
Urinogenital infections in the tropics

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The range of urinary tract infections and sexually transmitted infections varies from place to place and though the aetiology and clinical presentation of infections is similar in industrialised and developing countries it is evident that persons with these infections resource-constrained tropical areas of the world often present for care with more severe illness and often only after complications have developed. For clinicians working in resource-constrained settings it is important to be aware of symptoms and signs of UTI and STIs so that early effective care may be provided before complications develop. Clinicians should also be aware that laboratory services are not widely available in rural and remote countries throughout the world and hence persons suspected of having infection should be treated according to clinical symptoms and signs as results of tests may not become available till much later. In managing persons with STIs the syndromic approach is particularly useful as reliance is not placed on the results of laboratory tests.

PART A URINARY TRACT INFECTIONS

8.1 Introduction

The term urinary tract infection covers a number of infections affecting the urinary tract, including asymptomatic bacteriuria, pyelonephritis, cystitis, prostatitis and urethritis. In this section the non-sexually transmitted infections of the urinary tract are described. The commonest causes of community acquired infection world-wide are *Escherichia coli* and *Staphylococcus saprophyticus*; other pathogens including *Klebsiella*, *Proteus* and *Enterobacter* species cause infections more frequently in hospitalised patients, and in patients who have had urinary tract instrumentation and in those that have urinary catheters.

Infections of the lower urinary tract are commoner in women than in men. In general urinary tract infections are commoner in persons with diabetes, in pregnant women, in persons with renal calculi and renal tract malformations, in persons who have impaired voiding as a result of obstruction, and in those that have had surgical instrumentation of the urinary tract and urinary tract catheters in place.

UTIs are often categorized as complicated or uncomplicated depending on the presence or absence of host conditions known to promote infection, promote persistence of infection or lead to recurrence of infection. Complicating factors in UTI include:

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- Occurs in men, boys, premenarcheal girls and postmenopausal women
- Occurs during pregnancy
- Occurs in persons with diabetes or immunosuppression
- If the infection is hospital acquired
- Occurs in persons who have recently been on antibiotics
- Occurs in patients who have had instrumentation of the urinary tract or have a urinary catheter in place
- Occurs in patients who have a renal calculi
- Occurs in patients who have a structural abnormality of the urinary tract
- Delayed diagnosis and treatment due to delayed presentation

The symptoms of UTI in young children are non-specific; usually the child/infant presents with poor feeding, vomiting and fever. In the older child and adult the classic symptoms of UTI are dysuria and frequency and urgency of micturition. In elderly patients symptoms may be non-specific but often symptoms referable to the renal system such as frequency, urgency, nocturia and incontinence may occur. The urine may be turbid or blood-stained.

8.2 Laboratory diagnosis

Laboratory facilities are often not available or limited in many developing countries and tropical regions of the world especially in rural and remote areas. The diagnosis of UTI requires documentation of bacteriuria by urine culture. A clean catch pass of the mid-stream urine is cultured quantitatively for bacteria. The culturing of 10^5 colony forming units (CFU) of bacteria per mL of urine is usually taken as indicative of UTI; however it is known that some patients, usually women, with classic symptoms and signs of cystitis may be found to have a significantly smaller number of colonies cultured; hence it is advisable that in acutely symptomatic women significant bacteriuria or UTI is defined as the presence of 10^3 CFU/mL of a known uropathogen.

8.2.1 Rapid tests

Rapid tests are available for the detection of urinary leukocytes, erythrocytes and bacteria, and if used in the appropriate clinical setting these tests may be used to make a presumptive diagnosis of UTI. Pyuria (polymorphonuclear leukocytes in the urine) found microscopically in uncentrifuged urine of symptomatic women is a sensitive indicator of UTI. The leukocyte esterase dipstick method for the detection of white blood cells in the urine is less sensitive a method than microscopic examination of the urine. However it may be used in the absence of laboratory facilities for quantifying pyuria.

Microscopic bacteriuria, identified by examining gram-stained smears of uncentrifuged urine, is found in over 90% of patients with UTI in which colony counts are at least 10^5 CFU/mL. Bacteria are not readily detected microscopically with infections of lower colony counts.

Microscopic haematuria is found in over half the patients with acute cystitis and is an indicator of cystitis in women with classic symptoms. Haematuria also occurs commonly in urinary

schistosomiasis and in persons with renal calculi and tumours; hence these conditions should be kept in mind when assessing patients.

8.3 Principles of management of UTI

All symptomatic UTIs should be treated with antimicrobial agents given for a period long enough to eradicate infection. Successful treatment correlates with inhibitory concentration of antimicrobial agent in the urine. Patients with UTI should be advised to drink as much water as they can in order to dilute the concentration of bacteria in the urine in the bladder. Complete bladder emptying should be encouraged

8.4 Clinical features and treatment

8.4.1 Acute cystitis

8.4.1.1 Clinical Features

Acute cystitis generally occurs in women but may also be seen in men and children. Patients usually present with dysuria, frequency, urgency, voiding small amounts of urine, incontinence and suprapubic or pelvic pain.

8.4.1.2 Treatment

(i) Non-pregnant women

Uncomplicated lower urinary tract infection in non-pregnant women may be treated with any of the following regimens:

- Trimethoprim 300mg orally daily for 3 days, OR
- Cephalexin 500mg orally 12-hourly for 5 days, OR
- Amoxicillin 500mg plus clavulanate 125mg orally 12-hourly for 5 days, OR
- Nitrofurantoin 50mg orally 6-hourly for 5 days

In the event of resistance, Norfloxacin 400mg orally 12-hourly for 3 days may be given

(ii) Men

In men with cystitis an underlying urinary tract abnormality should be suspected and investigations are necessary. Men with cystitis may also have infection of the posterior urethra, prostate or epididymis.

