An Australian perspective on hepatitis elimination

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Declaration of Interest

I receive no funding of any kind from any pharmaceutical or other for-profit health care industry body.
Percentage change in age-standardised mortality rates, Australia, 1991 to 2010

AIHW: Cancer in Australia: an overview, 2012
Liver cancer in Victoria, Australia 1998 - 2007

Age-standardized HCC rate ratio by country of birth, males, Victoria, 1998-2007

Vietnam 9.94
China 8.69
Philippines 5.38
Malaysia 3.63
Egypt 3.17
Hong Kong 3.06
Italy 2.70
India 2.48
Greece 2.00
Sri Lanka 1.94
Malta 1.73
Croatia 1.56
UK & Ireland 1.16
New Zealand 1.06
Germany 0.73
Poland 0.53
Netherlands 0.46
Australia 1.00

Adapted from Carville et al, Liver Cancer in Victoria 1982-2007; VIDRL, 2012
Hepatitis C in Australia

Australian population: 23 million
Prevalence of anti-HCV: 1.3% (300,000)
Chronic HCV infection: 230,500 (est. December 2014)
Genotype distribution: GT-1: 55%, GT-3: 35%
Estimated proportion diagnosed: 75% (173,000)
Estimated proportion attributable to IDU: 80%

Kirby Institute UNSW; Annual Surveillance Report 2015
Cost-effectiveness modelling of treatment scale-up in Australia to achieve global elimination targets

Compartmental modelling of treatment scale-up and most efficient allocation to priority groups (PWID or patients with advanced liver disease)

Total health care and treatment costs – ICER per QALY compared with no change in treatment rate (currently <1% p.a. among PWID – modelled to increase to 2-16% p.a.)

Willingness to pay $50,000 AUD per QALY assumed

Slide credits:
Dr Joe Doyle, Burnet Institute with my thanks

Scott et al, Gut 2016; Apr: doi:10.1136/gutjnl-2016-311504 [online]
Cost-effectiveness of treatment scale-up in Australia to achieve global elimination targets

Treating to meet WHO 2030 targets:

<table>
<thead>
<tr>
<th></th>
<th>To reduce HCV incidence</th>
<th>To reduce HCV mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual treatments</td>
<td>4725 PWID (95% CI 3270—8240)</td>
<td>5662 people with F3/4 (95% CI 5202—6901)</td>
</tr>
<tr>
<td>Incidence reduction, by 2030</td>
<td>80% (95% CI 80—81%)</td>
<td>20% (95% CI 18—25%)</td>
</tr>
<tr>
<td>Mortality reduction, by 2030</td>
<td>67% (95% CI 66—74%)</td>
<td>65% (95% CI 65—70%)</td>
</tr>
<tr>
<td>Total cost, discounted AU$2015</td>
<td>AU$6.3 billion (95% CI $3.8—7.5B)</td>
<td>AU$5.9 billion (95% CI $5.3—7.2B)</td>
</tr>
<tr>
<td>ICER (AU$ per QALY)</td>
<td>AU$29,610 (95% CI $9180—52600)</td>
<td>AU$40,468 (95% CI $16,400—65980)</td>
</tr>
</tbody>
</table>

Slide credits:
Dr Joe Doyle, Burnet Institute with my thanks

Scott et al, Gut 2016; Apr: doi:10.1136/gutjnl-2016-311504 [online]
Achieving both targets:
Total cost $7.1B (95%CI 6.8—7.9B)
ICER $25,120 (95%CI 11—39k)

Slide credits:
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Scott el al, Gut 2016; Apr: doi:10.1136/gutjnl-2016-311504 [online]
HCV Treatment cascade, Australia: 2014

Figure 47: The 2014 hepatitis C diagnosis and care cascade

<table>
<thead>
<tr>
<th>Cascade stage</th>
<th>Estimate (range)</th>
<th>2014 estimate</th>
</tr>
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<tbody>
<tr>
<td>Living with chronic hepatitis C infection*</td>
<td>230 470 (180 490 – 243 990)</td>
<td></td>
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<tr>
<td>Diagnosed with chronic hepatitis C infection</td>
<td>172 932 (157 055 – 188 865)</td>
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<tr>
<td>Ever received hepatitis C treatment</td>
<td>44 405 (38 811 – 49 999)</td>
<td>2 790</td>
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<tr>
<td>Hepatitis C cured</td>
<td>24 543 (21 426 – 27 659)</td>
<td>1 693</td>
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Kirby Institute, UNSW Annual Surveillance Report 2015
Revolution - 2016

