HIV testing in the acute medical unit

Despite therapeutic advances and widespread accessibility of highly active antiretroviral therapy (HAART), undiagnosed human immunodeficiency virus (HIV) infection remains a significant problem worldwide. In 2014 it was estimated that 103 700 people in the UK were HIV positive and approximately 17% (18 100) of these were unaware of their diagnosis (Public Health England, 2015). HIV causes progressive loss of peripheral CD4 cells with resultant immune compromise. This increases the risks of life-threatening complications such as HIV-associated tumours and opportunistic infections (e.g. tuberculosis, *Pneumocystis jirovecii* infection), conditions associated with high morbidity, mortality and cost.

Evidence from the INSIGHT START (Strategic Timing of Antiretroviral Therapy) trial (The INSIGHT START Study Group, 2015) supports the need for early diagnosis and immediate treatment and is leading to international changes in treatment recommendations. The study demonstrated a 72% reduction in serious AIDS-related events if the antiretroviral therapy was started immediately at diagnosis, regardless of CD4 count. Even with effective treatment, late diagnosis is associated with a 10-fold higher 1-year mortality and poorer treatment response (The INSIGHT START Study Group, 2015).

Earlier diagnosis can also lead to modification of risk behaviour and reduction of onward transmission (Fox et al, 2009). American models of transmission suggest that up to 50% of new transmissions are from persons who are unaware of their HIV status (British HIV Association, 2008). The multinational randomized HPTN052 trial has led to the concept of 'Treatment as Prevention' supported by the World Health Organization. In the HPTN052

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Table 1. Clinical indicator diseases

	AIDS-defining diseases	Other conditions where testing should be offered
Respiratory	Tuberculosis Pneumocystis	Bacterial pneumonia Aspergillosis
Oncology	Non-Hodgkin's lymphoma	Anal cancer Anal intraepithelial dysplasia Lung cancer Seminoma Head and neck cancer Hodgkin's lymphoma Castleman's disease
Neurological	Cerebral toxoplasmosis Primary cerebral lymphoma Cryptococcal meningitis Progressive multifocal leucoencephalopathy	Aseptic meningitis or encephalitis Cerebral abscess Space-occupying lesion Guillain–Barré syndrome Transverse myelitis Peripheral neuropathy Dementia Leucoencephalopathy
Dermatology	Kaposi's sarcoma	Severe or recalcitrant seborrhoeic dermatitis Severe or recalcitrant psoriasis Multidermal or recurrent herpes zoster
Gastroenterology	Persistent cryptosporidiosis	Oral candidiasis Oral hairy leukoplakia Chronic diarrhoea of unknown cause Salmonella, Shigella or Campylobacter Hepatitis B infection Hepatitis C infection
Haematology		Any unexplained blood dyscrasia including thrombocytopenia, neutropenia and lymphopenia
Ophthalmology	Cytomegalovirus retinitis	Infective retinal diseases including herpesviruses and toxoplasma Any unexplained retinopathy
Ear, nose and throat		Lymphadenopathy of unknown cause Chronic parotitis
Gynaecology	Cervical cancer	Vaginal intraepithelial neoplasia Cervical intraepithelial neoplasia grade 2 or above
Others		Mononucleosis-like syndrome (primary HIV infection) Pyrexia of unknown origin Any lymphadenopathy of unknown cause Any sexually transmitted infections

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trial a negligible onward transmission rate was demonstrated in sero-discordant couples in which the HIV-positive individual had achieved virological suppression on HAART (viral RNA <50 copies/ml; Cohen et al, 2012, 2013), again supporting the need for early diagnosis and early treatment from a public health perspective.

Testing guidelines in the UK

Genitourinary medicine clinics and antenatal services have led the way in offering universal opt-out HIV testing, contributing to 80% of all HIV tests performed in the UK (Health Protection Agency, 2011). The 2008 British HIV Association guideline for HIV testing highlighted the need for more widespread testing. The guidelines recommend testing any patient with 'clinical indicator diseases', i.e. diseases associated with HIV infection that become more prevalent as CD4 counts decline (*Table 1*). These include conditions such as oesophageal candidiasis, Kaposi's sarcoma, lymphomas, tuberculosis and cryptococcal meningitis.

Additionally, opportunistic screening based on prevalence data is advocated (*Table 2*, British HIV Association, 2008). Routine testing is currently recommended in any patient where local prevalence is >2 per 1000/population aged 15–59 years. In 2013, one in five local authorities in the UK had a population prevalence above this threshold (Health Protection Agency, 2011). The National Institute for Health and Care Excellence (2011a,b) has identified the need for targeted testing in certain high-risk individuals and has published separate guidelines on HIV testing in black African communities and men who have sex with men.

