

Global Burden of Viral Hepatitis

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WHO Geneva



World Health
Organization



The Short Story

- Estimated 2.7% all deaths due to acute hepatitis B/C, cancer/cirrhosis of liver with increasing trend over time
- Estimated 57% of liver cirrhosis and 78% of primary liver cancer due to hepatitis B or C virus infection
- About 2000 million (2 billion) have been infected with HBV worldwide, > 350 million chronically HBV infected, ~600,000 deaths/yr as a result of HBV infection
- Approximately 130–170 million chronically infected with HCV, > 350,000 deaths/yr as a result of HCV infection



The "Am I Number 12?" Campaign

World Hepatitis Day

People

The WHA

Public Health Panel

Partners and Sponsors

Competition

Newsletter

Am I Number 12?

All over the world people have been asking the question 'Am I Number 12?'

Why 'Am I Number 12?'

Because shockingly [one in 12 people worldwide](#) are living with either chronic [hepatitis B](#) or [chronic hepatitis C](#). While this is far higher than the prevalence of HIV or any cancer, awareness is inexplicably low and the majority of those infected are unaware.

'Am I Number 12?' is the theme of World Hepatitis Day, which takes place annually on 19th May. The World Hepatitis Alliance hopes that 'Am I Number 12?' will prompt people to think about the huge scale of hepatitis infection globally, about whether they may be at risk (and if so, to [get tested](#)) and also about how to avoid becoming infected.

You can show your support by joining 'Am I Number 12?' groups



[Bebo](#)



[Facebook](#)

Blog Updates

[The New 'This is hepatitis...' Blog and How You Can Be Involved!](#)

09 Dec 2009

Hi everyone! Sorry for the long silence but I have been submerged in work since I...

[Looking ahead to 2010](#)

10 Sep 2009

So as I mentioned in my post on Ghana on 28th August, I've been really busy...

[News](#)

[Get involved](#)

[The risk factors](#)

[Information](#)

Global GBD Estimates

- GBD I produced hepatitis B and C estimates only
- Estimates reflected acute disease burden only
- Viral hepatitis prevalence maps commonly used (WHO and US CDC) not well referenced and dated



Previous Estimates of VH Burden (WHO GBD 2004 Update)

- HBV/HCV burden from acute disease
- Deaths (% of total)
 - Hepatitis B: 105,000 (0.2%)
 - Hepatitis C: 54,000 (0.1%)
 - HCC: 610,000 (1.0%)
 - Cirrhosis: 772,000 (1.3%)
- Disability Adjusted Life Years (DALYs) (% of total)
 - Hepatitis B: 2,068,000 (0.1%)
 - Hepatitis C: 955,000 (0.1%)
 - HCC: 6,712,000 (0.4 %)
 - Cirrhosis: 13,640,000 (0.9 %)



Previous Estimates of HBV Burden

- WHO Immunization Dept internal model
 - HBV-related deaths: 600,000 (500,000 – 700,000)
- US CDC Model
 - HBV-related deaths in 2000: 620,000



HBV Deaths by WHO Region (US CDC)

<u>Region</u>	<u>Total Deaths</u>	<u>Percent Global Deaths</u>
AFRO	69,000	11%
AMRO	12,000	2%
EMRO	21,000	3%
EURO	51,000	8%
SEARO	143,000	23%
WPRO	325,000	52%
Global	620,000	100%

Future Hepatitis B Disease Burden¹

<u>Region</u>	<u>Total Infections (millions)</u>	<u>Chronic Infections</u>	<u>Total Deaths²</u>
AFRO	18.5	2,915,000	276,000
AMRO	1.3	174,000	28,000
EMRO	5.3	663,000	96,000
EURO	2.9	365,000	56,000
SEARO	17.4	2,386,000	368,000
WPRO	19.3	3,230,000	581,000
Global	64.8	9,733,000	1,405,000³

¹ 2000 birth cohort over course of lifetime without vaccination

² Acute hepatitis B and chronic HBV infection

³ 95% from chronic infection and 5% from acute hepatitis B

From Goldstein ST, et al. Int J Epidemiology 2005;34:1329-1339.

