Pathways to HIV/AIDS Epidemic Control

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Outline

• Review some* pathways to HIV/AIDS epidemic control
  • Population viral load suppression
  • Robust combination HIV prevention

• Future directions
What is HIV/AIDS epidemic control?

Goal:

• Absolute rate of HIV incidence less than one per 10,000 adults per year

• 90% reduction in new HIV infections by 2030 from 2010 (UNAIDS)

Pathways to HIV/AIDS epidemic control

Universal Treatment
Population VLS, U=U

Zero new infections

Effective Combination Prevention
PrEP, PEP, VMMC, Vaccine

Zero stigma
Zero discrimination
Population viral load suppression as pathway to epidemic control

- **First 95 (Diagnosed):** 95% of PLHIV know or are aware of their HIV+ status
- **Second (On Treatment):** 95% of those aware of their PLHIV status are on antiretroviral therapy
- **Third 95 (With VLS):** 95% of those on ART with viral load suppression
Early ART with viral load suppression minimizes sexual transmission: Evidence from HPTN 052

No linked infections when participants were stably virally suppressed.
Linked infections associated with high VL
A substantial number of unlinked transmissions (36%): suggesting multiple sexual partners: need to ensure diagnosis, treatment and VLS for all PLHIV.

Linked partner infections

<table>
<thead>
<tr>
<th></th>
<th># of infections</th>
<th>Event rate/ 100 person years (95% CI)</th>
<th>Relative reduction with early ART</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early ART</td>
<td>3</td>
<td>0.07 (0.0-0.2)</td>
<td>↓ 93%</td>
</tr>
<tr>
<td>Delayed ART</td>
<td>43</td>
<td>1.03 (0.74-1.38)</td>
<td></td>
</tr>
</tbody>
</table>

The risk of sexual transmission of HIV in individuals with low-level HIV viraemia: a systematic review

Laura N Broyles, Robert Luo, Debi Boeras, Lara Vojnov

Summary

Background The risk of sexual transmission of HIV from individuals with low-level HIV viraemia receiving antiretroviral therapy (ART) has important public health implications, especially in resource-limited settings that use

• 7762 sero-different couples from 25 countries
  • 323 transmissions, none among stably couples with stably suppressed PLHIV partners
    • Except for 2 infections where there was delayed VL testing
  • No transmissions when partner VL was <200C/mL
2015-2021: 95-95-95 Achievements among individuals 15+ years in 5 SSA Countries

- All 5 countries did better on all 95’s in a ~5-year period
- First 95 (HIV testing, awareness) is a persistent gap, yet a critical gateway to ART and population VLS

Population HIV Impact Assessment (PHIA) project: https://phia.icap.columbia.edu/
How are achievements in 95-95-95 translating to population VLS among ALL individuals 15+ years?

- There is progress towards achieving population VLS in the past~ 5 years among all countries
- >20% of the PLHIV population still capable of HIV transmission in several countries

https://phia.icap.columbia.edu/countries/
Eswatini: 95-95-95 and Population VLS among adults 18-49 years (2011-2021)

- Population VLS has increased over time
- By 2021, target population VLS of 86% had been met
Eswatini: HIV incidence among adults 18-49 years (2011-2021)

- Significant decline in HIV incidence among men and women 18-49 years
- Annual HIV incidence among young women still exceeds 1%
### Are we there yet with population VLS?

<table>
<thead>
<tr>
<th>Country</th>
<th>Men 15+ years</th>
<th>Women 15+ years</th>
<th>Children 0-14 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania</td>
<td>93–91–89</td>
<td>98–97–95</td>
<td>72–72–66</td>
</tr>
<tr>
<td>Rwanda</td>
<td>94–91–89</td>
<td>95–93–91</td>
<td>76–75–73</td>
</tr>
<tr>
<td>Kenya</td>
<td>93–89–84</td>
<td>95–95–92</td>
<td>84–84–74</td>
</tr>
<tr>
<td>Namibia</td>
<td>91–86–80</td>
<td>97–94–90</td>
<td>76–76–68</td>
</tr>
</tbody>
</table>

*Source: UNAIDS Global AIDS Update 2023: The path that ends AIDS*
Are we there yet with decline in new infections?