Despite improvements in the number of late HIV diagnoses (CD4 <350 cells/mm^3) made, from 1224 in 2005 to 643 in 2014 among heterosexual men, 1905 in 2005 to 738 in 2014 among heterosexual women and 1131 in 2005 to 974 in 2014 among men who have sex with men (Public Health England, 2015), clinicians are still failing to identify many HIV infections in asymptomatic individuals. The groups most likely to be diagnosed late in the UK were identified as heterosexuals and the elderly (Public Health England, 2014). Also, there is a marked geographical variation throughout the UK, with the highest rates of late diagnosis being observed in the east (52%) and north of England (42%) (Public Health England, 2014). One predictive model suggests that reducing the number of undiagnosed HIV infections by half would result in a 28% reduction of patients living with HIV and a detectable viraemia (Brown et al, 2014). The acute and emergency medical settings have a high patient turnover and are optimal platforms for opportunistic HIV testing. This article looks at the current evidence and barriers to HIV testing in line with British HIV Association recommendations.

Barriers to testing

A review based on UK, Canadian and Australian data looked at obstacles to universal HIV testing (Bolsewicz et al, 2015) (*Table 3*). These included intrapersonal (such as fear of negative diagnosis or low perception of own risk), interpersonal (patients' worries about confidentiality and fear of judgement or providers' lack of confidence in the topic or a fear of potentially uncomfortable interactions) and extrapersonal obstacles (access to testing centre, sharing of results).

The UK experience: testing in the acute medical unit setting

Since the British HIV Association recommendations, six UK-based studies have explored universal HIV testing in the acute setting. They are summarized

Table 2. Summary of 2008 British HIV Association recommendations for HIV testing

Local prevalence >2/1000	At GP practice registration	
	General medical admissions	
Universal testing must be offered in:	Genitourinary medicine and sexual health clinics	
	Antenatal services	
	Termination of pregnancy services	
	Drug dependency programmes	
	Health-care services for those diagnosed with tuberculosis, hepatitis B, hepatitis C and lymphoma	
Routinely offered and recommended	Patients presenting with a clinical indicator disease	
	Patients diagnosed with a sexually transmitted infection	
	Sexual partners of men and women known to be HIV positive	
	Men who have disclosed sexual contact with other men	
	Female sexual contacts of men who have sex with men	
	Patients reporting a history of injecting drug use	
	Men and women known to be from a country of high HIV prevalence (1%)	
	Men and women who report sexual contact abroad in countries of high prevalence (1%)	
Repeat testing	Recent negative test, but a possible exposure within the window period	
	Men who have sex with men – at least annually (if high ongoing risk of exposure consider more frequently)	
	Injecting drug users – annually or more frequently if clinical symptoms are suggestive of seroconversion	
	Antenatal care	Women who refuse an HIV test at booking should be re-offered a test and should they decline again a third offer of a test should be made at 36 weeks
		Women presenting to services for the first time in labour should be offered a point of care test. This may also be considered for the infant of a woman who refuses testing antenatally

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Table 3. Barriers to HIV testing		
Intra-personal		Fear of negative diagnosis
		Low perception of own risk
		Poor knowledge of the disease
		Poor awareness of available services (e.g. immigrants, men having sex with men who are not close to the gay community)
		Fears around employment and insurance
Inter-personal	Patients	Worries about confidentiality
		Fear of judgement
		Poor perceived expertise, knowledge and attitude of the provider
		Patients' unease about in-clinic interaction (extensive history taking and pre-counselling)
		Lack of confidence in the topic
	Providers	Fear of potentially uncomfortable interactions
		Lack of awareness of current guidelines
		Insufficient understanding of HIV epidemiology (e.g. underestimating individual's risk)
Extra-personal		Geographical location (distance, visibility, unsuitability) of the testing centre
		The need to book the test (disclosure to non-clinical staff)
		The need to return for positive results

in *Table 4* (Perry et al, 2010; Ellis et al, 2011; Burns et al, 2012; Rayment et al, 2012; Palfreeman et al, 2013; Phillips et al, 2013). The new diagnosis rate in the studies varied from 0.14% (Perry et al, 2010) to 2.2% (Burns et al, 2012), in all cases higher than the rate deemed to make universal testing cost effective (0.05%) (Paltiel et al, 2005). Importantly, two of the studies diagnosed HIV in asymptomatic patients with high CD4 counts and no indicator diseases (six of 20 new diagnoses in Croydon (Phillips et al, 2013) and six of ten in Leicester (Palfreeman et al, 2013)). Without universal testing, these cases may well have been missed.

