# HIV testing in patients presenting with indicator conditions in outpatient settings: offer and uptake rates, and educational and active interventions

Article (Accepted Version)

**HIV testing in patients presenting with indicator conditions in outpatient settings: offer and uptake rates, and educational and active interventions**

**Objectives:** Approximately 13% of people living with HIV in the UK are undiagnosed which has significant implications in terms of onward transmission and late diagnosis. HIV testing guidelines recommend routine screening in anyone presenting to healthcare with an HIV indicator condition (IC), however this does not occur routinely. This study aimed to assess the feasibility and effectiveness of using case note prompts highlighting the presence of an IC to increase HIV testing.

**Methods:** Clinicians in three outpatient departments received case note prompts either before or after a period of clinician-led identification. Test offer and uptake rates were assessed. A parallel anonymous seroprevalence study estimated the prevalence of undiagnosed HIV.

**Results:** 4191 patients had an appointment during the study period; 608 (14.5%) had an IC. HIV test offer was significantly higher when a prompt was inserted into notes (34.3% versus 3.2%, $p<0.001$). The prevalence of diagnosed HIV in the cohort was 4.1%. No cases of undiagnosed HIV infection were identified.

**Conclusion:** Despite guidelines, offer of HIV testing is low. Strategies to increase routine screening of patients presenting with an IC are needed. Individual case note prompts significantly increase HIV test offer, however the effect is lost if the strategy is withdrawn.

**Introduction**

In order to end the AIDS epidemic by 2030, the Joint United Nations Programme on HIV/AIDS (UNAIDS) set up an ambitious target to see 90% of people living with HIV aware of their status, 90% on sustained antiretroviral therapy (ART), and 90% virally controlled by 2020[1]. In the UK the last two targets have been exceeded with 96% of diagnosed HIV positive individuals on antiretroviral therapy (ART) and 94% of these are virally supressed[2]. However, 13% (95% Crl 10-17%) of individuals living with HIV in the UK still remain unaware of their infection[2]. Early diagnosis of HIV carries a good prognosis, yet in 2015, almost 40% of all adults newly diagnosed with HIV in the UK were diagnosed late[3] (with a CD4 cell count <350 cells/mm³ within three months of diagnosis or presenting with an AIDS defining illness within 90 days of diagnosis)[4]. Late diagnosis of HIV is the most important predictor of morbidity and short-term mortality amongst people living with HIV, with a ten-fold increased risk of death within the first year of diagnosis compared to individuals who are diagnosed promptly[5, 6]. In addition, undiagnosed infection has major public health implications, as it represents a missed opportunity for reducing onward transmission. Modelling data have suggested that up to 82% of new infections may have occurred through contact with an individual whose HIV is undiagnosed[7].

HIV testing guidelines suggest that HIV testing should be considered in all patients presenting with an indicator condition (IC) regardless of local HIV prevalence, and when registering with a general practitioner and in all general medical admissions where the HIV prevalence is high (exceeding 2 per 1000)[8, 9] High levels of test uptake in these settings suggest high acceptability among patients[10]. Despite this, offer of HIV testing by clinicians remain low[10, 11] and as a result, many individuals diagnosed late with HIV infection have presented to healthcare services in the two years prior without the diagnosis being made[12].

ICs are conditions that occur more frequently in HIV infected individuals, either due to shared modes of transmission or because their occurrence is facilitated by immune deficiency. Failure to recognise an IC has been identified as a barrier to offering an HIV test to eligible patients[13, 14].

This study aims to assess the feasibility and effectiveness of using case note prompts to increase HIV testing in secondary care settings. A parallel anonymous seroprevalence study was also undertaken in the same outpatient settings to determine the prevalence of undiagnosed HIV in the study population.

**Methods**

A two-stage prospective study (part A) and a parallel anonymous seroprevalence study (part B) were undertaken.

Part A

A two-stage prospective study was performed over a 12-week period between April and August 2012, at the Royal Sussex County Hospital and Brighton General Hospital in Brighton, UK. Case notes of all patients aged ≥16 years attending the dermatology, gastroenterology (including hepatology), and haematology outpatient department (OPD) were eligible and included in the study. A one-off education programme lasting approximately 30 minutes was delivered to the majority of speciality clinicians within the three participating

OPDs by a member of the HIV team. The session consisted of a departmental group tutorial and provision of written information. It covered information on the research project, national HIV testing guidelines, ICs relevant to that speciality, options for how to perform the HIV test (serum or saliva sampling) and how to manage results and refer to the HIV team within 24 hours for confirmatory HIV testing and linkage into care.