Bridging from Cirrhosis/HCC to Hepatitis

- Major drivers of HBV/HCV burden are cirrhosis/HCC
- J.F. Perz et al. The contributions of hepatitis B virus and hepatitis C virus infections to cirrhosis and primary liver cancer worldwide. *Journal of Hepatology* 45 (2006) 529–538.
- 57% of cirrhosis was attributable to either HBV or HCV
 - 30% of cirrhosis was attributable to HBV
 - 27% of cirrhosis was attributable to HCV
- 78% of HCC was attributable to HBV or HCV
 - 53% of HCC was attributable to HBV
 - 25% of HCC was attributable to HCV



Estimates of Total HBV Burden (WHO GBD and Perz et al)

● GBD 2004 Deaths

- Hepatitis B: 105,000 (0.2%)
- Hepatitis C: 54,000 (0.1%)
- HCC: 610,000 (1.0%)
- Cirrhosis: 772,000 (1.3%)

- 105,000
- / 0.53 = 323,300
- / 0.30 = 231,600
- **659,900**

● DALYs

- Hepatitis B: 2,068,000 (0.1%)
- Hepatitis C: 955,000 (0.1%)
- HCC: 6,712,000 (0.4 %)
- Cirrhosis: 13,640,000 (0.9 %)

- 2,068,000
- / 0.53 = 3,557,360
- / 0.30 = 4,092,000
- **9,717,360**



Estimates of Total HCV Burden (WHO GBD and Perz et al)

● GBD 2004 Deaths

- Hepatitis B: 105,000 (0.2%)
 - Hepatitis C: 54,000 (0.1%)
 - HCC: 610,000 (1.0%)
 - Cirrhosis: 772,000 (1.3%)
- 54,000
 - / 0.25 = 152,500
 - / 0.27 = 194,940
 - **401,440**

● DALYs

- Hepatitis B: 2,068,000 (0.1%)
 - Hepatitis C: 955,000 (0.1%)
 - HCC: 6,712,000 (0.4 %)
 - Cirrhosis: 13,640,000 (0.9 %)
- 955,000
 - / 0.25 = 1,678,000
 - / 0.27 = 3,682,800
 - **6,315,800**



GBD II (To be published 2010/2011)

- Phase I: Systematic review of the literature
 - HAV complete, HBV and HCV search complete, abstracting and meta-analysis in progress, HEV nearly complete, unsafe injection in progress
- Phase II: Disease modelling
 - HAV complete, HBV complete, HCV in progress, HEV in progress, unsafe injection to be done
- Phase III: Final validation and generation of mortality and DALY estimates
 - To be done by completed by UW IHME (Murray et al)

Initial Data Needs for GBD

- Hepatitis A

- anti-HAV marker of past infection that is commonly available
- cohort-specific HepA coverage used as protective factor

- Hepatitis B

- anti-HBc marker of past infection
- HBsAg marker of current or chronic infection, since acute infection is rare this is used as proxy for chronic infection
- HBeAg marker for highly infectious persons and prevalence in women of child bearing age used to estimate perinatal HBV transmission
- Cohort-specific HepB coverage used as protective factor

