2020 European Guideline on HIV Testing

Deniz Gökengin1,2, Eleri Wilson-Davies3, Arzu Nazlı Zeka4, Josip Begovac5, Nikos Dedes6, Olga Tarashenko7, Milena Stevanovic8, Raj Patel9

1Ege University, Faculty of Medicine, Department of Clinical Microbiology and Infectious Diseases, Izmir, Turkey

2Ege University HIV/AIDS Research and Practice Center, Izmir, Turkey

3Southamptom Specialist Virology Center, University Hospitals Southampton, United Kingdom

4Dokuz Eylül University, Faculty of Medicine, Department of Clinical Microbiology and Infectiou Diseases, Izmir, Turkey

5Department of Infectious Diseases, University Hospital for Infectious Diseases, University of Zagreb School of Medicine, Zagreb, Croatia

6Positive Voice, Athens Greece

7Head Center of Hygiene and Epidemiology, Federal Medical-Biological Agency (FMBA) of Russia, Moscow, Russia

8Clinic for Infectious Diseases and Febrile Conditions, Skopje, Former Yugoslav Republic of Macedonia

9Solent NHS Trust, Southampton, United Kingdom

Background

In 2014, the Joint United Nations Program on HIV/AIDS (UNAIDS) set out global targets to end AIDS by 2030. By 2020, the target was to reach the so-called 90-90-90 treatment target [90% of all people living with HIV (PLHIV) diagnosed, 90% of those diagnosed on antiretroviral treatment (ART), 90% of those on treatment virally suppressed].1  Progress toward these targets varies significantly between countries and regions within Europe and Central Asia.2, 3 The European Centre for Disease Prevention and Control estimate that 80% of all PLHIV in Europe and Central Asia have been diagnosed with HIV (87% in the West sub-region, 83% in the Centre, and 76% in the East).4 Of those that have been diagnosed with HIV, a significant proportion are diagnosed late. In 2018, 53% of HIV-infected persons presented with a CD4+ T cell count below 350 cells/mm3 and 31% presented with less than 200 cells/mm.3,5 This implies that access to and uptake of HIV testing remains an important public health issue in Europe.

Aim

The main purpose of this guideline is to provide advice on testing for HIV infection in individuals aged 16 years and older who present to sexually transmitted infection (STI), genito-urinary (GU) or dermato-venereology (DV) clinics across Europe. Its aim is to provide details of best practice and offer practical guidance to clinicians and laboratories to identify those patients that should be offered an HIV test. The guideline may also be applied in other clinical settings including community settings where HIV testing is required, providing best practice requirements can be met. Decisions to follow this guideline must be based on professional judgment, consideration of individual patient circumstances and available resources.

Method

The 2014 European Guidelines on HIV Testing was the starting basis for the present guidelines, which have been reviewed and updated throughout. 6 The search strategy is described in Appendix 1. The grading system used in the guidelines is described in Appendix 2. In addition, the following guidelines and reports were reviewed in detail:

* British HIV Association (BHIVA)/British Association for Sexual Health and HIV (BASHH)/British Infection Association (BIA) Adult HIV Testing Guidelines Consultation,7
* Centers for Disease Control and Prevention (CDC) Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health-care Settings,8
* Centers for Disease Control and Prevention Quick reference guide: Recommended laboratory HIV testing algorithm for serum or plasma specimens,9
* 2019 US Preventive Services Task Force. Screening for HIV Infection: US Preventive Services Task Force Recommendation Statement,10
* HIV indicator conditions: guidance for implementing HIV testing in adults in healthcare settings,11
* UNAIDS and World Health Organization (WHO) Working Group on Global HIV/AIDS/STI Surveillance Guidelines for Using HIV Testing Technologies in Surveillance: Selection, Evaluation, and Implementation,12
* WHO Guidance on Provider-initiated HIV Testing and Counseling in Health Facilities,13 and
* European Centre for Disease Prevention and Control. Public health guidance: HBV, HCV and HIV testing in the EU/EEA: an integrated approach. 2018 14

Goals of HIV testing

The primary goals of HIV testing are to:

* identify HIV-infected individuals as early as possible and immediately link them into appropriate medical management and care;
* provide care, information and counselling for HIV-negative individuals at risk of HIV acquisition;
* reduce HIV transmission to others from those infected; and
* initiate partner notification and provide counselling, testing and referral to prevention services as required for partners of HIV-positive persons.

Benefits of HIV testing

Early knowledge of HIV infection has many benefits. Initiation of antiretroviral therapy (ART) before severe immunosuppression and onset of disease has been shown to dramatically improve life expectancy and quality of life. This underpins the need to test asymptomatic individuals, with a high risk of acquiring HIV infection including those attending STI clinics 15­-20 **(1 A)**. Antiretroviral treatment also markedly decreases the risk of HIV transmission by reducing viral burden and consequently the infectivity of diagnosed individuals. Individuals on ART who achieve and maintain viral suppression are considered non-infective for their sexual partners, this is often abbreviated to “Undetectable=Untransmissable (U=U)”. 21-24 Furthermore, diagnosed individuals significantly reduce sexual and needle-sharing risk behaviours, especially with uninfected partners to whom they have disclosed their HIV status. 25-31

Who should be tested for HIV in STI clinics?

HIV is predominantly sexually transmitted in most parts of Europe.5 We therefore recommend universal opt-out testing of all sexually active individuals that present for medical care in the following circumstances:

* All individuals who seek care in STI/GU/DV clinics regardless of signs or symptoms of disease or risk factors for infection should be offered an HIV test, as part of the initial screening for STI. 32 **(1 B)** It is recognized that in some settings such as DV clinics a targeted approach may be preferred; in such settings, however a low threshold for recommending HIV testing is encouraged **(2 B)** and data show high rates of patient acceptability. 33 If universal testing is not possible , targeted testing should be recommended to those individuals particularly at risk including (but are not limited to):
  + those with symptoms compatible with acute retroviral illness or immunosuppression; 11 **(1 A)**
  + those with a past or current history of STI11,34; **(1 A)**
  + individuals who have been sexually assaulted; **(1 B)**
  + known sexual contacts of people infected with HIV 35; **(1 A)**
  + known sexual contacts of patients with an STI **(2 D)**
  + sexually active men having sex with men (MSM) 36, 37; **(1 A)**
  + transgender women 38, 39 ; **(1 A)**
  + transgender men; 38, 39 **(2 C)**
  + those who inject drugs and share needles; 40, 41 **(1 A)**
  + those with a new sexual partner; **(2 D)**
  + those reporting sexual contact with a partner from a country with a high HIV prevalence regardless where contact occurred; 42 , 43 **(1 A)**
  + contacts of people at recognized risk of HIV infection; **(2 D)**
  + those who exchange sex for money or goods; **(2 D)**
  + individuals who received blood or other blood products before introduction of routine HIV screening (in most European countries this is before 1985); **(1 A)**
  + any pregnant woman regardless of risk factors; 44 **(1A)**
  + Several ‘‘indicator’’ conditions have been identified as occurring more often in HIV-infected persons and thus providing a crucial opportunity for diagnosis of HIV infection.11 Although data on HIV prevalence across different clinical conditions are still emerging, 34, 45-47 many testing guidelines now recommend indicator condition-guided HIV testing. 7, 13,14 IUSTI guidelines endorse the adoption of the indicator disease strategy for HIV testing in health care settings in Europe and recommend HIV testing of individuals who present to an STI clinic with any of the indicator conditions. For more detailed information on indicator condition-guided testing, please refer to <http://www.eurotest.org/Portals/0/Documents/Guidance.pdf.pdf?ver=2014-01-29-113626-000>.
  + persons who voluntarily seek testing, especially if they have never been tested before; 48, 49 **(2 B)**
  + children of mothers with HIV who have no documented evidence of a previous negative test; **(2 D)**
  + persons who are using pre-exposure prophylaxis (PrEP). **(1 A)**

Re-testing for HIV

In addition to newly presenting individuals to the healthcare setting, all cases that tested negative for HIV should be offered and be encouraged to have repeat HIV testing if there is ongoing risk 50-53 **(1 A)**. The optimal frequency of re-testing is still unknown due to lack of data. Annual re-testing for ongoing risk is suggested unless specific aspects of risk behaviour warrant more frequent testing (e.g. every 3–4 months). 51-58 Testing frequency should be based in part on the level of risk and requires a dialogue between the provider and the patient, which will include test history and any risk behaviours. **(2 D)** Further information can be found on testing frequency for specific key populations in the Public Health Guidance on HIV, Hepatitis B and C Testing in the EU/EEA.14 Individuals with ongoing risk exposures should be counselled about risk reduction strategies and may be candidates for PrEP **(2 D)**.

