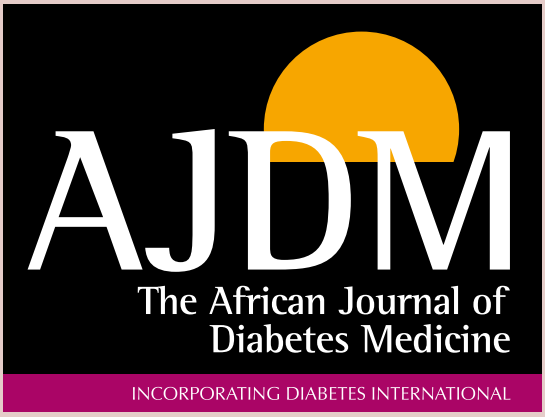


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Epidemiology of sexually transmitted infections: worldwide

David Mabey

Abstract

Sexually transmitted infections (STIs) cause an enormous burden of disease, especially among poor people, women and children. Those caused by bacteria and protozoa can be cured, often with single-dose treatment, whereas the viral infections, genital herpes and HIV, are lifelong, incurable infections. Other STIs, especially those which cause genital ulceration, facilitate the sexual transmission of HIV. Since a high proportion of STIs are asymptomatic, especially in women, their control depends on screening and treatment of populations at risk, as well as the provision of effective treatment for those with symptoms. Syndromic treatment for those with symptoms is recommended where laboratory testing is not feasible or may lead to a delay in treatment. Simple point-of-care (POC) screening tests are available for HIV, syphilis and *Trichomonas vaginalis*, but currently available POC tests for *Chlamydia trachomatis* are less sensitive than laboratory-based tests. Treatment of sexual partners is another cornerstone of STI control.

Keywords Bacterial vaginosis; chancroid; chlamydia; epidemiology; gonorrhoea; herpes; HIV; syphilis; trichomonas

What's new?

- Strains of *Neisseria gonorrhoeae* resistant to third-generation cephalosporins and all other widely available antibiotics are spreading globally
- Effective vaccines against oncogenic strains of human papilloma virus are now being given to young women in developed, and some developing countries
- A dual rapid, point-of-care test for HIV and syphilis is now available that does not require electricity or laboratory equipment, and can be performed on blood samples obtained by finger prick
- Increasing recognition of MSM as an important risk group for STIs in all settings, including sub-Saharan Africa
- 26 countries have halved HIV transmission rates since 2001

Worldwide estimates

Sexually transmitted infections (STIs) cause a heavy burden of suffering, particularly in women and children. The impact of HIV/AIDS has been catastrophic in many developing countries; more than 20% of adults are infected in some parts of Africa. The World Health Organisation (WHO) estimates that 70 million people have been infected with HIV since the start of the epidemic, 35 million of whom have died. At the end of 2012, 35.3 million people were living with HIV, two-thirds of them in sub-Saharan Africa, and 1.6 million people died of HIV-related conditions in 2012.[1] In recent years access to anti-retroviral treatment (ART) has increased dramatically in low- and middle-income countries, with 9.7 million people now being treated, compared to 400,000 in 2003, and more than 50% of HIV-positive pregnant women now receive treatment to prevent transmission to their infants. ART has been shown to reduce transmission of HIV to sexual partners,[2] and there is evidence that the incidence of HIV has decreased with increasing ART coverage,[3] but HIV prevalence will continue to increase as infected people live longer. Circumcision has been shown to reduce HIV incidence by about 60% in three randomized controlled trials in African men.[4] Trials of vaccines have not shown any evidence of protection against HIV.

Few low- or middle-income countries have accurate reporting systems for STIs; as a result, in most of the world's population, the incidence of these infections (usually expressed as the number of new cases per 100,000 population per year) is unknown. Knowledge of the epidemiology is based on the results of *ad hoc* prevalence surveys undertaken in convenient populations. Surveys of antenatal clinic attenders can provide useful information on the prevalence of STIs in the general sexually active population.[5] Large population-based prevalence surveys undertaken in some African countries have confirmed the high prevalence of STIs, even in rural populations. Syphilis was found in 5–10% of adults, *Trichomonas vaginalis* in 20–30% of women and 10% of men, and bacterial vaginosis in up to 50% of women.[6] Syphilis is estimated to cause about 500,000 stillbirths and neonatal deaths per year[7]; this figure is similar to the number of children dying of HIV/AIDS worldwide.