- Global HIV Prevention Coalition focus countries
- Between 2010 and 2021
  - A few countries on track: >60% ↓ in new infections
  - Many countries making moderate progress 30-60% ↓ in new infections
  - Some countries with limited progress or increase in new infections

Source: Global HIV Prevention Coalition: Change in the number of people acquiring HIV in Coalition focus countries, 2010–2021
The implications of not achieving the ‘Last Mile’ with population VLS

A ‘few’ unsuppressed PLHIV can potentially sustain HIV transmission...

Source: SHIMS3, 2021
The implications of not achieving the ‘Last Mile’

- STI point of care testing in outpatient clinics in Eswatini (feasibility study)
  - 7% of adults with CT/NG listed 27% of the partners
  - Only 50/102 (49%) of the partners were notified of STI diagnosis by partner

<table>
<thead>
<tr>
<th>Participants with 1 partner</th>
<th>Participants with 2 partners</th>
<th>Participants with 3 partners</th>
<th>Participants with 4+ partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>12</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Nuwagaba-Biribonwoha, H., Simelane S, Sithole T et al Undiagnosed sexually transmitted infections (STI) in high HIV recency settings (in progress)
Pathways to HIV/AIDS epidemic control

- Universal Treatment
- Population VLS, U=U
- Zero new infections
- Effective Combination Prevention
- PrEP, PEP, VMMC, Vaccine
- Zero stigma
- Zero discrimination

*Note: Undetectable is not a static destination!
More options for HIV Combination Prevention

The HIV Prevention Pipeline

Currently available:
- HIV treatment for people living with HIV/U=U
- Male & female condoms
- Voluntary medical male circumcision
- Syringe exchange programs
- Daily oral PrEP
- PEP
  (Event-driven for some populations)

Newly Approved and Recommended:
- Dapivirine vaginal ring
- Long-acting injectable

In development: Efficacy trials under way:
- Long-acting injectable
- Preventive vaccines
- Daily & monthly oral PrEP
- Combo oral PrEP/OC
  (Possible dual pill to market by 2024)

In development: Preclinical and clinical:
- Long-acting implants
- Preventive vaccines
- Multipurpose vaginal ring
- Broadly neutralizing antibodies
- Vaginal/Mucosal Inserts
- Patches
- Long-acting vaginal ring
- Douche
- Vaginal Film
- Vaginal Gel

And in implementation science projects:
www.prepwatch.org/resources/implementation-study-tracker/

The ongoing (unmet) need for combination prevention

Less than universal condom use among sexually active individuals

Sub-Saharan Africa: Condom use at last sex among AGYW 15-24 years with non-regular partner

5,000,000,000
Male and female condoms procured by UNFPA and partners (2018-2022), most of which were provided to countries in sub-Saharan Africa.

Source: 2023 UNAIDS Global AIDS Update: The path that ends AIDS
Is PrEP accessible?

PrEP knowledge, willingness to use PrEP among those HIV negative, and PrEP use by age and sex

Source: SHIMS3, 2021
PrEP Access vs PrEP use

- Compared objective oral PrEP adherence measures (plasma/DBS levels) to subjective measures (pill counts, self-report, electronic pill cap monitoring) in PrEP demonstration projects in Botswana, Kenya Uganda, South Africa, India, USA
- A pooled analysis of 6,296 women, 2,955 with objective adherence measures. Mean age 25 years.
- Overall HIV incidence: 32/6296 (0.72%)

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Cross-sectional Objective and Subjective Adherence by Visit (n = 2955)
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HIV Incidence Rates Among Women with Available Adherence Data (n = 2955)
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VMMC not at scale: A continuing missed opportunity