Pre-test assessment and counselling

The HIV pre-test assessment should be pragmatic and patient-centred and be tailored for the individual patient. Some studies outside of the GU setting show that pre-test counselling could be a barrier for HIV testing; 59-61 the key element is obtaining verbal informed consent to the test. 7,14,62 Pre-test counselling is important to assess the likely window period (the time from possible exposure to the HIV test becoming positive) and whether repeat testing should be advised, in addition to describing how and when the test result will be given **(2 D)**. One randomized controlled study in a prenatal setting reported that extensive pre-test counselling would not be required and that a short pre-test assessment was as effective as a long session for a patient’s decision to take an HIV test. 63 However, there is no study comparing extensive and abbreviated assessment sessions in GU settings. Depending on circumstance, the components of pre-test assessment may include the following: 6, 64

* Provide information on the benefits of HIV testing including the health benefits of early diagnosis and treatment, and the opportunity to reduce risk behaviour and risk of transmission to sexual partners or infants **(2 D)**;
* Obtain a full sexual history and history of other types of risk behaviour (including date of last risk activity); **(2 D)**
* Obtain HIV testing history (including the time, setting, reason and result of prior testing); **(2 D)**
* Ensure knowledge of condom use and include a practical demonstration if needed. If appropriate, discuss risk reduction and the need for referral to other services, e.g. drug dependency treatment, support services and groups, needle exchange programmes, etc.; **(2 D)**
* Offer testing for other STIs; **(2 D)**
* Offer post-exposure prophylaxis after sexual exposure (PEPSE) if indicated and available, in agreement with national policy. Detailed information on PEPSE can be found on the BHIVA website (<http://www.bhiva.org/PEPSE.aspx>); **(2 D)**
* Offer or refer persons to PrEP services if indicated; **(2 D)**
* Give an opportunity to the individual to ask questions and answer them clearly; give more in-depth information if required; **(2 D)**
* Advice the patient to adopt safe sex behaviours and to follow national blood donation policies until the testing process is over. **(2 D)**
* Provide information on home-based self sampling/testing if available and endorsed by national guidelines. **(2 D)**

A novel approach for testing is online access to postal sampling/test kits and many services offer this tool in an attempt to provide wider access to easier and early testing. Although these are usually supported by a web taken history with the opportunity for high risk individuals to be fast-tracked into face to face clinical services, many higher risk patients often prefer to use this relatively anonymous tool for initial testing. In this case, it may be difficult to cover all the elements of pre-test assessment. In such cases, results, particularly positive ones are followed up with an urgent voice call and individuals directed into traditional services for thorough assessment, confirmatory testing and care. For those with negative tests any risks that require modification and support should also trigger refferal to clinics. **(2 D)**

Informed consent

* HIV testing should not be coercive or mandatory 14, 62 except for the screening of donated blood, organs or other bodily tissues. Verbal communication is sufficient for obtaining informed consent. **(2 B)** Obtaining written consent is a barrier to HIV testing and opt-out testing rates were shown to increase if testing requires only oral consent. 65-71
* If a patient declines or defers HIV testing, this decision should be documented in the medical record but kept confidential. The reasons why they have made that choice should be explored to ensure that these are not due to incorrect beliefs about the virus, the consequences of testing or needle phobia (which can be overcome with less invasive sampling). **(2 D)**
* Declining an HIV test should not result in reduced quality or denial of services that do not depend on knowledge of HIV status. 62, 64 **(2 D)**
* An information leaflet 72 **(2 B)** or a video 73, 74 **(2 B)** about HIV testing can provide or replace much of the information needed prior to obtaining informed consent, and is effective in many settings. The information should be prepared in an easy to understand and informative way, be concise and be available in the languages commonly encountered in populations within the service. 64, 72

Individuals below the legal age of consent

All children born to mothers with HIV should be routinely tested for HIV as per national guidelines. A negative HIV test will usually exclude infection at 18 months but may need to be repeated at 2 years as the passive maternal antibody may still be present in some cases.75 Children born to HIV positive mothers who do not have evidence of a negative test (eg. born elsewhere) should be tested for HIV at the first feasible opportunity. **(2 D)**

Special considerations apply in the case of adolescents who are below the legal age of consent. The pre-test discussion should be adapted to the patient’s age, developmental stage and literacy level. 64 Since the legal framework, including the age of consent for sexual intercourse and offering testing and treatment services to adolescents varies between countries, relevant national guidelines should be consulted. If a national guideline is not available, advice is available from recent WHO/UNAIDS Guidance on provider-initiated testing and counselling in health facilities 64 **(2 D)**.

Testing without informed consent

Where a patient is unable to give informed consent for HIV testing due to physical or mental incapacity-for example, if critically ill and unconscious-HIV testing might be indicated to help diagnose the cause of the illness in the patient’s best interests. In all cases where HIV testing is performed without informed consent, the health-care provider must be able to justify their actions and must take into consideration national legal and regulatory frameworks, guidance from national professional bodies and consensus opinion from experienced colleagues. 7, 62

Confidentiality

Individuals undergoing HIV testing should be informed that testing and test results will remain confidential. 7,14,62,64 However, individuals when indicated, should also be advised that confidentiality is not absolute and that health-care providers may be legally bound to disclose HIV status information in exceptional circumstances. **(2 D)** Since this may create a major barrier for testing, testing centers offering anonymous testing may be an option to overcome this if in aggreement with national policy. 76-78 **(2 D)** Self-testing and self-sampling are additional options to overcome barriers related to confidentiality as they offer a highly confidential testing setting and are free of perceived stigma. 79

Recommendations for the laboratory

Specimens

Many types of specimens such as plasma, serum, whole blood-venous or finger-prick, dried blood spots (DBS) and oral (gingival crevicular) fluid can be used for HIV testing. Each specimen type has specific advantages and disadvantages. The choice of the specimen depends on the population to be tested, transport options, testing site, and the HIV screening/testing strategy and subsequent confirmation algorithm. For accurate and reliable results, specimens must be collected, stored, transported and tested appropriately. 14,80 **(2 D)** Especially when using samples other than venous blood, the full testing pathway should be subjected to rigorous training and quality assurance. 80 **(2 D)** Further information on collection, storing, transportation and processing of specimens can be found in Guidelines for Using HIV Testing Technologies in Surveillance. UNAIDS/WHO Working Group on HIV/AIDS/STI Surveillance. 2009. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK305270/pdf/Bookshelf_NBK305270.pdf>

HIV screening and confirmatory tests

Screening serology test

* The most common approach is to use a highly sensitive screening test. Fourth generation screening assays-either in the form of standard ELISA or rapid diagnostic tests (RDT) that simultaneously test for HIV-1/2 antibodies (IgG/IgM) and p24 antigen should be used wherever possible due to their ability to detect HIV infection early. 81 **(1A)** This reduction in the window period indentifies patients with the highest risk of transmission, enabling behaviour modification and a reduction in risk. 82 Use of a third generation (IgM/IgG) assay for screening must be restricted to situations where an antibody/antigen assay is unavailable due to insurmountable logistical or financial restrictions. Standard laboratory ELISA assays available in Europe have excellent sensitivities (99.78–100%) and specificities (99.5%–99.93%). 83-86 Fifth generation assays [Conformité Européenne (CE) marked] that can both detect p24 antigen and discriminate between HIV-1 and HIV-2 antibody are becoming available. These may be used in place of a 4th generation assay after completion of adequate local quality assurance. **(2 D)** Test providers should be fully aware of the qualifications, sensitivity and specificity of the tests, and their window period of diagnosis, to interpret test results accurately and to determine if and when re-testing is required.85, 86  For more details on rapid diagnostic tests please see below.
* Nucleic acid amplification tests (NAATs), typically plasma HIV-1 RNA testing, are not recommended for initial HIV screening because they offer only a marginal advantage over fourth generation screening assays in detecting recent HIV infection. 81 **(2 D)** They can be useful in confirming infection and in circumstances where antibody production may be impaired. 87-89 The role of NAAT testing is controversial in PrEP users in whome acute HIV infection is suspected because HIV RNA was shown to be significantly lower among PrEP users compared to the placebo group, causing dealys in the detection of infection. 90, 91

Confirmation of detection in a screening assay

* Detection of HIV in the screening test should be confirmed in a laboratory with experience in HIV confirmation **(2 D)**;
* Confirmatory algorithms vary. Until recently, they included at least one additional antibody only test that employed a different platform from the initial screening test. 92 The more recent approach is to use a sensitive and highly specific test different from the screening test for confirmation. 85, 86 The confirmatory test should be an HIV-1/HIV-2 differentiation antibody assay and the final laboratory report must clearly indicate whether the patient has an HIV-1, HIV-2 or dual infection. 92 **(2 B)** Countries should refer to their national guidelines for confirmatory algorithms.
* Repeat serology testing of a second sample is recommended to rule out mislabelling and confirm patient identity. **(2 D)** It may be replaced by testing a plasma sample for HIV-1 RNA, provided the viral load is >1000 copies/mL and HIV-2 infection has been excluded in the first sample. In patients with a lower or undetectable viral load, a second serum sample must be collected for repeat serological testing. 93 **(2 D)**

Confirmation of indeterminate/equivocal serology results

An indeterminate screening test may indicate a possibility of recent infection. 81  Where there are other indications of a possible recent infection (i.e. high-risk behavior history, clinical signs and symptoms) and availability of fast turnaround NAAT technology, the best strategy is to test the initial specimen for HIV-1 RNA (or in some cases p24 antigen) to provide evidence of ongoing seroconversion. Otherwise one should obtain a follow-up specimen 1-2 weeks later for repeat testing. **(2 D)** If on the follow-up sample the fourth generation test is clearly positive then a diagnosis of recent seroconversion can be made. 94, 95 In all cases seroconversion should be confirmed on a follow-up specimen. **(2 D)**

Recent HIV infection

For individuals who test positive with the screening test but who have negative or indeterminate results with the confirmatory test, HIV-1 RNA testing is indicated to rule out acute/recent HIV infection. 85 **(2 D)** If HIV-1 RNA is detected, infection should be confirmed by demonstrating seroconversion in a sample collected 1–2 weeks later. Low HIV-1 RNA values (<1000 copies/mL) should be interpreted with caution and not considered as indicative of infection in the absence of further evidence **(2 D)**. In settings where NAATs are not widely available or affordable, or in circumstances where there is no suspicion of a recent HIV infection, NAATs are replaced by a fourth generation screening test repeated 1–2 weeks later **(2 D)**. The process of seroconversion may be prolonged in some cases such as elite controllers. 96

