Cost-effectiveness of harm reduction

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Cost-effectiveness in decision making

- Competing priorities
- Limited resources available to be allocated for best outcomes
- Desire to implement effective programs
  - Interventions with proven efficacy and feasible
  - At least cost
- Comparative cost-effectiveness helps prioritize resource allocation
Need to do something:
Prevalence of Injecting Drug Use

Need to do something:
Prevalence of HIV among PWID

### Why worry?

<table>
<thead>
<tr>
<th>Key population</th>
<th>Overall risk of HIV infection, relative to general population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex workers</td>
<td>13-fold higher</td>
</tr>
<tr>
<td>MSM</td>
<td>13.5 fold higher</td>
</tr>
<tr>
<td>PWID</td>
<td>20-fold higher</td>
</tr>
</tbody>
</table>
What HR interventions work?

- **Three proven priority interventions**
  - **NSP** - provide sterile needles/syringes and other injecting equipment to PWID. By maximising the number of clean injecting equipment in circulation, we minimise the time infected equipment remain in use and the proportion of unsafe injections.
  - **OST** - prescribed to dependent users to diminish the use and effects of illicitly acquired opiates. It is usually taken orally and therefore reduces the frequency of injection and unsafe injecting practices.
  - **ART** - is prescribed to HIV-positive PWID to treat AIDS and to reduce viral load and consequently HIV transmission.

What we know about NSPs

- Review of evidence from 42 studies (Gibson et al, 2001)
  - 28 showed a favorable outcome
  - 2 showed an unfavorable outcome
  - Others showed no clear results or mixed findings

- Ecological studies: 81 cities (Hurley et al, 1997)

<table>
<thead>
<tr>
<th></th>
<th>NSPs</th>
<th>No NSPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cities</td>
<td>29</td>
<td>52</td>
</tr>
<tr>
<td>Change in HIV prevalence per year</td>
<td>-5.8%</td>
<td>+5.9%</td>
</tr>
</tbody>
</table>
What we know about NSPs

- Led to incidence declines
  - E.g. New York City: 4% to 1%
- Many places without NSPs have had large increases
  - E.g. Sargodha, Bangkok, Manipur, Cebu
- Reasons are obvious
  - Behavior in British Columbia exemplifies (Vancouver, Victoria)
What are the cost ranges?

**NSPs**

- **Average cost of NSP provision**: $23–71/year\(^1\)
- **NSP cost varies by region and delivery system**

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**NSP unit cost estimates, regional averages**\(^2\)

<table>
<thead>
<tr>
<th>Region</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South, East, SE Asia</td>
<td>70</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>21</td>
</tr>
<tr>
<td>Middle East &amp; North Africa</td>
<td>62</td>
</tr>
<tr>
<td>W Europe, N America &amp; Aus</td>
<td>158</td>
</tr>
<tr>
<td>E Europe &amp; Central Asia</td>
<td>62</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>15</td>
</tr>
</tbody>
</table>

\(^1\) UNAIDS 2007 resource estimations; Schwartlaender et al 2011. \(^2\) UNSW estimates, based on 10 studies identified in the 6 regions
Systematic review (Jones 2006)

- 13 economic studies [most in North America]: all concluded that NSPs were cost-effective or cost-saving compared to lifetime cost of HIV

Net financial benefits of NSPs in all regions; both high- and low- income settings

- E.g. China (Ni et al 2012)
- USA (Hrishikesh et al 2008)
- Bangladesh (Guinness et al 2008)
- Australia (Kwon et al 2012)
What we know about OST

- All randomized controlled trials of OST have produced positive results (Mattick et al, 2003)
- OST reduces injecting activity (Cochrane Syst. Review; Gowing, 2008; Mattick, 2009)
- Meta-analysis (North America, Europe & Asia)
  - 54% reduction in HIV acquisition
What we know about OST and the importance of combining the priority HR interventions to achieve impact

**Empirical evidence: NSP + OST at scale:** Amsterdam cohort study - 57% HIV incidence reduction, 64% HCV incidence reduction (incidence reductions low if service uptake partial). Similar findings in Central Asia.

