and its risk factors are reported in the *Annual Surveillance Report on HIV/AIDS, Hepatitis and Sexually Transmissible Infections* recorded by the National Centre in HIV Epidemiology and Clinical Research (NCHECR). Currently, surveillance for hepatitis B is overly reliant on these routine case-notification mechanisms. One of the major limitations of these mechanisms is that they generally fail to report the country of birth and Indigenous status.

Aspects of the hepatitis B epidemic that require monitoring include

- Incidence of acute or newly acquired infection
- Prevalence in the overall population and in at-risk populations
- Impact of hepatitis B vaccination programs on incidence and prevalence
- Long-term morbidity of hepatitis B, including incidence of cirrhosis, liver failure, and liver cancer
- Impact of hepatitis B treatment on long-term morbidity

Priority action areas for hepatitis B surveillance include

- Development of a national hepatitis B surveillance strategy, under the supervision of the Communicable Diseases Network of Australia (CDNA)
- Administration of a national blood survey to evaluate age-specific hepatitis B prevalence and uptake of vaccination (this could be incorporated into a serological survey for several other infectious diseases)

- Improvement in the reporting of country of birth and Indigenous status on routine hepatitis B notifications
- Administration of targeted serological surveys to determine prevalence in at-risk populations (in particular, Indigenous and Asian ethnicity communities)
- Formation of a working group to coordinate estimates and projections of hepatitis B, including liver disease burden

7.4 Research

The evidence base for an effective public health response to the hepatitis B epidemic should be established through well-conducted national and international research. The relatively limited public health response to hepatitis B in Australia may be partially the consequence of an absence of dedicated funding for research. Although public funding is available through the National Health and Medical Research Council (NHMRC) and the Australian Research Council (ARC), overall grant rates are low (20% to 25% for NHMRC project grants), and only a limited number of researchers work in the area of hepatitis B. Lack of a national hepatitis B strategy is a further barrier to dedicated public funding. In many other areas of health concern (e.g., HIV/AIDS), dedicated public research funds became available once they were linked to national strategies.

Priority action areas for research include

- Establishment of a funding stream for hepatitis B strategic research
- Development of a clinical trials network to support Australian investigator-initiated hepatitis B clinical research
- Epidemiological research to improve understanding of the patterns of hepatitis B transmission, the impact of prevention strategies, and the extent of liver disease burden and its economic impact in Australia
- Socio-behavioural and clinical research to identify the barriers to access to treatment and testing for chronic hepatitis B
- Basic science research to improve understanding of hepatitis B pathogenesis and antiviral drug resistance
- Establishment of a national database to track antiviral drug resistance, including clinical correlates

7.5 Workforce development

The sub-optimal public health response to hepatitis B in Australia in part relates to a lack of appropriately trained health care and public health professionals. This contributes to the low rates of hepatitis B vaccination among at-risk populations and limited uptake of treatment for chronic hepatitis B. Because of the diversity of the populations affected by hepatitis B, particularly their cultural and language diversity, special strategies are needed for workforce development. Lessons learned from the experience of workforce development for other blood-borne virus diseases, such as HIV and hepatitis C, should help in developing the workforce for hepatitis B, although disease-specific strategies will still be needed.

Priority action areas for workforce development include

- Development of a specific hepatitis B training program for primary care practitioners
- Educating and training multicultural health workers in hepatitis B
- Educating and training Indigenous health workers in hepatitis B
- Developing hepatitis B screening and vaccination capabilities for needle and syringe program service staff
- Increasing hepatitis B content in health care professional undergraduate curricula
- Incorporating hepatitis B content in health-related school curricula

7.6 Development of a National Hepatitis B Strategy

This document outlines strategies to improve the public health response to hepatitis B in Australia. However, it is important that a National Hepatitis B Strategy be developed, with input from Commonwealth, State and Territory governments, and a broad range of stakeholders, to provide the foundation for an enhanced response and ensure that hepatitis B receives appropriate priority. An effective national strategy would be linked with several other national health strategies. These include

- National Hepatitis C Strategy
- National HIV/AIDS Strategy
- National Drug Strategy
- National Aboriginal and Torres Strait Islander Sexual Health and Blood Borne Virus Strategy
- National STIs Strategy
- National Immunisation Strategies

Other countries, including the United States and New Zealand, have mounted concerted public health responses to hepatitis B, by developing specific strategies, broad advocacy, and community action. Australia urgently needs this type of response.

The New Zealand Hepatitis B Screening Program: A pro-active public health response

Chronic hepatitis B virus infection is endemic in New Zealand, accounting for more than two thirds of liver-related deaths,⁴¹ one third of adult liver transplantations,⁴² and more than three quarters of cases of liver cancer.⁴³ Recognition of the increasing morbidity, mortality, and economic impact associated with untreated chronic hepatitis B in New Zealand⁴⁴ prompted the Ministry of Health to fund a national screening programme in 1998, targeting all Maori, Pacific, and Asian people age 15 years and older. (Younger individuals were protected by universal neonatal vaccination and intermediate-school catch-up programmes introduced in 1987.)

The contract was awarded to two very different providers: a community-based hepatitis foundation for the southern region, and a consortium of public health physicians and primary care providers for the northern region. Each provider utilised a screening strategy specifically designed to optimise recruitment from distinct geographic and demographic target populations. The hepatitis foundation in the southern region used community workers to screen predominantly rural Maori. The northern provider used primary care health providers to screen an urbanised population of almost equal numbers of Maori, Pacific Islander, and Asian New Zealanders. The two providers collaborated closely, developing common algorithms for screening and follow-up, sharing information systems, sharing a central data repository, and appointing a central steering committee. These efforts facilitated the recent merger of the two regional programmes under one of the providers, the hepatitis foundation, which will continue to follow up all identified carriers.

Initial screening included testing for HBsAg and anti-HBs. People who had not been exposed to hepatitis B were offered vaccination, while those with evidence of active infection were offered long-term follow-up for chronic hepatitis B and liver cancer. Screening was conducted every 6 months and included assessments for liver enzymes, hepatitis B serology, and a biochemical marker for early detection of liver cancer. For people with cirrhosis or a known family history of primary liver cancer, a liver ultrasound examination was performed as an additional liver cancer screening tool.

To date, the screening program has identified more than 12,000 New Zealanders with chronic hepatitis B. Prevalence rates were highest in Maori (5.8%), Chinese and South-East Asians (9.5%), and Pacific Islanders (6% to 13%), as compared with 0.4% in Indian and 0.8% in European ethnic groups. The high-risk ethnic groups (Maori, Asian, and Pacific Islanders) constitute more than one third of the total population of New Zealand. Based on prevalence rates from the screening program, the estimated number of New Zealanders with chronic hepatitis B exceeds 100,000. This number is likely to continue to increase due to high birth rates (Maori, Pacific Islander) and net migration (Asian).

Outcome data for secondary care are currently being analysed to determine the overall benefits of the screening program. The preliminary data on liver cancer surveillance are very encouraging. Already, 95 people with primary liver cancer have been detected in the screened population, of which 65% were amenable to curative resection or transplantation. Among these individuals, 5-year survival exceeded 50%, whereas it was 0% among 150 people with chronic hepatitis B and primary liver cancers diagnosed during the same period but not enrolled in the screening program.⁴³ The effect of antiviral therapy on progression of chronic hepatitis B in the screened and non-screened populations will be similarly evaluated. To date, 12% of the screened population with chronic hepatitis B have met criteria for antiviral therapy.

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