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Cost effectiveness of HIV testing in non-traditional settings – the HINTS Study

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Background

- Efforts to reduce the undiagnosed fraction of patients with HIV have public health benefits in epidemiological terms
 - Prompt diagnosis and treatment with combination antiretroviral therapy (ART) have improved life expectancy to several decades (Losina, Freedberg 2011).
- But there is also an economic impact that should not be undervalued
 - early diagnosis translates in a cheaper drug treatment and complications management;
 - infection awareness reduces risk behaviours and transmissions, with consequent cost savings for avoided infections (Paltiel et al 2006).



The HIV testing In Non Traditional Settings - HINTS

- The HINTS study is a multi-site, observational study to test for HIV in non traditional settings within areas of diagnosed HIV prevalence $>0.2\%$
- Study conducted across four sites in London:
 - an Emergency Department (ED),
 - an Acute Care (medical and surgical admissions) Unit (ACU)
 - a Dermatology Outpatient Clinic (OPD)
 - a Primary Care Centre (PC).
- HIV testing was offered to patients attending the settings.
- Patients with a reactive HIV test were recalled to undergo confirmatory test.



HINTS study design

- Inclusion criteria:
 - all adults aged between 16 and 65 years: (i) not known to be HIV positive, (ii) and able to consent to a test.
- The model of testing varied according to clinical sites
 - Oral fluid-based in PC, ED, OPD using a 4th generation assay to detect HIV-1 antibodies (Duo test).
 - In the ACU, 4th generation HIV serology was performed on serum samples obtained during the inpatient admission.

Aim of this study

- Assess the **costs** and **cost-effectiveness** of routine HIV testing in non traditional settings in area of high prevalence

Primary outcome measures

- Number of patients undertaking the test, the results, the confirmatory tests (for each setting)
- Costs for testing and confirmatory testing on false reactive
- Costs for testing true positive
- Staff costs
- Promotional materials costs
- The total costs of the screening programme
- The effectiveness of the programme (numbers of newly diagnosed patients)
- **But.. True prevalence of undiagnosed HIV infection was not a primary outcome.**

Methods

- A cost analysis to assess the cost of the HINTS screening programme in the four settings.
- A cost-effectiveness analysis has been carried out using the cost data and the effectiveness outcomes (number of true positives newly diagnosed patients) from the HINTS study for each setting.
- A sensitivity analysis was conducted using data from the **Survey of Prevalent HIV Infection Diagnosed (SOPHID)**, Health Protection Agency, UK), to estimate true prevalence in each population and simulate results in different scenarios.

The analysis

- **Base case scenario** – the HINTS study: using the data coming from the real study carried out in the 4 settings;
- **SOPHID scenario**: using the SOPHID data we estimated the undiagnosed prevalence in each setting and run the analysis again with the new numbers assuming the same test uptake rate as in the HINTS study;
- **SOPHID best case scenario**: using the SOPHID data we estimated the undiagnosed prevalence and the numbers of undiagnosed patients in each setting and we run the analysis assuming a 100% coverage and 100% test uptake.



Costs

HINTS SCENARIO	EMERGENCY <i>C&W hosp</i>	OPD <i>Kings College</i>	ACUTE CARE <i>Homerton</i>	PRIMARY CARE <i>H&F</i>
Test type	Oral fluid (saliva)	Oral fluid (Oracol)	Whole serum	Oral fluid (Oracol)
Unitary cost for screening negatives	£ 5.60	£ 10.30	£ 2.50	£ 6.98
Unitary cost for confirm. testing on false reactives¹	£ 7.02	£ 24.00	£ 21.00	£ 18.40
Unitary cost to test positives²	£ 24.38	£ 30.92	£ 21.00	£ 25.76
Staff costs (including study coordinators costs)	£ 3,884.00	£ 25,000.00	£ 23,500.00	£ 21,815.00
Incentives to GPs for testing				£ 10 per test
Promotional material	£ 500.00	£ 500.00	£ 500.00	£ 500.00

¹ estimated based on local cost for serology and £6 for Insti

² estimated based on local cost for serology and £6 for Insti and £7.36 for Abbot Determine

Results: Base case scenario- HINTS study - outcomes

HINTS SCENARIO	EMERGENCY	OPD	ACUTE CARE	PRIMARY CARE	TOTAL
A. Attendances (n)	5541	1776	1388	6337	15042
B. Offered (n)	4070	898	623	1442	7033
<i>C. Coverage [B/A] (%)</i>	73.45%	50.56%	44.88%	22.76%	46.76%
D. Tests accepted (n)	2121	598	384	1002	4105
<i>E. Uptake [D/B] (%)</i>	52.11%	66.59%	61.64%	69.49%	58%
F. Reactives (n)	6	0	4	5	15
G. True positives (n)	4	0	4	0	8
H. False positives	2	0	0	5	7
I. Negatives [D-G]	2117	598	380	1002	4097
J. True negatives [I*SPECIFICITY]	2113	597	379	1000	4090

Results: Base case scenario- HINTS study - costs

HINTS SCENARIO	ED	OPD	ACUTE CARE	PRIMARY CARE	TOTAL
N. Total cost for screening negatives [K*I]	£ 11,844.00	£ 6,159.40	£ 950.00	£ 6,959.06	£ 25,912.46
O. Total cost for screening false reactive [L*H]	£ 34.04	£ -	£ -	£ 92.00	£ 126.04
P. Total cost to test true positives [M*G]	£ 97.52	£ -	£ 84.00	£ -	£ 181.52
Q. Staff costs	£ 31,384.00	£ 12,500.00	£ 11,000.00	£ 9,315.00	£ 64,199.00
R. Study coordinators	£ 12,500.00	£ 12,500.00	£ 12,500.00	£ 12,500.00	£ 50,000.00
S. Incentives to GPs for testing				£ 10,020.00	£ 10,020.00
T. Promotional material (patient info sheets and posters)	£ 500.00	£ 500.00	£ 500.00	£ 500.00	£ 2,000.00
U. TOTAL COST OF SCREENING HINTS [N+O+Q+R+S+T]	£56,359.56	£31,659.40	£25,034.00	£39,386.06	£152,439.02