Curable and incurable STIs

STIs can be divided into:

- curable infections caused by bacteria and protozoa
- incurable viral infections that are often of lifelong duration (Table 1).

Curable and incurable STIs

Major curable STIs	
• *Neisseria gonorrhoeae*	Gonorrhoea
• *Chlamydia trachomatis*	Chlamydial infection
• *Treponema pallidum*	Syphilis
• *Haemophilus ducreyi*	Chancroid
• *Trichomonas vaginalis*	Trichomoniasis
Major incurable STIs	
• Herpes simplex virus	Genital herpes
• Human papilloma virus	Genital warts, cervical carcinoma
• HIV	HIV disease and AIDS

Table 1

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Bacterial and protozoal infections

The WHO has estimated the worldwide incidence of curable STIs (syphilis, gonorrhoea, trichomoniasis and chlamydial infection) from prevalence data and the estimated duration of infection. This analysis suggests that, in 2008, there were 499 million new cases of curable STIs: 276 million cases of trichomoniasis, 106 million cases of chlamydial infection, 106 million cases of gonorrhoea, and 11 million cases of syphilis.[8] In view of the uncertainty surrounding the prevalence estimates, the duration of untreated STIs and the mean duration before effective treatment is administered, these figures cannot be considered definitive. Third-generation cephalosporins have been recommended as first-line treatment for gonorrhoea since the rapid global spread of quinolone-resistant strains of *Neisseria gonorrhoeae* in the 1990s. In recent years there have been reports of treatment failure with third-generation cephalosporins in several regions, and an increasing proportion of isolates show reduced sensitivity to cephalosporins, as well as other classes of antibiotic, *in vitro*.[9] (see also Gonorrhoea on pages 323–326 of this issue).

Viral infections

Genital herpes and human papilloma virus (HPV) infections are common among all sexually active populations, but cause a particularly heavy burden of disease in developing countries. Genital herpes, which is usually caused by herpes simplex virus type 2 (HSV-2), is a lifelong infection, causing recurrent episodes of genital ulceration that are more frequent, more severe and longer lasting in immunocompromised individuals. A population-based study in rural Tanzania found that 50% of women and 25% of men were infected with herpes simplex virus type 2 (HSV-2) by the age of 20 years.[10] A very high prevalence of HSV-2 infection has been found in several other African countries.[11] The proportion of genital ulcers caused by HSV-2 has increased greatly in populations with a high HIV prevalence. Cervical carcinoma is the most common malignancy in women in much of the developing world, reflecting the high incidence of sexually transmitted HPV infection and inadequate screening and control programmes. Two effective vaccines against oncogenic HPV strains are available and are being given to young women in developed and some developing countries.[12]

Socio-economic determinants

STIs are more common in poor populations. The incidence of gonorrhoea in inner-city ethnic minorities in the USA is at least 30-fold greater than that in middle-class white Americans, and similar to that in many developing countries, where incidences of 3000/100,000/year have been estimated in the general population (compared with <50/100,000/year in the UK and other countries in Northern Europe). Gonorrhoea and syphilis are now uncommon in affluent countries, except in certain high-risk groups such as men who have sex with men. The prevalence of *T. vaginalis* infection is also high (up to 20%) among disadvantaged women in the USA.

The poor are at increased risk of STIs for several reasons.

- They may have to travel long distances away from their families in search of work. Many poor rural villagers have migrated into cities in developing countries in the last few decades, and many more have been displaced by war or famine
- Poverty and lack of education drive many women into commercial sex.
- Even within marriage, women in many cultures are at risk of acquiring STIs from their husbands, because they are unable to insist on using condoms.
- Health education messages warning of the dangers of HIV/AIDS may be lost on those whose most pressing need is the cost of their next meal.
- Perhaps most importantly, the poor often lack access to effective treatment for curable STIs.

