Universal access to medicine: HIV and beyond

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Universal access to HIV treatment – the past 17 years

July 2000: Pharmaceutical companies take South Africa to court over access to generic HIV medicines. South Africa wins.

1st December 2003: WHO “3 by 5” project – to get 3 million people on antiretroviral treatment by 2005


December 2016: over 18/37 million people with HIV are on ARV treatment (49%)
Global Estimates (2016) to reach 90-90-90 Targets

37 million
Breakpoint 1: 13.4 million Undiagnosed

53%

20 million
Breakpoint 2: 11.8 million not treated

49%

18 million
Breakpoint 3: 15.3 million Not Virally Suppressed

32%*

14* million

0%

100%

HIV Positive People
Diagnosed
On ART
Viral Suppression <1000 (ITT)*

Global ART treatment demand will rise by 800,000 per year, unless HIV infection rates fall.

2.1 million new HIV infections*/year

Need for ART (90-90-90):
30 million in 2017
32.4 million in 2020
36.4 million in 2025

1.1 million HIV-related deaths*/year

Three main predictors of HIV treatment coverage

- Region
- HIV prevalence
- Global Peace Index
Percentage of people with HIV on Antiretroviral treatment, by region

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage of UNAIDS Targets</th>
<th>Percentage of Estimated Total PLHIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe / Australia</td>
<td>67%</td>
<td>81%</td>
</tr>
<tr>
<td>S America / Caribbean</td>
<td>66%</td>
<td>81%</td>
</tr>
<tr>
<td>Africa, C America, USA</td>
<td>50%</td>
<td>67%</td>
</tr>
<tr>
<td>SE Asia</td>
<td>50%</td>
<td>66%</td>
</tr>
<tr>
<td>E Europe, M East C Asia, N Africa</td>
<td>42%</td>
<td>50%</td>
</tr>
<tr>
<td>Central Asia</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>USA (2011)</td>
<td>37%</td>
<td>42%</td>
</tr>
<tr>
<td>South East Asia &amp; Pacific</td>
<td>36%</td>
<td>40%</td>
</tr>
<tr>
<td>Eastern Europe and Central Asia</td>
<td>17%</td>
<td>37%</td>
</tr>
<tr>
<td>Middle East and North Africa</td>
<td>10%</td>
<td>36%</td>
</tr>
</tbody>
</table>

% On ART:
- UNAIDS Targets: 81%
- Western Europe: 67%
- Australia (2013): 66%
- Caribbean: 50%
- South America: 50%
- Sub Saharan Africa: 42%
- Central America: 40%
- USA (2011): 37%
- South East Asia & Pacific: 36%
- Eastern Europe and Central Asia: 17%
- Middle East and North Africa: 10%
Percentage of people on antiretroviral treatment by country
Three main predictors of HIV treatment coverage

• Region

• HIV prevalence

• Global Peace Index
Percentage of adults on ARV versus prevalence

Hill et al: CROI 2016
Percentage of children on ARV vs prevalence

Hill et al: CROI 2016
Percentage pregnant women on ARV vs prevalence

Hill et al: CROI 2016
Three main predictors of HIV treatment coverage

• Region

• HIV prevalence

• Global Peace Index
Percentage of Estimated Total PLHIV on ART
VS Global Peace Index, Weighted by Epidemic Size

Bubble colour:
Red = GPI = 2.88 - 4.00
Orange = GPI = 2.83 - 2.38
Yellow = GPI = 2.37 - 1.92
Green = 1.91 - 1.43
Blue = 1.43 - 1.19

Hill et al: IAS 2017
Cascade of HIV care – Sweden

Sweden 2015

- Living with HIV: 100% (7,718)
- Diagnosed: 90% (6,946)
- Linked to care: 90% (6,938)
- Retained in care: 87% (6,730)
- On ART: 83% (6,398)
- Viral Suppression (<50 copies/ml): 79% (6,059)

Hill et al: IAS 2017
Cascade of HIV care – Somalia

Hill et al: IAS 2017
Global ART treatment demand will rise by 800,000 per year, unless HIV infection rates fall.