Cystitis in men may be treated as follows; note that treatment should be continued for 14 days:

- Trimethoprim 300mg orally daily for 14 days, OR
- Cephalexin 500mg orally 12-hourly for 14 days, OR
- Amoxicillin 500mg plus clavulanate 125mg orally 12-hourly for 14 days, OR

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- Nitrofurantoin 50mg orally 6-hourly for 14 days

(iii) Pregnant women

Any one of the following regimens may be used:

- Cephalexin 250mg orally 6-hourly for 10 to 14 days, OR
- Nitrofurantoin 50mg orally 6-hourly for 10 to 14 days, OR
- Amoxicillin 500mg plus clavulanate 125mg orally 12-hourly for 10 to 14 days

(iv) Children

When cystitis is confirmed by positive urine culture it is necessary to investigate for underlying abnormality males of any age, females under 5 years of age and premenarcheal females with recurrent urinary tract infection. Any of the following regimens may be used:

- Cephalexin 12.5mg/kg up to 500mg orally 6-hourly for 5 to 10 days, OR
- Trimethoprim 6mg/kg up to 300mg orally daily for 5 to 10 days, OR
- Amoxicillin plus clavulanate 22.5mg/kg up to 500mg/125mg orally 12-hourly for 5 to 10 days, OR
- Cotrimoxazole 4/20mg/kg up to 160/800mg orally 12-hourly for 5 to 10 days

NOTES: After the initial infective episode has been treated in children, antibiotic prophylaxis with nitrofurantoin or trimethoprim should be commenced until such time as a urinary tract abnormality has been excluded. It is generally considered best to avoid the fluoroquinolones in children and persons less than 18 years of age unless, on microbiological grounds, no alternatives are available.

8.4.2 Acute pyelonephritis

8.4.2.1 Clinical features

Patients with acute pyelonephritis present with flank, low back or abdominal pain as well as fever, rigors, headache, nausea, vomiting and malaise. Symptoms and signs of cystitis may or may not be present. A wide spectrum of illness is encountered in persons with acute pyelonephritis, ranging from mild disease to gram-negative septicaemia. Patients may be hypovolaemic as a result of poor fluid intake and vomiting and may develop intrarenal or perinephric abscesses. These latter complications are usually associated with urinary tract obstruction, diabetes and immunosuppression.

8.4.2.2 Treatment

(i) Mild and moderate infection

Patients who are not ill and do not require hospitalisation may be treated with oral antibacterial agents as outpatients. Any one of the following treatments may be given:

- Cephalexin 500mg orally 6-hourly for 14 days
- (Children: 12.5mg/kg, up to 500mg, orally 6-hourly for 14 days), OR
- Amoxicillin/clavulanate 875mg/125mg orally 12-hourly for 14 days
- (Children: 22.5mg/kg, up to 875mg/125mg, orally 12-hourly for 14 days), OR
- Trimethoprim 300mg orally daily for 14 days
- (Children: 6mg/kg, up to 300mg, orally daily for 14 days)

If resistance to these antibacterials has been demonstrated, or the causative pathogen is *Pseudomonas aeruginosa*, use,

- Ciprofloxacin 500mg orally 12-hourly for 14 days.

Ciprofloxacin should be avoided in children

(ii) Severe infection

Patients who are severely ill and those with suspected gram-negative sepsis should be hospitalised and treated with parenteral antibacterials. Treatment should be changed to the oral route as soon as the patient improves. The following treatment may be given:

- Amoxicillin or ampicillin 2g (children: 50mg/kg up to 2g), intravenously 6-hourly, PLUS
- Gentamicin 4mg to 6mg/kg (children less than 10 years: 7.5mg/kg; and more than 10 years 6mg/kg), intravenously daily tailoring the dose to the age of the patient and renal function.

When gentamicin is used alkalisation of the urine potentiates its activity and this may be achieved with sodium citrotartrate 4g orally 6-hourly.

In patients allergic to penicillin, monotherapy with gentamicin alone may be sufficient.

In patients in whom gentamicin is undesirable, i.e., elderly patients, patients with significant renal failure, and in those who have had a previous adverse drug reaction, the following may be used:

- Cefotaxime 1g (child: 50mg/kg up to 1g), intravenously 8-hourly, OR
- Ceftriaxone 1g (child: 50mg/kg up to 1g), intravenously daily

It is important to continue treatment for 14 days, the latter part of the treatment may be administered orally, using the regimens recommended for outpatient treatment, or by daily outpatient intravenous injections.

8.4.3 Recurrent urinary tract infections

Recurrent infections occur either as a relapse of a previously treated infection (same organism cultured as previously), or as a result of reinfection (new pathogen cultured or reinfection with the same pathogen that caused the initial infection). In female patients instruction on perineal hygiene should be given. Occasionally recurrences may be related to sexual intercourse and the

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use of the diaphragm. Micturition after intercourse may prevent recurrences. In women using the diaphragm alternative contraception should be prescribed. In postmenopausal women intravaginal oestrogen administration significantly reduces recurrences. In patients with recurrences of UTI investigations should be performed to exclude urinary tract abnormalities, renal calculi and abnormal renal function.

(i) Treatment of recurrent UTI

For the treatment of an episode of recurrent UTI the following may be used:

- Trimethoprim 300mg orally daily for 14 days, OR
- Cephalexin 500mg orally 12-hourly for 14 days, OR
- Amoxicillin 500mg plus clavulanate 125mg orally 12-hourly for 14 days, OR
- Nitrofurantoin 50mg orally 6-hourly for 14 days

Selection of antibacterial agent should be guided by the results of antimicrobial sensitivity patterns of pathogens cultured.