Within two weeks following the HIV education programme, the three OPDs were allocated into 2 stages depending on timing of the 'prompt' insertion in the clinical notes (Table 1). For the gastroenterology and haematology clinics, stage 1 relied on clinician-led identification of an IC and offer of an HIV test, without a prompt. This was followed by stage 2, which consisted of pre-identification of an IC by a member of the HIV research team and insertion of a prompt to consider testing in the case notes. For the dermatology outpatient clinic, these stages were reversed. Clinics were allocated to these stages due to their geographical location and expected research team availability.

| **Clinic specialty** | **Stage 1 (6 weeks)** | **Stage 2 (6 weeks)** |
|---|---|---|
| Gastroenterology | No prompt | IC prompt |
| Haematology | No prompt | IC prompt |
| Dermatology | IC prompt | No prompt |

Table 1. Study stages in Part A

All eligible case notes available for the clinic were assessed by the research team on the working day prior to each clinic, and for the intervention stage, a prompt was inserted into the notes. The prompt was a highly visible sticker inserted into individual clinical notes by a member of the research team where the entry on that day would be made. An IC was identified prior to the clinical appointment from referral letters. The prompt stated that an HIV IC was present, and that offer of HIV testing to the patient was recommended. The clinician was asked to indicate on the prompt sticker whether the test was offered and performed; and if the HIV test was not performed, the reason for this (pre-classified into: patient did not want to test for HIV, patient did not want to give a blood or saliva sample, known HIV positive, recent HIV test, no capacity, other reason to be specified). Participating OPDs were given the option of saliva or serum sampling for HIV testing. Gastroenterology and haematology teams opted for blood testing for HIV, and the dermatology OPD opted for saliva testing for HIV.

Part B:

Part B was a parallel anonymous seroprevalence study to estimate the prevalence of undiagnosed HIV within each participating OPD. Anonymised blood sample residues which had been obtained for routine clinical purposes in the 3 OPD settings were tested for HIV. Patients were excluded if no residual blood sample was

available. Samples were re-labelled with a study number to anonymise them irreversibly. Following testing, samples were discarded.

Statistical analysis

Data were analysed using SPSS software. Contingency tables were drawn for categorical data. Proportions were compared using chi square test, and Fisher's exact test was used where the numbers were too small for asymptotic assumptions to hold.

**Results**

OPD characteristics

A total of 145 clinics were reviewed during the 12-week study period, the majority of which were in the dermatology and gastroenterology OPDs. 4191 eligible patients had a booked appointment at one of the OPDs during this period (Table 2).

There was an overall IC prevalence of 14.5% during the study period. The highest prevalence was observed in the haematology clinic (22.7%, $p<0.001$) (Table 2). The prevalence of ICs was assumed to be the same during the control and intervention stages.

| **OPD** | **Number of clinics reviewed** | **Number of eligible patients with a booked appointment** | **IC prevalence (%)** |
|---|---|---|---|
| Dermatology | 57 | 2132 | 189 (8.9) |
| Gastroenterology | 50 | 1108 | 203 (18.3) |
| Haematology | 38 | 951 | 216 (22.7) |
| Total | 145 | 4191 | 607 (14.5) |

Table 2. Breakdown of appointments and patients per OPD

Patients included in analysis

Of the 607 individuals identified with ICs, 140 (23.1%) were excluded from analysis; 25 (4.1%) were already known to be HIV positive, 107 (17.6%) failed to attend their booked clinic appointment, and 8 (1.3%) had incomplete data. Analysis was conducted in the remaining eligible 467 participants (Figure 1).