2.1 million new HIV infections*/year

Need for ART (90-90-90):
- 30 million in 2017
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Can HIV incidence fall with high treatment coverage and PrEP?

Centres with:

- High rates of HIV testing
- Treating all HIV+ people
- Rapid uptake of ART – same day starts
- PrEP available / PEP prescribed
- Regular monitoring
New HIV diagnoses among adults attending sexual health services

Current HIV trends in England
HIV+ diagnoses, 56 Dean Street Clinic, London, 2015 to 2017

What is driving this fall:
- Expanded testing
- Treating all HIV+
- Earlier treatment starts
- PrEP and PEP widely used
How many people need to take PrEP for each HIV infection prevented?

PROUD study (9%): NNTB=13

High-risk (2%): NNTB=58
How many people need PrEP per HIV infection prevented?

<table>
<thead>
<tr>
<th>Country, region</th>
<th>HIV incidence</th>
<th>NNTB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mozambique, Beira</td>
<td>6.5%</td>
<td>18</td>
</tr>
<tr>
<td>Mozambiqye, Manhica</td>
<td>3.6%</td>
<td>33</td>
</tr>
<tr>
<td>Uganda, Lake Victoria</td>
<td>3.4%</td>
<td>35</td>
</tr>
<tr>
<td>Mozambique, Southern</td>
<td>3.2%</td>
<td>37</td>
</tr>
<tr>
<td>South Africa, Matlosana</td>
<td>2.2%</td>
<td>53</td>
</tr>
<tr>
<td>Mozambique, Maputo</td>
<td>1.1%</td>
<td>103</td>
</tr>
<tr>
<td>Kenya, Kisumu</td>
<td>1.1%</td>
<td>106</td>
</tr>
<tr>
<td>Uganda</td>
<td>0.6%</td>
<td>214</td>
</tr>
</tbody>
</table>

Studies of heterosexuals in sub-Saharan Africa
NNTB assumes PrEP is 85% effective in preventing HIV infection
Australian PrEP trials of imported generic TDF/FTC: 11,000 people in three states

- “QPrePD” project, n=2000
- “EPIC-NSW” study n>5000
- Victoria “PrEPX” study n=3000 fully enrolled, expanding to 4000
Expanded treatment and prevention
Results so far

• 40% fall in new HIV diagnoses in London: 2015 to 2016

• Lowest ever incidence of new HIV infections in Australia in 2016 – 25% reduction since 2015

• 17% falls in new HIV diagnoses in San Francisco in 2016
Eliminating HIV infection by 2030?

1. Country-level targets for 90-90-90 will continue to rise if global HIV infections remain at 2 million/year

2. Countries with lower HIV prevalence and higher levels of conflict need to give HIV treatment higher priority. North Africa and E Europe need to upscale their services.

3. In centres with Expanded Treatment and Prevention programmes, HIV incidence appears to be falling

4. PrEP could lower HIV incidence, but millions will need access – could this save money in the long-term?
Worldwide deaths from HBV, HCV, HIV, tuberculosis and malaria in 2013
How could we achieve Universal Access to all Essential Medicines?
The WHO Essential Medicines List

All drugs in the EML have been included

Prices available for India, South Africa and the UK

Also, “estimated generic prices” estimated, based on costs of API. Almost all medicines in the EML are extremely cheap to make.

We need data for more countries
Active Pharmaceutical Ingredient

Raw drug substance Database [www.indiainfodrive.com](http://www.indiainfodrive.com) shows exports of API from India to other countries, with costs per kilogram of API, for many drugs
A Hill, M Barber, D Gotham, J Fortunak, A Pozniak. Generic treatments for HIV, HBV, HCV, TB could be mass produced for <$90 per patient. Abstract number THU-221, presented at the International Liver Congress 2017, Amsterdam.
Cost-based generic price of sofosbuvir (12 weeks)

- Cost of API = $1,224/kg
- API needed per person = 34g (400mg x 84 days)
- API per 12 weeks = $41
- Formulation = $0.01/tablet
- Formulated drug = $42
- Packaging = $0.35/month
- Packaged drug = $43
- Profit margin = 10%
- Final generic price = $47

