Health and budget impact of combined HIV prevention

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Outline

- Context and objectives
- Modeling approach
- Model validation
- Results
- Conclusions

Disclosures

- The study was performed independently by Sebastian Vermeersch and supervised by Lieven Annemans
- hict and Lieven Annemans received financial compensation to perform this study as part of a consultancy agreement with Gilead.
New HIV diagnoses rates per 100 000 population, by country, in 2014 (West European WHO region)

European Centre for Disease Prevention and Control, WHO Regional Office for Europe. HIV/AIDS surveillance in Europe 2014.

4th highest!
Context & objectives

Can we make a difference?

Prevention!

Impact of prevention on

Epidemiology

Budget
Model scope & terminology

Treatment cost only

Outreach

Pre-exposure prophylaxis (PreP)

Treatment as Prevention (TasP)

Not included

Prevention

General prevention

Not included
Modeling approach
Model mechanics

Year

# Patients in medical follow-up

+ # New HIV diagnoses Entering follow-up

# Death

# NET LOSS =
+ # inflow (re-entering follow-up)
- # outflow (lost to follow-up)

Year+1

# Patients in medical follow-up
Model mechanics

# Patients in medical follow-up + # New HIV diagnoses Entering follow-up

# Death

# NET LOSS =
+ # inflow (re-entering follow-up)
- # outflow (lost to follow-up)
Model mechanics

- # Patients in medical follow-up
- # New HIV diagnoses Entering follow-up
- # Death

# NET LOSS =

+ # inflow (re-entering follow-up)
- # outflow (lost to follow-up)

- # unknown
- # Known, untreated
- # Treated, VL>200 copies/ml
Modeling prevention: Outreach & TasP

# Patients in medical follow-up

# New HIV diagnoses Entering follow-up

# Death

# NET LOSS = + # inflow (re-entering follow-up) - #outflow (lost to follow-up)

# unknown

# Known, untreated

# Treated, VL>200 copies/ml

Outreach

TasP
Modeling prevention: PreP

# Patients in medical follow-up + # New HIV diagnoses Entering follow-up = # Death

# NET LOSS = + # inflow (re-entering follow-up) - # outflow (lost to follow-up)

Population @ risk ➔ # treated PreP ➔ # infections avoided

PreP

infections avoided

# treated PreP

# New HIV diagnoses Entering follow-up

# Death

# Patients in medical follow-up
Costs included in the model

**HIV treatment:**
- € 12 330/year

**PreP:**
- € 6 328/year (before 2017)
- € 4 929/year (generics & cluster opening 2017)
- € 2 596/year (post 2017)

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1Vandijck et al., 2015
Additional principles

(Sub)population differences
- MSM, hetero, PWID

Differing ‘infectiousness’
- Undiagnosed, diagnosed but untreated, treated and VL>=200

HIV infections in migrants occurring prior to migration

Effect of aging HIV population
Model validation
Model validation - Actual vs estimated

- # patients in medical follow-up
- # new HIV diagnoses

2008 - 2015

- Adults in medical follow-up (Actual)
- Adults in medical follow-up (estimated)
- New diagnoses (actual)
- New diagnoses (estimated)
Results
Epidemiology
New HIV diagnoses in the absence of additional prevention effort

3% reduction in % undiagnosed (13% -> 10%)
3% increase in % patients on ART (89% -> 92%)
New HIV diagnoses - TasP

3% reduction in % undiagnosed (13% -> 10%)
7% (+4%) increase in % patients on ART (89% -> 96%)
8% (+5%) reduction in % undiagnosed (13% -> 5%)
3% increase in % patients on ART (89% -> 92%)
3% reduction in % undiagnosed (13% -> 10%)
3% increase in % patients on ART (89% -> 92%)
↗ 2 600 patients treated with PreP (90% MSM)
New HIV diagnoses – Combined prevention

- Old world
- New world

-52%
-60%
Total budget in the absence of additional prevention

+64%
Budget impact – Combined prevention

2014: € - 
2015: € 4,1
2016: € 6,9
2017: € 11,5
2018: € 12,8
2019: € 14,3
2020: € 11,1
2021: € 7,6
2022: € 2,4
2023: € -2,9
2024: € -8,3
2025: € -13,8
2026: € -19,4
2027: € -25,2
2028: € -31,0
2029: € -37,0
2030: € -43,0

MILLIONS
Total budget – Combined prevention

-17%

Old world
New world
Conclusions
Conclusions

Can we make a difference?

Impact of prevention on

- Epidemiology
- Budget
Conclusions

Can we make a difference?

Yes, we can!

Not investing in prevention = not an option!

\[ \Rightarrow \text{ new diagnoses} \quad \Rightarrow \quad \Rightarrow \text{ total budget} \]

Added value of combined prevention:

\[ \Downarrow \Downarrow \text{ new diagnoses} \quad \Rightarrow \quad \rightarrow \text{ total budget} \]
New HIV diagnoses and rates per 100 000 population, by country, in 2014 (West European WHO region)
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**Data sources**

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<thead>
<tr>
<th><strong>Main data source:</strong></th>
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<tbody>
<tr>
<td>WIV-ISP. <em>Epidemiologie van aids en hiv infectie in België. Toestand op 31 december 2014.</em></td>
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<td>Skarbinsky et al. <em>Human immunodeficiency virus transmission at each stage of the care continuum in the United States.</em> JAMA Intern Med 2015; 175(4):588-596</td>
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