<table>
<thead>
<tr>
<th>Study or subcategory</th>
<th>Incidence rate ratio (fixed)</th>
<th>95% CI</th>
<th>Incidence rate ratio (fixed)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Incomplete harm reduction</td>
<td></td>
<td></td>
<td>01 Incomplete harm reduction</td>
<td>0.74 [0.43, 1.27]</td>
</tr>
<tr>
<td>Van Den Berg 2007</td>
<td></td>
<td></td>
<td>Van Den Berg 2007</td>
<td>0.32 [0.17, 0.61]</td>
</tr>
</tbody>
</table>

Source: Van Den Berg et al, 2008
What are the cost ranges?

**OST**

- **Average OST cost**: Methadone 80 mg: $363 - 1,057 / year; Buprenorphine, low dose: $1,236 – 3,167 /year
- **OST** consistently far costlier than NSP

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*Figure: OST unit cost estimates, regional averages*

1 UNAIDS 2007 resource estimations; Schwartlaender et al 2011. 2 UNSW estimates, based on 10 studies identified in the 6 regions
What we know about ART

- Reverses disease progression and increases survival
  - Shown to be highly cost-effective
- Prevention
  - HPTN052: 96% reduction in infectiousness for heterosexuals on ART
  - No direct evidence for PWID
  - Highly plausible that ART will be efficacious
What are the cost ranges ART?

- **Average cost of ART provision:** UNAIDS minimum estimate $176 in 2010, declining to $125 by 2020.¹
- Estimated costs range from $1,000-2,000 per HIV+ PWID

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**ART unit cost estimates, regional averages**²

<table>
<thead>
<tr>
<th>Region</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South, East &amp; SE Asia</td>
<td>885</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>1,305</td>
</tr>
<tr>
<td>Middle East &amp; North Africa</td>
<td>1,127</td>
</tr>
<tr>
<td>W Europe, N America &amp; Aus</td>
<td>1,600</td>
</tr>
<tr>
<td>E Europe &amp; Central Asia</td>
<td>1,305</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>1,189</td>
</tr>
</tbody>
</table>

¹ UNAIDS 2007 resource estimations; Schwartlaender et al 2011. ² UNSW estimates, based on 10 studies identified in the 6 regions.
What we know about ART as PrEP

- PrEP (Bangkok Tenofovir Study: 49% efficacy)
  - May not be cost-effective: Cost per infection averted
    - $24,785-1,847,853 (high-income countries)
    - $4,233-74,642 (discounted tenofovir)
    - $1,166-17,791 (generic tenofovir)
Priority HR intervention packages are cost-effective and cost-saving

- Estimated cost-effectiveness ratios for priority intervention package favorable in all regions
  - costs per HIV infection averted: $100 to $1,000

- In all regions with data on return on investment, harm reduction packages are cost-saving
  - Total future ROI $1.1 – 8.0 (3% discounting)
What is the current coverage of NSP, OST and ART among PWID?
Where NSP is available as per policy
(black: community and prison, red: community only)

Global State of Harm Reduction, 2012
Implementation and coverage limited

86% low coverage or no report

NSP coverage in countries (number of syringes distributed per IDU)

No report: 93
Low coverage <100: 32
Medium coverage 100-200: 11
High coverage >200: 9

UNAIDS, 2012
Worldwide, over 14 million PWID (90%) may not access NSP

Source: Authors’ literature and estimations, based on Mathers et al., 2010
Where OST is available as per policy
(black: community and prison, red: community only)
Almost 15 million PWID (92%) may not use OST

Estimated OST coverage of PWID in regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of PWID</th>
<th>PWID accessing OST</th>
<th>OST coverage gap (PWID in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S, E &amp; SE Asia</td>
<td>4.260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA &amp; Caribbean</td>
<td>2.202</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M-East &amp; N-Africa</td>
<td>0.120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W-Europe, N-America &amp; Australasia</td>
<td>2.531</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Europe &amp; C-Asia</td>
<td>3.689</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSA</td>
<td>1.777</td>
<td></td>
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</tr>
</tbody>
</table>

Source: Authors’ literature and estimations, using Mathers et al., 2010
ART coverage in HIV+ PWID

- ART uptake of HIV-infected PWID shows the largest discrepancies across regions
  - Outside high-income countries, ART coverage in PWID is less than 5%.