The studies also showed that a large proportion of diagnoses were made in patients over 50 years of age, supporting extending the upper age limit for testing (Palfreeman et al, 2013). As part of one of the studies anonymous serological testing was performed which aimed to identify the prevalence of HIV in all acute hospital admissions, i.e. extending to orthopaedic, surgical and obstetrics and gynaecology. A further 2416 HIV tests were done, leading to four out of 1564 new diagnoses in acute surgery and four out of 542 new diagnoses in orthopaedics, supporting the need to expand testing beyond acute medicine (Perry et al, 2010).

HIV testing is generally considered both feasible and acceptable to patients, with patient questionnaires indicating acceptability rates of up to 97% (Burns et al, 2012). Between 66% (Rayment et al, 2012) and 92% (Perry et al, 2010) of patients offered an HIV test as part of the universal screening accepted it. The interaction with test providers was generally considered to be a positive experience.

The HINTS study (Rayment et al, 2012) showed a variation in acceptance rate depending on the test provider; medical students were most likely to successfully offer a test, followed by doctors, nursing staff and finally non-clinical staff. This observation may reflect the perceived expertise of a provider or the time allocated to discussions around testing. Reasons for declining testing included recent testing (54%), low perceived risk (47%) and other health concerns at the time of the offer (24%) (Rayment et al, 2012). Similarly in a further study patients indicated low perceived risk (59%), a recent negative test (7%), worry about the implications of a positive result (5%), and concerns about confidentiality (2%) as reasons for declining the test (Ellis et al, 2011).

Point of care testing was offered in some of the studies instead of or in conjunction with standard venepuncture. These are sensitive screening assays that are easy to perform and require little training (Winter et al, 2006). They offer the advantage of an immediate result in large numbers of individuals from a fingerprick test or mouth swab. While this is particularly useful in settings where venepuncture is not readily available such as community settings or when venepuncture is refused, the benefits must be weighed against the downsides of the test which include reduced specificity and sensitivity compared to laboratory-based serological tests. All positive results obtained by point of care testing must be subsequently confirmed by serological tests because of the higher rate of false positives (Winter et al, 2006).

Caution should be exercised if the patient is thought to be seroconverting or has been exposed to HIV within 21 days of presenting. In these cases point of care testing or rapid diagnostic tests will be of little value; screening via fourth generation tests (i.e. HIV antigen/antibody tests) in conjunction with plasma HIV RNA assays must be performed together with an antibody test 3 months post exposure.

The cost-effectiveness of HIV testing has not been fully evaluated in the UK. The data on which the UK recommendations are based come from the USA (Paltiel et al, 2005). In the USA, HIV testing is considered cost-effective when the positivity rate is more than one per thousand. The USA-based model showed that voluntary screening for HIV once every 3–5 years is justified by survival benefit and cost-per-quality adjusted life year gained (Paltiel et al, 2005). All the UK studies had a positivity rate in excess of this and by extrapolation this would be considered cost-effective. Establishing a UK-specific threshold of positivity for routine offer will be critical in informing future testing policies.

The most overwhelming barrier to universal testing, however, was the low test offer rate ranging between 15.6% (Ellis et al, 2011) and 44% (Rayment et al, 2012) in eligible patients. It was also evident that patients with clinical indicator diseases

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Table 4. Experience of HIV testing in the UK in acute medical settings