Transmission of STIs

The rate at which an STI spreads in a population depends on the average number of new cases of infection generated by an infected individual – the basic reproduction number (R_0). This in turn depends on the mean rate of sexual partner change (c), the average duration of the infection (D) and its infectiousness (the likelihood of it being transmitted per sexual act, b). This relationship has been described by the simple formula: $R_0 = bcD$.

The duration of a curable infection depends on the time that elapses before effective treatment is given:

- A disease such as chancroid (Figure 1), which almost always causes unpleasant symptoms, is likely to be treated rapidly in populations with access to effective treatment. For this reason, chancroid has almost disappeared from most industrialized countries. It remains endemic in core groups in some developing countries, although its incidence is thought to have declined in the past decade, probably as a result of behaviour change resulting from the HIV/AIDS epidemic
- In contrast, chlamydial infection, which is often asymptomatic in both men and women, is likely to be of longer duration and therefore to persist even in affluent populations with good access to treatment.



Figure 1 Chancroid.

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When R_0 declines below 1 in a given population, the infection will eventually disappear. However, even when R_0 is less than 1, infections may be maintained in core groups with a high rate of sexual partner change (e.g. sex-workers and their clients, men who have sex with men [MSM]), and may continue to occur in the general population as a result of sexual contact with members of high-risk groups.

Interactions between HIV and other STIs

It has been demonstrated that diseases such as chancroid, syphilis and herpes, which cause genital ulceration, facilitate sexual transmission of HIV by increasing both infectivity and susceptibility.

- A prospective study of STI clinic attenders in Nairobi, Kenya showed that about one in six men who acquired a genital ulcer from an HIV-positive sex-worker after a single sexual exposure also acquired HIV.[13] This suggests that the presence of a genital ulcer increases the risk of transmission 50–100 times. It has also been shown that STIs causing genital discharge (e.g. gonorrhoea) increase shedding of HIV in both seminal and cervicovaginal secretions.
- A community-randomized trial conducted in the Mwanza region of Tanzania showed that improved services for the management of STIs, using the syndromic approach in rural health centres and dispensaries, reduced the incidence of HIV infection by 40% over a 2-year period.[14]
- A similar trial in Uganda, and another community-randomized design assessing the impact of periodic mass treatment for curable STIs, failed to show any impact on the incidence of HIV. Review of the data from these trials, and mathematical modelling using the three datasets, suggested that improved STI case management is more likely to reduce HIV incidence in the early stages of an HIV epidemic, when most infections are concentrated in core groups.[15]

HIV and HSV-2 each appears to facilitate the transmission of the other, leading to a 'vicious circle' as shown in Figure 2. Suppressive treatment for HSV-2 has been shown to reduce HIV shedding and plasma viral load in co-infected individuals but, disappointingly, recent trials found no evidence that suppressive herpes treatment reduced the risk of HIV acquisition among high-risk groups.[16]

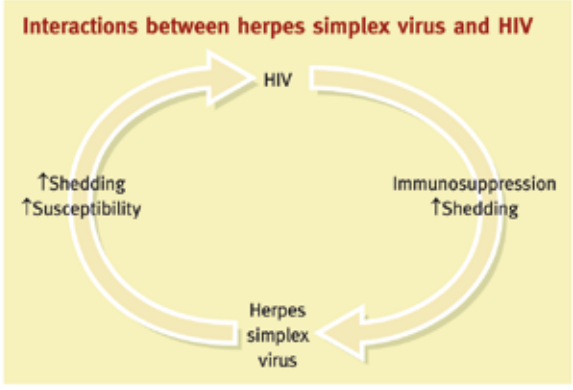


Figure 2

Control of STIs

Given sufficient resources and political commitment, it is possible to control curable STIs through the provision of accessible, acceptable and affordable clinical services, combined with partner notification and screening programmes in high-risk groups. Criminalization of vulnerable groups such as sex-workers and MSM is an important barrier to STI control in some countries. Control of curable STIs could significantly reduce the incidence of HIV infection worldwide.