Quality control

* All HIV testing and confirmation should be done in accredited laboratories under strict quality control. **(2 D)**Where a national laboratory accreditation scheme is not available, testing should be undertaken only using approved (i.e. CE-IVD) tests under a strict quality assurance programme; quality assurance results should be made available for inspection where requested. **(2 D)**
* RDT services should be subject to the same strict quality assurance principals as practiced by accredited laboratories. **(2 D)** Backup provided by a referral laboratory is a prerequisite for all testing and counselling facilities. This includes quality assurance training for the individual with responsibility for the test (ideally this is provided by the accredited referral laboratory associated with the service), using standard operating procedures (SOPs), regular use of negative and positive controls, external quality controls and an external quality assessment process where available. Regular onsite audits should be performed to confirm that SOPs are being followed, records are maintained, adequate training has been provided, internal and external quality standards are used. A second test is required if the RDT is reactive; this must use different antigens and/or a different platform and should be performed in an accredited laboratory whenever possible.97-99
* Local rules and regulations should be followed for storage of plasma/serum samples. **(2 D)**
* Laboratories should provide their latest external quality control scores to their users upon request.**(2 D)**

Interpreting HIV test results

The health-care provider should be aware of the

* HIV testing algorithm used in their laboratory;
* HIV screening test used in their laboratory;
* capability of their laboratory to distinguish between HIV-1 and HIV-2 infections.

Interpreting negative HIV test results

* Individuals whose specimens test negative on the initial HIV screening should be considered uninfected unless the patient presents with symptoms of primary HIV infection or has a history of recent (≤6 weeks for fourth generation assays, ≤12 weeks for other assays) high-risk exposure. In the case of recent exposure, the tests should be repeated at 6 weeks to 12 weeks (according to the test to be used) from the time of exposure. 81,85-87, 100-102 **(1 B)**
* Individuals with a high-risk exposure to HIV should not be fully reassured until the test process is completed. 103 **(2 D)**
* When using fourth generation assays, individuals who have a negative screening test after 6 weeks of exposure may be recalled for a follow-up in specific circumstances, e.g. if post-exposure prophylaxis (PEP) was given for any reason (e.g. occupational or sexual exposure), with patients who are very anxious and seek further reassurance, individuals who are using PrEP, where there is impaired ability to develop antibodies and where there is microbiologically proven simultaneous acute infection with another viral pathogen, such as hepatitis B and/or C virus. 104-108 In this case, the final testing time may be 12 or 24 weeks after exposure. **(2 C)**
* For individuals presenting for PEP in the occupational setting, local professional regulations may vary in terms of immediate testing for HIV or postponing HIV testing and storing a baseline venous blood sample at start of prophylaxis for retrospective testing in case follow-up testing is positive. Healthcare providers should follow their relevant local rules and regulations. Patients presenting for PEPSE however should be tested at the start of PEPSE. 109 In individuals using PrEP or PEP/PEPSE, seroconversion was shown to be delayed; thus, rapid HIV tests are not recommended as the sole mode of HIV testing in this context. 110,111 **(2 B)**
* If a patient presents with clinical symptoms suggestive of HIV infection or AIDS and the HIV screening tests are repeatedly negative, then referral of the specimen to a specialized laboratory for analysis using alternative tests to exclude uncommon HIV strains is recommended. **(2 D)**

Interpreting positive HIV test results

* A person should not be informed that he/she is HIV positive based on an initial result of a screening test alone without a confirmatory test **(2 D)**.
* Attention should be paid to whether HIV-1 or HIV-2 (or both) has been diagnosed as it has important prognostic and treatment implications.

Interpreting indeterminate and unconfirmed HIV test results

* HIV screening tests occasionally produce reactive results that prove not to be consistent with HIV infection.
* In cases where the initial reactive screening test cannot be confirmed, the result is reported as ‘indeterminate’ and a second blood sample should be requested **(2 D)**. The first and second blood sample should be separated by at least two weeks.53 Please see “Confirmation of indeterminate/equivocal serology results” above.
* Weakly reactive screening results that do not become more strongly reactive and cannot be confirmed on a subsequent, appropriately timed sample are highly likely to indicate a non-specific reaction, i.e. false-positive result. **(2 D)**

Rapid diagnostic tests/Point of care tests

Rapid HIV tests have become an important tool to encourage HIV testing. Rapid tests are typically capillary flow tests where whole blood (e.g., fingerprick or venous), serum, plasma, or gingival crevicular fluid (commonly identified as oral fluid) can be used as the specimen. 86 Their major advantages include the visibility of the test, simple-to-use procedures, rapid turn-around time, availability of on-site results and avoidance of clerical errors. These tests allow individual screening of clients, eliminating long waiting times and providing a highly confidential environment for the tested individual. They also can be used outside of healthcare facilities (i.e. community-based testing centers or venues visited by key populations) and in the field (i.e. mobile clinics) by appropriately trained lay-providers. Rapid tests have been shown to be highly acceptable 112 and to increase testing uptake in various settings such as harm reduction services, pharmacies, STI clinics and among migrant populations. 113-120

The major drawback of rapid HIV tests has been their reduced sensitivity and specificity relative to laboratory-based tests and the likelihood of false negative results in early HIV infection because until recently, rapid tests were only able to detect IgG +/- IgM. 97, 98, 121-124 While the introduction of the first antigen/antibody sensitive rapid test was expected to improve the performance of RDTs, its performance was also shown to vary in several studies with excellent sensitivity for antibody detection but variable, suboptimal sensitivity for p24 antigen. 110, 125-128 A newer version of the same test has proved to have a much higher antigen sensitivity. 111, 129-131 CE-IVD-marking in Europe, FDA approval in the US and WHO prequalification requires high sensitivity (100% for CE-IVD, ≥99% for FDA and WHO) and specificity (≥99% for CE-IVD and FDA, ≥98% for WHO) to avoid a missed diagnosis due to a false-negative or a false-positive result. 111 However, test performance may vary in real life depending on many factors such as the clinical stage of the patient, the genetic characteristics of the etiologic agent, specimen type used or the tested population.

Specimen choice is flexible with RDTs and most of the tests work well with capillary or venous whole blood, serum or plasma.80, 86, 132, 133 Gingival crevicular fluid may also be an option for several RDTs; however, it has beenshown to have significantly lower antibody concentrations compared to plasma. Thus, RDTs using gingival crevicular fluid may be subject to more variation in assay performance and sensitivity. 86, 129,134-136

Rapid tests that screen for HIV-1 RNA have been shown to be highly sensitive in both acute and chronic HIV infection but have had limited uptake due to technical challenges such as their requirement for plasma samples and complex preparation. 137

In the light of the abovementioned evidence, these guidelines recommend the following:

* Health-care providers should familiarize themselves with the performance characteristics of the test adopted as they guide their use and interpretation **(2 D)**.
* Health-care providers should be aware that the performance of rapid HIV tests (including combined antibody/antigen tests) may differ and be subject to variation depending on the training of the healthcare worker performing the test, the clinical status of the patient, the genetic characteristics of the virus, specimen type used or the tested population. **(1 B)** Acute HIV infection may be a critical blind spot for RDTs, and healthcare providers should keep in mind that they may give false negative results in early infection. **(1 B)**
* As with all tests, the positive predictive value of a reactive test is reduced in low prevalence settings meaning that false positive results will occur to a different extent depending on the setting and population undergoing screening. 115
* Obtaining a blood sample for laboratory testing is recommended in all patients with reactive or indeterminate results and in patients with a negative test if recent infection is suspected. 9,138, 139 **(1 B)**
* Sites using RDTs should collaborate with the local laboratory and have robust quality assurance programmes in place. 92, 121 **(2 D)**

Self-sampling

Self-sampling is defined as the collection of a blood or saliva sample by the individual him/herself and posting it to a designated laboratory for testing. Self-testing is testing the self-collected sample by the individual using a rapid diagnostic kit and interpreting the result according to the manufacturer’s instructions. Both methods are additional options to increase the uptake of HIV testing by providing a flexible and non-stigmatizing testing environment. 14

Although the experience with self-sampling and self-testing is limited, studies have reported that both are acceptable with high levels of satisfaction 140-149, capture never-tested populations and increase testing frequency and positivity rates for HIV, compared to other settings. 140,145,149-152, 157

The largest body of evidence for both methods is with MSM and migrants with very limited evidence for other populations. 148,149

The major limitations of self-sampling are difficulty obtaining a blood sample 153, lack of support from healthcare providers 154 and the vitally limited evidence on linkage to care after sampling. 155,156 In addition, the testing laboratory does not have any independent verification of the sample identification or the duration since sampling, as well as the conditions under which the sample has been taken and transported. The major perceived barriers for self-sampling and self-testing are reported as lack of support in case of a positive result and the individual’s capacity to run the test accurately. 147, 157,158 In addition, self-testing kits do not always offer integrated testing for HIV, hepatitis B and hepatitis C viruses.