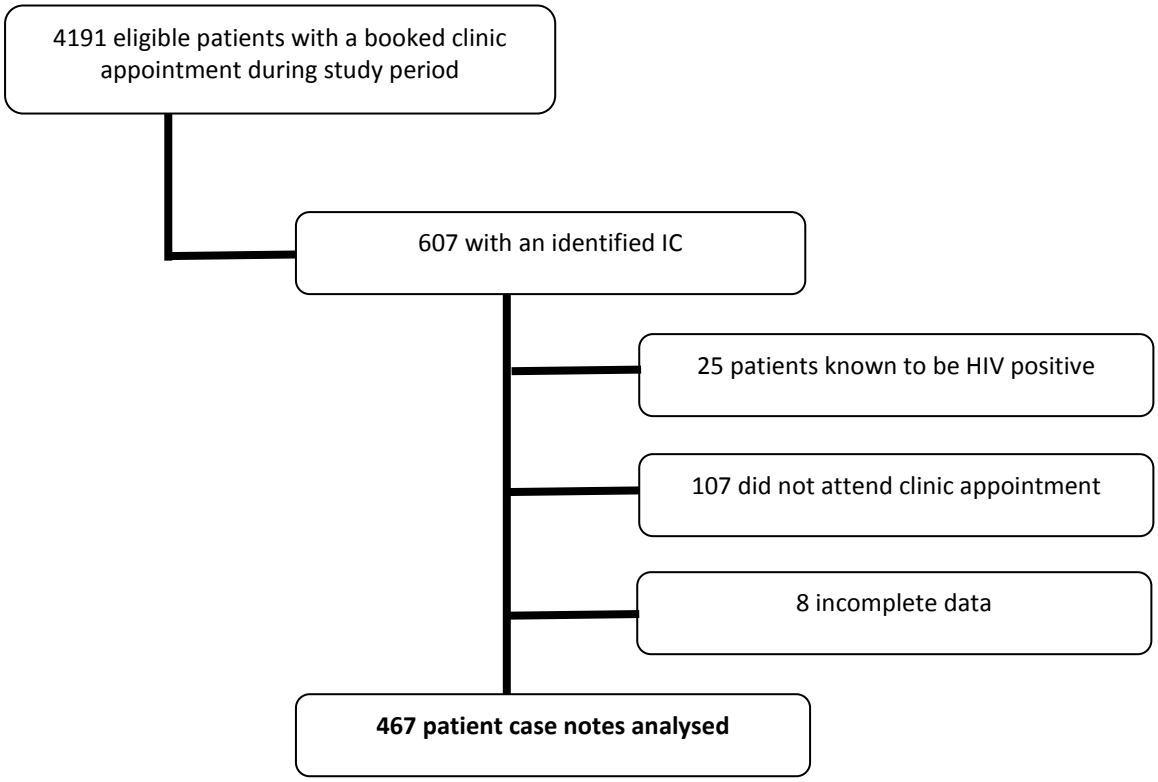


Figure 1: Cases included and excluded from analysis

Patient characteristics

Just over half of the patients were male (53.1%) and the majority of patients were white British/Irish (63.8%) (Table 3). Median age was 54 years (IQR 39-69).

| Characteristic | Number (%) |
|---|---|
| Gender | |
| Male | 248 (53.1) |
| Female | 217 (46.5) |
| Missing | 2 (0.4) |
| Ethnicity | |
| Asian | 30 (6.4) |
| Black African/Caribbean | 6 (1.3) |
| White British/Irish | 298 (63.8) |
| Other | 35 (7.5) |
| Missing | 98 (21.0) |

Table 3. Baseline characteristics of 467 patients evaluated

Case note prompts

Overall, 215 (46.0%) of case notes had prompts inserted during the study period (77; 35.8%, 60; 27.9%, 78; 36.3% in dermatology, gastroenterology and haematology case notes respectively) and 252 (54%) of case notes did not have a prompt inserted.

HIV test offer

Overall, 82 (17.6%) patients were offered an HIV test. Test offer was significantly higher during the prompt stage (74, 34.3%) versus non-prompt stage (8, 3.2%); p<0.001. There was a statistically significant difference in the offer of HIV testing between the different OPD, with a higher offer rate in the dermatology OPD (36, 27%) in comparison to the gastroenterology (18, 11%) or haematology OPD (28, 16%), p= 0.001. There was no significant difference in offer rate by patient age (p=0.189), gender (p= 0.888) or ethnic group (p= 0.506). Median age was not significantly different between those offered and not offered an HIV test (49.1 versus 52.7 years respectively, p= 0.111).

Reasons for not offering an HIV test

Documentation that an HIV test was not offered was present in 78 (36.3%) of the notes where a prompt had been placed, and in 60 (24.0%) of notes where a prompt was not added (Table 4). The most common reason documented for not offering an HIV was that a recent HIV test had been performed (33, 42.3% and 17, 28.3% in the prompt and non-prompt groups respectively).

| **Reason documented for not offering an HIV test** | **Prompt group (n=78) (%)** | **Non-prompt group (n=60) (%)** |
|---|---|---|
| Recent test | 33 (42.3) | 17 (28.3) |
| Test deemed to be inappropriate or not indicated | 18 (23.1) | 3 (5.0) |
| No capacity | 4 (5.1) | 0 |
| Did not want to test | 3 (3.8) | 1 (1.7) |
| Other | 2 (2.6) | 1 (1.7) |
| Reason not stated | 18 (23.1) | 38 (63.3) |

Table 4: Reasons for not offering an HIV test

Acceptability of HIV testing

Of the 82 patients offered an HIV test, data on whether a test was performed was available in 45 (54.9%) patients. Of these patients, 28 (62.2%) accepted the offer of an HIV test. No patients tested as part of this project were found to be HIV-positive.