In most developing countries, case management of STIs must be syndromic, because facilities for laboratory diagnosis are unavailable outside a few specialist centres. Syndromic management of genital ulcers, and urethral discharge in men is straightforward and cost-effective but syndromic management of vaginal discharge in women is not, because symptoms are poor predictors of the presence of an STI. A sensitive, cheap, simple, dipstick-type test for gonorrhoea and chlamydial infection in women would be of great value in the control of these infections; it is to be hoped that such a test will become available in the next few years.

Universal screening of pregnant women for syphilis, and treatment with single-dose benzathine penicillin, could prevent 500,000 perinatal deaths per year.[17] This is one of the cheapest and most cost-effective health interventions available. New, simple, rapid, cheap point-of-care serological tests for syphilis, which can be performed on whole blood obtained from a finger prick, are now available. Since they can be stored at room temperature, and require no laboratory equipment, they could greatly increase the coverage of prenatal syphilis screening at the primary healthcare level in developing countries.[18] A single, oral dose of azithromycin 2 g has been shown to be effective in treating syphilis in Tanzania, although resistance to azithromycin has been identified in strains of *Treponema pallidum* from MSM in the USA and Europe, and in China.[19–21]

The increased resources now available for the prevention of mother-to-child transmission of HIV in many developing countries offer an important opportunity to increase the coverage of prenatal syphilis screening, but the vertical nature of many HIV programmes has often prevented this opportunity from being seized.[22] A new, dual point-of-care test for HIV and syphilis, which has recently become available, should help to increase the coverage of prenatal screening for syphilis. In the longer term, control of STIs will depend on improved living conditions and access to care for the poor, particularly women, in both the developed and the developing world. ◆

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Sexually transmitted infections in women: history and examination

Bavithra Nathan
Jan Welch

Abstract
Sexually transmitted infections (STIs) are common. Sensitive, non-judgemental history taking and careful examination are crucial steps in facilitating the correct diagnosis in symptomatic women as well as in providing the basis for delivering safe and effective treatment to the patient and her partner(s). The article provides detailed information about how to do this, including sample questions to ask.

Keywords Bimanual examination; sexual history; sexually transmitted infections; speculum; symptoms; vaginal examination

What's new?

- Recognition of the prevalence of unreported non-volitional sex and intimate partner violence and its impact on women in particular
- Increasing recognition in women of the need to sample additional anatomical sites as well as the vaginal tract, given increasing sexual repertoire
- Integrated sexual health care, requiring practitioners to take a complete sexual infection risk and reproductive history, dealing with risk reduction for infection and contraception needs

Setting the foundations

Many generic sexual health services and general practitioners (GPs) provide screening tests for sexually transmitted infections (STIs) in asymptomatic women, but a more comprehensive assessment – comprising detailed history and genital examination[1] – is usually necessary when symptoms are present or a risk identified. In this article we explain how best to take a sexual history and undertake a comprehensive genital examination in women, pointing out some 'tricks of the trade' and useful sample questions. For more detail, see the recently published BASHH 'Guideline for Consultations requiring sexual history taking'.[2] Like other areas of medicine, sexual history taking and genital examination require practice and skill development.

Both patients and doctors often find it difficult to talk about sex. A good sexual history is facilitated by conducting the consultation in a private, comfortable environment, establishing a good professional relationship with the woman, and preserving her confidentiality. A non-judgemental attitude is important, as is the use of questions and choice of words that are both appropriate to the consultation and readily understood. Appropriate body language and maintaining eye contact (if culturally acceptable) can reassure the patient. It may be necessary to explain the rationale behind some of the questions asked. The presence of an observer, such as a student, should be allowed only with the woman's consent. If necessary, arrangements should be made for a sign or foreign language interpreter to be present, or for Language Line to be available. Relatives should never be asked to interpret for a sexual history.