Source: Authors literature review and estimations, using Mathers et al. 2010
What is the global coverage of HR services?

A small proportion of PWID access all three priority interventions.

- An estimated 10% access NSP
- An estimated 8% access OST
- About 14% of HIV+ PWID access ART

Source: Authors' literature review and estimations, using Mathers et al. 2010
How much is spent on HR?

- Plausible estimate of ~$160 million in LMIC in 2007 (or 3 cents per PWID per day) for HIV-related HR, of which 90% from international donors.

- **Global Fund** largest funder for HR targeted at PWID

Global Fund PWID investments by Region (US$)

- Asia: 366,100,000
  - 30% Ukraine
  - 17% Thailand
  - 15% Viet Nam
  - 14% China
- Latin America: 10,200,000
- Middle East & North Africa: 24,000,000
- Sub-Saharan Africa: 22,000,000
- Western Europe: 7,800,000
- Eastern Europe & Central Asia: 900,000

Sources: Bridge 2012, summarised in Global State of Harm Reduction, 2012
How much is needed to scale up the priority HR interventions?

Two scenarios: “mid target” and “high target”

<table>
<thead>
<tr>
<th>Current estimated level</th>
<th>NSP coverage (%)</th>
<th>Needles / PWID /year</th>
<th>OST uptake</th>
<th>ART uptake of HIV+ PWID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid target</td>
<td>20</td>
<td>100</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>High target</td>
<td>60</td>
<td>200</td>
<td>40</td>
<td>75</td>
</tr>
</tbody>
</table>
## Summary: Annual cost of scale-up of NSP, OST and ART for PWIDs (USD)

<table>
<thead>
<tr>
<th>Region</th>
<th><strong>Mid target</strong></th>
<th><strong>High target</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20% NSP coverage</strong></td>
<td>20% OST coverage</td>
<td>60% NSP coverage</td>
</tr>
<tr>
<td><strong>25% ART coverage</strong></td>
<td></td>
<td>40% OST coverage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75% ART coverage</td>
</tr>
<tr>
<td>South, East &amp; South East Asia</td>
<td>527 million</td>
<td>1,491 million</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>625 million</td>
<td>1,468 million</td>
</tr>
<tr>
<td>Middle East &amp; North Africa</td>
<td>26 million</td>
<td>55 million</td>
</tr>
<tr>
<td>W- Europe, N- America &amp; Australasia</td>
<td>17 million</td>
<td>1,193 million</td>
</tr>
<tr>
<td>Eastern Europe &amp; Central Asia</td>
<td>1,037 million</td>
<td>2,513 million</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>414 million</td>
<td>901 million</td>
</tr>
<tr>
<td><strong>Total per year (USD)</strong></td>
<td>2,645 million</td>
<td>7,621 million</td>
</tr>
</tbody>
</table>

1: Mathers et al, Lancet (2010)  2: Scale-up calculations by UNSW
Annual scale-up costs: Split by region and intervention

Mid target scenario:

- Costs dominated by scale-up needs in Eastern Europe and Central Asia
- Most resource intense intervention to scale-up is OST (71% of total mid target costs), then ART for HIV+ PWID (26%), than NSP (3%)
- Similar pattern for high target scenario

1: Mathers et al, Lancet (2010)  2: Scale-up calculations by UNSW
Conclusions

- Globally, harm reduction interventions are good value for money, improving health outcomes for PWID.
  - ~US$100 to $1,000 per HIV infection averted
  - NSPs: Moderate-to-strong effectiveness and cost-effectiveness
  - OST: Strong evidence for effectiveness.
    - Questionable cost-effectiveness when considering just HIV or HCV alone; moderate cost-effectiveness when drug-related issues included
  - OST + NSP: Strong cost-effectiveness
  - ART: Cost-effective for survival, weak evidence for prevention, PrEP not cost-effective