EPIDEMIOLOGICAL REVIEW

Monitoring the effectiveness of HIV and STI prevention initiatives in England, Wales, and Northern Ireland: where are we now?

A E Brown, S E Tomkins, L E Logan, D S LaMontagne, H L Munro, V D Hope, A Righarts, J E Blackham, B D Rice, T R Chadborn, P A Tookey, J V Parry, V Delpech, O N Gill, K A Fenton

Primary and secondary prevention are essential components of the response to HIV and sexually transmitted infections (STIs). We present findings from nationally implemented HIV/STI prevention interventions. In 2003, of those attending STI clinics at least 64% of men who have sex with men (MSM) and 55% of heterosexuals accepted a confidential HIV test; 88% of all HIV infections in women giving birth in England were diagnosed before delivery; 85% of MSM eligible for hepatitis B vaccination received a first dose of vaccine at their first STI clinic attendance; 74% of STI clinic attendees for emergency appointments, and 20% of those for routine appointments were seen within 48 hours of initiating an appointment; the National Chlamydia Screening Programme in England found a positivity of 10% and 13% among young asymptomatic women and men, respectively. Prevention initiatives have seen recent successes in limiting further HIV/STI transmission. However, more work is required if current levels of transmission are to be reduced.

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### Table 1: Summary of aims and outcomes of prevention interventions nationally monitored by the Health Protection Agency and its collaborators

| Prevention aim                                                                 | Year aim introduced | Indicator | Data source                     | Area covered | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|--------------------------------------------------------------------------------|---------------------|-----------|---------------------------------|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| **All STI clinics to offer VCT to all attendees on their first screening for STIs, and subsequently according to risk** | 2002                | Percentage MSM attending STI clinics accepting VCT | UAPMP         | E, W & NI | 47%  | 2956/6294 | 2903/6021 | 31%  | 2913/5781 | 396/6870 | 4637/7431 | 54%  | 4920/7697 | NA   | NA   | NA   |
| **To reduce the proportion of individuals newly diagnosed with HIV who have a “late diagnosis”** | NA                  | Percentage of MSM newly diagnosed with CD4 count below 200 cells × 10^9/l | CD4 surveillance | England & Wales | 30%  | 219/738 | 225/779 | 24%  | 239/890 | 254/1073 | 25%  | 255/1010 | 62%  | 2956/6553 | NA   | NA   | NA   |
|                                                                                                         | NA                  | Percentage of heterosexuals newly diagnosed with a CD4 count below 200 cells × 10^9/l | CD4 surveillance | England & Wales | 45%  | 206/459 | 246/625 | 44%  | 399/1315 | 578/1390 | 44%  | 674/1538 | 64%  | 2956/5812 | NA   | NA   | NA   |
| **The universal offer and recommendation of an HIV test as a routine part of antenatal care** | 1999                | Percentage HIV infected women diagnosed before delivery | UAPMP and NSHPC | England | 40%  | 113/284 | 192/327 | 71%  | 281/398 | 420/501 | 82%  | 536/650 | 88%  | 697/790 | NA   | NA   | NA   |
|                                                                                                         | 1999                | Percentage exposed infants becoming HIV infected | UAPMP and NSHPC | England | 13%  | 284/17 | 12%  | 37/398 | 6%  | 31/501 | 7%  | 43/650 | 5%  | 39/790 | NA   | NA   | NA   |
| **To monitor the proportion of HIV infected individuals on triple ARV or more** | NA                  | Percentage of diagnosed HIV infected MSM on triple ARV therapy or more | SOPHID        | E, W & NI | 56%  | 5231/9367 | 66/10156 | 66%  | 7144/10885 | 8011/12472 | 67%  | 9062/13593 | 65%  | 9911/15333 | NA | NA   | NA   |
|                                                                                                         | NA                  | Percentage of diagnosed HIV infected heterosexuals on triple ARV therapy or more | SOPHID        | E, W & NI | 50%  | 2158/4286 | 63/5251/5182 | 66%  | 4094/6296 | 5695/9046 | 64%  | 7631/12024 | 63%  | 9950/15717 | NA | NA   | NA   |
| **To offer all MSM hepatitis B vaccination at their first STI clinic attendance** | 2003                | Percentage MSM taking up first dose at their first STI clinic attendance | HepB3 survey  | England | NA   | NA   | NA   | NA   | NA   | NA   | 85%  | 5598/6553 | 39%  | 5598/6553 | NA   | NA   | NA   |
|                                                                                                         | 2003                | Percentage MSM taking up first dose | HepB3 survey  | England | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   |
| **To reduce waiting times at STI clinics** | 2004                | Percentage patients with emergency appoints seen within 48 hours | STI waiting times survey | England | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | 74%  | 1359/1843 | 20%  | 304/41520 | 7%  | 4960/6307 | NA | NA   | NA   |
|                                                                                                         | 2004                | Percentage patients with routine appoints seen within 48 hours | STI waiting times survey | England | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   |
|                                                                                                         | 2004                | Percentage patients with walk-in appoints seen within 48 hours | STI waiting times survey | England | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   | NA   |
| **To control genital chlamydial infection through early detection and treatment of asymptomatic infection among individuals aged under 25** | 2004                | Chlamydia prevalence among women aged under 25 | NCSP          | England | NA   | NA   | NA   | NA   | NA   | NA   | NA   | 10.1% | 1538/15241 | 13.3% | 156/1172 | NA   | NA   | NA   |
|                                                                                                         | 2004                | Chlamydia prevalence among men aged under 25 | NCSP          | England | NA   | NA   | NA   | NA   | NA   | NA   | NA   | 10.1% | 1538/15241 | 13.3% | 156/1172 | NA   | NA   | NA   |
| **To reduce the proportion of injecting drug users who share injecting equipment** | NA                  | Percentage current injectors who report sharing needles syringes | UAPMP         | E, W & NI | 32%  | 678/2138 | 478/2276 | 31%  | 672/2184 | 570/2001 | 33%  | 643/1934 | 34%  | 601/1775 | 29%  | 494/1677 | NA | NA   | NA   |
|                                                                                                         | NA                  | Percentage current injectors who report sharing other injecting equipment | UAPMP         | E, W & NI | 54%  | 1213/2252 | 1297/2418 | 52%  | 1191/2298 | 1029/2005 | 51%  | 947/1832 | 52%  | 830/1670 | NA | NA   | NA   |