Initial questions should be open and should establish the woman's presenting concerns, which can then be further explored. If genital symptoms are present, direct questions to elicit relevant details such as duration are generally expected. In other circumstances (e.g. a teenager requesting contraception), it may be necessary to broach the subject with a question such as: '*Are you in a regular relationship?*' Competency and safeguarding concerns should also be explored for young people and particularly in those aged under 16 with reference to local and General Medical Council guidelines.[3]

History

Symptoms

Common symptoms of STIs are:

- discharge
- genital skin problems – sores, lumps, bumps and rashes
- pain on intercourse
- pain in the pelvis.

Vaginal discharge is a common presenting complaint that does not necessarily indicate infection. Physiological discharge varies with the menstrual cycle, and may be altered by hormonal or intrauterine contraception. Symptoms suggesting an infection are itching, soreness or smell.

- '*Do you have a discharge?*' '*Has there been any change in your discharge?*'
- '*Does it itch?*' – pruritus is usually caused by *Candida*, or sometimes trichomoniasis.
- '*Is it sore?*' – soreness may also be associated with *Candida* or trichomoniasis.
- '*Have you noticed an odour?*' – if yes, '*What does it smell of?*' – a fishy-smelling discharge is highly suggestive of bacterial vaginosis.

Dysuria: urethral dysuria is commonly caused by a urinary tract infection, but can also occur in urethral infection with

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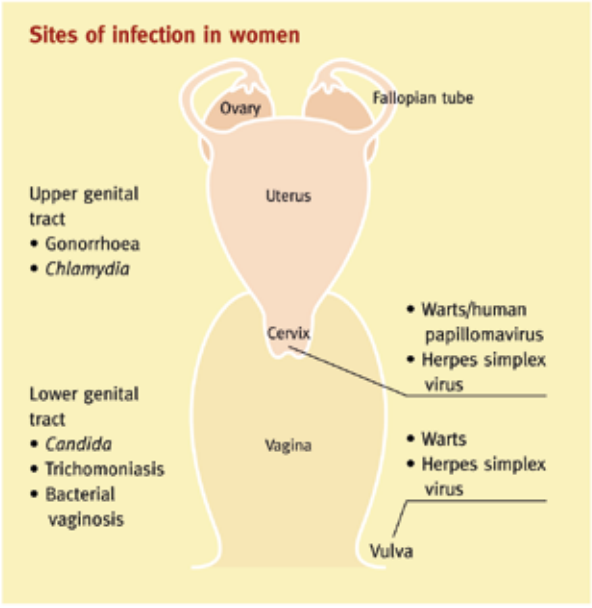


Figure 1

gonorrhoea, chlamydia and trichomonas. Dysuria can also occur in the presence of herpes ulcers.

- '*Does it hurt when you pass urine?*' – if yes, elicit other urinary symptoms such as frequency, and ask: '*Does it hurt where the urine comes out, or around the outside?*'

Genital lesions and rashes: when the woman complains of sores, lumps, bumps or rashes, elicit the duration and site, and whether there are associated symptoms of itching or pain. Sores may follow scratching associated with pruritus or may occur spontaneously. The sores of genital herpes are usually very painful, whereas the primary chancre or secondary lesions of syphilis are generally painless. Rashes may relate to infections, such as molluscum contagiosum, a viral infection producing characteristic umbilicated pearly papules, or non-infective conditions such as lichen sclerosus (Figure 1).

- '*Have you ever had anything like this before?*' – recurrence suggests warts or genital herpes; the history of the latter is characteristic, with tingling in an area followed by blisters and then sores, which then dry and heal.
- '*Have you put any cream or anything else on it?*' – over-the-counter topical remedies have generally not been formulated for genital use and can often lead to reactions.
- '*Do you have any problems in your mouth, or elsewhere on your skin?*' – many generalized skin conditions can give rise to genital disease. Any suspicion should prompt a general examination, with particular emphasis on the finger webs (scabies), knees and elbows (psoriasis), flexures (eczema) and mouth (lichen planus, Behçet's disease).

