HIV drug resistance

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### Global summary of the AIDS epidemic

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of people living with HIV in 2015</td>
<td>36.7 million</td>
<td>[34.0 million – 39.8 million]</td>
</tr>
<tr>
<td>Adults</td>
<td>31.8 million</td>
<td>[30.1 million – 33.7 million]</td>
</tr>
<tr>
<td>Women</td>
<td>16.0 million</td>
<td>[15.2 million – 16.9 million]</td>
</tr>
<tr>
<td>Children (&lt;15 years)</td>
<td>3.2 million</td>
<td>[2.9 million – 3.5 million]</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>People newly infected with HIV in 2015</td>
<td>2.1 million</td>
<td>[1.9 million – 2.4 million]</td>
</tr>
<tr>
<td>Adults</td>
<td>1.9 million</td>
<td>[1.7 million – 2.1 million]</td>
</tr>
<tr>
<td>Children (&lt;15 years)</td>
<td>240 000</td>
<td>[210 000 – 280 000]</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>AIDS deaths in 2015</td>
<td>1.1 million</td>
<td>[940 000 – 1.3 million]</td>
</tr>
<tr>
<td>Adults</td>
<td>1.0 million</td>
<td>[1.2 million – 1.5 million]</td>
</tr>
<tr>
<td>Children (&lt;15 years)</td>
<td>190 000</td>
<td>[170 000 – 220 000]</td>
</tr>
</tbody>
</table>

Source: UNAIDS/WHO estimates.
Universal health coverage to end AIDS

Source: Global Health Sector Strategy on HIV, 2016-2021.
Improvements are needed at each stage of the cascade of HIV testing and treatment services, 2015.

Source: UNAIDS/WHO estimates.
ART coverage over time

Source: UNAIDS/WHO estimates.
Life expectancy of patients receiving ART
attachment and entry

HIV life cycle

RNA
reverse transcription

DNA
integration

maturation
HIV latency

RNA detection level

CD4+ cells

macrophages

latently infected cells
The targets of antiretroviral therapy are HIV enzymes (DAA).

HIV virus is highly variable.

Mutations can arise spontaneously.

Drug resistance evolves under treatment.
HIV DR mutations development and evolution

suboptimal drug doses

mutations
Main causes of HIV DR are:

- Low adherence
- Drug usage
- Drugs stock-outs
- Toxicity etc.
HIV drug resistance (DR) can be:

- acquired
- transmitted
HIV transmitted drug resistance in the world (http://hivdb.stanford.edu/surveillance/map/)

- 4-25%
- 5-22%
- 13%
- 2-15%
- 0-23%
- 10%
WHO Global Action Plan on HIV drug resistance, 2017-2021


Combating HIV drug resistance, a little known but growing threat

Online public consultation

The zero draft of the WHO Global Action Plan on HIV drug resistance (HIVDR) was made available online for comments and feedback on 18 July 2016, during consultations at the International AIDS Conference in Durban (18-22 July 2016). The consultation was closed on 30 September 2016. In total, there were 131 submissions from 73 different countries and 104 different organizations, including civil society organizations.
East Europe and Central Asia HIV epidemic

New cases 2000-2014

<table>
<thead>
<tr>
<th>Region</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Europe and Central Asia</td>
<td>+40</td>
</tr>
<tr>
<td>Latin America</td>
<td>-13%</td>
</tr>
<tr>
<td>West Europe</td>
<td>-2%</td>
</tr>
<tr>
<td>Caribbean countries</td>
<td>-52%</td>
</tr>
<tr>
<td>Middle East and North Africa</td>
<td>+22%</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>-39%</td>
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</tbody>
</table>

UNAIDS Global HIV Estimates (2014)
New HIV diagnoses (rates per 100 000 population), by country and year of diagnosis in EECA


Number of HIV cases and deaths per year (Russia, 2001-2016)

Source: http://hivrussia.org/stat/index.shtml
Main routes of HIV transmission in Russia, 2000-2012

Source: http://hivrussia.org/stat/index.shtml
ART coverage by country (EECA)
Main features of Russian HIV-infection epidemic

• Huge number of patients
  • Mainly IDUs
  • Growing number of women infected heterosexually

• Most of patients are HIV-HCV co-infected
  • Long distances to the points of care
  • Low/intermediate adherence
  • Regular drug supply interruptions
  • Domestic generic usage (Russia)

• No regular system of HIV DR monitoring
HIV genotyping in Russia

More than 40 laboratories in regions, seven laboratories in federal centers

Two test-systems registered

More than 12000 genotypes analyzed during five years

ViroSeq HIV-1

AmpliSence® HIV-Resist-Seq
No Eastern Europe and Central Asia country has the regular system of HIV DR monitoring
HIV-1 genetic variants (subtypes) in Russia and FSU
HIV drug resistance may depend on subtype!
Thank you for the attention!

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