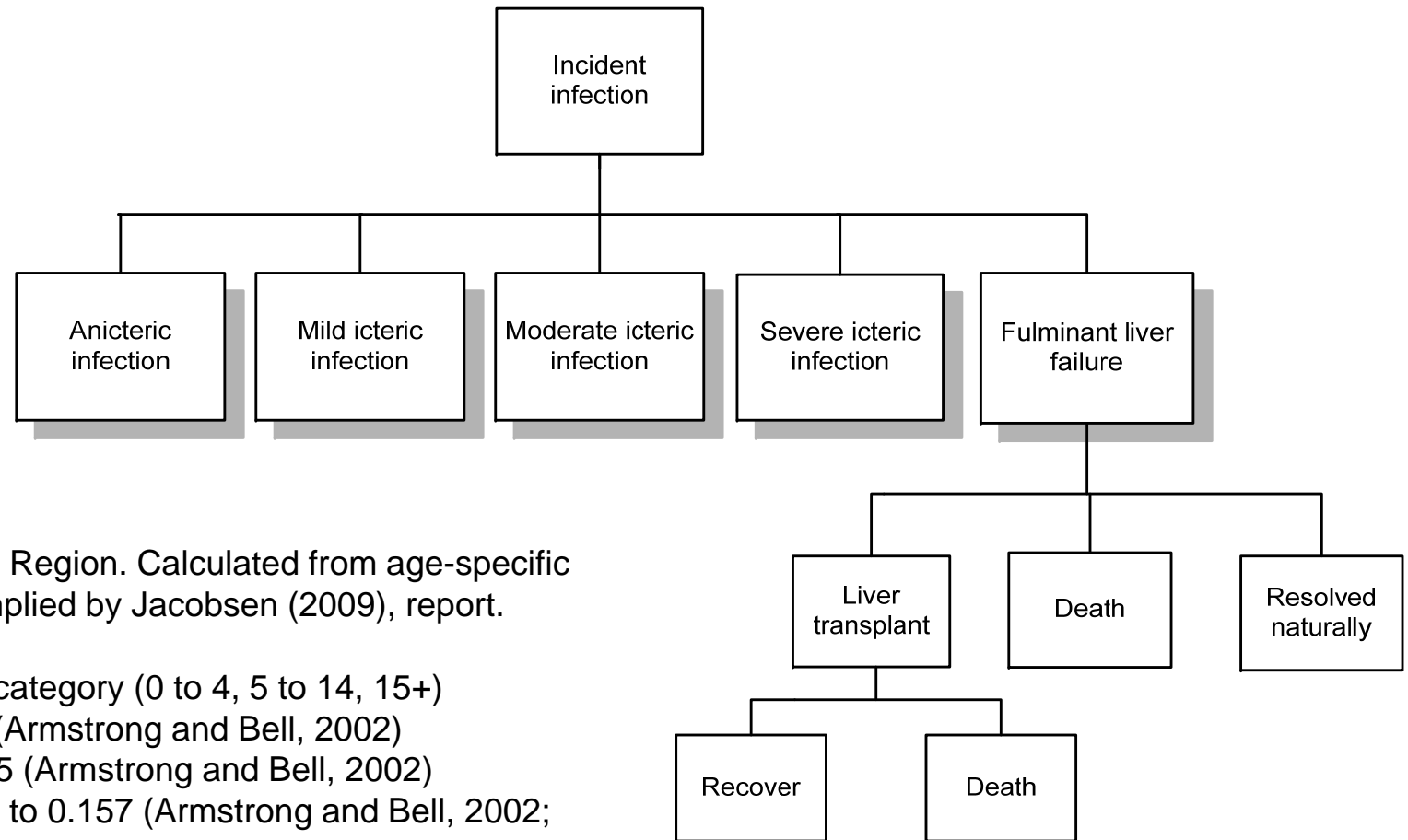


Initial Data Needs for GBD

- Hepatitis C
 - prevalence anti-HCV
- Hepatitis E
 - anti-HEV: past infection can be determined by anti-HEV
- Unsafe Injection
 - prevalence of unsafe injections



Hepatitis A Model



Probabilities

Incident Infection: Vary by WHO Region. Calculated from age-specific prevalence as compiled by Jacobsen (2009), report. See next slide.

Disease outcomes vary by age category (0 to 4, 5 to 14, 15+)

Anicteric infection: 0.15 to 0.93 (Armstrong and Bell, 2002)

Mild icteric infection: 0.55 to 0.65 (Armstrong and Bell, 2002)

Moderate icteric infection: 0.017 to 0.157 (Armstrong and Bell, 2002; CDC surveillance)