Anonymous seroprevalence study

378 available residual serum specimens were tested as part of the anonymous seroprevalence study (part B). 66 (17.5%) of subjects who were tested as part of the seroprevalence study had an IC. No cases of undiagnosed HIV infection were identified in the anonymous seroprevalence study.

**Discussion**

Studies have shown that HIV prevalence among patients with an IC exceeds the 0.1% threshold for cost effectiveness of wider testing[11]. In this study, HIV test offer to OPD attendees with an IC was low despite a targeted educational programme, however test offer improved significantly with the addition of individual case note prompts highlighting the presence of an IC. Where the OPD started with the prompt stage (dermatology), the effect of prompting was lost upon withdrawal of the intervention, however overall offer of HIV testing was significantly higher during the entire study period compared to the other OPDs. This may indicate some residual benefit from prompting. The dermatology OPD was also the only department which opted for saliva testing for HIV rather than blood testing, due to the low frequency of routine blood tests in their OPD. In this cohort, saliva testing may have been more acceptable to clinicians and patients, however, further research is needed to verify this assumption.

The main reason given for not offering an HIV test was the patient having had a recent test. Whilst this provides some reassurance that patients in this high prevalence cohort report previous testing, data was not collected on whether an assessment of new or ongoing risk for HIV acquisition was performed and if the last test fell within the recommended screening window period. A European study showed that amongst patients diagnosed with HIV, more than half had previously recently tested negative[11], highlighting the need for regular testing for individuals at ongoing risk.

In 23% of cases, testing was not offered based on the OPD clinician's assessment that the test was inappropriate or not clinically indicated, despite presence of an IC and test prompt [9, 15]. Previous studies have indicated that clinician-directed targeting of HIV testing occurs, and results in missed HIV diagnoses in non-targeted patient groups[10], and that non offer of an HIV test despite the presence of an IC may be due to a focus on diagnosis and management of individual symptoms rather than consideration of the patient holistically[13]. At the same time, a benefit of IC based HIV testing is normalisation of HIV testing within investigation bundles and

removal of a need for individual risk assessment. A barrier to IC based testing strategy is poor identification of ICs by clinicians[14]. . Other reported barriers to wider HIV testing include time constraints, a lack of training, a perception that HIV is exceptional with regards to the consenting process, and operational barriers to testing[16]. Amongst case notes without a prompt, a higher than expected proportion (24%) had a statement about non-offer of an HIV test. This may be attributed to increased awareness of HIV testing following the educational session.

There were no new cases of HIV identified through either the OPD testing or anonymous seroprevalence parts of the study. This is likely due to the relatively small number of patients and samples tested respectively.

In order to meet the UNAIDS target, new strategies are urgently needed to normalise HIV testing as part of routine care outside of specialist Genitourinary Medicine (GUM) services, particularly in settings where the prevalence of HIV ICs are high. Despite their success in increasing testing, insertion of prompts in individual paper case notes is labour and time intensive and unlikely to be a feasible routine intervention in the long term. As more clinics adopt electronic records, automation of prompts in individual records of patients presenting with ICs or other risk factors may be feasible. Studies in the primary care setting and in hospitalised patients have shown that the use of reminders in electronic medical records can significantly increase the rate of HIV testing and new diagnosis[17-20]. Further evaluation of the feasibility and effectiveness of this strategy in specialty outpatient settings are needed.

**Strengths and weaknesses of the study**

Missing data, particularly within notes of the non-prompt group meant exclusion of some cases from analysis. However, the study included a large sample size in a cohort which had a high prevalence of ICs, making this an ideal setting for this study.

**Acknowledgments**

Authors would like to acknowledge Professor Martin Fisher for his invaluable contribution toward study design and data analysis.

**Funding acknowledgments**

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

**Declaration of conflicting interests**

The Authors declare that there is no conflict of interest

**Contributors**

NP and OD were involved in study design. EY, TS, AB and MH were involved in data collection. All authors were involved with data analysis and have reviewed the manuscript.