(ii) Prophylaxis

Long-term prophylaxis is advisable in women who have more than 3 episodes of UTI in a year. Prophylaxis should be continued for 3 to 6 months:

- Trimethoprim 150mg (child: 2mg/kg) orally once at night, OR
- Nitrofurantoin 50mg (child 2.5mg/kg) orally once at night, OR
- Cephalexin 250mg (child: 12.5mg/kg) orally once at night

8.4.4 Asymptomatic bacteriuria

Different patient groups require different management.

(i) Neonates and pre-school children

Asymptomatic bacteriuria in this group of patients should be treated as follows and they should be investigated for vesico-ureteric reflux and other structural abnormalities of the renal tract:

- Cephalexin 12.5mg/kg up to 500mg orally 6-hourly for 10 days, OR
- Trimethoprim 6mg/kg up to 300mg orally daily for 10 days, OR
- Amoxicillin plus clavulanate 22.5mg/kg up to 500mg/125mg orally 12-hourly for 5 days, OR
- Cotrimoxazole 4/20mg/kg up to 160/800mg orally 12-hourly for 10 days

(ii) Pregnant women

Pregnant women should be treated for asymptomatic bacteriuria as there is a risk of developing pyelonephritis. Pregnant women should be treated as follows:

- Cephalexin 250mg orally 6-hourly for 14 days, OR
- Nitrofurantoin 50mg orally 6-hourly for 14 days, OR
- Amoxicillin 500mg plus clavulanate 125mg orally 12-hourly for 14 days

(iii) Men aged less than 60 years

Patients should be treated and investigated for the presence of chronic prostatitis and renal tract abnormalities. The following treatment is given:

- Trimethoprim 300mg orally daily for 14 days, OR
- Cephalexin 500mg orally 12-hourly for 14 days, OR
- Amoxicillin 500mg plus clavulanate 125mg orally 12-hourly for 14 days, OR
- Nitrofurantoin 50mg orally 6-hourly for 14 days

(iv) School-age children, non-pregnant women, patients aged more than 60 years

Asymptomatic bacteriuria probably does not require treatment in this group of patients if no abnormality is found in the renal tract. However treatment is necessary if patients have a urinary tract abnormality, if they are to undergo renal tract instrumentation or intermittent catheterization.

8.4.5 Catheter-associated urinary tract infections

Catheter-associated UTI should be treated if the patient has features of systemic infection, i.e., fever and rigors. Urine cultures should be taken at the time of suspected infection and not routinely. Systemic infection is often associated with catheter blockage. It is important to prevent catheter blockage by encouraging patients to drink adequate quantities of fluids and by changing catheters frequently. A poorly functioning catheter should be changed immediately. Removal of the catheter whenever possible makes a great contribution towards a cure especially where *Candida* is involved.

8.4.6 Prostatitis

Inflammation of the prostate may be caused by sexually transmissible and other bacterial pathogens. The clinical features of acute bacterial prostatitis are quite typical and the condition is easily diagnosed, while chronic bacterial prostatitis is difficult to diagnose as symptoms are non-specific and often vague.

8.4.6.1 Acute prostatitis

(i) Clinical features

Patients with acute bacterial prostatitis present with a sudden onset of chills, fever, perineal pain, low backache, dysuria, passing a poor urinary stream, and difficulty in micturition. On examination the prostate is tender, swollen and warm. Prostatic secretions, obtained after prostatic massage, reveal numerous white blood cells and culture show a heavy growth of

bacterial pathogens. The condition is commonly caused by *E. coli* and *P. aeruginosa* but other pathogens may also be responsible.

(ii) Treatment

For mild and moderate infection any one of the following is may be prescribed:

- Trimethoprim 300mg orally daily for 14 days, OR
- Cephalexin 500mg orally 12-hourly for 14 days, OR
- Amoxicillin 500mg plus clavulanate 125mg orally 12-hourly for 14 days, OR
- Nitrofurantoin 50mg orally 6-hourly for 14 days

For severe infection, use

- Amoxicillin or ampicillin 2g intravenously 6-hourly, PLUS
- Gentamicin 4mg to 6mg/kg intravenously daily tailoring the dose to the age of the patient and renal function.

This treatment is continued till there is substantial improvement and then the treatment is changed to any of the above-mentioned oral regimens to complete a 14-day course.

8.4.6.2 Chronic prostatitis

(i) Clinical features

Chronic bacterial prostatitis should be suspected in men with recurrent UTI. Symptoms are usually minimal, as inflammation often does not occur. Treatment is difficult as antibacterial agents penetrate the non-inflamed prostate poorly. Chronic prostatitis may be caused by *Chlamydia trachomatis* (Types D-K).

(ii) Treatment

Usually prolonged treatment is necessary. Any one of the following regimens may be used:

- Trimethoprim 300mg orally daily for 4 weeks, OR
- Norfloxacin 400mg orally 12-hourly for 4 weeks, OR
- Erythromycin 500mg orally 6-hourly for 2 to 4 weeks, OR
- Doxycycline 100mg orally 12-hourly for 2 to 4 weeks.

8.4.7 Renal tuberculosis

Renal tuberculosis occurs as a result of haematogenous dissemination of *Mycobacterium tuberculosis*. Though features of renal TB occur 2 to 5 years or more after initial infection, haematogenous dissemination of pathogens from the initial site of infection occurs soon after infection. Host defences and immunity play an important role in the occurrence of renal infection. Following haematogenous dissemination to the kidneys tubercles form in the renal cortices.