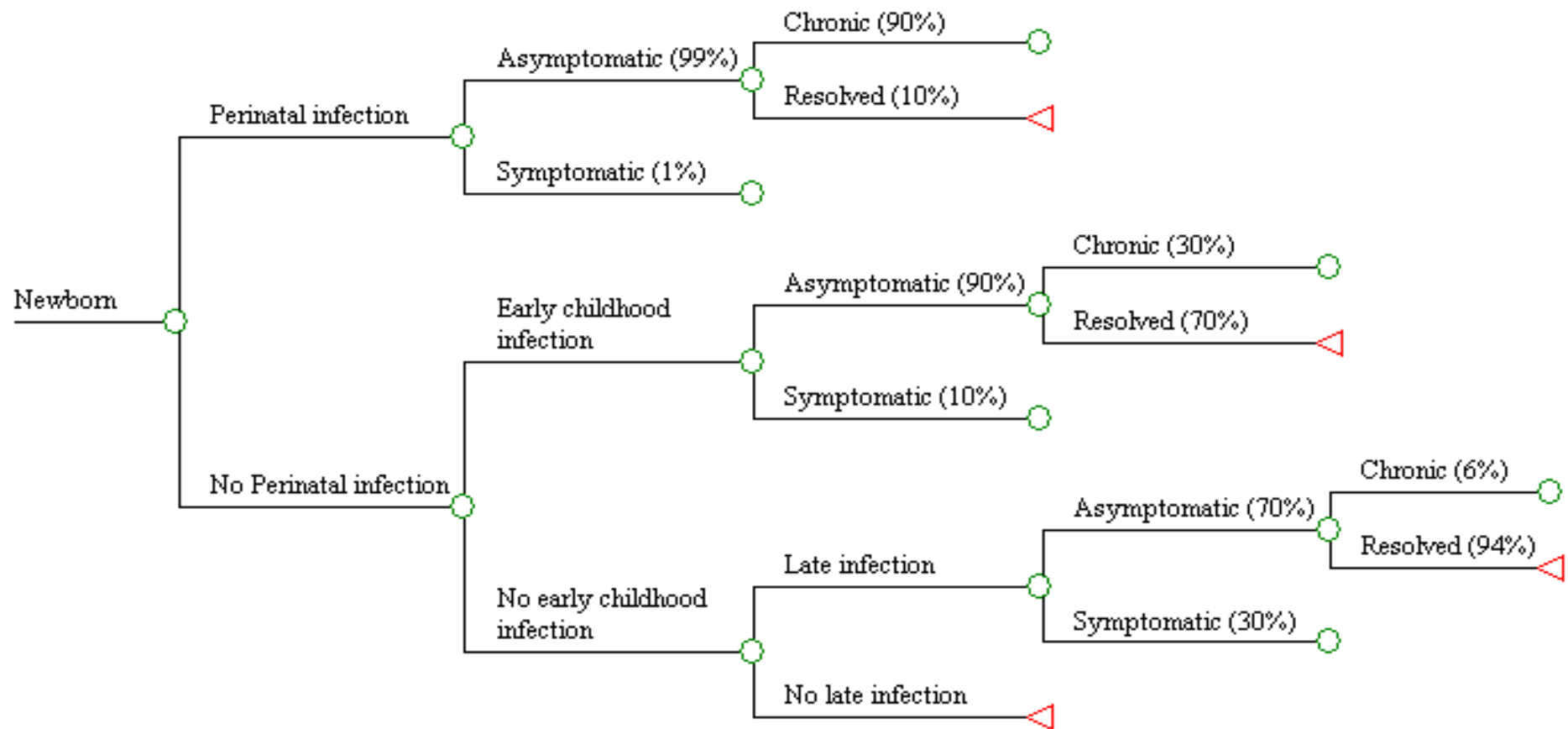
Severe icteric, non-fulminant: .001 to .032 (Armstrong and Bell, 2002; CDC surveillance)

Fulminant, death, and transplant states: <.001 to .008 (Armstrong and Bell, 2002; CDC surveillance; U.S. United Network for Organ Sharing 1990 -2003)