A generalized illness with rash, lymphadenopathy and sometimes mouth and genital lesions can result from secondary syphilis or the seroconversion illness of HIV infection. A detailed drug history should also be taken as severe allergic reactions can cause mucosal ulceration including the genital area.

Pelvic pain may be physiological in association with ovulation or menstruation, or may result from pelvic pathology, such as infection, ectopic pregnancy or ovarian cysts. A detailed menstrual history is useful to identify this.

- '*Do you have any pain in your tummy?*' – if yes, determine the duration, severity and site, and ask: '*Is it present all the time?*', '*Does it hurt when you have sex?*' and '*Is it related to your periods?*' If pain on intercourse is present, elicit whether it is deep in the pelvis or in the vulva or vagina. Deep dyspareunia is suggestive of pelvic infection, but may have a non-infective cause such as ectopic pregnancy. Superficial dyspareunia is often related to candidal infection.

Sexual history

The details required depend on the presentation and the possible differential diagnosis. Generally, information about all sexual partners during at least the last 3 months is necessary to allow for the window period for detection of STIs and also for contact tracing of at-risk partners.[4] Tact is important when infidelity seems likely or following sexual assault.

- '*When did you last have any type of sex?*'
- '*Is that a regular or a casual partner?*' – if casual, '*Is that someone you know or was it a one-off episode?*' If the gender of the partner has not already been stated, it may be relevant to ask, '*was that with a male or female partner?*'
- '*Was that with your permission?*' '*Did you want it to happen?*' or '*Have you ever felt pressured to have sex?*' are useful questions to ascertain whether sex was consensual; women often find sexual assault or rape hard to disclose unless they are asked directly. If someone has been sexually assaulted, ask about other types of abuse, as women experiencing intimate partner violence (IPV) may need medical, social and psychological support. The HARK questions (see Box 1) were developed for general practice but can be useful in other settings.[5] If IPV is identified, then safeguarding issues should be considered for the woman and any children she has, and advice provided about referral services and further management.

The HARK questions

H HUMILIATION
Within the last year, have you ever been humiliated or emotionally abused in other ways by your partner or ex-partner?

A AFRAID
Within the last year, have you been afraid of your partner or ex-partner?

R RAPE Within the last year have you been raped or forced to have any kind of sexual activity by your partner or ex-partner?

K KICK
Within the last year, have you been kicked, hit, slapped or otherwise physically hurt by your partner or ex-partner.

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- *'Did you use a condom?'* – if yes, *'Did it break or fall off?'*
- *'How long have you been together?'*
- *'When was the last time you had sex with someone else?'* – elicit further details of that episode if relevant to the timescale of the history.

Sometimes, it is also necessary to obtain, sensitively but clearly, further information about the type of contact (e.g. anal or oral intercourse), to assist in deciding which sites to sample, or following sexual assault.

Now that HIV is so readily treatable, testing is carried out routinely in many settings, with universal 'opt-out' HIV testing being recommended in high prevalence areas including genitourinary medicine, general medical and antenatal clinics.[6] However, when HIV is suspected or an HIV test is requested, it may be useful to establish whether the woman has any significant risk factors for acquisition of the virus. Worldwide, the most important factor for HIV acquisition is unprotected intercourse with a partner from a high-prevalence area such as sub-Saharan Africa or the Caribbean. Other risk factors for HIV (and for hepatitis B and C) are injecting drug use involving sharing of needles, unprotected sex with a bisexual partner, medical treatment or blood transfusion in a resource-poor country, and mother-to-child transmission.

Menstrual and contraceptive history

The menstrual and contraceptive history is crucial in women with pelvic pain, to avoid missing potentially life-threatening ectopic pregnancy. It is also important to know whether the woman may be pregnant when selecting treatments such as antibiotics. Relevant factors are details of the woman's menstrual cycle, the date of the first day of her last menstrual period, and whether it was atypical. It may also be useful to establish when the last cervical smear was carried out, and whether the woman has ever been referred for colposcopy.