*Health Protection Scotland; The Institute of Child Health (London); Collaborators on the Unlinked Anonymous Programme.*
HIV infection) in attendees of 16/232 STI clinics in England, Wales, and Northern Ireland undergoing syphilis tests. Out of 106/l (the recommended threshold for beginning therapy) at HIV diagnosis are categorized as having a "late HIV diagnosis."

Antiretroviral therapy monitoring among diagnosed HIV infected individuals
The annual Survey of Prevalent HIV Infections Diagnosed (SOPHID) provides a census of the total number of individuals receiving HIV related care in England, Wales and Northern Ireland. Subsidiary information is collected on ARV uptake and most recent CD4 count.

Uptake of hepatitis B vaccination among men who have sex with men
The HepB3 survey monitors hepatitis B vaccination uptake among eligible men who have sex with men (MSM) on their first STI clinic attendance. Since the study started in 2003, 187/209 English clinics have participated.

Chlamydia screening programme
The National Chlamydia Screening Programme (NCSP) aims to control genital chlamydial infection through early detection of asymptomatic infection outside STI clinic settings. From April 2003 to March 2004, 302 screening venues (including contraceptive clinics, GPs, young people's services, and termination clinics) participated from 10 programme areas. The target population is sexually active individuals aged under 25. Demographic and behavioural data are also collected.

STI clinic waiting times
Since 2004, a biannual audit of waiting times is conducted among all new attendees at all STI clinics in England for 1 week. Age and sex specific waiting times are collected for each clinic as discreet categorical units.