Study, sites, duration	Eligibility criteria	Local prevalence	Aids, mode of testing, provider(s)	Numbers of participants	New diagnoses	Characteristics of new diagnosis	Cost	Important points and challenges
RAPID, Burns et al (2012) central London acute admissions unit, 2010 (16 weeks)	19–65 years, stable condition, not tested in the past 3 months	Not stated	Information video, point of care testing (finger prick), health advisor	606 eligible, 153 offered test (25%), 135 accepted (88.2%)	3/135 (2.2%)	No characteristics described	£21 per patient, £1083 per case of HIV identified	97% acceptability (questionnaire), 90% liked the video aid (consistent message, overcomes linguistic barriers), no approach bias
HINTS, Rayment et al (2012) emergency department, acute admissions unit (outpatient department, primary care), August 2009–September 2010 (12–15 weeks depending on setting)	16–65 years, not known to be HIV positive, accessing health-care setting for first time over the testing period, able to consent	>2/1000	Multilingual leaflet, emergency department: point of care testing saliva, acute admissions unit, outpatient department, primary care: venepuncture, staff (medical students, nurse, doctor, non-clinical)	Pooled data across all sites 13 855 eligible, 6194 offered test (44.7%), 4105 accepted (66.3%)	8/4105 (0.2%)	No characteristics described	No data	92% acceptability (questionnaire), doctors and nurses not feeling comfortable offering the HIV test themselves (emergency department 57%; acute care unit 42%; primary care 75%; outpatient department 63%), staff identifying the need for additional training before routinely offering tests (72%), operational barriers: lack of time, perceived low risk decreased the uptake
Leicester, Palfreeman et al (2013), acute admissions unit, August 2009–July 2010 (12 months)	15–59 years	2.83/1000	Multilingual posters, leaflets, venepuncture, doctors	5517 eligible, 938 tested (17.0%), no data on patients declined	10/938 (1.1%)	All diagnoses >45 years, five >50 years, indicator disease at presentation in four cases, four from high prevalence area, four had CD4 <350 cells/mm^3, six had CD4 >350 cells/mm^3	No data – cost effective based on national recommendations	Large variation of testing between consultants
Croydon University Hospital, Philips et al (2013), acute medical unit, July 2011–2013 (21 months)	16–79 years, capacity to consent	4.78/1000	Posters, emails and articles in trust intranet, welcome package for patients, adapted acute medical unit proforma, venepuncture, staff trained by HIV team (workshops)	12 682 eligible, 4122 tested (32.5%) No data for overall rate of offer but 84% in sample of 154/183 who accepted	20/4122 (0.48%)	Median age = 41.3 years, 14/20 (65%) had clinical indicator disease, six patients tested because they had a clinical indicator disease, the remaining 14 because of the universal testing policy, median CD4 = 313 cells/mm^3	£4.98, £20 527 for 4122 tests	Six diagnoses (30% of new diagnoses) made solely on basis of the policy (i.e. without clinical indicator disease) and picked up at high CD4 count (early in the disease), three patients were >59 years, short patient stay on acute medical unit, rapid staff turnover, use of bank staff contributed to low coverage rate
Brighton and Sussex, Perry et al (2010), acute medical unit, August 2009–January 2010	16–79 years, capacity to consent, unknown to have HIV	7.38/1000	Opt-out testing, medical doctors	3913 eligible, 1553 offered test (39.7%), 1413 accepted (91%)	2/1413 (0.14%)	Both diagnoses CD4 <350 cells/mm^3, both clinical indicator diseases, one seroconverter, one positive pa rtner	No data	Targeted testing by clinicians, clinician variability in offering testing, good acceptability among patients
Newcastle, Ellis et al (2011), acute medical unit, 2009– 2011 (26 weeks)	Over 18 years, capacity to consent	1.62/1000	Training by infectious diseases team: presentations, group tutorials, information leaflet, physician and physician assistants	3753 eligible, 478 offered test (15.6%), 396 accepted (82%)	2/396 (0.5%)	Both patients had clinical indicator disease (pneumocystis pneumonia), both patients had CD4 <50 cells/mm^3	£3.88 per test	Low test offer rate, poor confidence of medical staff as a barrier to testing (i.e. misconception that extensive pre-counselling is required), patient barriers: low perceived risk (59%), recent negative test (7%), worried about the effects of a positive result (5%), acute medical unit not appropriate environment (5%), concerns about confidentiality (2%)

Table 5. How to do it yourself? Tips on offering an HIV test in any setting

Who can test?		Any doctor, midwife, nurse or trained health-care worker should be competent to conduct an HIV test
Pre-test discussion		The purpose is to establish informed consent – a documented verbal consent is sufficient. If the patient refuses, document the reason
		A lengthy pre-test discussion is not necessary
		Essentials to cover: benefits of testing and how the result will be shared
		Arrangements for results sharing should be agreed upon at the time of testing, particularly when performed in an outpatient or emergency setting. A negative test result could be shared in non-direct ways: telephone, email, text message if necessary. A positive result should be given by the testing clinician directly to the patient. Similar arrangements are also recommended for patients with a non-negative result (equivocal or reactive), inpatients, vulnerable patients, those with mental health problems and those who do not speak English as their first language
Post-test discussion	HIV negative result	Emphasize the need for repeat testing at 3 months if patient is still in the window period after exposure
		Arrange specialist advice or referral to genitourinary medicine/HIV services if patient is at high risk of repeat exposure (for advice around risk reduction and post-exposure prophylaxis) or if the result comes back as equivocal or reactive
	HIV positive result	Ensure there is an appropriate environment to relay the diagnosis together with a direct and clear discussion
		Use a translation service if the patient's first language is not English
		Identify local specialist services and a pathway for onward referral before the discussion
		Anyone with a new HIV-positive diagnosis should be seen by an HIV clinician, specialist nurse or sexual health advisor preferably within 48 hours of receiving the result (2 weeks at most)
		Leave more detailed discussion regarding staging, treatment and partner notification to the specialist genitourinary medicine/HIV team