- *'Have you noticed any bleeding between your periods, or after sex?'* – abnormal bleeding has various causes, both gynaecological and infective. Pelvic infection is often associated with menorrhagia, and sometimes also with intermenstrual bleeding.
- *'Are you or your partner using any contraception?'* – if yes, elicit details such as type and adherence. When condoms are used intermittently as the sole contraceptive method, it may be useful to ask: *'Have you had any unprotected sex since your last period?'* as the answer may lead to an offer of emergency contraception or a revision of choice of medication.

General questions

Other aspects of history taking are important in identifying information relevant to the management of women with genital symptoms. General medical conditions can be associated with genital problems; for example, women with diabetes may develop candidiasis, and those taking immunosuppressive agents may have intractable genital warts. A reproductive and gynaecological history may identify previous episodes of pelvic infection, or operations causing adhesions. A drug history may identify drugs known to cause particular rashes, such as a fixed drug eruption. A travel history may identify potential exposure to tropical infections such as chancroid, or medical treatment abroad may highlight the risk of HIV and hepatitis B and C. Family history and general medical history are relevant when prescribing hormonal contraception.

Physical examination

Before undertaking genital examination of a woman, it is important to consider her comfort and what aspects of the examination are necessary, to ensure that an adequate examination can be conducted. A clear explanation (of what the examination entails and why it is important) is reassuring for the patient and minimizes the risk of misinterpretation. In some circumstances, it is possible safely to avoid performing an examination if the woman prefers; for example, following rape, many women would rather take prophylactic antibiotics or be offered self-taken vaginal swabs than undergo the perceived additional violation of a speculum examination to check for infection.

Privacy

Privacy is essential. Use of curtains around the examination couch ensures this, even if the door to the examination room is opened. Once the woman has partially undressed, the examination should proceed as soon as possible to minimize her anxiety and embarrassment, and she will feel more confident in any subsequent discussion if she has been allowed to re-dress. The UK General Medical Council advises that doctors should always offer a chaperone, though it is recognized that the feasibility of this depends on staff availability. When the doctor is male, the presence of a female chaperone is important for the protection of both patient and doctor.

Equipment

Essentials for the examiner are a good light source and an adequate couch; a gynaecology couch with leg supports is ideal. Most clinics now use disposable plastic vaginal speculums that do not require preliminary warming, unlike metal ones. These are readily available and come in a variety of sizes from very small ones for use in virgins, to the large ones that are often necessary to visualize the cervix in multiparous women, particularly those who are obese.

Genital examination

Genital examination is usually performed with the woman in the lithotomy position.

Inguinal region: initially, the inguinal region should be palpated for lymphadenopathy. The presence of shotty nodes is normal, but large, tender nodes of recent onset suggest acute infection, particularly genital herpes.

Pubic region may require close inspection in women who report problems there; the most common are folliculitis and infestation with *Phthirus pubis*. In the latter, lice are occasionally seen as tiny, mobile insects; more commonly, oval eggs are seen adhering to the hair shaft, often with associated small areas of excoriation, bleeding and crusting.

The vulva and perianal region should be inspected next, starting with the labia majora and then the labia minora and clitoral region. Warts are generally asymmetrical and feel slightly gritty, as though containing grains of sand; they should not be confused with vestibular papillae, which may be seen as symmetrical roughening around the introitus in some women and are a normal finding. The lesions of genital herpes vary widely, from small patches of erythema to vesicles or small or large ulcers. Other causes of ulceration include skin reactions, the indurated

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– and generally solitary – primary chancre of syphilis, and imported infections such as chancroid. Vulval erythema is often caused by candidal infection and is associated with oedema and fissuring, when tiny, superficial cracks develop in shiny skin.

Vaginal examination

Following explanation of the procedure to the patient, the speculum is fully inserted gently, then opened smoothly to reveal the cervix.