Behavioural and serosurveillance of injecting drug users
The UAPMP survey of injecting drug users (IDUs) collects self reported behavioural data (for example, injecting equipment sharing) in addition to measuring the prevalence of blood borne viruses among injectors attending 63 specialist services in England, Wales, and Northern Ireland. Sharing rates are calculated for those who reported injecting in the previous 4 weeks.

RESULTS: PREVENTION MONITORING UPDATE
VCT uptake
Overall, VCT uptake rose by 17% (95% CI 15% to 19%) from 47% (2956/6294) in 1998 to at least 64% (4920/7697) in 2003 among MSM and by 28% (95% CI 27% to 28%) from 27% (106/l) to 47% (2956/6294) in 1998 to at least 64% (4920/7697) in 2003 among heterosexuals (fig 1A and B). Of those who did not have VCT, at least 29% (817/2777) of MSM and 31% (11 312/36 419) of heterosexuals (fig 1A and B).

Descriptive epidemiology is the focus of the paper, but 95% confidence limits (95% CI) have been used to supplement main findings from the NCSP and the sentinel Unlinked Anonymous STI and IDU survey. All other prevention monitoring systems are comprehensive.
CD4 counts below 200 cells \(\times 10^6/\text{l}\). MSM are increasingly being tested at earlier stages of their infection\(^2\) (fig 2). HIV infected heterosexuals were more likely to be diagnosed late.

**Antenatal HIV testing**

In England, 88\% (697/790) of HIV infected women who gave birth in 2003 are calculated to have had their infection diagnosed before delivery. The majority of births to HIV infected women occurred in London where 89\% (455/511) of women were diagnosed before delivery (fig 3).

The proportion of children exposed to maternal HIV infection who acquire HIV is decreasing. Based on current estimated detection rates, 5\% of children exposed to vertical transmission would have been infected in England in 2003, compared to 17\% in 1998.

**Uptake of antiretroviral therapy**

Of MSM receiving HIV care, 65\% (9991) were receiving at least three antiretroviral drugs in 2003 compared to 56\% (5231) in 1998. Among heterosexuals, equivalent figures were 63\% (9956) and 50\% (2158). Thirty three per cent of MSM (5065) and 35\% (5466) of heterosexuals were not receiving HIV therapy in 2003.

**Uptake of hepatitis B vaccine among MSM**

MSM were considered to be eligible for hepatitis B vaccination (dose 1) if they were not known to be either immune or fully/partially vaccinated. Overall, 85\% (5598/6553) of eligible MSM were vaccinated with dose 1.

MSM eligible for the third vaccine dose (dose 3) included those who had had fewer than three doses, but excluded those who had had a booster dose, and those known to have immunity through blood testing following previous doses. The coverage rate for dose three was 39\% (2588/6624) overall but showed regional variation (fig 4). Nearly one half (46\%, 2588/5669) of MSM eligible for dose 1 completed the three dose course.

**STI clinic waiting times**

Nationally, 74\% (1359/1843) of emergency appointments, 79\% (4960/6307) of people attending walk-in clinics, and 20\% (3044/15 520) of people with routine appointments were seen within 48 hours. Lower proportions of 16–24 year olds and women of any age were seen within 48 hours. Full results have been published elsewhere.\(^{22}\)

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36 123) of heterosexuals are known to have been offered, but declined, VCT (fig 1C). Of those that declined VCT, 7\% (56/817) of MSM and 1\% (83/11 312) of heterosexuals were HIV infected.

The proportion of HIV infected individuals who could have been diagnosed during their attendance, but who left the clinic remaining unaware of their HIV infection, fell by 9\% (95\% CI 1\% to 17\%) from 48\% (104/217) in 1998 to 41\% (160/394) in 2003 among heterosexuals.