Announcement in December 2015: Australian Government to invest $1 billion on hepatitis C antivirals in next 3 years

From 1 March 2016, sofosbuvir, ledipasvir/sofosbuvir, and daclatasvir were listed on the Australian Pharmaceutical Benefits Scheme (PBS)

From 1 May 2016, paritaprevir/ritonavir/ombitasvir & dasabuvir was listed on the PBS

For treatments listed on the PBS, for each month of treatment, the total co-payment (AUD) by the patient is $38.30; for concessional patients it is $6.20

Competitive pricing agreed with pharmaceutical companies; innovative risk-share ‘cap’ arrangement’
Treatment is fully reimbursed for all Australian permanent residents aged 18 years or older with chronic hepatitis C, regardless of degree of fibrosis, current injecting status, custodial status, previous treatment history.

Specialist hepatologists, gastroenterologists and infectious diseases physicians can prescribe independently (with phone authority from PBS after providing information on HCV genotype and cirrhotic status); other medical practitioners including family doctors can prescribe in consultation with a specialist (practically, faxed form, phone call, or email).
<table>
<thead>
<tr>
<th>Genotype 1</th>
<th>Treatment naïve</th>
<th>Treatment experienced</th>
<th>Genotype 1</th>
<th>Treatment naïve</th>
<th>Treatment experienced</th>
</tr>
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<tbody>
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<td>OR</td>
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<table>
<thead>
<tr>
<th>Genotype 2</th>
<th>Treatment naïve</th>
<th>Treatment experienced</th>
<th>Genotype 2</th>
<th>Treatment naïve</th>
<th>Treatment experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genotype 3</td>
<td>Treatment naïve</td>
<td>Treatment experienced</td>
<td>Genotype 3</td>
<td>Treatment naïve</td>
<td>Treatment experienced</td>
</tr>
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<td></td>
<td>OR</td>
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</tr>
<tr>
<td>Genotype 4, 5, 6</td>
<td>Treatment naïve</td>
<td>Treatment experienced</td>
<td>Genotype 4, 5, 6</td>
<td>Treatment naïve</td>
<td>Treatment experienced</td>
</tr>
</tbody>
</table>

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In 2014, 2790 people were treated for hepatitis C in Australia; likely fewer than this in 2015.

In March 2016 alone – the 1st month of PBS access to DAAs – at least 1,811 people initiated HCV treatment.

Impact of innovation not limited to treatment access – every month in 2016 so far, the notification rate for chronic HCV infections nationally has been 20% over the previous 5-year baseline rate.

The Kirby Institute, UNSW. Monitoring hepatitis C treatment uptake in Australia (Issue 1). May 2016.
Hepatitis C elimination – an Australian perspective

With appropriate resourcing, rapid scale-up of HCV treatment with DAAs is feasible when access is provided in the community, at low or no cost to patients, infrastructure for testing and treatment is in place, and no barriers are raised on basis of patient or prescriber characteristics. Such open access is believed to be cost effective in the Australian setting and will save thousands of lives in coming years.

If such a scale-up of treatment is accompanied by ongoing prevention and harm reduction activities, early Australian experience suggests the 2030 WHO goal of elimination of hepatitis C as a public health concern is achievable.

-- and now, for hepatitis B!
Hepatitis B in Australia

Chronic HBV infection:
Est. 218,500 in 2011
– 1.0% prevalence

Estimated proportion diagnosed:
56% (123,000)

Estimated proportions of people living with CHB:
Migrants from endemic areas: 57%
Aboriginal and Torres Strait Islander people: 9%
People who inject drugs: 5.5%

Understanding and using local epidemiology

www.ashm.org.au/HBVmapping

Prevalence of CHB, 2011
Mapping Victoria

- Estimated 56,700 people living with CHB in Victoria in 2011

All of Melbourne’s Primary Health Networks have prevalence > national average

- North Western Melbourne 1.34%
- Eastern Melbourne 1.13%
- South Eastern Melbourne 1.13%

Predominant countries of birth:

- China
- Vietnam
- Malaysia
- Philippines
- Italy
Anti-cancer programs in Australia
Cost effectiveness

Incremental cost effectiveness ratios per QALY:

- Breast cancer screening $10,000
- Colorectal cancer screening $20,000
- Cervical cancer screening $45,000
- HCC prevention in CHB $13,000

- Incorporating HCC surveillance, routine 6 monthly monitoring, referral for specialist management and treatment if ALT > 1.5x ULN

Antiviral therapy for hepatitis B-related liver cancer prevention is more cost-effective than cancer screening

Monica C. Robotin¹,²,*, Melanie Kansil³, Kirsten Howard², Jacob George⁴,⁵, Steven Tipper¹, Gregory J. Dore⁶, Miriam Levy⁷, Andrew G. Penman⁸

Journal of Hepatology 50 (2009) 990–998
Policy responses: treatment and care
2nd National Hepatitis B Strategy 2014 - 2017

• Continued emphasis on partnerships; culturally competent community engagement; workforce development; shift focus to primary care

• Targets as well as indicators:
  – Childhood vaccination coverage: 95%
  – **Increase** priority populations vaccination
  – Proportion diagnosed: 80% (from 57%)
  – Antiviral treatment: 15% (from 5%)

For Australia’s national BBV/STI strategies, specific targets against key objectives, with indicators for measuring progress, have been essential for advocacy, inspiration, and accountability
The cascade of care for CHB

218,567 LIVING WITH CHRONIC HEPATITIS B INFECTION

DIAGNOSED (57%)

28,354 (13%)
RECEIVING YEARLY HBV DNA OR TREATMENT

UNDIAGNOSED (43%)

NOT IN CARE 190,213 (87%)

10,987
(5%) ON TREATMENT

OF 32,785 ESTIMATED TO NEED TREATMENT (15% OF TOTAL), 21,798 CURRENTLY NOT RECEIVING IT

Cascade-of-care for chronic hepatitis B Australia, 2012: subnational estimates

Table 1: Proportion of people not in care (defined as not receiving treatment or yearly HBV viral load) by state and territory using 2011 Census derived estimates, PBS and MBS data.

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Number of yearly viral load tests, 2012</th>
<th>Number of people receiving antiviral treatment, 2012 (percentage of census based estimates on treatment)</th>
<th>Census based estimates of people living with CHB, 2011 2</th>
<th>Total notifications for unspecified (chronic) hepatitis B, 1998-2012</th>
<th>Proportion of people with CHB not in care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Capital Territory</td>
<td>265</td>
<td>152 (4.2%)</td>
<td>3,603</td>
<td>1,101</td>
<td>88%</td>
</tr>
<tr>
<td>New South Wales</td>
<td>7,782</td>
<td>5,844 (7.6%)</td>
<td>77,076</td>
<td>42,455</td>
<td>82%</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>336</td>
<td>72 (2.0%)</td>
<td>3,556</td>
<td>1,527</td>
<td>89%</td>
</tr>
<tr>
<td>Queensland</td>
<td>1,412</td>
<td>941 (2.5%)</td>
<td>37,427</td>
<td>12,736</td>
<td>94%</td>
</tr>
<tr>
<td>South Australia</td>
<td>141</td>
<td>419 (2.9%)</td>
<td>14,442</td>
<td>5,350</td>
<td>96%</td>
</tr>
<tr>
<td>Tasmania</td>
<td>47</td>
<td>31 (0.9%)</td>
<td>3,513</td>
<td>628</td>
<td>98%</td>
</tr>
<tr>
<td>Victoria</td>
<td>6,856</td>
<td>2,979 (5.2%)</td>
<td>56,836</td>
<td>26,496</td>
<td>83%</td>
</tr>
<tr>
<td>Western Australia</td>
<td>528</td>
<td>549 (2.5%)</td>
<td>22,055</td>
<td>8,065</td>
<td>95%</td>
</tr>
<tr>
<td>Australia</td>
<td>17,367</td>
<td>10,987 (5.0%)</td>
<td>218,567*</td>
<td>98,358</td>
<td>87%</td>
</tr>
</tbody>
</table>

* Total includes 59 people with CHB whose state was recorded as 'other territory.'
Mapping project: treatment uptake

- June-December 2013: 11,527 people receiving treatment for CHB (5.3% of 218,000)
### Heat map key:

**BURDEN OF CHRONIC HEPATITIS B**
- Higher
- Lower

**TREATMENT AND MONITORING UPTAKE**
- Lower
- Higher

### Figure 1: Heat Map of CHB burden and access to care, in order of CHB prevalence

<table>
<thead>
<tr>
<th>STATE</th>
<th>MEDICARE LOCAL</th>
<th>PREVALENCE RANK</th>
<th>NOTIFICATIONS RANK</th>
<th>VIRAL LOAD TESTING RANK</th>
<th>TREATMENT UPTAKE RANK</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT</td>
<td>NORTHERN TERRITORY</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>31</td>
</tr>
<tr>
<td>NSW</td>
<td>INNER WEST SYDNEY</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>NSW</td>
<td>SOUTH WESTERN SYDNEY</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>NSW</td>
<td>WESTERN SYDNEY</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>WA</td>
<td>KIMBERLEY-PILBARA</td>
<td>5</td>
<td>4</td>
<td>-</td>
<td>59</td>
</tr>
<tr>
<td>VIC</td>
<td>SOUTH EASTERN MELBOURNE</td>
<td>6</td>
<td>9</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>VIC</td>
<td>INNER EAST MELBOURNE</td>
<td>7</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>VIC</td>
<td>MACEDON RANGES &amp; NORTH WEST MELB.</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>NSW</td>
<td>NORTHERN SYDNEY</td>
<td>9</td>
<td>12</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>VIC</td>
<td>INNER NORTH WEST MELBOURNE</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>NSW</td>
<td>SOUTH EASTERN SYDNEY</td>
<td>11</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>NSW</td>
<td>EASTERN SYDNEY</td>
<td>12</td>
<td>8</td>
<td>13</td>
<td>13</td>
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<tr>
<td>QLD</td>
<td>CENTRAL AND NORTH WEST QLD</td>
<td>13</td>
<td>29</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>WA</td>
<td>BENTLEY ARMADALE</td>
<td>14</td>
<td>20</td>
<td>20</td>
<td>25</td>
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<tr>
<td>QLD</td>
<td>FAR NORTH QUEENSLAND</td>
<td>15</td>
<td>14</td>
<td>21</td>
<td>36</td>
</tr>
<tr>
<td>VIC</td>
<td>SOUTH WESTERN MELBOURNE</td>
<td>16</td>
<td>15</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>NSW</td>
<td>FAR WEST NSW</td>
<td>17</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>VIC</td>
<td>NORTHERN MELBOURNE</td>
<td>18</td>
<td>16</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>SA</td>
<td>CENTRAL ADELAIDE AND HILLS</td>
<td>19</td>
<td>17</td>
<td>34</td>
<td>17</td>
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<tr>
<td>QLD</td>
<td>GREATER METRO SOUTH BRISBANE</td>
<td>20</td>
<td>19</td>
<td>19</td>
<td>21</td>
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<tr>
<td>SA</td>
<td>NORTHERN ADELAIDE</td>
<td>21</td>
<td>24</td>
<td>36</td>
<td>23</td>
</tr>
</tbody>
</table>
Getting information to the local level

- Efficiency – prioritisation of high prevalence areas, and those areas with largest need/access gap
- Appropriateness – tailor for particular communities in particular areas
- Utility – to date, used in national, state and local programs; community engagement and education, health workforce development and training delivery, state program development
- Monitoring – capacity to assess ecological trends over time
Actions flowing from Australia’s National Hepatitis B Strategy 2014-2017

• Health workforce
  • National Hepatitis B Curriculum for primary care doctors, nurses, ID Registrars, Aboriginal Health Workers
  • Over 100 GPs completed HBV advanced training nationally, prescriber accreditation
  • Community antiviral dispensing from July 2015
  • Integrated Hepatitis B Nurse Pilot Programs – capacity building
• Surveillance and monitoring – mapping, modelling, data linkage
• Responding to notifications (HBV and HCV) – data completeness, information for doctors at time of diagnosis
• Strengthening vaccination
• Community engagement and awareness
Will HBV elimination require HBV cure?

- International Coalition to Eliminate HBV (ICE-HBV)
- Jointly initiated by senior staff at Doherty Institute and ANRS Lyon
- Subgroups – virology, immunology, innovative technology, clinical trials
- Mobilisation of funding
- Strategic planning and governance structure under development
- Planning for HBV cure symposia at major international conferences
- ? For formal launch at EASL 2017
Epidemiology Unit, WHO Collaborating Centre for Viral Hepatitis, VIDRL at the Doherty Institute

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Doherty Institute
Melbourne Health Office for Research & RMH Foundation
Australian Postgraduate Award Scheme

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