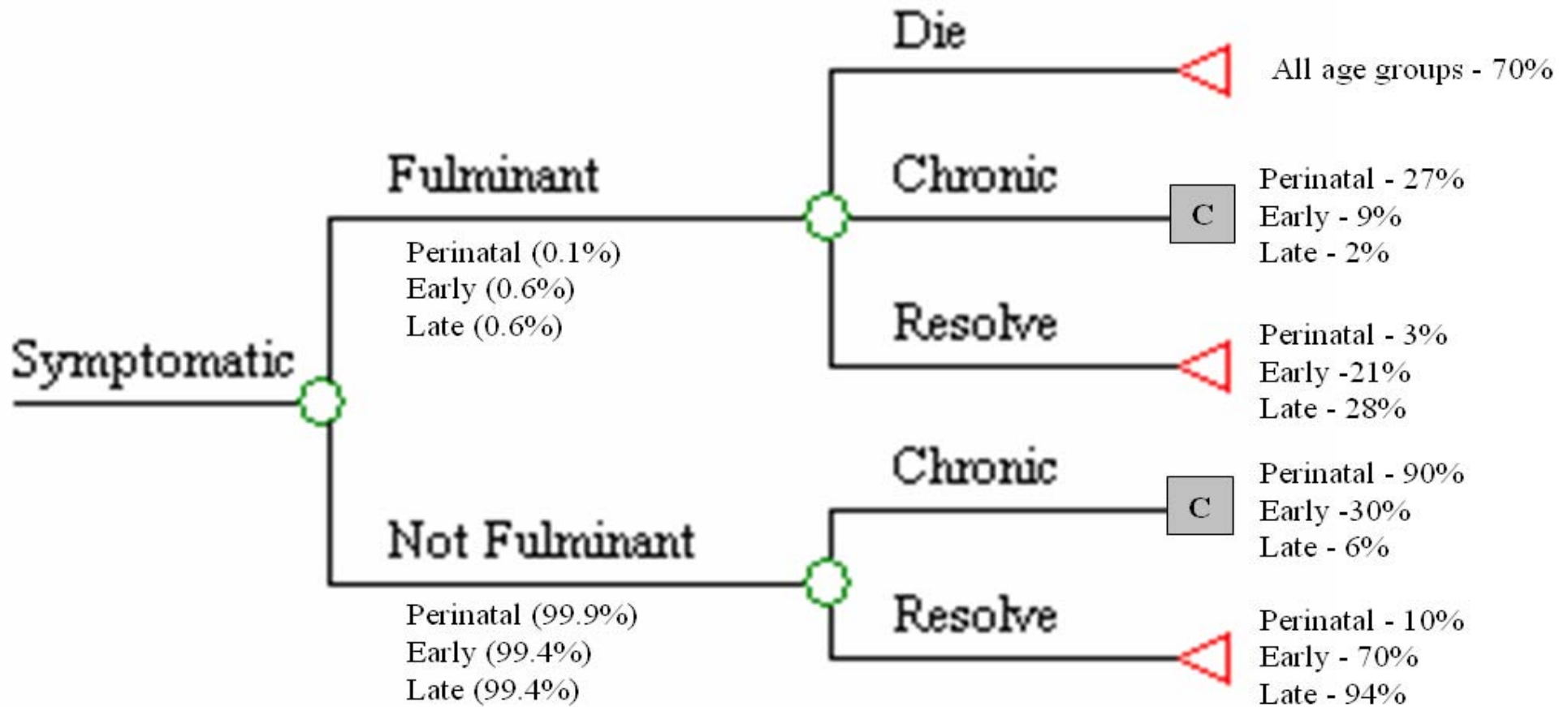


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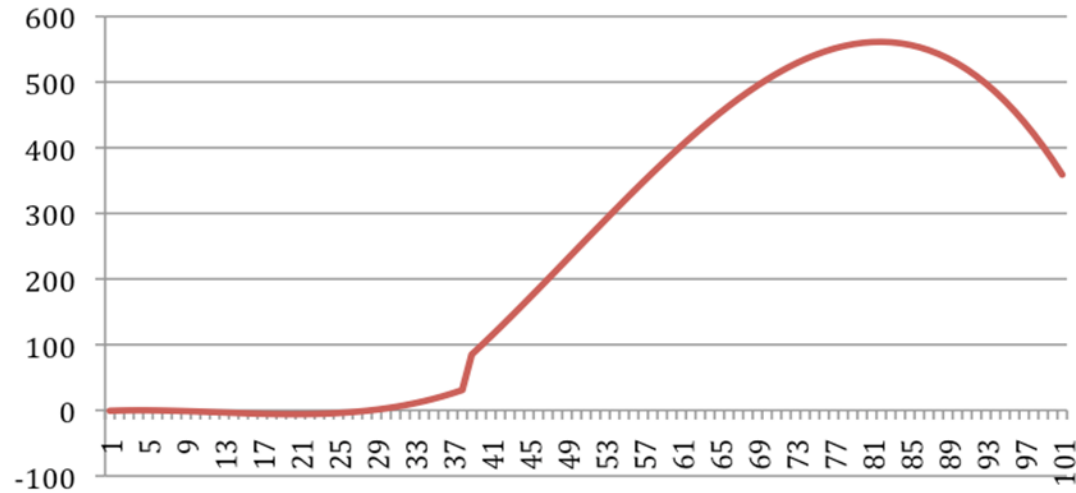
HBV Model