**Late diagnoses**

In 2003, 33\% (995/2982) of people with newly diagnosed HIV infection in England and Wales had CD4 counts below 200 cells \(\times 10^6/\text{l}\). MSM are increasingly being tested at earlier stages of their infection\(^2\) (fig 2). HIV infected heterosexuals were more likely to be diagnosed late.
The number of diagnoses is determined by interactions between transmission dynamics, migration of individuals from high prevalence areas, and the relative effectiveness of targeted testing. Increases in diagnoses represent both successes in increased testing in high risk populations as well as continued disease transmission within that population. The relative contribution of these factors is difficult to disentangle.

However, HIV incidence may be increasing among MSM attending STI clinics, whilst HIV prevalence among recently initiated injectors (those who began injecting in the previous 3 years) was at the highest level recorded in 2003, perhaps as a result of elevated levels of equipment sharing.

Are prevention initiatives reducing transmission?

Despite the individual success of many prevention initiatives, the number of HIV/STI diagnoses is increasing. In 2003 there were 6606 more HIV diagnoses than in 2002, double the 2835 diagnoses in 1998. The number of diagnoses is determined by interactions between transmission dynamics, migration of individuals from high prevalence areas, and the relative effectiveness of targeted testing. Increases in diagnoses represent both successes in increased testing in high risk populations as well as continued disease transmission within that population. The relative contribution of these factors is difficult to disentangle.

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The reasons for continuing transmission despite apparently successful prevention initiatives require consideration:

**Do prevention monitoring systems show the whole picture?**

In the United Kingdom, methods for monitoring prevention initiatives are pragmatic, simple, inexpensive and reach accessible populations—not necessarily those at greatest risk. Consequently, data are generally derived from those using health services, and will exclude high risk populations who have poor access to services.

Monitoring systems also collect limited data. While rates of STIs are higher among black and ethnic minority populations, few UK prevention monitoring systems collect ethnicity data, making it difficult to monitor the specific impact of prevention initiatives on such vulnerable populations.

Each prevention monitoring system has its own limitations.

**HIV testing**

All patients included in the Unlinked Anonymous STI survey are undergoing syphilis tests, therefore, VCT in this population may not represent all STI clinic attendees. The survey cannot monitor the frequency of repeat HIV testing (which may positively bias the results), or outcomes among first time attendees.

Diagnosis detection rates among HIV infected pregnant women are calculated by aligning diagnosis reports to the NSHPC with UAPMP prevalence data. Since data are anonymised, records are not individually matched. Limited matching may occur with respect to time and geography. Detection rates are minimum estimates and may rise as late reports are received by the NSHPC.

CD4 surveillance suggests MSM with HIV are being diagnosed earlier in their infection. However, the high proportion of heterosexuals categorised as having a “late diagnosis” may not accurately reflect recent efforts in VCT promotion; a high proportion of heterosexuals are infected abroad and may not have been resident in the United Kingdom long enough to have had an earlier diagnosis.

**ARV**

HIV infected individuals accessing health care show an increase in ARV uptake. However, it is difficult to calculate what proportion of HIV infected individuals should be on therapy. Guidelines state that individuals who have a CD4 count below 200 cells x10^9/l should begin therapy. Such guidelines are not directed from a public health perspective to prevent HIV transmission, but on the basis of individual need/readiness; patients may delay, interrupt, or stop therapy for many reasons.

The proportion of diagnosed HIV infected individuals with low CD4 counts on ARV is not routinely calculated because these specific fields are incomplete for a minority of records. In the future, this proportion may be calculated through cross linking to other HIV reporting databases.

**Hepatitis B vaccination**

The HepB3 study demonstrates that high proportions of MSM are vaccinated with dose 1 on their first STI clinic attendance, but lower proportions complete the three dose course. Patient identifiers are not collected, so it is impossible...
to monitor movement of patients between clinics. This, combined with reporting delay, may lead to an underestimate of the true performance.

**STI clinic waiting times**
Although the national waiting times survey show a high proportion of attendees cannot get a timely appointment, it is not possible to calculate the median waiting time since data is collected in categories.

