The road to elimination of Hepatitis C: Analysis of SVR versus new HCV infections in 91 countries

Dr Andrew Hill, PhD, University of Liverpool, UK
Sanjay Nath, Bryony Simmons MPH, Imperial College, London, UK
WHO targets for elimination of Hepatitis C by 2030:

- 90% of people infected with HCV are diagnosed
- 80% of infected people are treated

Database: country-level rates of diagnosis, treatment in 2016

Research question: are we on the road to elimination of HCV?
Methods: country-level database

Polaris Observatory 2016: [http://polarisobservatory.org](http://polarisobservatory.org)

- Total viraemic infections
- New HCV infections
- Numbers treated (assumed 90% SVR rate)
- Percentage of patients diagnosed, new diagnoses
- HCV related deaths (0.5% per year)
- Non-HCV related deaths (1.5% per year)
- For countries with missing data, regional averages were used.
Methods: changes in prevalence

Change in prevalence, 2016-2017:

CV infections in 2016 + new HCV infections
- cures
- HCV-related deaths
- non-HCV related deaths
Diagnosis and treatment of HCV
Data assumptions for USA, 2016

30,200 new HCV Infections

1.32 million undiagnosed patients

6600 deaths from HCV
20,000 deaths from other causes

110,000 new HCV diagnoses

208,000 cures (7.6%)

1.40 million diagnosed patients (51%)

7000 Deaths from HCV
21,000 deaths from other causes
HCV infections diagnosed by 2016

Database: CDA Foundation

[Map showing global distribution of HCV infections with percentage values for different regions]
HCV diagnosis by Gross National Income

WHO Target: 90% diagnosed

High Income Countries

Upper-Middle Countries

Lower-middle Countries

Low income Countries

Income Group

WHO Target: 90% diagnosed

<table>
<thead>
<tr>
<th>Income Group</th>
<th>Diagnosis Rate 2016</th>
<th>New Diagnosis Rate 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIC</td>
<td>44%</td>
<td>3%</td>
</tr>
<tr>
<td>UMIC</td>
<td>17%</td>
<td>1.6%</td>
</tr>
<tr>
<td>LMIC</td>
<td>15%</td>
<td>1.3%</td>
</tr>
<tr>
<td>LIC</td>
<td>9%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Ref: Polaris database 2017

Database: CDA Foundation
patients cured per new HCV infection: countries
new HCV infections per patient cured: 23 countries
<table>
<thead>
<tr>
<th>Region</th>
<th>HCV Epidemic 2016</th>
<th>New HCV Infections</th>
<th>Cures</th>
<th>HCV Related Deaths</th>
<th>Non HCV Related Deaths</th>
<th>HCV Epidemic 2017</th>
<th>Net Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>69,563,426</td>
<td>1,597,877</td>
<td>1,512,827</td>
<td>347,818</td>
<td>1,043,452</td>
<td>68,257,207</td>
<td>-1,306,219</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>5,069,000</td>
<td>130,800</td>
<td>3,805</td>
<td>25,345</td>
<td>76,035</td>
<td>5,094,615</td>
<td>+ 25,615</td>
</tr>
<tr>
<td>Asia</td>
<td>2,364,430</td>
<td>35,440</td>
<td>105,821</td>
<td>11,822</td>
<td>35,466</td>
<td>2,246,670</td>
<td>-117,760</td>
</tr>
<tr>
<td>South America</td>
<td>3,513,000</td>
<td>27,807</td>
<td>48,140</td>
<td>17,565</td>
<td>52,695</td>
<td>3,422,407</td>
<td>-90,603</td>
</tr>
<tr>
<td>Western Europe</td>
<td>6,507,700</td>
<td>322,800</td>
<td>26,110</td>
<td>32,539</td>
<td>97,616</td>
<td>6,674,236</td>
<td>+166,536</td>
</tr>
<tr>
<td>Europe</td>
<td>29,564,900</td>
<td>574,330</td>
<td>456,552</td>
<td>147,825</td>
<td>443,474</td>
<td>29,091,380</td>
<td>-473,520</td>
</tr>
</tbody>
</table>
Changes in HCV prevalence: 2016-2017

USA: -9%
Canada: -6%
Brazil: -4%
China: -3%
Australia: -13%
Egypt: -11%
Spain: -9%
Russia: +4%
India: +1%
Japan: -13%

Database: CDA Foundation
Results: “diagnostic burn-out”

Spain and Portugal could soon reach the stage where there are no more diagnosed patients available:

At this stage, cure of HCV is limited by rates of new HCV diagnosis, which are currently low.

**Diagnostic burn-out” – potential outcomes, based on 2016 data**

<table>
<thead>
<tr>
<th>Country</th>
<th>HCV Epidemic</th>
<th>Diagnosed before 2016</th>
<th>New HCV Diagnoses in 2016</th>
<th>Cures in 2016</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>1.8 million</td>
<td>235,000 (13%)</td>
<td>10,000 (0.6%)</td>
<td>43,000 (2.4%)</td>
<td>Dx Burn-out in 2025</td>
</tr>
<tr>
<td>Spain</td>
<td>328,000</td>
<td>140,000 (43%)</td>
<td>5500 (1.7%)</td>
<td>25,000 (8%)</td>
<td>Dx Burn-out in 2022</td>
</tr>
<tr>
<td>Portugal</td>
<td>96,000</td>
<td>37,000 (39%)</td>
<td>1300 (1.3%)</td>
<td>4400 (4.6%)</td>
<td>Dx Burn-out in 2026</td>
</tr>
</tbody>
</table>

Database: CDA Foundation
Estimates of HCV prevalence and new infections are changing as new data become available – this analysis needs to be updated regularly.

We cannot assume that current rates of diagnosis and treatment will be maintained. “Warehousing” of patients may already have finished in some countries. Many patients could be diagnosed with HCV, but unable to access or afford HCV DAAs.
In 2016, there were 1.6 million people newly infected with HCV, versus 1.5 million people cured.

The worldwide HCV epidemic fell from 69.6 million in 2016 to 68.3 million in 2017 – a reduction of only 2%

This reduction is not large enough to achieve elimination of HCV by 2030

Between 6-7 million people need to be diagnosed and treated each year

Harm reduction needs to be intensified, to lower infection rates
Prices versus costs of HCV DAAs

- USA (NADAC): $142,710
- Denmark: $104,723
- Norway: $96,404
- Germany: $87,632
- United Kingdom: $84,281
- Sweden: $76,757
- France: $68,280
- Argentina: $65,616
- Saudi Arabia: $50,059
- Spain: $37,729
- Brazil: $33,800
- Australia: $29,361
- Thailand: $11,598
- Egypt: $9,906
- India: $174

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The real cost of HCV elimination

SoF/DCV can now be produced for <$50 per 12-week treatment course.

At $50 per course, it would cost $3.5 billion to treat all 70 million people infected with HCV worldwide.

Global sales of HCV DAAs from 1Q2014 to 2Q2017 average $1.6 billion per month.

Therefore, all 70 million people with HCV worldwide could be treated for the equivalent of 10 weeks of commercial sales of the HCV DAAs.