**References**


1. UNAIDS. 90-90-90 an ambitious treatment target to help end the aids epidemic. In: HIV/AIDS JUNPo, editor. 2014.
2. Kirwan P, Chau C, Brown A, Gill O, Delpech V, and contributors. Hiv in the uk - 2016 report. In: Public Health England, editor. 2016.
3. Chau C, Kirwan P, Brown A, Gill N, Delpech V. Hiv diagnoses, late diagnoses and numbers accessing treatment and care. In: Public Health England, editor. 2016.
4. Antinori A, Coenen T, Costagiola D, Dedes N, Ellefson M, Gatell J et al. Late presentation of hiv infection: A consensus definition. HIV Med. 2011 Jan; 12(1):61-4.
5. Chadborn TR, Delpech VC, Sabin CA, Sinka K, Evans BG. The late diagnosis and consequent short-term mortality of hiv-infected heterosexuals (england and wales, 2000-2004). Aids. 2006 November; 20(18):2371-9.
6. Brown AE, Kall MM, Smith RD, Yin Z, Hunter A, Delpech VC. Auditing national hiv guidelines and policies: The united kingdom cd4 surveillance scheme. Open AIDS J. 2012; 6:149-55.
7. Phillips AN, Cambiano V, Nakagawa F, Brown AE, Lampe F, Rodger A et al. Increased hiv incidence in men who have sex with men despite high levels of art-induced viral suppression: Analysis of an extensively documented epidemic. PLoS One. 2013; 8(2):e55312.
8. NICE. Hiv testing: Increasing uptake among people who may have undiagnosed hiv (joint nice and public health england guideline). In: NICE P, editor. 2016.
9. British HIV Association, British Association for Sexual Health and HIV, British Infection Society. Uk national guidelines for hiv testing. 2008.
10. Health Protection Agency. Time to test for hiv: Expanding hiv testing in healthcare and community services in england. 2011.
11. Sullivan AK, Raben D, Reekie J, Rayment M, Mocroft A, Esser S et al. Feasibility and effectiveness of indicator condition-guided testing for hiv: Results from hides i (hiv indicator diseases across europe study). PLoS One. 2013; 8(1):e52845.
12. Ellis S, Curtis H, Ong EL, (BHIVA) BHA, sub-committee BCAaS. Hiv diagnoses and missed opportunities. Results of the british hiv association (bhiva) national audit 2010. Clin Med (Lond). 2012 Oct; 12(5):430-4.
13. Womack J, Herieka E, Gompels M, Callaghan S, Burt E, Davies CF et al. A novel strategy to reduce very late hiv diagnosis in high-prevalence areas in south-west england: Serious incident audit. J Public Health (Oxf). 2017 Mar; 39(1):170-6.
14. Hunter E, Perry M, Leen C, Premchand N. Hiv testing: Getting the message across--a survey of knowledge, attitudes and practice among non-hiv specialist physicians. Postgrad Med J. 2012 Feb; 88(1036):59-65.
15. National Institute for Health and Care Excellence. Hiv testing: Increasing uptake among people who may have undiagnosed hiv (joint nice and public health england guideline). 2016.
16. AC T, Rayment M, Elam G, Atkins M, Jones R, Nardone A et al. Exploring staff attitudes to routine hiv testing in non-traditional settings: A qualitative study in four healthcare facilities. Sex Transm Infect. 2012; 88(8):601-6.
17. Goetz MBH, T.; Knapp, H.; Burgess, J.; Fletcher, M. D.; Gifford, A. L.; Asch, S. M.; Q. UERI-HIV/Hepatitis Program. Central implementation strategies outperform local ones in improving hiv testing in veterans healthcare administration facilities. Journal of General Internal Medicine. 2013; 28(10):1311-7.
18. Felsen UR, Cunningham CO, Heo M, Futterman DC, Weiss JM, Zingman BS. Expanded hiv testing strategy leveraging the electronic medical record uncovers undiagnosed infection among hospitalized patients. J Acquir Immune Defic Syndr. 2017 May; 75(1):27-34.

19. Chadwick DR, Hall C, Rae C, Rayment M, Branch M, Littlewood J et al. A feasibility study for a clinical decision support system prompting hiv testing. HIV Med. 2017 Jul; 18(6):435-9.
20. Kershaw C, Taylor JL, Horowitz G, Brockmeyer D, Libman H, Kriegel G et al. Use of an electronic medical record reminder improves hiv screening. BMC Health Serv Res. 2018 01; 18(1):14.