Based on the evidence on self-sampling and self-testing, these guidelines recommend:

* Self-sampling and self-testing is acceptable and may contribute to increased testing uptake and case detection especially in specific key populations such as MSM. These guidelines recommend their use in STI, GU and DV clinics to increase testing uptake especially among individuals who would not be tested otherwise, **(1 A)** providing they are allowed by national laws and regulations.
* Self-sampling and self-testing kits may be distributed through various channels including STI clinics.
* Since evidence is limited on linkage to care after self-sampling and self-testing, clear pathways should be defined for access to appropriate support and medical care. **(2 D)**
* Countries are recommended to discuss and change local regulations to allow for access to or distribution of self-sampling and self-testing kits. **(2 D)**

Post-test issues

Health-care providers should take care that the HIV test result and its delivery should remain confidential, as for all healthcare associated patient information **(2 D)**.

Post-test discussion for individuals who are negative

* Face-to-face post-test discussion is generally preferred for providing results, but alternative methods, such as telephone, letter or texting, may be appropriate in some instances **(2 D)**. If alternative methods are used a standard procedure should be developed to ensure that the information is received by the tested individual **(2 D)**.
* Discuss the window period and address the need for a repeated test in those with high-risk behaviour within the last 6–12 weeks (according to the test used).
* Encourage safe sex behaviour, particularly addressing behaviour change regarding unsafe sex or the maintenance of safer sexual practices; provide and demonstrate how to use condoms if necessary.
* Use the opportunity to refer persons with particular high-risk behaviours to HIV and other prevention services, e.g. drug-dependency treatment, support schemes, needle exchange programmes, PrEP, etc. For detailed information on PrEP use please refer to BHIVA/BASHH guidelines on the use of HIV pre-exposure prophylaxis (PrEP) 2018. (https://www.bhiva.org/PrEP-guidelines)

Post-test discussion for individuals with inconclusive test results

* Post-test discussion for individuals with inconclusive test results should be done face-to-face whenever possible **(2 D)**.
* An explanation should be provided on the significance and possible reasons for an inconclusive HIV test result.
* The nature of the additional tests that are required to resolve the inconclusive result should be explained.
* The importance of ongoing follow-up until the inconclusive result is resolved should be stressed.
* Discuss safer sex and safe drug-use behaviour until the indeterminate result is resolved.
* For persons reporting high-risk behaviour, discuss the possibility of acute HIV infection and consider additional NAAT testing or ask for a repeat sample 1-2 weeks later, particularly for pregnant women who have not been tested previously.

Post-test discussion for individuals who are positive

HIV-positive results should be given in a confidential environment and in a clear and direct manner.62, 64 Patients are often very distressed when first informed about a positive HIV test result. They are faced with major adaptive challenges, such as accepting to live with a chronic condition, being subject to intense stigma and discrimination and developing and adopting strategies for maintaining physical and emotional health. Appropriate support should be available on site or through referral to address the behavioural, psychosocial and medical implications of HIV infection. The following issues should be covered: **(2 D)**

* Inform the patient straightforwardly that the HIV test was positive and make sure that the patient has understood the implications of a positive test.
* Plan for repeat HIV antigen/antibody test of a second sample to rule out mislabelling and to confirm patient identity. Arrangement should also be made to run the following tests:
  + HIV IgG avidity (if available)
  + HIV-1 quantitative RNA
  + HIV-1 drug-resistance test
  + Hepatitis A virus IgG (or total: IgM/IgG)
  + Hepatitis B surface antigen and core IgG or IgM/IgG
  + Hepatitis C virus antibody
  + Full STI screen including syphilis IgM/IgG, Chlamydia and Gonnorrhoea NAAT
* Measles and varicella zoster virus IgG (if no past history of infection/immunisation)
* Address the question of whether the patient wants to inform anyone (e.g. partner(s), friends, family) or not and discuss the advantages and disadvantages of sharing the diagnosis.
* Discuss the importance of partner notification. Encourage partner notification for providing testing and medical care if needed for the partner.
* Schedule a new consultation in the near future, e.g. next day.
* Assess the need for psychological support or contact with other services, e.g. drug-dependency and refer as necessary.
* Discuss what will happen next and clarify whether the individual wants to talk further at this stage or not. Experience has shown that even when the patient expected a positive result, there is still a powerful emotional reaction. Hence, it may be wise to postpone some of the information giving to subsequent consultations. If the individual is willing to continue, inform them that treatment is available and discuss current treatment options and the benefits of early initiation of treatment. Discuss antiretroviral drugs and emphasize their ability to control HIV disease effectively. Inform them that the life-expectancy of PLWH is almost equal to those who are HIV negative with early ART and that AIDS-related mortality rates have decreased significantly.20,159  If feasible offer/refer for same-day ART.
* Discuss prevention methods such as safe sex, use of condoms, not sharing needles, etc. to reduce transmission to others and transmission of other STIs to the patient.
* Discuss the importance of adherence to treatment and that PLWH who use their treatment regularly and achieve virologic suppression do not transmit the virus, (U=U) 22-24

For seropositive women, the following should be included in the counselling at an early stage.

* Discuss the implications for possible future pregnancy such as the risks for the child and the need for ART during pregnancy. Inform that antiretroviral treatment if administered to women during pregnancy and to the newborn child for a short period can significantly reduce this risk of mother-to-child transmission. 160, 161
* If already pregnant, discuss the implications.

Further guidance should be sought from relevant national guidelines or, if not available, from the CDC ([www.cdc.gov/hiv](http://www.cdc.gov/hiv)), the BHIVA ([www.bhiva.org](http://www.bhiva.org)) or EACS (<https://www.eacsociety.org/>).

Following a positive HIV diagnosis, a newly diagnosed individual should be immediately referred to an appropriate specialist HIV treatment centre for further management and care. 157 However, it should be stressed that after HIV diagnosis it is important to offer not only continuous monitoring of viral and immunological parameters for HIV infection, but also regular, comprehensive and easily accessible monitoring of other STIs and repeated sexual risk reduction counselling in a context of sympathetic, non-judgemental sexual historytaking. 162-165

Non-attendance for positive results

* An agreed recall process following failure of a patient to return for an HIV-positive result should be established and contact options should be discussed with the patient at the first testing visit **(2 D)**.
* Attempts should be made to contact the patient if they test positive and fail to collect the result **(2 D)**; this may include making telephone calls, sending emails or text messages, sending letters or making home visits.

Voluntary disclosure, partner notification and contact tracing

Partner notification or partner referral is a cornerstone of STI programmes worldwide. The rationale for partner notification is to reduce transmission, to identify people that have already acquired the infection to ensure early access to care, and to promote safer sexual behaviour.166

All patients should be strongly advised to disclose their HIV infection status to their regular, previous and new sexual or injecting partner(s) and those at risk to be tested for HIV. 166 **(2 D)** In addition, testing of all children of HIV-positive women is recommended as HIV transmission has been documented from breastfeeding from mothers who acquired their infection postnatally, and vertically-acquired HIV infection can present in adolescence **(2 D)**.

Healthcare providers should be aware that partner notification is a voluntary process and and the core principle of confidentiality should always be respected. 62,166 It should be noted that the legal circumstances pertaining to partner notification vary from country to country and local rules and regulations should be followed.

Further information can be found in the 2015 European guidelines for the management of partners of persons with sexually transmitted infections at [www.iusti.org](http://www.iusti.org) and the ECDC Public health guidance: HBV, HCV and HIV testing in the EU/EEA: an integrated approach at <https://ecdc.europa.eu/en/publications-data/public-health-guidance-hiv-hepatitis-b-and-c-testing-eueea>.

Acknowledgements

The authors would like to thank to Teymur Noori, Anastasia Pharris, ……………….., the contributing organizations (Appendix 3) and the members of the European STI Guidelines Editorial Board (Appendix 4) for their contributions.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