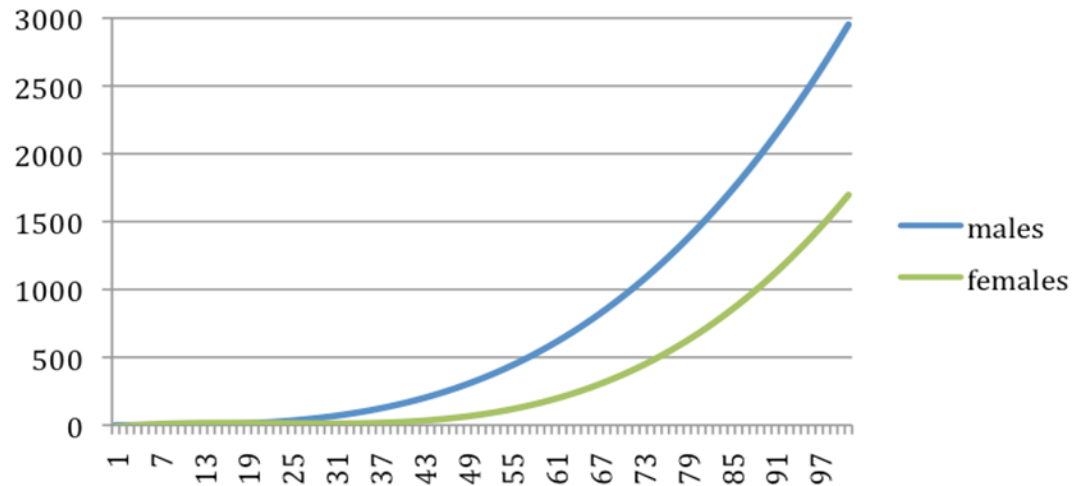
HBV Model



Cirrhosis mortality (deaths per 100 000 HBsAg- positive persons)