These may heal over a period of time but may progress to involve the renal medulla, renal pelvis, ureters and bladder. Infection may also occur in the prostate, seminal vesicles, epididymes and the testes. In women the fallopian tubes may become involved. Although infection is bilateral, progression of disease is usually asymmetrical. Inflammation and fibrosis usually occur with obstruction of hollow viscera such as the ureters, urethra and fallopian tubes. The spread of HIV infection has resulted in the increased incidence of both pulmonary and extra-pulmonary TB in areas of high HIV prevalence. Both epidemics have been spreading in parallel and in many developing countries the commonest opportunistic infection found in HIV infected individuals is TB. Clinicians working in the tropics should be conscious of the inter-relationships between HIV infection and TB.

(i) Clinical features

Patients with renal TB may present with dysuria, haematuria, frequency of micturition and loin pain. Fever and systemic symptoms are infrequent. They may also present with symptoms of urethral obstruction and hydronephrosis. The seminal vesicles may become firm, swollen and craggy and the epididymes may be enlarged and swollen. One or both testes may be affected and patients then present with firm, swollen and lumpy testes. Women may present with chronic lower abdominal and pelvic pain, dyspareunia and low backache, with or without menstrual irregularities. TB is a recognised cause of subfertility in women and occasionally in men.

(ii) Laboratory investigations

Laboratory tests should be carried out in all patients with suspected TB. A chest radiograph may show old, healed, calcified opacities. A plain radiograph of the abdomen may show calcified lesions in the area of the kidneys and adrenal glands. A tuberculin skin test may be positive. The urine classically shows red blood cells and sterile pyuria, i.e., white blood cells but no bacteria. Early morning urine specimens should be collected and examined for acid-fast bacilli and cultured for mycobacteria.

(iii) Treatment

National guidelines for the treatment of TB should be followed. In general the following treatment is given:

- Rifampicin 600mg orally daily for 6 months, PLUS
- Isoniazid 300mg orally daily for 6 months, PLUS
- Ethambutol 800mg orally daily for 2 months, PLUS
- Pyrazinamide 2g orally daily for 2 months

Some experts recommend that the rifampicin and isoniazid should be continued for 9 months in patients with renal TB.

Surgical intervention may be necessary to relieve obstruction of the ureters and fallopian tubes.

8.4.8 Urinary Schistosomiasis

Schistosomiasis is one of the most common parasitic infections in the world and is caused by the *Schistosoma* genus of fluke. The form of schistosomiasis affecting the urinary tract involves *Schistosoma haematobium*. The other forms, *Schistosoma japonicum*, *Schistosoma mansoni*, and *Schistosoma mekongi* affect the gastrointestinal tract. *S. haematobium* typically affects the urinary system, especially the bladder, but ureteral involvement is found in as many as 30% of patients. The eggs of the flukes are excreted into the urinary tract, causing an intense granulomatous reaction, fibrosis and subsequent calcification. Fibrosis in the bladder wall may lead to obstruction of the ureteral orifices resulting in hydronephrosis and possible pyonephrosis and renal failure. The presence of *S. haematobium* eggs in the bladder wall and the induced calcification is known to be carcinogenic with the subsequent development of squamous carcinoma of the bladder wall. Vesico-ureteric reflux often occurs as a result of fibrosis around the lower ends of the ureters and this is complicated by recurrent urinary tract infection.

(i) Clinical features

Urinary schistosomiasis (also known as bilharzia) causes an initial flu-like illness and later fatigue, headache, and microscopic or gross haematuria (typically terminal haematuria occurs), dysuria, frequency and urinary urgency. Rarely neurologic symptoms of headache, lethargy and neck stiffness occur.

(ii) Laboratory investigations

The diagnosis of urinary schistosomiasis is made on the finding of blood, protein and leucocytes together with the typical *S. haematobium* eggs in centrifuged deposits of urine collected at midday.

(iii) Treatment

Praziquantel is highly effective in the treatment of urinary schistosomiasis and is given in a dose of 20mg/kg orally for 2 doses after food 4 hours apart.

8.5 Conclusion

Urinary tract infections are extremely common throughout the world. The causes of infections vary from place to place. The clinical presentations and complications encountered in the tropics and remote and rural areas are similar to those found in the developed world except that the clinical presentation is often delayed and hence complications of infections are more frequently encountered. Finally, some infections, the tropical infections, are only found in the tropical areas of the world and in persons who have visited the tropical areas.

PART B SEXUALLY TRANSMITTED INFECTIONS

8.6 Introduction

A large number of pathogens, including bacteria, viruses, fungi, protozoa and parasites, are sexually transmissible and may cause sexually transmitted infections (STIs) (Table 8.1).

Table 8.1: Sexually transmissible pathogens and illnesses caused
Bacteria:
<i>Treponema pallidum</i> - Primary secondary, latent and late syphilis, congenital syphilis <i>Neisseria gonorrhoeae</i> - Urethritis, cervicitis, proctitis, conjunctivitis, ophthalmia neonatorum, salpingitis, pelvic inflammatory disease, prostatitis, epididymo-orchitis, urethral fistulae and stricture, perihepatitis, disseminated gonococcal infection <i>Chlamydia trachomatis</i> (Types D-K) - Urethritis, cervicitis, proctitis, conjunctivitis, ophthalmia neonatorum, salpingitis, pelvic inflammatory disease, lymphogranuloma venereum, prostatitis, epididymo-orchitis, Reiters syndrome <i>Haemophilus ducreyi</i> - Chancroid, acute inguinal lymphadenitis (bubo) <i>Klebsiella (Calymmatobacterium) granulomatis</i> - Granuloma inguinale (Donovanosis) Group B streptococci - Pelvic inflammatory disease, neonatal sepsis Anaerobic bacteria - Pelvic inflammatory disease, bacterial vaginosis
Viruses:
Herpes simplex virus - Genital herpes, neonatal herpes, disseminated herpes Hepatitis B virus – Hepatitis, liver cirrhosis, primary hepatocellular carcinoma Molluscum contagiosum virus - Molluscum contagiosum Human immunodeficiency virus (HIV) - HIV infection, AIDS Human papilloma virus – Genital warts, genital cancer
Fungi:
<i>Candida albicans</i> – genital candidiasis <i>Torulopsis glabrata</i> – genital thrush
Protozoa:
<i>Trichomonas vaginalis</i> – vaginitis, urethritis, prostatitis <i>Giardia intestinalis</i> – enteritis <i>Cryptosporidium parvum</i> – enteritis
Parasites:
<i>Sarcoptes scabiei</i> – scabies <i>Pthirus pubis</i> – pubic lice