- The presence (or absence) of threads should be recorded in women with an intrauterine device (IUD) *in situ*. Cervical ectopy is the presence of an area of columnar epithelium surrounding the os, giving a red, granular appearance; it is hormonally mediated and common in young women.
- Warts may occasionally occur on the cervix.
- Vaginal discharge and vaginal walls can be assessed on speculum examination. In candidal infection, a white, lumpy discharge may be present; this is often adherent to an erythematous base. Bacterial vaginosis does not cause vaginal inflammation, but a homogeneous white/grey discharge that may smell fishy. In trichomoniasis, the discharge is usually profuse and yellow, and is associated with profound inflammation and vascularity of the vagina and cervix ('strawberry cervix') due to micro-haemorrhages.

Bimanual examination

Bimanual examination is performed last. Following explanation, the first two fingers of the gloved right hand are inserted into the vagina and moved upwards and backwards while the examiner pushes carefully down into the pelvis with the other hand, thereby palpating the pelvic organs to assess their size and the presence of masses or tenderness. Lubrication of the right hand is required; single-use sachets of water-soluble lubricant minimize the risk of cross-contamination.

Bimanual examination may be uncomfortable for the patient, but should not be painful. The finding of cervical motion tenderness (excitation – pain when the cervix is moved gently from side to side) and/or adnexal tenderness is suggestive of pelvic infection or ectopic pregnancy. A pelvic mass (e.g. ovarian cyst) may be detected. The position of the uterus (whether it is anteverted or retroverted) can also be established and is particularly relevant if the woman is to have an IUD inserted.

Investigations

Investigations undertaken during the examination depend on the setting (e.g. general practice, GUM clinic), the local availability of investigations and prevalence of infections, and the presentation and wishes of the patient. How the results will be communicated should be established. Most sexual health clinics will provide text message results.

New diagnostic techniques have changed sampling requirements; nucleic acid amplification tests (NAATs) combined for chlamydia and gonorrhoea are very sensitive and can be performed on self-taken vulvo-vaginal or cervical swabs. Point-of-care tests (POCT) are also used and can be helpful in the community setting where access to microscopy and laboratories are limited. POCT testing for HIV can be used in emergency situations where HIV status is unknown and may affect whether post-exposure prophylaxis (PEP) for HIV is required. Culture for gonorrhoea is still necessary due to problems with emerging resistance in the UK.

Blood

- Syphilis (serological tests for syphilis usually by automated enzyme immunoassay.)
- HIV (fourth-generation HIV antibody/antigen test can have a testing window period of 28 days and will detect most infections but testing at 3 months post exposure is advised to definitely exclude infection.)
- Hepatitis B markers and hepatitis C antibody if suggested by risk

Vagina

- Microscopy (Gram stain for *Candida* and clue cells (evidence of bacterial vaginosis)), wet preparation/culture for *Trichomonas vaginalis*

Cervix

- Cervical cytology (opportunistically in eligible women who have missed participation in the relevant National Screening Programme as screening ages vary in England and Scotland)
- Microscopy and culture for gonorrhoea if symptoms or a contact of gonorrhoea if available will aid immediate diagnosis and provide antibiotic sensitivity.
- NAAT for chlamydia and gonorrhoea

Urethra

- Microscopy and culture for gonorrhoea (in some clinical situations)

Vulva or skin

- Herpes simplex (vigorous sample from base of suggestive lesions, for PCR and HSV typing) and treponemal polymerase chain reaction (PCR) test from ulcers. Dark-field examination of a specimen from ulcerative lesion should also be done if syphilis is suspected.

Rectum and pharynx

- Culture and NAAT for gonorrhoea (if indicated by sexual history)

Urine

- A sample of urine may be required. If urethral samples are to be taken, the urine sample should ideally be requested last so that evidence of infection is not lost
- Urinalysis for glucose, protein, nitrites and leucocytes and mid-stream urine for culture when significant urinary symptoms are present
- Urine for pregnancy testing.

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Practice points

- Attention to a woman's privacy and comfort is essential for successful history taking and examination
- Sexual history taking aims to assess recent and lifetime risk of sexual infections including BBV risk, to permit tailored risk reduction advice where appropriate
- Attendance for sexual health screening can be the first presentation of intimate partner violence
- Sexual health includes reproductive and emotional health needs, and practitioners should be holistic in their outlook

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