A Hill, M Barber, D Gotham, J Fortunak, A Pozniak. Generic treatments for HIV, HBV, HCV, TB could be mass produced for <$90 per patient. Abstract number THU-221, presented at the International Liver Congress 2017, Amsterdam.
Lowest global price versus estimated generic price, for HIV, TB and Malaria
The new “$90 $90 $90” in 2017

There should be standard prices to treat HIV, Hep B/C and TB

< $90 per year to treat HIV: TDF/3TC/EFV
< $90 per year to treat Hepatitis B: TDF/3TC or ETV
< $90 for first-line treatment for TB
< $90 for 12-weeks course of HCV DAAs: SOF/DCV

TDF/3TC, efavirenz, entecavir and most TB drugs will be generic worldwide in 2017. Prices should then fall in all countries, close to Indian / South African levels.

< $90 price to cure Hepatitis C will only be in low and middle income countries
How can you access patented drugs at low prices?
Voluntary licenses

Some pharmaceutical companies allow cheap generics to be sold in certain low and middle income countries, with voluntary licenses. However:

1. China, South America, Russia and Eastern European countries are not included in most of these agreements. As a result, prices in these countries can be unaffordable.

2. Other countries may have voluntary licenses but if the company does not register the drug for regulatory approval, then the drug cannot be accessed.

3. Merck and AbbVie have no voluntary licenses for their Hepatitis C treatments.
Sofosbuvir voluntary license coverage

Lowest prices of sofosbuvir (for HCV) by country

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Hepatitis C drug sales

Cumulative sales of HCV DAAs from 2014 to 1Q2017:

$56 billion

Reference: Gilead, AbbVie and Merck quarterly product sales summaries
Hepatitis C: how is the epidemic emerging in the era of DAAs? 91 countries

58 million chronically infected with HCV in 2016

1.4 million with SVR

Polaris Observatory Database April 2017
Hepatitis C: how is the epidemic emerging in the era of DAAs? 91 countries

1.3 million new infections

58 million in 2016
57.6 million in 2017

<1% reduction

1.4 million SVR
0.3 million deaths

Polaris Observatory Database April 2017
Prices of linezolid for MDR-TB

- US (Pfizer): $4.298
- Spain (Pfizer): $2.011
- UK (Pfizer): $1.862
- South Africa (Pfizer): $1.246
- Russia (Pfizer): $711
- Russia (generic): $690
- GDF Catalogue (generic): $150
- India (SRA-generic): $70
- India (nonSRA-generic): $17
- High Target: $13
- Low Target: $5

Prices are in USD per month.
Are you getting the best price for generics in your country?
Examples of generic medicines with relatively consistent prices

<table>
<thead>
<tr>
<th>Medicine</th>
<th>UK</th>
<th>South Africa</th>
<th>India</th>
<th>Estimated generic price</th>
</tr>
</thead>
<tbody>
<tr>
<td>paracetamol</td>
<td>€0.4</td>
<td>€0.5</td>
<td>€0.7</td>
<td>€1.0</td>
</tr>
<tr>
<td>simvastatin</td>
<td>€1.4</td>
<td>€1.0</td>
<td>€1.4</td>
<td>€1.7</td>
</tr>
<tr>
<td>allopurinol</td>
<td>€1.6</td>
<td>€2.4</td>
<td>€3.0</td>
<td>€3.3</td>
</tr>
<tr>
<td>metoclopramide</td>
<td>€1.3</td>
<td>€0.4</td>
<td>€0.4</td>
<td>€1.5</td>
</tr>
<tr>
<td>warfarin</td>
<td>€1.1</td>
<td>€1.2</td>
<td>€1.2</td>
<td>€1.1</td>
</tr>
</tbody>
</table>
Martin Shkreli, Turing Pharmaceuticals: 5000% price rise $750 is a ‘more appropriate’ price for $13 AIDS medicine
Busulfan 2mg tablets for CML (Aspen)

Price per 2mg tablet (£)