Though the main mode of transmission of such pathogens is sexual intercourse, some infections may be transmitted through close body contact, others through the introduction of infected blood and blood products, and yet others may be transmitted from infected mother to her foetus or neonate (Table 8.2) and some via ano-oral contact, e.g., *Giardia*.

Table 8.2: Modes of transmission of STIs	
Transmission mode	Type of infection
Vaginal and anal intercourse	<ul style="list-style-type: none"> ▪ All STIs are transmitted this way ▪ Anal intercourse is more risky than vaginal intercourse
Oro-genital contact	<ul style="list-style-type: none"> ▪ Syphilis ▪ Gonorrhoea ▪ Herpes simplex virus infection ▪ HIV infection
Kissing	<ul style="list-style-type: none"> ▪ Herpes simplex virus infection ▪ Syphilis ▪ Hepatitis B virus
Mother-to-child	<ul style="list-style-type: none"> ▪ Gonorrhoea ▪ Chlamydial infection ▪ Herpes simplex virus infection ▪ Hepatitis B virus infection ▪ HIV infection ▪ Group B streptococcal infection
Transfusion of blood and blood products	<ul style="list-style-type: none"> ▪ HIV infection ▪ Hepatitis B virus infection ▪ Syphilis
Using unsterile needles and syringes	<ul style="list-style-type: none"> ▪ HIV infection ▪ Hepatitis B virus infection

8.7 Prevention and control of STIs and HIV infection

All STIs, including HIV infection, are preventable. Prevention may be primary prevention, or, secondary prevention. Primary prevention means the prevention of becoming infected in the first place. Secondary prevention means that once a person is infected further transmission is prevented. With the advent of the pandemic of HIV infection it has become urgent and imperative that measures be taken to prevent the transmission of STIs. It is known that STIs facilitate the transmission of HIV, and therefore, a very important aspect in the prevention of HIV transmission is the rapid and effective treatment of the treatable STIs.

8.7.1 Primary prevention of STIs

Primary prevention may be achieved through adopting safer sexual behaviour, i.e., abstinence from sexual activity altogether, delaying age of sexual debut, and adhering to lifelong mutual monogamy, and secondly through engaging only in safer sexual activity, i.e., engaging only in non-penetrative sex acts and engaging in penetrative sex acts only if a condom is used.

8.7.2 Secondary prevention of STIs

Secondary prevention of the transmission of STIs may be achieved through promoting STI care seeking behaviour, through rapidly and effectively treating persons with STI, and, through

identifying and treating persons who may have STI but have only minimal or no symptoms. These are described below:

- Promoting STI care-seeking behaviour is achievable through public education campaigns, providing non-stigmatizing and non-discriminatory health facilities, through providing quality STI care and by ensuring a continuous supply of highly effective drugs and condoms
- The rapid and effective treatment of persons with STI may be achieved through the comprehensive case management of STIs and through training health care providers in STI case management
- Active case finding of STIs should be pursued through examining persons attending for health care for reasons other than STI related symptoms, including asymptomatic women attending clinics for maternal and child health and family planning
- Partner referral and treatment is an important component of STI control and all attempts should be made to examine and treat all contacts of persons with STI
- Interventions that target persons at high risk of STI, e.g., sex workers, long distance truckers, uniformed services, and youth-in-and-out-of-school, give significant beneficial results when implemented in an acceptable way

8.7.3 Recognising STI symptoms and signs

Both men and women with STI may have no symptoms at all, but remain infectious to their partners and at risk of developing STI-related complications. Symptoms and signs that occur in persons with STIs include:

- Purulent or mucoid urethral discharge in men
- Dysuria
- Slight or profuse, odourless or malodorous vaginal discharge in women
- Vulval pruritus
- Dyspareunia
- Lower abdominal pain and tenderness
- Sores on the genitals and perineum and occasionally on the mouth, breast and fingers
- Swellings or growths on the genitals
- Swelling and or pain in one or both testes
- Swelling or pain in the inguinal regions
- Rash anywhere on the body

8.7.4 Provision of STI care

STIs facilitate the transmission of HIV infection and an important strategy in the prevention and control of the epidemic is the rapid and effective treatment of the treatable STIs. Care for STIs should be widely available and should be of a high quality. In most parts of the world, STI care is available in the private and public sectors.