were still more likely to be tested despite the emphasis on universal testing (Ellis et al, 2011; Palfreeman et al, 2013). There was marked inter-clinician variability in offering the test with variation between 3% and 22% (Palfreeman et al, 2013). Staff reported uneasiness about offering the test (emergency department 57%, acute admissions unit 42%) and additional training was requested by a large proportion of the staff (Rayment et al, 2012). Operational issues affecting feasibility were also raised. This included lack of time, lack of appropriate environment, language barriers, the phlebotomist not having authorization to do the test, or lack of specialist services for onward referral on site. Another reason given for poor testing rates was rapid turnover of medical assessment unit staff, reliance on agency staff and a short time spent by patients in the department.

Offering an HIV test

Offering the test is a straightforward process that does not require extensive pre-test counselling and can be done by a doctor, nurse or any trained health-care practitioner. The essentials of the testing process, pre-testing communications and communicating a positive result as outlined by British HIV Association (2008) guidelines are summarized in *Table 5*.

It is essential at this point to recognize and respect each patient as an individual; pre-test discussions may vary according to the presenting complaint, presence of indicator disease, patient's needs, personal anxieties and previous beliefs or misconceptions. There is no consensus as to what may increase the uptake of HIV testing but assurance of confidentiality, normalizing the testing process and an open-minded attitude are likely to help. The HINTS study (Rayment et al, 2012) found that the uptake was highest when the test was offered by medical students. Although the authors did not look into this finding more closely, one could speculate that contributing factors may have included longer time taken to explain the test, empathy and engagement, all of which form a non-judgmental and trusting image of the test provider. It may also indicate that HIV is less stigmatized among younger generations of health professionals, and that this may have been reflected in the consent process. Testing can be viewed in a positive light; deemed as empowering and responsible, it lends an opportunity to dispel myths about HIV status as well as enabling early treatment to avoid serious complications and consequences of untreated illness (National Institute for Health and Care Excellence, 2011a).

Testing when the individual's capacity to make a decision is lacking might seem difficult and fraught with legal ambiguities. However, the process should follow the same rules as with any other informed consent procedure (British HIV Association, 2008). In such cases all attempts should be made to maximize the patient's capacity to give consent. It should be considered whether the loss of capacity is transient or permanent. If it is likely to be permanent and there is no relevant power of attorney or advance statement, HIV testing may be undertaken if it is believed to be in the patient's immediate clinical interests, for example to aid the diagnostic process. The situation is different when HIV testing of an individual is to benefit another person, for example a health-care worker sustaining a needlestick injury from an unconscious patient where HIV would be unrelated to their clinical presentation, e.g. a road traffic accident. In such cases it would be unlawful to test for HIV.

Conclusions

Despite HIV testing being considered feasible, acceptable to patients and cost-effective, the test-offering rate remains disappointingly low. The main barriers to testing are staff-related and include a lack of awareness of current national and local guidelines, misconceptions and apprehension regarding the testing process. This highlights the need for further education of health-care professionals together with the integration

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of HIV testing into standard care pathways, for example as part of the clerking proforma, or via inclusion as a local performance indicator, e.g. Commissioning for Quality and Innovation payment framework.

The high proportion of new diagnoses in patients over 50 years old indicates that testing should be extended to include older age groups. Although the current British HIV Association guidelines focus on general medical admissions, the evidence suggests that universal testing should apply to all specialities. In areas of the UK traditionally considered 'low prevalence' such as Leicester and Newcastle (Ellis et al, 2011; Palfreeman et al, 2013) there is a need for increased staff awareness to improve the diagnosis and early management of HIV infection. **BJHM**

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KEY POINTS

- An estimated quarter of HIV-positive people in the UK are unaware of their status.
- Early diagnosis of HIV and immediate commencement of highly active antiretroviral therapy leads to improved outcomes, and reduced HIV transmission risk.
- British HIV Association guidelines suggest testing every patient aged 15–59 years in general practice and medical assessment units where the local prevalence is >2/1000.
- Despite the current guidelines, testing offer rates remain poor.
- Offering an HIV test is considered acceptable to patients in many medical settings; the main barriers identified in the UK-based studies were staff related, including lack of staff confidence and uncertainty regarding the testing process.
- Further education and staff training is necessary to raise awareness and implement HIV testing into standard care pathways.
- Expansion of testing across other specialties, e.g. surgery, as well as extending the upper age limit for testing are further steps towards the universal HIV testing, justified by the available data.

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