**Chlamydia screening programme**
While the NCSP has improved access for chlamydia screening since its implementation in England, it is not currently possible to calculate national coverage. When the programme is fully rolled out throughout England, coverage will be calculated by dividing the number of people aged 16–24 screened by the total eligible population (sexually active population aged 16–24).

**Risk behaviour monitoring**
The Unlinked Anonymous IDU survey only includes those in contact with services for drug users and therefore the data may not be generalisable to all injectors, specifically, those not in contact with services, who may have different levels of risk behaviour.

**Are prevention initiatives effective?**
The effectiveness of prevention initiatives to reduce transmission requires assessment. For instance, although the promotion of VCT has reduced the proportion of HIV infected individuals leaving the clinic remaining undiagnosed, it may not target those who have been recently infected, who may be more infectious. Research is required to elucidate the role of “recently HIV infected” people in contributing onward HIV transmission. For IDUs, there is evidence of a recent shift in needle exchange provision towards pharmacy based services. Studies suggest that IDUs using pharmacy based services may be more likely to share equipment owing to absence of harm reduction counselling in these settings.

**Are prevention initiatives implemented on the correct scale?**
Since the prevalence of an infection drives onward transmission, recent increases in the prevalent pool of diagnosed and undiagnosed infections may limit the ability of prevention programmes to reduce transmission levels.

For example, the success in reducing the proportion of infants exposed to maternal HIV infection who become infected, has not substantially reduced the absolute number, because prevalence among pregnant women has increased.

Continuing investment in prevention activities is essential, and activities need to adapt to meet the challenge of the evolving epidemics.

**What next?**
While individual prevention initiatives have had an impact, and rates of ongoing transmission would have been higher in their absence, investment needs to be strengthened and sustained in order to reduce HIV/STI transmission. Current prevention initiatives partially accommodate the diversity of populations at high risk of infection, but require flexibility if they are to match the evolving epidemic. Evaluation of prevention initiatives, both individually and in combination, is needed to measure how much they reduce transmission.

Novel monitoring tools require development to assess prevention initiatives aimed at populations who have poor access to health services, but who play an important part in HIV/STI transmission.

Local and national surveillance systems are essential in ensuring that the effectiveness of prevention initiatives are continually reviewed and updated to meet the diversity of the needs of the populations at risk of HIV/STIs.

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Confidential reports of HIV infected pregnant women are collated at the Institute of Child Health by the National Study of HIV in Pregnancy and Childhood through surveillance schemes run in collaboration with the Royal College of Obstetricians and Gynaecologists and the British Paediatric Surveillance Unit of the Royal College of Paediatrics and Child Health. Research at the Institute of Child Health benefits from R&D funding received from the NHS Executive.

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**CONTRIBUTORS**
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**Key messages**
- Prevention activities have seen recent successes in limiting further HIV/STI transmission in England, Wales, and Northern Ireland
- High proportions of STI clinic attendees are having voluntary confidential HIV tests. HIV infected pregnant women are diagnosed before delivery; MSM are receiving hepatitis B vaccinations at their first clinic attendance
- Prevention monitoring activities may be missing at-risk populations who are likely to have an important role in onward HIV/STI transmission
- Existing prevention initiatives may only be having a limited effect on the current rate of HIV/STI transmission and require development to match evolving epidemics

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Authors’ affiliations
A E Brown, S E Tomkins, L E Logan, D S LaMontagne, H L Munro, V D Hope, A Righarts, J E Blackham, B D Rice, T R Chadborn, V Delpech, O N Gill, K A Fenton, HIV and STI Department, Health Protection Agency Centre for Infections, 61 Colindale Avenue, London NW9 5EQ, UK
P A Toolkey, Institute of Child Health (ICH), University College London, UK
J V Parry, The Sexually Transmitted and Blood-borne Viruses Laboratory, Health Protection Agency Centre for Infections, UK
K A Fenton, The Centre for Sexual Health and HIV Research, Department of Primary Care and Population Sciences, Royal Free and University College Medical School, London, UK

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