Results: Base case scenario- HINTS study

HINTS SCENARIO	ED	OPD	ACUTE CARE	PRIMARY CARE	TOTAL
G. Nr. of true positives (prevalence %)	4 (0.19%)	0 (0%)	4 (1.9%)	0 (0%)	8 (0.19%)
U. TOTAL COST OF SCREENING HINTS [N+O+Q+R+S+T]	£ 56,359.56	£ 31,659.40	£ 25,034.00	£ 39,386.06	£ 152,439.02
V. Cost for a newly diagnosed HIV patient in HINTS [U/G]	£14,089.89		£ 6,258.50		£ 19,054.88

The cost of HIV testing per newly diagnosed patient is £ 19,054.88
in the HINTS study

Results: SOPHID scenario

Assumptions

- We estimated 77,700 individuals would attend the 4 sites over one year
- Using SOPHID data the modelled prevalence of undiagnosed HIV infection in this population, across the sites is 0.47% (range across sites)
- Specificity and sensitivity of tests is the same
- The staff would be able to approach the same proportion of patients as in the HINTS scenario
- The same uptake rate as in the HINTS scenario
- Length of the study: 1 year

Results: SOPHID scenario

SOPHID SCENARIO	ED	OPD	ACUTE CARE	PRIMARY CARE	TOTAL
G. Nr. of true positives	56 (0.26%)	49 (3.00%)	6 (0.50%)	9 (0.41%)	119 (0.47%)
U. TOTAL COST OF SCREENING SOPHID [N+O+Q+R+S+T]	£ 316,693.35	£ 80,947.68	£ 60,078.34	£73,495.44	£531,214.81
V. Cost for a newly diagnosed HIV patient in SOPHID [U/G]	£ 5,705.82	£ 1,646.62	£ 10,340.86	£ 8,528.64	£ 4,460.59

The cost of HIV testing per newly diagnosed patient is £ 4,460.59 in SOPHID scenario

Results: Best case scenario

Assumptions:

- All undiagnosed patients can be reached and tested, so 100% coverage and 100% test uptake
- Specificity and sensitivity of tests is the same
- Staff workload and costs reflect the higher coverage, so will increase proportionally
- Length of the study: 1 year

Results: best case scenario

BEST CASE SCENARIO	ED	OPD	ACUTE CARE	PRIMARY CARE	TOTAL
G. Nr. of true positives	145 (0.26%)	146 (3.00%)	21 (0.50%)	55 (0.41%)	367 (0.47%)
U. TOTAL COST OF SCREENING SOPHID [N+O+Q+R+S+T]	£ 558,841.76	£ 141,021.28	£ 92,377.62	£285,394.78	£ 1,077,635
V. Cost for a newly diagnosed HIV patient in best case scenario [U/G]	£ 3,854.08	£ 965.90	£ 4,398.93	£ 5,236.60	£ 2,940.34

The cost of HIV testing per newly diagnosed patient is £ 2,940.34 in the best case scenario

Conclusions

Cost for a newly diagnosed HIV patient	ED	OPD	ACUTE CARE	PRIMARY CARE	TOTAL
HINTS study scenario	£14,089.89	-	£ 6,258.50	-	£ 19,054.88
SOPHID scenario	£ 5,705.82	£ 1,646.62	£ 10,340.86	£ 8,528.64	£ 4,460.59
Best case scenario	£ 3,854.08	£ 965.90	£ 4,398.93	£ 5,236.60	£ 2,940.34

The results are really encouraging and suggest that a screening in a **high prevalence** area could identify HIV infected at a **very low cost**.

Conclusions

- These figures **do not take into account the cost savings** due to early diagnosis of HIV-infected individuals.
- Early diagnosis may have **further cost benefits** in terms of aversion of incident infections and early treatment of infected individuals.

References

1. Agency HP. HIV in the United Kingdom 2010: Health Protection Agency 2010 [24th January 2011].
2. Stohr W, Dunn D, Porter K, Hill T, Gazzard B, Walsh J, et al. CD4 cell count and initiation of antiretroviral therapy: trends in seven UK centres, 1997-2003. *HIV Med* 2007;8(3):135-41.
3. Krentz HB, Auld MC, Gill MJ. The high cost of medical care for patients who present late (CD4 <200 cells/microL) with HIV infection. *HIV Med* 2004;5(2):93-8.
4. Lucas SB, Curtis H, Johnson MA. National review of deaths among HIV-infected adults. *Clin Med* 2008;8(3):250-2.
5. Sullivan AK, Curtis H, Sabin CA, Johnson MA. Newly diagnosed HIV infections: review in UK and Ireland. *BMJ* 2005;330(7503):1301-2.
6. Losina E, Freedberg KA. Life expectancy in HIV. *BMJ* 2011;343:d6015.
7. Paltiel A, Walensky R, Schackman B, Seage G, Mercincavage L, Weinstein M, et al. Expanded HIV screening in the United States: effect on clinical outcomes, HIV transmission, and costs. *Annals of Internal Medicine* 2006;145(1):797-806.

Contact and questions

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