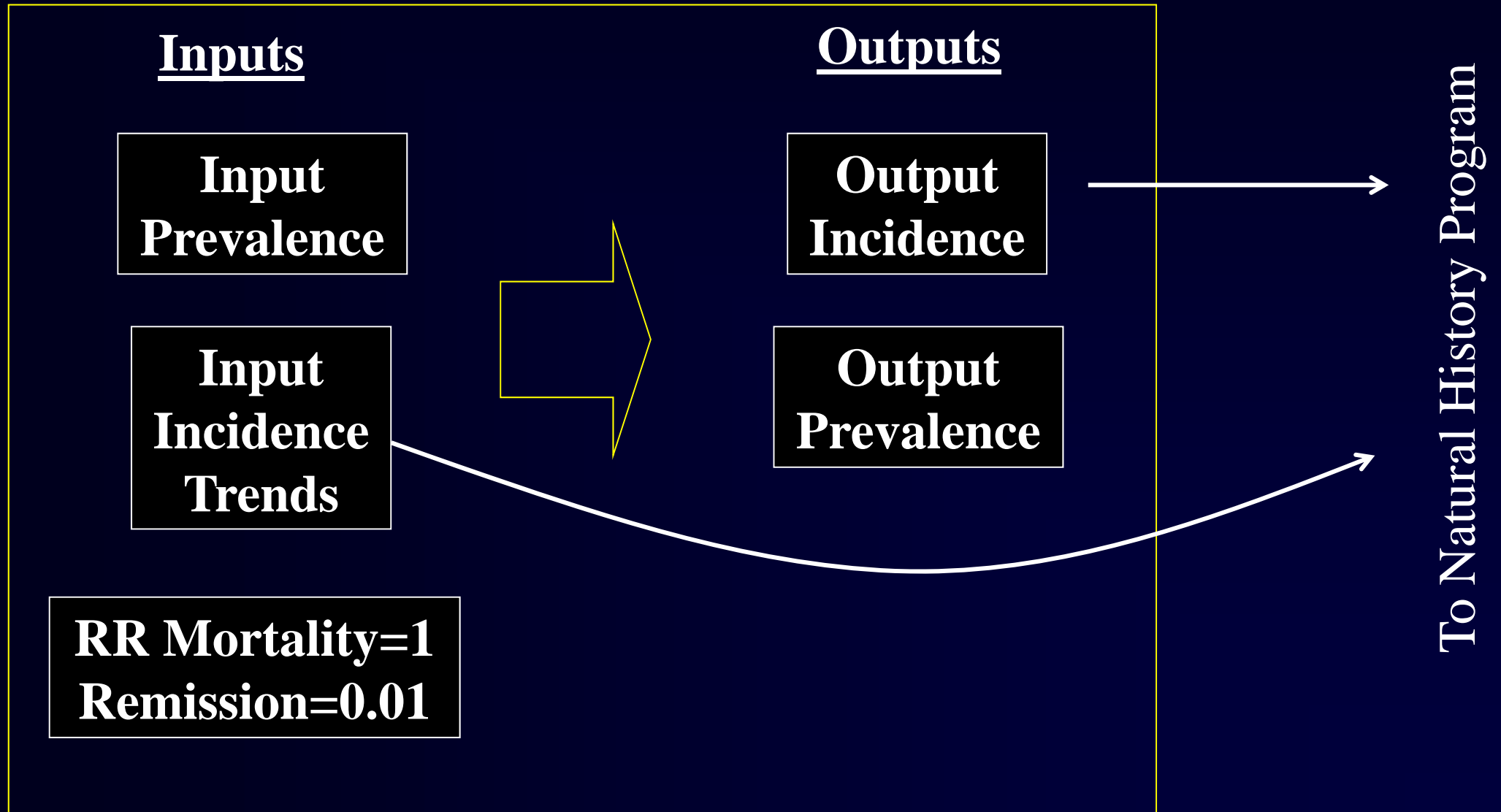


HCC mortality (deaths per 100 000 HBsAg- positive persons)



Overall approach (1)

DisMod II



Overall approach (2)