1. Joint United Nations Programme on HIV/AIDS. 90-90-90 an ambitious target to help end the AIDS epidemic. Geneva, Switzerland: UNAIDS, 2014. <https://www.unaids.org/sites/default/files/media_asset/90-90-90_en.pdf> (accessed December 14th, 2019)
2. European Centre for Disease Prevention and Control. Continuum of HIV care. Monitoring implementation of the Dublin Declaration on partnership to fight HIV/AIDS in Europe and Central Asia: 2018 progress report. Stockholm: ECDC; 2018. Available at: <https://www.ecdc.europa.eu/en/publications-data/continuum-hiv-care-monitoring-implementation-dublin-declaration-2018-progress> (accessed March 9th, 2020)
3. Brown AE, Hayes R, Noori T et al. The ECDC Dublin Declaration Monitoring Network. HIV in Europe and Central Asia: progress in 2018 towards meeting the UNAIDS 90-90-90 targets. *Euro Surveill*. 2018; 23(48): pii=1800622. <https://doi.org/10.2807/1560-7917.ES.2018.23.48.1800622>
4. European Centre for Disease Prevention and Control. Continuum of HIV care. Monitoring implementation of the Dublin Declaration on partnership to fight HIV/AIDS in Europe and Central Asia: 2018 progress report. Stockholm: ECDC; 2018. Available at: <https://www.ecdc.europa.eu/sites/default/files/documents/HIV-testing-dublin-declaration-monitoring-2018.pdf> (accessed March 9th, 2020)
5. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. HIV/AIDS surveillance in Europe 2019 – 2018 data. Stockholm: ECDC; 2019. Available at: <https://www.ecdc.europa.eu/en/publications-data/hivaids-surveillance-europe-2019-2018-data>. (accessed March 9th, 2020)
6. Gökengin D, Geretti AM, Begovac J, et al.2014 European Guideline on HIV testing. *Int J STD AIDS*. 2014; 25(10): 695-704.
7. British HIV Association (BHIVA)/British Association for Sexual Health and HIV (BASHH)/British Infection Association (BIA) Adult HIV Testing Guidelines Consultation Available at: https://www.bhiva.org/file/5dfceab350819/HIV-Testing-Guidelines.pdf (accessed March 9th, 2020)
8. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR Recomm Rep.* 2006. 22; 55(RR-14): 1-17; quiz CE1-4.
9. Centers for Disease Control and Prevention. 2018 Quick reference guide: Recommended laboratory HIV testing algorithm for serum or plasma specimens. 2018. Available at: <https://stacks.cdc.gov/view/cdc/50872> (accessed December 14th, 2019)
10. US Preventive Services Task Force. Screening for HIV Infection: US Preventive Services Task Force Recommendation Statement. *JAMA*. 2019; 321(23): 2326–2336.
11. HIV Indicator Conditions: Guidance for Implementing HIV Testing in Adults in Health Care Settings. HIV in Europe. Available at: <http://www.eurotest.org/Portals/0/Guidance.pdf.pdf> (Accessed December 14th, 2019).
12. UNAIDS and World Health Organization (WHO) Working Group on Global HIV/AIDS/STI Surveillance Guidelines for Using HIV Testing Technologies in Surveillance: Selection, Evaluation, and Implementation. 2009. Available at: <https://www.who.int/hiv/pub/surveillance/hiv_testing_technologies_surveillance.pdf> (accessed December 14th, 2019)
13. WHO Guidance on Provider-initiated HIV Testing and Counseling in Health Facilities. 2007 Available at: <https://apps.who.int/iris/bitstream/handle/10665/43688/9789241595568_eng.pdf;jsessionid=095254E39AE8A8ABC70C3B36DA7771DD?sequence=1> (accessed December 14th, 2019)
14. European Centre for Disease Prevention and Control. Public health guidance: HBV, HCV and HIV testing in the EU/EEA: an integrated approach. Stockholm: ECDC; 2018 Available at: <https://www.ecdc.europa.eu/sites/default/files/documents/hiv-hep-testing-guidance_0.pdf> (accessed December 14th, 2019)
15. Kitahata MM, Gange SJ, Abraham AG, et al. Effect of early versus deferred antiretroviral therapy for HIV on survival. *N Engl J Med* 2009; 360: 1815–1826.
16. May M, Gompels M, Delpech V, et al. Impact of late diagnosis and treatment on life expectancy in people with HIV-1: UK Collaborative HIV Cohort (UK CHIC) Study. *BMJ* 2011; 343: d6016.
17. Johnson LF, Nakagawa F, May M, et al. Updates of lifetime costs of care and quality of life estimates for HIV-infected persons in the United States: late versus early diagnosis and entry into care. *J Acquir Immune Defic Syndr*. 2013; 64(2): 183-9.
18. May M, Gompels M and Sabin C. Life expectancy of HIV-1-positive individuals approaches normal, conditional on response to antiretroviral therapy: UK collaborative HIV cohort study. *J Int AIDS Soc* 2012; 15(Suppl 4): 18078.
19. Soria A and Lazzarin A. Antiretroviral treatment strategies and immune reconstitution in treatment-naive HIVinfected patients with advanced disease. *J Acquir Immune Defic Syndr* 2007; 46: 19–30.
20. The INSIGHT START Study Group Initiation of Antiretroviral Therapy in Early Asymptomatic HIV Infection. *N Engl J Med* 2015; 373: 795-807.
21. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med* 2011; 365: 493–505.
22. Rodger AJ, Cambiano V, Bruun T, et al. Sexual activity without condoms and risk of HIV transmission in serodifferent couples when the HIV-positive partner is using suppressive antiretroviral therapy. *JAMA*. 2016; 316(2): 171-81.
23. Bavinton BR, Pinto AN, Phanuphak N, et al. Viral suppression and HIV transmission in serodiscordant male couples: an international, prospective, observational, cohort study*. Lancet HIV*. 2018; 5(8): 438-447.
24. Rodger AJ, Cambiano V, Bruun T, et al. Risk of HIV transmission through condomless sex in serodifferent gay couples with the HIV-positive partner taking suppressive antiretroviral therapy (PARTNER): final results of a multicentre, prospective, observational study. *Lancet* 2019; 393: 2428–2438.
25. Desenclos JC, Papaevangelou G and Ancelle Park R. Knowledge of HIV serostatus and preventive behaviour among European injecting drug users. *AIDS* 1993; 7: 1371–1377.
26. Kamb ML, Fishbein M, Douglas JM Jr, et al. Efficacy of risk-reduction counseling to prevent human immunodeficiency virus and sexually transmitted diseases: a randomized controlled trial. *JAMA* 1998; 280: 1161–1167.
27. Gibson DR, Lovelle-Drache J, Young M, et al. Effectiveness of brief counseling in reducing HIV risk behavior in injecting drug users: final results of randomized trials of counseling with and without HIV testing. *AIDS Behav* 1999; 3: 3–12.
28. Allen S, Meinzen-Derr J, Kautzman M, et al. Sexual behavior of HIV discordant couples after HIV counseling and testing. *AIDS* 2003; 17: 733–740.
29. Crepaz N, Lyles CM, Wolitski RJ, et al. Do prevention interventions reduce HIV risk behaviours among people living with HIV? A meta-analytic review of controlled trials. *AIDS* 2006; 20: 143–157.
30. Marks G, Crepaz N, Senterfitt JW, et al. Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States: implications of HIV prevention programs. *J Acquire Immune Defic Syndr* 2005; 39: 446–453.
31. Marks G, Crepaz N and Janssen RS. Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. *AIDS* 2006; 20: 1447–1450.
32. Gamoudi D, Flew S, Cusini M, et al. 2018 European guideline on the organization of a consultation for sexually transmitted infections. *J Eur Acad Dermatol Venereol*. 2019; 33(8): 1452-1458.
33. Rayment M, Thornton A, Mandalia S, et al. HIV testing in non-traditional settings–the HINTS study: a multicentre observational study of feasibility and acceptability. *PLoS One* 2012; 7(6): e39530.
34. Sullivan AK, Raben D, Reekie J, 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).
35. Dalal S, Johnson C, Fonner V, et al.Improving HIV test uptake and case finding with assisted partner notification services. *AIDS* 2017; 31:1867–1876.
36. Likatavičius G, Klavs I, Devaux I, et al. An increase in newly diagnosed HIV cases reported among men who have sex with men in Europe, 2000–6: implications for a European public health strategy. *Sex Transm Inf* 2008; 84: 499-505.
37. Ferrer L, Furegato M, Foschia JP, et al.Undiagnosed HIV infection in a population of MSM from six European cities: results from the Sialon Project. *Eur J Public Health* 2015; 25(3):494–500.
38. Baral S, Poteat T, Wirtz A, et al. Global burden of HIV infection among transgender persons: a systematic review and meta-analysis. *J Int AIDS Soc*. 2012; 15: 98–99.
39. Poteat T, Scheim A, Xavier J, et al. Global Epidemiology of HIV Infection and Related Syndemics Affecting Transgender People. J Acquir Immune Defic Syndr. 2016; 72(Suppl 3): S210–S219.
40. Mathers BM, Degenhardt L, Phillips B, et al. Global epidemiology of injecting drug use and HIV among people who inject drugs: a systematic review. *Lancet.* 2008; 372(9651). doi: 10.1016/S0140-6736(08)61311-2.
41. Degenhardt L, Peacock A, Colledge S, et al. Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review. *Lancet Glob Health*. 2017; 5(12): e1192–e1207.
42. Data on the size of the HIV/AIDS epidemic: prevalence of HIV among adults aged 15 to 49 (%) by country. WHO. Available at: <http://apps.who.int/gho/data/view.main.22100WHO?lang=en> (accessed December 14th, 2019)
43. Joore IK, Arts DL, Kruijer MJP, et al. HIV indicator condition-guided testing to reducethe number of undiagnosed patients and preventlate presentation in a high-prevalence area:a case–control study in primary care. *Sex Transm Infect* 2015; 91:467–472.
44. Graves N, Walker DG, McDonald AM, et al. Would universal antenatal screening for HIV infection be cost-effective in a setting of very low prevalence? Modelling the data for Australia. *J Infect Dis*. 2004; 190(1): 166-174.
45. Raben D, Mocroft A, Rayment M, et al. Auditing HIV Testing Rates across Europe: Results from the HIDES 2 Study. *PloS One*. 2015; 10(11): e0140845.
46. Menacho I, Sequeira E, Muns M, et al. Comparison of two HIV testing strategies in primary care centres: indicator-condition-guided testing vs. testing of those with non-indicator conditions. *HIV Medicine*. 2013; 14: 33-37.
47. Davies C, May M and Gompels M. Use and Effectiveness of HIVIndicator Conditions in Guiding HIV testing: A Review of the Evidence. *International STD Research and Reviews* 2017; 6(2): 36373.
48. Paltiel AD, Weinstein MC, Kimmel AD et al. Expanded screening for HIV in the United States--an analysis of cost-effectiveness. *N Engl J Med* 2005; 352: 586–595.
49. Chou R, Dana T, Grusing S, et al. Screening for HIV infection in asymptomatic, nonpregnant adolescents and adults. Updated evidence report and systematic review for the US Preventive ServicesTask Force. Evidence Synthesis, No. 176. Report No: 18-05246-EF-1
50. Balaji AB, Bowles KE, Le BC, et al. NHBS Study Group. High HIV incidence and prevalence and associated factors among young MSM. *AIDS* 2013; 27(2): 269–278.
51. HIV testing among men who have sex with men: 21 cities, United States, 2008. *MMWR* 2011; 60: 694–699
52. Owens DK, Davidson KW, Krist AH, et al. Screening for HIV Infection: US Preventive Services Task Force Recommendation Statement. *JAMA* 2019 18; 321(23): 2326-2336. doi: 10.1001/jama.2019.6587.
53. Delivering HIV test results and messages for retesting and counselling in adults. WHO 2014 Available at: <https://apps.who.int/iris/bitstream/handle/10665/44278/9789241599115_eng.pdf?sequence=1> (accessed January 20th 2020)
54. Vriend HJ, Stolte IG, Heijne JC, et al. Repeated STI and HIV testing among HIV-negative men who have sex with men attending a large STI clinic in Amsterdam: a longitudinal study. *Sex Transm Infect* 2015; 91(4): 294-299. doi:10.1136/sextrans-2014-051786. Epub 2014 Dec 10.