Table 8.3: STI/HIV prevention and control strategies and activities
<p>Public health education</p> <ul style="list-style-type: none"> ▪ Inform and educate the public about the nature of HIV and other STIs including danger of infection, complications, modes of transmission, methods of prevention and treatment ▪ Counter myths about HIV infection and its transmission
<p>Promote safer sexual behaviour</p> <ul style="list-style-type: none"> ▪ Abstain from sexual activity altogether ▪ Delay sexual debut until one has found one's lifelong mutually faithful partner ▪ Have sex only with one's lifelong mutually faithful partner ▪ Educate and empower adolescents, especially girls, to avoid sex with high-risk older partners ▪ Avoid situations that may promote casual sexual liaisons
<p>Promote safer sexual activity</p> <ul style="list-style-type: none"> ▪ Use condoms if engaging in casual sex ▪ Use condoms correctly and consistently ▪ Engage in non-penetrative sexual activities ▪ Promote and provide condoms widely
<p>Promote early STI-care seeking</p> <ul style="list-style-type: none"> ▪ Promote good STI-care seeking behaviour ▪ Make STI services accessible and acceptable
<p>Promote voluntary counselling and testing for HIV</p> <ul style="list-style-type: none"> ▪ Knowing one's HIV status promotes behaviour change, provided appropriate education and counselling are also offered ▪ Provide accessible and acceptable services for the voluntary testing for HIV ▪ Provide HIV counselling services
<p>Prevent mother-to-child transmission of HIV</p> <ul style="list-style-type: none"> ▪ Provide education and counselling to pregnant women and their partners ▪ Implement activities for the prevention of mother-to-child transmission of HIV using antiretroviral drugs ▪ Promote appropriate infant feeding practices ▪ Provide appropriate family planning services ▪ Promote appropriate labour and delivery techniques
<p>Adolescent friendly health services</p> <ul style="list-style-type: none"> ▪ Education on health and hygiene, sexuality and sexual health ▪ Promoting good health care seeking behaviour ▪ Providing accessible and acceptable adolescent-friendly health services ▪ Providing adolescent-friendly services for reproductive health
<p>Prevent transmission through blood and blood products</p> <ul style="list-style-type: none"> ▪ Promote appropriate use of blood and blood products ▪ Provide safe blood supplies and safe blood transfusion practices ▪ Promote avoidance of sharing of needles and syringes ▪ Promote avoidance of skin piercing practices ▪ Institute programmes for post-occupational exposure prophylaxis

When STI care in these sectors is either inaccessible or is unacceptable then persons needing care may seek it in the informal sector, including, traditional practitioner clinics, drug vendors selling antibiotics and other medications, drugs obtained from friends and peers, and may engage in self-treatment with medications bought from pharmacies or the market place.

In order to achieve any form of control in the spread of STIs, it is necessary that all persons with infection be treated effectively as quickly as possible. The formal sector is best placed to achieve this goal.

8.8 Essential elements of STI care

To improve the access to STI services, health facilities should be within easy reach, should be affordable and should provide services during times when the care seeker is able to access them. Some population groups, for various reasons, may not be able access existing services, and hence there is a need to develop services targeting groups at high risk for infection, such as, youth in- and out-of-school and sex workers. Factors that affect access to care include geographic location of services, hours when services are available and costs of services. Factors that affect acceptability of services are waiting times, health worker attitudes, stigmatisation and discrimination at the health facility, and the availability or non-availability of privacy and confidentiality. Patients also feel more confident if facilities are well-managed and services are provided in a professional manner. This will encourage patient acceptance of medical advice that is scientifically-based rather than seek care in alternate sectors. Issues that affect accessibility and acceptability of STI services are summarised in Table 8.4.

The integration of STI prevention and control services with primary and reproductive health care is an important component in the provision of STI care, as these are the health facilities that persons seeking care visit in the first instance.

8.8.1 Making a diagnosis of STI

There are a number of ways of making a diagnosis of STI. A clinical diagnosis based on symptomatology and clinical presentation is often inaccurate as mixed infections commonly occur and atypical presentations are often mismanaged. Making an aetiologic diagnosis is the most accurate method but requires expertise and laboratory services capable of identifying the pathogen(s) that are responsible for the symptoms and signs. In most developing countries laboratory services are usually lacking in health care facilities where patients seeking STI-care usually present, i.e., primary care clinics and reproductive health centres. The diagnosis of STIs may also be made syndromically. In this method the symptoms and signs are noted after history taking and examination. It is known that a number of different sexually transmissible pathogens produced a common pattern of symptoms and signs. This pattern of symptoms and signs forms a syndrome and it is therefore relatively easy to make a syndromic diagnosis.

Table 8.4: Issues affecting accessibility and acceptability of STI services
<p>Accessibility of health services</p> <ul style="list-style-type: none"> ▪ STI services are available in all health care facilities at which patients with STIs seek health care including private and public sector based primary care clinics and reproductive health centres such as clinics specifically providing care for women, antenatal clinics, postnatal clinics, family planning clinics and maternal and child health centres ▪ Services available at times when client can access them ▪ Services are affordable ▪ Care seekers should know where services are available ▪ Services are located close to where people live or work
<p>Acceptability of health services</p> <ul style="list-style-type: none"> ▪ Services are non-stigmatising and non-penalising ▪ Provider attitudes are non-judgmental and non-moralizing ▪ Privacy and confidentiality are assured ▪ Waiting times are not too long ▪ Health facility has the necessary equipment for examination, i.e., couch, specula, light source, gloves ▪ Health facility has an uninterrupted supply of drugs and condoms ▪ Providers are professional and competent and capable of providing counselling ▪ Treatment provided is effective in relieving symptoms and eradicating the infection

The advantages of making a syndromic diagnosis are that the patient may be managed appropriately during the first visit to the health centre; the method does not rely on the results of laboratory investigations; and the method be used by different cadres of health care providers. However, it is an essential to have prior knowledge of the aetiology of the different STI syndromes when treatment recommendations for STI syndromes are made. Table 8.5 summarises the clinical features and causes of the common STI syndromes.

8.8.2 Laboratory diagnosis

It is good clinical practice to establish the cause of the STI and wherever possible attempts should be made to establish the aetiology of symptoms. However it is important that all patients presenting with symptoms and signs of STI should be treated immediately according to the STI syndrome. If treatment is to be delayed there is a risk that the patient may develop complications of STI and may well infect others while waiting.

