2017

World Indigenous Peoples’ Conference on Viral Hepatitis

Estimating the HBV and HCV Burden of Disease for Indigenous Peoples and Nations

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Polaris Observatory:

**Mission Statement** – Provide data, tools, training and decision analytics to support elimination of hepatitis B and C globally by 2030

**Products & Services –**

- Global observatory for HBV, HCV & HDV ([http://polarisobservatory.com](http://polarisobservatory.com))
- HCV disease burden & economic impact model
- HBV vertical transmission (vaccination/treatment), disease burden & economic impact model

**Advisory Board –**

- Athens University, JCM Foundation, AASLD, EASL, Viral Hepatitis Prevention Board, World Hepatitis Alliance & WHO-PAHO with WHO & US CDC as observers
Polaris Guiding Principles:

• Function as a platform to provide data, tools and analyses with a user friendly interface
• Facilitate good decisions and policies through quality data and analyses
• Develop partnerships at country and regional levels to collect and analyze hepatitis data
• Validate all data/analyses with local experts
• Complement country interviews with literature searches to minimize the burden on country experts
• Publish key findings with local collaborators
A Delphi process is used to develop consensus estimates of hepatitis disease burden in each country

- **Pre-Meeting 1**
  - Conduct an exhaustive literature search for English and non-English published studies finding key inputs
  - Pre-populate the disease burden model and send out a slide deck summarizing findings

- **Meeting 1 with local experts (3 hours)**
  - Provide a brief overview of the methodology and model
  - Review assumptions and identify data gaps
  - Make modifications to key inputs based on expert input and unpublished data
  - Identify action items with key responsibilities

- **Between Meetings 1 & 2**
  - Work with stakeholders to gather additional data and re-calibrate the model

- **Meeting 2 with local experts (3 hours)**
  - Review updated inputs and gain agreement
  - Develop strategies to manage the disease & cost burdens over the next 20 years

- **Post-Meeting 2**
  - Develop manuscripts to be submitted to peer-reviewed journals
  - Submit abstracts to conferences to present findings
Methodology

• Hepatitis B (HBsAg)
  » 456 articles reviewed after removing duplicates and non-representative studies data was available for:
    ▪ 106 specific indigenous peoples and nations and 22 broader groups in 13 countries

• Hepatitis C (anti-HCV)
  » 393 articles reviewed after removing duplicates and non-representative studies data was available for:
    ▪ 24 specific indigenous peoples and nations and 12 broader groups in 10 countries
    ▪ Only six studies reported HCV-RNA positivity

• For Latin American countries, the population of the indigenous peoples was used to develop a weighted prevalence

• For English speaking countries, the most representative study was used for the base and the other studies were utilized for the high and low
The majority of studies had a small sample size and most HBsAg studies were conducted prior to 1991.

82% of HBsAg studies had a sample size of <500 while 89% of HCV studies had a sample size of <500.

55% of the HBsAg studies were conducted prior to 1991. HCV studies are more recent but HCV diagnostics did not become widely available until the early 1990s.
Anti-HCV: Indigenous peoples and nations report a prevalence that is approximately 3x that of the total population (excluding Alaska)

- At this time, we do not have reliable estimates for Hawaii and New Zealand.
- In Canada, there were higher prevalence estimates in emergency department patients (33% vs 10%) but the relative prevalence ratio is the same.

Most total population studies exclude or under-sample in indigenous peoples and nations.

Relative prevalence among the country’s population – 100%
Anti-HCV: Indigenous peoples and nations report a prevalence that is approximately 0.5-5.80x that of the total population.

After weighting by population size, Brazil showed a lower relative prevalence among indigenous peoples & nations relative to the total population.

Bolivia, Chile, French Guiana and Mexico all reported the anti-HCV prevalence among indigenous peoples and nations as 0% - None had a sample size over 160.
HBsAg—Alaska and Hawaii indigenous peoples have a significantly higher prevalence relative to the total population.

- Vaccination has reduced prevalence in younger age groups.
- In 2008, only two Alaskan Natives under the age of 20 were chronically infected with HBsAg.
- Treatment of the older chronic population is needed to manage the disease burden.

There are vaccination programs in Alaska, US, Hawaii, Australia and New Zealand among the indigenous peoples and nations.
HBsAg: Relative to the white/European population, the prevalence among indigenous peoples and nations is significantly higher.

- In the English speaking countries, the HBsAg prevalence is concentrated in the immigrant populations.
- The ratio between the indigenous peoples and background population increases as these populations are removed.

Each country reported the prevalence among the white/European population, which had a lower HBsAg infection rate than the total population.
HBsAg: Prevalence among indigenous peoples of Latin America is estimated to be 5-49x that of the total population

- The HBsAg infection is very localized & heterogeneous.
- Most available data is concentrated in the Amazon region.
- While high prevalence is reported in some villages/regions, neighboring villages can report a very low (or zero) prevalence.

More detailed recent studies & geospatial mapping is needed to identify hot spots within each country.
The Alaskan experience shows that more than 25% of those diagnosed were treated.

With a population based strategy and appropriate funding, the Alaskan program shows that a high percentage of all diagnosed can be linked to care and treated.

Conclusions

• More robust (large sample size) and recent studies are required in indigenous populations for more accurate estimates of HCV & HBsAg prevalence

• A significant number of HBsAg studies were conducted in the pre-vaccination era and thus may not reflect the existing disease burden

• Geospatial mapping is needed to identify hot spots within each country

• With a population based strategy and appropriate funding, HCV and HBV can be eliminated in the indigenous peoples and nations
Appendix
HCV Incidence in the US

Figure 4.4. Incidence of acute hepatitis C, by race/ethnicity — United States, 2000–2015

Source: CDC, National Notifiable Diseases Surveillance System (NNDSS)
Data Quality Scoring System - only studies with a score of 3 or higher are used

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‡10 reserved for a nationally representative sample with a stratified, multistage and random sampling design which documents the study design and demographics of subjects thoroughly (e.g. NHANES).

‡Variability subject to authors discretion based on quality of study design, as well as the geographic scope of the respective country.
The Bright model simulates HCV disease progression over time

- Acute Hepatitis → Spontaneously Cured
- Chronic Hepatitis – F0 → Chronic Hepatitis – F1
- Chronic Hepatitis – F1 → Chronic Hepatitis – F2
- Chronic Hepatitis – F2 → Chronic Hepatitis – F3
- Chronic Hepatitis – F3 → Compensated Cirrhosis
- Chronic Hepatitis – F0 → Compensated Cirrhosis

- Hepatocellular Carcinoma → Liver Related Death
- Decompensated Cirrhosis → Liver Transplantation

The outputs of the model are compared against empirical data

The PRoGReSs model takes into account the impact of vaccination & treatment on HBV prevalence and disease burden.

Legend:
- = treatment initiation; ▲ = background mortality; ■ = liver-related mortality

The outputs of the model are compared against empirical data.