55. Hutchinson AB, Farnham PG, Sansom SL, et al. Cost-Effectiveness of Frequent HIV Testing of High-RiskPopulations in the United States. *J Acquir Immune Defic Syndr* 2016; 71: 323–330
56. Di Nenno EA, Prejean J, Irwin K, et al. Recommendations for HIV screening of gay, bisexual, and other men who have sex with men—United States, 2017. *MMWR* 2017; 66(31): 830-832.
57. Hutchinson AB, Hicks KA, Yaylali E, et al. Cost-Effectiveness of HIV Screening of Heterosexuals in the United States. Conference on Retroviruses and Opportunistic Infections. March 8–11, 2020 Boston, Massachusetts. Abstract number 1029. Available at: http://www.croiconference.org/sessions/cost-effectiveness-hiv-screening-heterosexuals-united-states (accessed January 20th, 2020).
58. Mabileau G, Amo JD, Rüütel K, Paltiel AD, Lemsalu L, Díaz A, Fernández JM, Walensky RP, Freedberg K, Yazdanpanah Y. Effectiveness and cost-effectiveness of HIV screening strategies across Europe. Conference on Retroviruses and Opportunistic Infections. March 8–11, 2020 Boston, Massachusetts. Abstract number 1028. Available at: http://www.croiconference.org/sites/default/files/posters-2017/1028\_Mabileau.pdf. (accessed January 20th, 2019).
59. Epstein RM, Morse DS, Frankel RM, et al. Awkward moments in patient-physician communication about HIV risk. *Ann Intern Med* 1998; 128: 435–442.
60. Troccoli K, Pollard H 3rd, McMahon M, et al. Human immunodeficiency virus counseling and testing practices among North Carolina providers. *Obstet Gynecol* 2002; 100: 420–427.
61. Kellock DJ and Rogstad KE. Attitudes to HIV testing in general practice. *Int J STD AIDS* 1998; 9: 263–267
62. Consolidated guidelines on HIV Testing Services. 5Cs: Consent, Confidentiality, Counselling, Correct Results and Connection. World Health Organization. July 2015. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK316021/pdf/Bookshelf_NBK316021.pdf>. (accessed January 20th, 2019).
63. Cohan D, [Gomez E](https://www.ncbi.nlm.nih.gov/pubmed/?term=Gomez%20E%5BAuthor%5D&cauthor=true&cauthor_uid=19367335), [Greenberg M](https://www.ncbi.nlm.nih.gov/pubmed/?term=Greenberg%20M%5BAuthor%5D&cauthor=true&cauthor_uid=19367335), et al. Patient perspectives with abbreviated versus standard pre-test HIV counseling in the prenatal setting: a randomized-controlled, non-inferiority trial. *PLoS One* 2009; 4: e5166.
64. Guidance on provider-initiated HIV testing and counselling in health facilities. World Health Organization. 2007 Available at: <https://apps.who.int/iris/bitstream/handle/10665/43688/9789241595568_eng.pdf;jsessionid=356248E2A15E9A32452BC7C1DEE7A10A?sequence=1>. ( accessed January 20th, 2020.
65. Charu L, Zetola NM, Klausner JD, et al. Association between rates of HIV testing and elimination of written consents in San Francisco. *JAMA* 2007; 297: 1061–1062.
66. Bayer R, Philbin M and Remien RH. The End of Written Informed Consent for HIV Testing: Not With a Bang but a Whimper. Am J Public Health. 2017; 107(8): 1259-1265.
67. Ehrenkranz PD, Pagán JA, Begier EM, et al. Written informed-consent statutes and HIV testing. *Am J Prev Med* 2009; 37: 57–63.
68. Wing C. Effects of written informed consent requirements on HIV testing rates: evidence from a natural experiment. *Am J Public Health* 2009; 99: 1087–1092.
69. Zetola NM, [Grijalva CG](https://www.ncbi.nlm.nih.gov/pubmed/?term=Grijalva%20CG%5BAuthor%5D&cauthor=true&cauthor_uid=18596933), [Gertler S](https://www.ncbi.nlm.nih.gov/pubmed/?term=Gertler%20S%5BAuthor%5D&cauthor=true&cauthor_uid=18596933) et al. Simplifying consent for HIV testing is associated with an increase in HIV testing and case detection in highest risk groups, San Francisco January 2003-June 2007. *PLoS One* 2008; 3: e2591.
70. Brewster MF. HIV exceptionalism must end. *BMJ* 2007; 335: 60. 27.
71. Sokol DK. Commentary on ethics of HIV testing in general practice without informed consent: a case series*. J Med Ethics* 2005; 31: 701–702.
72. Rogstad K, Bramham L, Lowbury R, et al. The use of a leaflet to replace verbal pretest discussion for HIV: effects and acceptability. *Sex Transm Infect* 2003; 79: 243–245.
73. Calderon Y, Haughey M, Bijur PE, et al. An educational HIV pretest counseling video program for off-hours testing in the emergency department. *Ann Emerg Med* 2006; 48: 21–27.
74. Merchant RC, Clark MA, Mayer KH, et al. Video as an effective method to deliver pretest information for rapid human immunodeficiency testing. *Acad Emerg Med* 2009; 16: 124–135.
75. Nastouli E, Atkins M, Seery P, et al. False positive HIV antibody results with ultrasensitive serological assays in uninfected infants born to mothers with HIV. *AIDS* 2007; 21(9): 1222-1223.
76. Patterson SE, Milloy MJ, Ogilvie G, et al. The impact of criminalization of HIV non-disclosure on the healthcare engagement of women living with HIV in Canada: a comprehensive review of the evidence*. J Int AIDS Soc* 2015; 18(1): 20572. doi:10.7448/IAS.18.1.20572
77. Kesler MA, Kaul R, Loutfy M, et al. Prosecution of non-disclosure of HIV status: Potential impact on HIV testing and transmission among HIV-negative men who have sex with men. *PLoS One* 2018; 13(2): e0193269. doi:10.1371/journal.pone.0193269
78. O'Byrne P, Willmore J, Bryan A, et al. Nondisclosure prosecutions and population health outcomes: examining HIV testing, HIV diagnoses, and the attitudes of men who have sex with men following nondisclosure prosecution media releases in Ottawa, Canada. *BMC Public Health*. 2013; 13:94.
79. Johnson CC, Kennedy C, Fonner V, et al. Examining the effects of HIV self-testing compared to standard HIV testing services: a systematic review and meta-analysis. *J Int AIDS Soc* 2017; 20(1): 21594. doi: 10.7448/IAS.20.1.21594.
80. Guidelines for Using HIV Testing Technologies in Surveillance. UNAIDS/WHO Working Group on HIV/AIDS/STI Surveillance. 2009. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK305270/pdf/Bookshelf_NBK305270.pdf> (accessed January 20th, 2020)
81. Fiebig EW, Wright DJ, Rawal BD, et al. Dynamics of HIV viremia and antibody seroconversion in plasma donors: implications for diagnosis and staging of primary HIV infection. *AIDS* 2003; 17: 1871–1879.
82. Powers KA, Ghani AC, Miller WC, et al. The role of acute and early HIV infection in the spread of HIV and implications for transmission prevention strategies in Lilongwe, Malawi: a modelling study. *Lancet.* 2011; 378(9787): 256-268. doi: 10.1016/S0140-6736(11)60842-8.
83. Parry JV, Mortimer PP, Perry KR, et al. Towards errorfree HIV diagnosis: guidelines on laboratory practice. *Commun Dis Public Health* 2003; 6: 334–350.
84. Perry KR, Ramskill S, Eglin R, et al. Improvement in the performance of HIV screening kits. *Transfus Med* 2008; 18: 228–240.
85. Centers for Disease Control and Prevention and Association of Public Health Laboratories. Laboratory Testing for the Diagnosis of HIV Infection: Updated Recommendations. Available at: http://stacks.cdc.gov/view/cdc/23447. Published June 27, 2014. (accessed December 14th, 2019)
86. Hurt CB, Nelson JAE, Hightow-Weidman LB, et al. Selecting an HIV Test: A Narrative Review for Clinicians and Researchers. *Sex Transm Dis* 2017; 44(12): 739–746
87. Rich JD, Merriman NA, Mylonakis E, et al. Misdiagnosis of HIV infection by HIV-1 plasma viral load testing: a case series. *Ann Intern Med* 1999; 130: 37–39.
88. Sherman GG, Cooper PA, Coovadia AH, et al. Polymerase chain reaction for diagnosis of human immunodeficiency virus infection in infancy in low resource settings. *Pediatr Infect Dis J* 2005; 24: 993–997.
89. Marinovich A, Narlieva M, Bashir M, et al. False-positive result from a Bayer Versant human immunodeficiency virus type 1 branched-DNA viral load assay, with a possible role for light leakage after inadequate maintenance of the analyzer. *J Clin Microbiol* 2006; 4: 4288–4289.
90. Donnell D, Ramos E, Celum C, et al. The Effect of Oral Pre-Exposure Prophylaxis on the Progression of HIV-1 Seroconversion*. AIDS*. 2017; 31(14): 2007–2016.
91. Zucker J, Carnevale C, Rai AJ, et al. Positive or Not, That is the Question: HIV Testing for Individuals on Pre-Exposure Prophylaxis (PrEP). *J Acquir Immune Defic* *Syndr* 2018; 78(2): e11–e13.
92. Joint United Nations Programme on HIV/AIDS (UNAIDS)-WHO. Revised recommendations for the selection and use of HIV antibody tests. *Wkly Epidemiol Rec* 1997; 72: 81–88
93. Pillay D, Geretti AM and Weiss R. HIV. In: Principles and practice of clinical virology. 6th ed. Wiley, 2008.
94. Terzi R, Niero F, Iemoli E, et al. Late HIV seroconversion after non-occupational postexposure prophylaxis against HIV with concomitant hepatitis C virus seroconversion. *AIDS* 2007; 21(2): 262–263.
95. Hecht FM, Busch MP, Rawal B, et al. Use of laboratory tests and clinical symptoms for identification of primary HIV infection. *AIDS* 2002; 16: 1119–1129.
96. Clerca O, Cavassinia M, Bönic J, et al. Prolonged seroconversion in an elite controller of HIV-1 infection. *J Clin Virol* 2009; 46: 371–373.
97. World Health Organization. Rapid HIV Tests: Guidelines for Use in HIV Testing and Counselling Services in Resource-Constrained Settings. 2004. Available at: http:// [www.emro.who.int/aiecf/web28.pdf](http://www.emro.who.int/aiecf/web28.pdf) (accessed January 20th, 2020)
98. Greenwald JL, Burstein GR, Pincus J, et al. A rapid review of rapid HIV antibody tests. *Curr Infect Dis Rep* 2006; 8: 125–131.
99. Wesolowski LG, MacKellar DA, Facente SN, et al. Postmarketing surveillance of OraQuick whole blood and oral fluid rapid HIV testing. *AIDS* 2006; 20: 1661–1666
100. Ananworanich J, Fletcher JL, Pinyakorn S, et al. A novel acute HIV infection staging system based on 4th generation immunoassay. *Retrovirology* 2013; 10: 56.
101. Taylor D, Durigon M, Davis H et al. Probability of a false-negative HIV antibody test result during the window period: a tool for pre- and post-test counselling. *Int J STD AIDS* 2015; 26: 215–224.
102. Delaney KP, Hanson DL, Masciotra S et al. Time until emergence of HIV test reactivity following infection with HIV-1: implications for interpreting test results and retesting after exposure. *Clin Infect Dis* 2017; 64: 53–59.
103. Lindback S, Thorstensson R, Karlsson AC, et al. Diagnosis of primary HIV-1 infection and duration of follow-up after HIV exposure. Karolinska Institute Primary HIV Infection Study Group. *AIDS* 2000; 14: 2333–2339.
104. Ridzon R, Gallagher K, Ciesielski C, et al. Simultaneous transmission of human immunodeficiency virus and hepatic C virus from a needlestick injury. *N Engl J Med* 1997; 336: 919–922. 45.
105. Young TN, Arens FJ, Kennedy GE, et al. Antiretroviral post-exposure prophylaxis (PEP) for occupational HIV exposure. *Cochrane Database Syst Rev* 2007; 24: CD002835. 46.
106. Terzi R, Niero F, Lemoli E, et al. Late HIV seroconversion after non-occupational postexposure prophylaxis against HIV with concomitant hepatitis C virus seroconversion. *AIDS* 2007; 21(2): 262–263.
107. Baeten JM, Donnell D, Ndase P,et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. N Engl J Med. 2012; 367(5): 399-410. doi: 10.1056/NEJMoa1108524.
108. Choopanya K, Martin M, Suntharasamai P, et al. Antiretroviral prophylaxis for HIV infection in injecting drug users in Bangkok, Thailand (the Bangkok Tenofovir Study): a randomised, double-blind, placebo-controlled phase 3 trial*. Lancet*. 2013; 381(9883): 2083-90. doi: 10.1016/S0140-6736(13)61127-7.
109. UK Guideline for the use of HIV Post-Exposure Prophylaxis Following Sexual Exposure (PEPSE) 2015. Available at: https://www.bashh.org/documents/PEPSE%202015%20guideline%20final\_NICE.pdf. (accessed 27.02.2020)