Persons who have placed themselves at risk for STIs may be screened for STIs after a history is taken, an examination carried out and an assessment for risk for infection has been performed. In screening for infection the following tests are performed if laboratory services are available:

Table 8.5: Clinical features and causes of STI-associated syndromes

STI syndrome	Symptoms	Signs	Causes of syndrome
Urethral discharge syndrome	Passing pus or mucus from the urethra Dysuria	Visible discharge emanating from the urethral orifice	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i> (Types D-K), <i>T. vaginalis</i>
Vaginal discharge syndrome	Passing yellow, white, mucoid, odourless or malodourous vaginal discharge Dysuria Vulval itch	Visible vaginal discharge may or may not be associated with vulval excoriations	<i>T. vaginalis</i> , <i>C. albicans</i> , <i>N. gonorrhoeae</i> , <i>C. trachomatis</i> (Types D-K), synergistic role of combined infection with anaerobic bacteria, including <i>G. vaginalis</i> and <i>Mobiluncus</i>
Genital ulcer syndrome	Sores on the genitals, perineum, scrotum, labia Sores may be painful or painless	Painful or painless ulcers on the external genitalia, perineum Vesicles on these sites	<i>T. pallidum</i> , <i>H. ducreyi</i> , <i>C. trachomatis</i> (L-types), <i>K. granulomatis</i> , Herpes simplex virus
Syndrome of lower abdominal pain and tenderness in women	Lower abdominal pain usually deep in pelvis Irregular menses Dyspareunia	Lower abdominal tenderness Cervical excitation tenderness	Pelvic inflammatory disease (PID) caused by <i>N. gonorrhoeae</i> , <i>C. trachomatis</i> (Types D-K), anaerobic bacteria Exclude acute surgical and gynaecological causes
Syndrome of inguinal bubo (acute suppurative inguinal lymphadenitis)	Pain and swelling in inguinal region(s)	Acutely tender and often suppurating inguinal lymph nodes	<i>H. ducreyi</i> , <i>C. trachomatis</i> (L-types) Exclude suppurative lesions affecting, thighs and buttocks
Syndrome of acute scrotal swelling	Pain and swelling in one or both testes	Acutely tender and swollen testis(es)	Acute epididymo-orchitis caused by <i>N. gonorrhoeae</i> , <i>C. trachomatis</i> (Types D-K), pyogenic bacteria, mumps virus Exclude acute surgical causes
Syndrome of conjunctivitis with discharge in neonate (ophthalmia neonatorum)	Neonate has discharging eye(s)	Purulent discharge from one or both eyes, conjunctivitis Swelling of eyelids Periorbital swelling	<i>N. gonorrhoeae</i> , <i>C. trachomatis</i> (Types D-K), pyogenic bacteria

(i) In Men:

PCR tests for gonorrhoea, chlamydial infection and trichomoniasis are performed on first void urine, and tests for syphilis (syphilis antibody test [SAS] and rapid plasma reagin [RPR] test), HIV (ELISA test), and Herpes simplex virus are performed on venous blood

(ii) In Women:

PCR tests for gonorrhoea and chlamydial infection are performed on endocervical swabs, and PCR tests for trichomoniasis performed on a high vaginal swab, or PCR tests for gonorrhoea, chlamydial infection and trichomoniasis are performed on provider-collected high vaginal swabs or patient-collected lower vaginal swabs, or on urine. Tests for syphilis (syphilis antibody test [SAS] and rapid plasma reagin [RPR] test), HIV (ELISA test), and Herpes simplex virus are performed on venous blood. A rapid test that is very useful is to test the pH of vaginal fluid using testing strips – an alkaline pH (greater than 4.5) is strongly associated with trichomoniasis and/or bacterial vaginosis.

Table 8.6 summarises the specimens that may be collected and the laboratory tests that may be carried out in order to establish the aetiologic diagnosis of STI.

8.9 Management of STIs

Regardless of the method used for diagnosing STI, all patients with STI should receive comprehensive care, which includes treating the infection, educating the patient, counselling the patient and arranging for partners to be treated. As a minimum all patients should receive the comprehensive case management for STIs as follows:

1. Treatment for the infection
2. Health education
3. Counselling
4. Information and education on the proper use of condoms
5. Supply of condoms
6. Information on partner treatment
7. Date for follow up examination
8. Voluntary counselling and testing for HIV infection if possible and appropriate

8.9.1 Treatment for the infection

Patients with STIs should be treated immediately and appropriately at the first health centre that they visit for STI-care. In centres where laboratory facilities are available the recommended specimens may be taken and laboratory tests ordered, but patients should be treated appropriately at the same visit and not after the results of tests become available. The patient's treatment may be adjusted at the follow up visit when the results of tests are available. All patients should be provided with comprehensive STI care at their first visit.