**Eswatini:** Self-reported male circumcision status among men aged 15 years and older by survey HIV test result

**Sub-Saharan Africa:** Coverage of VMMC among boys and men 15-49 years

Source: SHIMS3, 2021

Source: UNAIDS Global AIDS Update. The path that ends AIDS
Future Directions: Minding the Program Gaps

Men lag behind women in awareness of HIV-positive status

- Consider expansion and enhancements in HIV self-testing
- DSD models incorporating HIV self-testing

<table>
<thead>
<tr>
<th>Country</th>
<th>Uptake of HIV testing (per 1,000)</th>
<th>Standard of care</th>
<th>HIV self-testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rwanda</td>
<td>371</td>
<td>371</td>
<td>901</td>
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<tr>
<td>Eswatini</td>
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<td>Namibia</td>
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<td>Lesotho</td>
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<td>Malawi</td>
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<td>Zimbabwe</td>
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<td>Tanzania</td>
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<td>Cameroon</td>
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<tr>
<td>Cote d'Ivoire</td>
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Source: https://phia.icap.columbia.edu/
Gaps: Youth as priority population

95-95-95 Cascade in the Younger Population 15-24 years

PLWHIV (%)

Younger Population 15-24 years:
- Diagnosed
- On treatment
- Virally suppressed

Older Population (25+):
- Diagnosed
- On treatment
- Virally suppressed

PLWHIV (%)
Gaps: Key populations

- 2020 ZIMPHIA data in general population vs 2020 Zim BBS data
- 95’s almost achieved in general population, <50% of KP know their HIV status
- Population VLS among KP lower than general population: continued potential of HIV transmission
- <50% KP had disclosed their PLHIV status to their partner

HIV and STI biobehavioural survey among men who have sex with men, transgender women, and genderqueer individuals in Zimbabwe: Final Report, Aug 2020
## Exploring Differentiated Service Delivery Models for Prevention and Treatment

<table>
<thead>
<tr>
<th></th>
<th>Facility-based models</th>
<th>Community-based models</th>
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<tbody>
<tr>
<td><strong>Group models</strong></td>
<td>ART adherence clubs</td>
<td>Community ART Groups</td>
</tr>
<tr>
<td></td>
<td>Teen clubs</td>
<td></td>
</tr>
<tr>
<td><strong>Individual models</strong></td>
<td>Fast Track, Collect &amp; Go Appointment spacing</td>
<td>Community pharmacies Outreach models</td>
</tr>
</tbody>
</table>

- Ease medication pick-up/access
- Peer support and encouragement
- Reduce facility visits (or promote more convenient visits)
- De-congest facilities, more focus on emerging issues: co-morbidities
Embrace New Tools and Technology: Multipurpose Prevention Technologies (MPTs)

Pregnancy, Sexual Health, and HIV MPTs:
• A **dual-prevention pill** for the prevention of pregnancy and HIV
• A **vaginal ring** with the potential to prevent pregnancy, HIV and sexually transmitted infections
• **Injectables**
  • Shorten the time to real-world and scaled access to CAB-LA
  • Explore co-formulation with long-acting hormonal contraception
  • Expand PrEP education, sensitization, understanding uptake, reasons for non-uptake
• Continued investments in advancing **monoclonal antibodies and vaccines** development
Sustaining investments is crucial

Additional $8M expanding HST, LA PrEP reaches EHE 2030 goal

- Flatlined funding levels will hinder progress
- De-funding programs means 2030 targets will not be met

Summary

• Population VLS suppression and effective combination prevention are critical pathways to HIV epidemic control.

• Focus on key and target populations is crucial as countries meet the 95-95-95.

• Sustain gains in the 95-95-95: manage treatment fatigue, ART resistance, co-morbidities, maximize DSD opportunities.

• New research to expand PrEP options is important.

• Implementation science to understand real-world effectiveness, efficient delivery models and barriers.

Source: Global HIV Prevention Coalition, HIV Prevention Roadmap, 2025
‘… There are two main approaches to tackling the virus. One is to invent new medicines: ideally a cure or an effective vaccine. The other is to reach more people with existing technology’

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