110. Curlin ME, Gvetadze R, Leelawiwat W, et al. Analysis of false-negative HIV rapid tests performed on oral fluid in three international clinical research studies. *Clin Infect Dis*. 2017
111. Mourez T, Lemée V, Delbos V, et al. HIV rapid screening tests and self-tests: Be aware of differences in performance and cautious of vendors. *EBioMedicine* 2018; 37: 382–391
112. Turner SD, Anderson K, Slater M, et al. Rapid point-of-care HIV testing in youth: A systematic review. *J Adolesc Health*. 2013; 53(6): 683–91.
113. Op de Coul EL, Hahne S, van Weert YW, et al. Antenatal screening for HIV, hepatitis B and syphilis in the Netherlands is effective*. BMC Infect Dis*. 2011; 11: 185.
114. Bulman J, Goode D and Evans A. HIV-testing African service users within a newly integrated sexual health service-our experience. P203.*Sex Transm Infections* 2016; 92(Suppl 1): A87. http://dx.doi.org/10.1136/sextrans-2016-052718.251
115. Taegtmeyer M, MacPherson P, Jones K, et al. Programmatic evaluation of a combined antigen and antibody test for rapid HIV diagnosis in a community and sexual health clinic screening programme. *PLoS One* 2011; 6(11): e28019.
116. Wouters K, Fransen K, Beelaert G, et al. Use of rapid HIV testing in a low threshold centre in Antwerp, Belgium, 2007–2012. *Int J STD AIDS* 2014; 25(13): 936-942.
117. Schreuder I, van der Sande MAB, de Wit M, et al. Seroprevalence of H I V, hepatitis b, and hepatitis c among opioid drug users on methadone treatment in the netherlands. *Harm Reduct J*. 2010; 7: 25.
118. Fernandez-Lopez L, Folch C, Majo X,et al. Implementation of rapid HIV and HCV testing within harm reduction programmes for people who inject drugs: a pilot study. *AIDS Care* 2016; 28(6): 712-726.
119. Kendrick SR, Kroc KA, Withum D, et al. Outcomes of offering rapid point-of-care HIV testing in a sexually transmitted disease clinic. *J Acquir Immune Defic Syndr* 2005; 38(2): 142–146.
120. Kendrick SR, Kroc KA, Couture E, et al. Comparison of point-of-care rapid HIV testing in three clinical venues. *AIDS* 2004; 18: 2199–2212.
121. Centers for Disease Control and Prevention. Quality Assurance Guidelines for Testing Using Rapid HIV Antibody Tests Waived Under the Clinical Laboratory Improvement Amendments of 1988. 2007. www.cdc.gov/hiv/topics/testing/resources/guidelines/pdf/ QA\_Guidlines.pdf (accessed 27 June 2013).
122. Chetty V, Moodley D and Chuturgoon A. Evaluation of a 4th generation rapid HIV test for earlier and reliable detection of HIV infection in pregnancy. *J Clin Virol* 2012; 54(2): 180–184.
123. Faraoni S, Rocchetti A, Gotta F, et al. Evaluation of a rapid antigen and antibody combination test in acute HIV infection. *J Clin Virol* 2013; 57(1): 84–87.
124. Brauer M, De Villiers JC and Mayaphi SH. Evaluation of the DetermineTM fourth generation HIV rapid assay. *J Virol Methods* 2013; 189(1): 180–183.
125. Conway DP, Holt M, McNulty A, et al. Multi-centre evaluation of the Determine HIV Combo assay when used for point of care testing in a high risk clinic-based population. *PLoS One* 2014; 9(4): e94062.
126. Duong YT, Mavengere Y, Patel H, et al. Poor performance of the determine HIV-1/2 Ag/Ab combo fourth-generation rapid test for detection of acute infections in a National Household Survey in Swaziland. *J Clin Microbiol* 2014; 52(10): 3743–3748.
127. Laperche S, Leballais L, Ly TD, et al. Failures in the detection of HIV p24 antigen with the determine HIV-1/2 Ag/Ab combo rapid test*. J Infect Dis* 2012; 206(12): 1946–1947.
128. Rosenberg NE, Kamanga G, Phiri S, et al. Detection of acute HIV infection: A field evaluation of the determine(R) HIV-1/2 Ag/Ab combo test. J Infect Dis 2012; 205(4): 528–534.
129. Masciotra S, Luo W, Westheimer E, et al. Performance evaluation of the FDA-approved Determine HIV-1/2 Ag/Ab Combo assay using plasma and whole blood specimens. *J Clin Virol*. 2017; 91: 95-100. doi: 10.1016/j.jcv.2017.03.019
130. Fitzgerald N, Cross M, O’Shea S, et al. Diagnosing acute HIV infection at point of care: a retrospective analysis of the sensitivity and specificity of a fourth-generation point-of-care test for detection of HIV core protein p24. *Sex Transm Infect* 2017; 93(2): 100–101.
131. Chavez PR, Bradley HM, Wesolowski LG, et al. Performance evaluation of four point-of-care HIV tests using unprocessed specimens*. J Clin Virol* 2020; 124: 104282. doi: 10.1016/j.jcv.2020.104282.
132. Vázquez-Morón S, Ryan P, Ardizone-Jiménez B, et al. Evaluation of dried blood spot samples for screening of hepatitis C and human immunodeficiency virus in a real-world setting. *Sci Rep* 2018; 8**:**1858. https://doi.org/10.1038/s41598-018-20312-5
133. Page M, Atabani SF, Wood M, et al. Dried blood spot and mini-tube blood sample collection kits for postal HIV testing services: a comparative review of successes in a real-world setting. *Sex Transm Infect* 2019; 95(1): 43-45.
134. Pavie J, Rachline A, Loze B, et al. Sensitivity of five rapid HIV tests on oral fluid or finger-stick whole blood: a real-time comparison in a healthcare setting. *PloS One* 2010; 5(7): e11581.
135. Pilcher CD, Louie B, Facente S, et al. Performance of rapid point-of-care and laboratory tests for acute and established HIV infection in San Francisco*. PloS One.* 2013; 8(12): e80629.
136. Stekler JD, O’Neal JD, Lane A, et al. Relative accuracy of serum, whole blood, and oral fluid HIV tests among Seattle men who have sex with men. *J Clin Virol* 2013; 58(Suppl 1): e119–122.
137. AgutuI CA, Ngetsa CJ, Price MA, et al. Systematic review of the performance and clinical utility of point of care HIV-1 RNA testing for diagnosis and care. *PLoS One* 2019; 14(6): e0218369.
138. Delaugerre C, Antoni G, Mahjoub N, et al. Assessment of HIV Screening Tests for Use in Preexposure Prophylaxis Programs. *J Infect Dis* 2017; 216(3): 382-386. doi: 10.1093/infdis/jix297.
139. Centers for Disease Control and Prevention. Implementing HIV Testing in Nonclinical Settings, (2019) Available at: <https://www.cdc.gov/hiv/pdf/testing/CDC_HIV_Implementing_HIV_Testing_in_Nonclinical_Settings.pdf>. (accessed April 4th 2020).
140. Gillespie R.Testing history and risk behaviour of individuals requesting an HIV test through an online self‐sampling service. International AIDS Conference. Melbourne, Australia, July 2014. Abstract WEAX0105LB.
141. Greaves L, Symonds M, Saunders J, et al. Is offering STI & HIV self‐sampling kits to men who have sex with men (MSM) in a London sauna a feasible and acceptable way to widen access to testing? *HIV Med* 2014; 15; 102–103.
142. Guerra L, Logan L, Alston T, et al. The national HIV self‐sampling service. *Sex Transm Infect* 2016; 92; A14.
143. Brady M, Carpenter G, Bard B. Self‐testing for HIV: Initial experience of the UK's first kit. *HIV Med* 2016; 17: 9.
144. de la Fuente L, Rosales‐Statkus ME, Hoyos J, et al. Are participants in a street‐based HIV testing program able to perform their own rapid test and interpret the results? *PLoS One* 2012; 7: e46555.
145. Gibson W, Challenor R and Warwick Z. HIV home/self‐testing: A pilot project and service evaluation. *Sex Transm Infect* 2016; 92: A32.
146. Prazuck T, Karon S, Gubavu C, et al. A finger‐stick whole‐blood HIV self‐test as an HIV screening tool adapted to the general public. *PLoS One* 2016; 11: e0146755.
147. Witzel TC, Rodger AJ, Burns FM, et al. HIV Self-Testing among Men Who Have Sex with Men (MSM) in the UK: A Qualitative Study of Barriers and Facilitators, Intervention Preferences and Perceived Impacts. *PLoS One* [Electronic Resource]. 2016; 11(9): e0162713.
148. Croxford S, Tavoschi L, Sullivan AK, et al. HIV testing strategies outside of health care settings in theEuropean Union (EU)/European Economic Area (EEA): asystematic review to inform European Centre for DiseasePrevention and Control guidance. HIV Med. 2019; (3): 142-162. doi: 10.1111/hiv.12807.
149. Johnson CC, Kennedy C, Fonner V,et al. Examining the effects of HIV self-testing compared to standard HIV testing services: a systematic review and meta-analysis. *J Int AIDS Soc*. 2017;15 ; 20(1):21594. doi: 10.7448/IAS.20.1.21594.
150. Ahmed‐Little Y, Bothra V, Cordwell D, et al. Attitudes towards HIV testing via home‐sampling kits ordered online (RUClear pilots 2011–12). *J Public Health* 2016; 38: 585–590.
151. Brady M, Nardone A, Buenaventura E, et al. Acceptability of home HIV sampling and testing: A user survey. *HIV Med* 2014; 15: 89–90.
152. Platteau T, Fransen K, Apers L, et al. Swab2know: An HIV‐testing strategy using oral fluid samples and online communication of test results for men who have sex with men in Belgium. *J Med Internet Res* 2015; 17: e213.
153. Williams S, Scholfield C, Nadarzynski T, et al. Acceptability, uptake and impact of online home-sampling for stis in Hampshire, UK: A service evaluation. *Sex Transm Infect* 2017; 93: A6.
154. Wayal S, Llewellyn C, Smith H,et al. Home sampling kits for sexually transmitted infections: preferences and concerns of men who have sex with men. *Cult Health Sex* 2011; 13(3):343-353
155. Elliot E, Rossi M, McCormack S,et al. Identifying undiagnosed HIV in men who have sex with men (MSM) by offering HIV home sampling via online gay social media: a service evaluation. *Sex Transm Infect* 2016;92(6):470-3.
156. Croxford SE, Yin Z, Burns F, et al. Linkage to HIV care following diagnosis in the WHO European Region: a systematic review and meta-analysis, 2006-2017. *PLoS One* 2018; 13(2): e0192403.
157. Pittaway H, Barnard S, Wilson E, et al. SH:24‐user perspectives on an online sexual health service. *Sex Transm Infect* 2016; 92: A19–A20.
158. Greacen T, Friboulet D, Fugon L, et al. Access to and use of unauthorised online HIV self-tests by internet-using French-speaking men who have sex with men. *Sex Transm Infect* 2012; 88(5): 368-374.
159. The Antiretroviral Therapy Cohort Collaboration. Survival of HIV-positive patients starting antiretroviral therapy between 1996 and 2013: a collaborative analysis of cohort studies. *Lancet HIV* 2017; 4: e349–356.
160. Fowler MG, Lampe MA, Jamieson DJ, et al. Reducing the risk of mother-to-child human immunodeficiency virus transmission: past successes, current progress and challenges, and future directions. *Am J Obstet Gynecol* 2007; 197: S3–S9.
161. Suksomboon N, Poolsup N and Ket-Aim S. Systematic review of the efficacy of antiretroviral therapies for reducing the risk of mother-to-child transmission of HIV infection. *J Clin Pharm Ther* 2007; 32: 293–311.
162. Flagg EW1, Weinstock HS, Frazier EL,et al. Bacterial sexually transmitted infections among HIV-infected patients in the United States: estimates from the Medical Monitoring Project. *Sex Transm Dis* 2015; 42(4): 171-9.
163. Dean BB, Scott M, Hart R, et al. Sexually Transmitted Disease Testing of Human Immunodeficiency Virus-Infected Men Who Have Sex With Men: Room for Improvement. *Sex Transm Dis* 2017; 44(11): 678-684.
164. Dougan Sarah, Evans BG and Elford J. Sexually Transmitted Infections in Western Europe Among HIV-Positive Men Who Have Sex With Men. *Sex Transm Dis* 2007; 34(10): 783-790.
165. Landes M, Thorne C, Barlow P, et al. Prevalence of sexually transmitted infections in HIV-1 infected pregnant women in Europe. *Eur J Epidemiol* 2007); 22: 925–936.
166. Tiplica GS, Radcliffe K, Evans C, et al. 2015 European guidelines for the management of partners of persons with sexually transmitted infections. *J Eur Acad Dermatol Venereol* 2015; 29(7): 1251-1257..