- Sep-11: £0.21
- Mar-12: £0.21
- Sep-12: £0.62
- Mar-13: £0.87
- Sep-13: £2.50
- Mar-14: £2.61
- Sep-14: £2.61
- Mar-15: £2.61
- Sep-15: £2.61
- Mar-16: £2.61
- Sep-16: £2.61

Indian Price
2016: £0.03
Melphalan 2mg tablets for ovarian cancer (Alliance / Aspen)

Price per 2mg tablet (£)

- £0.00
- £0.20
- £0.40
- £0.60
- £0.80
- £1.00
- £1.20
- £1.40
- £1.60
- £1.80
- £2.00

Date
- Sep-11
- Mar-12
- Sep-12
- Mar-13
- Sep-13
- Mar-14
- Sep-14
- Mar-15
- Sep-15
- Mar-16
- Sep-16

Indian Price
2016: £0.08

BNF

£0.55

£1.82
**UK vs Indian prices per tablet for generic cancer drugs**

<table>
<thead>
<tr>
<th>Drug / dose</th>
<th>India</th>
<th>UK</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melphalan 2mg **</td>
<td>8p</td>
<td>£1.82</td>
<td>+2,175%</td>
</tr>
<tr>
<td>Chlorambucil 2mg</td>
<td>5p</td>
<td>£1.71</td>
<td>+3,320%</td>
</tr>
<tr>
<td>Lomustine</td>
<td>£1.00</td>
<td>£37</td>
<td>+3,600%</td>
</tr>
<tr>
<td>Cyclophosphamide 50mg</td>
<td>2p</td>
<td>£1.39</td>
<td>+6,850%</td>
</tr>
<tr>
<td>Mesna 1g vial</td>
<td>16p</td>
<td>£13.41</td>
<td>+8,281%</td>
</tr>
<tr>
<td>Busulfan 2mg **</td>
<td>3p</td>
<td>£2.76</td>
<td>+9,100%</td>
</tr>
</tbody>
</table>

*Imatinib generic in USA, patent expires in Europe in 2017*

** GSK had a large share-holding in Aspen from 2009 until late-2016
## Indian vs South African prices for generic drugs, 2016

Prices in US dollars (cents) per tablet

<table>
<thead>
<tr>
<th>Drug / dose</th>
<th>India</th>
<th>South Africa</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rifampicin, 300mg</td>
<td>4c</td>
<td>16c</td>
<td>+300%</td>
</tr>
<tr>
<td>Valganciclovir, 450mg</td>
<td>220c</td>
<td>1285c</td>
<td>+484%</td>
</tr>
<tr>
<td>Clarythromycin, 500mg</td>
<td>3c</td>
<td>36c</td>
<td>+1100%</td>
</tr>
<tr>
<td>Linezolid, 600mg</td>
<td>45c</td>
<td>741c</td>
<td>+1547%</td>
</tr>
<tr>
<td>Ondansetron, 4mg</td>
<td>0.3c</td>
<td>13c</td>
<td>+4233%</td>
</tr>
<tr>
<td>Azithromycin, 500mg</td>
<td>1c</td>
<td>48c</td>
<td>+4700%</td>
</tr>
</tbody>
</table>

There are many more other examples
Legal action

October 2016: Aspen fined 5 million Euros by Italian Health Ministry

December 2016: Pfizer and Flynn pharma fined £70 million by UK government for fixing prices of epilepsy medicines

January 2017: Concordia fined £50 million by UK government for fixing prices of hydrocortisone and other drugs

May 2017: Aspen under new legal investigation from European Union for fixing cancer drug prices – fines could reach $270 million
Conclusions

Most medicines can be manufactured at very low cost.

Medicines are already available for HIV, TB and malaria at prices close to the basic costs of manufacture.

We could do the same for a range of other diseases.

Please look at your national drug prices very carefully – you could save tens of millions of dollars per year from buying drugs elsewhere.
“With drug prices, you don’t get what you deserve: you get what you can negotiate”
Universal access to HIV treatment is one of the greatest success stories in medicine (>17 million treated).

This should not stand alone, but be repeated for mass treatment of cancer, viral hepatitis and other diseases – this time, more quickly.