Natural History Program

From DisMod II

Incidence

Incidence
Trends

Natural Hx
Model

Modeled
Cirrhosis
Burden

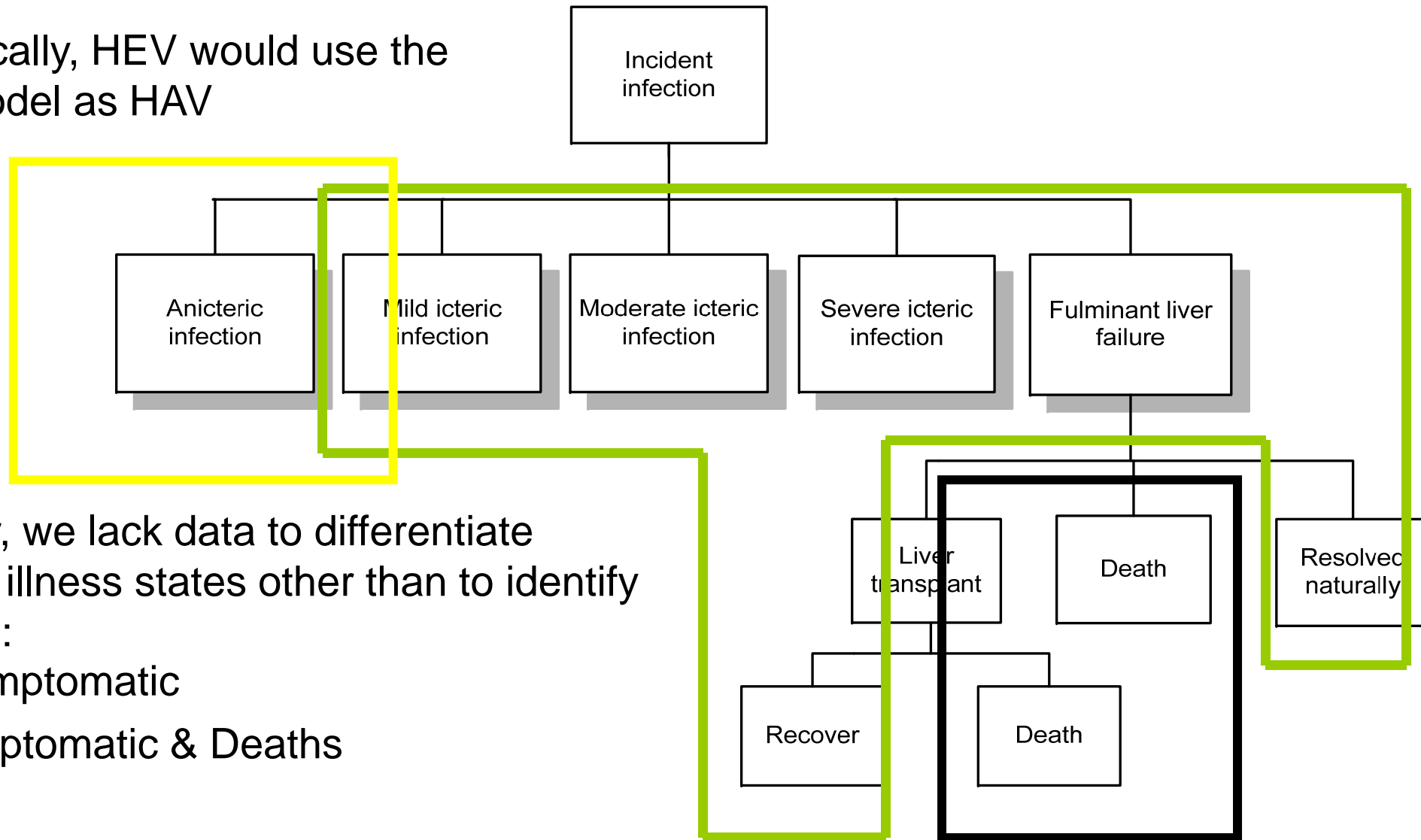
Modeled
HCC
Burden

Overall
Cirrhosis
Burden
(from GBD)

Overall
HCC
Burden
(from GBD)

Hepatitis E Model

Theoretically, HEV would use the same model as HAV



However, we lack data to differentiate between illness states other than to identify cases as:

Asymptomatic

Symptomatic & Deaths

Hepatitis E Model

Use a simplified model

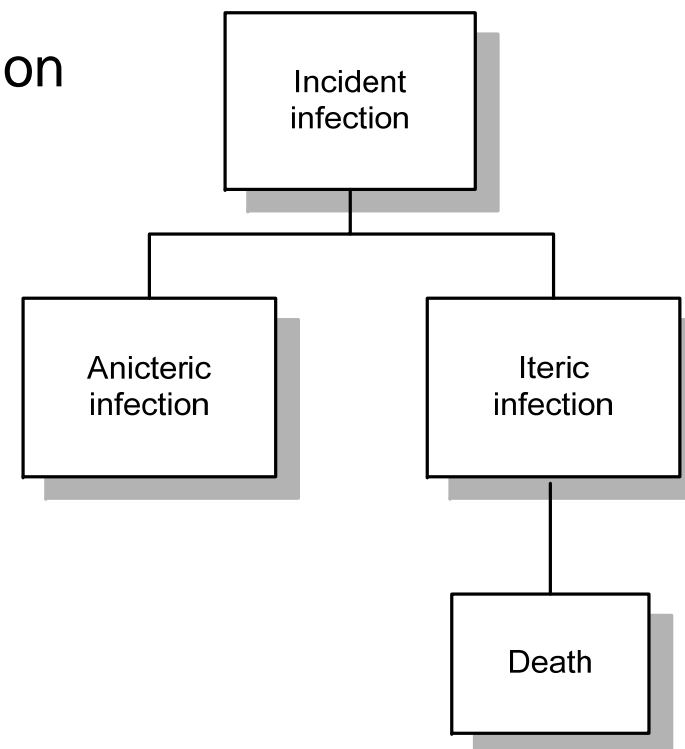
Maintain ability to add categories given new information

Probabilities of outcomes vary by age and pregnancy status

Age group	Anicteric	Icteric	Death
0-4	0.58	0.42	0.00/?
5-14	0.58	0.41	0.01
15+ Non-pregnant	0.32	0.67	0.01
15+ Pregnant	0.32*	0.60	0.09

*Assumed equal to the estimate of those 15+, non-pregnant

Source: Outbreak investigation data. (Guthmann, 2006; Bile 1994)



Burden of Disease—Plans

- Publication of systematic literature reviews
- Estimations of uncertainty
- Publication of models
- Country consultation for country-specific estimates
- Revision of prevalence/risk maps
- Publication of burden estimates



Thanks