Appendix 1

Search strategy

The present guideline was produced according to the protocol for production and revision of European STI guidelines, which has been written and approved by the IUSTI European STI Guidelines Editorial Board (https://www.iusti.org/regions/Europe/pdf/2017/ProtocolForProduction2017.pdf). Evidence for this guideline was provided by review of the Medline/Pubmed, Embase, Google, Cochrane Library and relevant guidelines published since the development of the 2014 European HIV Testing Guideline starting from 01.04.2013 to 31.12.2019. Search headings ‘HIV testing’, ‘HIV guideline(s)’ and ‘recommendation(s)’ were used and 1602 citations were identified. For some specific recommendations, additional Medline/Pubmed search was performed when necessary.

Appendix 2

Levels of evidence and grading of recommendations

Levels of evidence and grading of recommendations that were used in the present guideline can be found in the protocol for production and revision of European STI guidelines at: https://www.iusti.org/regions/Europe/pdf/2017/ProtocolForProduction2017.pdf

Appendix 3

A list of contributing organisations can be found at:

https://www.iusti.org/regions/Europe/euroguidelines.htm

Appendix 4

Composition of the European STI Guidelines Editorial Board

The current composition of the European STI Guidelines Editorial Board can be found at: https://www.iusti.org/regions/Europe/euroguidelines.htm.