Table 8.6: Laboratory diagnosis of STI
<p>Urethral discharge and acute scrotal swelling: Urethral swab – wet preparation: immediate examination for polymorphonuclear leucocytes (pus cells) and motile trichomonads Urethral smear – Gram stain and microscopy for gram-negative intracellular diplococci and pus cells Urethral swab - gonococcal culture and sensitivity and polymerase chain reaction (PCR) Endourethral swab - monoclonal antibody test for chlamydial antigen and chlamydial PCR Urine – microscopy, culture and sensitivity and PCR</p>
<p>Vaginal discharge and pelvic inflammatory disease (PID): Vaginal swab – wet preparation: immediate examination for polymorphonuclear leucocytes (pus cells), clue cells, yeasts and pseudohyphae and motile trichomonads Vaginal smear – Gram stain and microscopy for bacteria, clue cells, yeasts and pseudohyphae Endocervical swab - microscopy, gonococcal culture and sensitivity and PCR Endocervical swab – fluorescent monoclonal antibody test for chlamydial antigen and chlamydial PCR Urine – microscopy, culture and sensitivity and PCR The diagnosis of bacterial vaginosis is made using Amsel’s criteria: vaginal pH >4.5, typical sticky white-grey discharge, release of fishy odour when 10% potassium hydroxide solution is added to the discharge on the speculum, lack of inflammation of vaginal epithelium, clue cells found on microscopy of vaginal discharge</p>
<p>Genital ulcers: Ulcer swab – wet mount examined by darkfield microscopy for motile treponemes Ulcer smear – Gram stain and microscopy for bacteria (shoal of fish appearance of <i>H. ducreyi</i>) Deep ulcer scrape or ulcer biopsy – Giemsa stain and microscopy for Donovan bodies (<i>K. granulomatis</i>) Ulcer swab – <i>H. ducreyi</i> culture and sensitivity, PCR for <i>H. ducreyi</i>, <i>C. trachomatis</i> (L-types) Ulcer swab – Herpes simplex virus culture, fluorescent monoclonal antibody test and PCR Blood – syphilis serology, herpes simplex virus serology</p>
<p>Purulent neonatal conjunctivitis: Conjunctival smear – Gram stain and microscopy for gram-negative intracellular diplococci and pus cells Conjunctival swab - gonococcal culture and sensitivity and PCR and for culture of other bacteria Conjunctival swab –fluorescent monoclonal antibody test for chlamydial antigen and chlamydial PCR</p>
<p>Acute suppurative inguinal lymphadenitis: Bubo aspirate – gram stain and microscopy and culture and sensitivity for <i>H. ducreyi</i> and other bacteria Bubo aspirate – PCR for <i>H. ducreyi</i> and <i>C. trachomatis</i></p>
<p>ALL PATIENTS WITH STI: Exclude latent or active syphilis by performing syphilis serology Offer voluntary counselling and testing for HIV infection</p>

8.9.2 Treating STI syndromes

(i) Urethral discharge syndrome

- a. Treat for gonococcal and chlamydial infection
- b. Provide comprehensive STI care
- c. Review the patient in 7 days:
 - Patient is better – no further treatment necessary, discuss results of tests (if tests have been performed), give post-test counselling for HIV, reinforce education and counselling, check on whether partner has been treated
 - Patient is not better – If treatment compliance has been poor and/or re-infection is likely then re-treat the patient; if treatment compliance is good and there is no likelihood of re-infection manage patient for persistent urethral discharge
 - If patient has another STI now – manage appropriately for the new STI

(ii) Persistent urethral discharge

- a. Treat for trichomoniasis
- b. Provide comprehensive STI care
- c. Review the patient in 7 days:
 - Patient is better – no further treatment necessary, reinforce education and counselling, check on whether partner has been treated
 - Patient is not better – refer the patient for specialist opinion investigation

(iii) Vaginal discharge syndrome ¹

- a. Conduct risk assessment for cervicitis: WHO advises that a risk assessment for cervicitis in a woman with a vaginal discharge is positive if she states that her partner has an STI **OR** any two of: patient is unmarried, patient is aged less than 20 years, patient has had sex with a new partner in the last 3 months, patient has had sex with more than one partner in the last 3 months (there may be other risk factors applicable locally)
- b. If risk assessment for cervicitis is positive - treat for gonococcal and chlamydial infection **AND** for candidiasis if discharge is white and flaky and is associated with vulvo-vaginal itchiness, or for trichomoniasis/bacterial vaginosis if discharge is profuse, runny or malodorous
- c. If risk assessment for cervicitis is negative - treat for candidiasis if discharge is white and flaky and is associated with vulvo-vaginal itchiness, or for trichomoniasis/bacterial vaginosis if discharge is profuse, runny or malodorous
- d. Provide comprehensive STI care
- e. Review the patient in 7 days:

¹ **NOTE:** Up to 20% of females infected with pinworm (*Enterobius vermicularis*) may have a vaginal discharge associated with the worm infection. Ref: Beaver, PC, Jung, RC and Cupp, EW (1984) Clinical Parasitology 9th edit. Lea and Febiger. Philadelphia. P 304.

- Patient is better – no further treatment necessary, discuss results of tests (if tests have been performed), give post-test counselling for HIV, reinforce education and counselling, check on whether partner has been treated
- Patient is not better – refer the patient for specialist opinion and investigation
- If patient has another STI now – manage appropriately for the new STI

(iv) Genital ulcer syndrome

- In all patients with genital ulcers determine from the history and examination whether it is likely that the patient has genital herpes: history of spontaneous occurring lesions that start with an itch and develop into vesicles which eventually form superficial ulcers and heal spontaneously, examination shows a crop of vesicles or closely grouped crop of superficial ulcers. In this situation manage as for genital herpes described below
- If ulcers are present treat for syphilis and chancroid ² (in some parts of the world chancroid is extremely rare and treatment for chancroid need not be included)
- Provide comprehensive STI care
- Advise patient to wash lesions frequently with soap and water and to keep the area clean and dry
- Review the patient in 7 days:
 - Patient is better – no further treatment necessary, discuss results of tests (if tests have been performed), give post-test counselling for HIV, reinforce education and counselling, check on whether partner has been treated
 - Patient is not better – manage patient for genital herpes
 - If patient has another STI now – manage appropriately for the new STI

(v) Lower abdominal pain and tenderness syndrome in women

- In a woman with lower abdominal pain exclude acute gynaecological or surgical emergency first: **refer immediately** all women with lower abdominal pain and tenderness if there is a history of a missed or overdue period, if there is active vaginal bleeding, if there has been a delivery, miscarriage or abortion in the last 6 weeks, if there is abdominal guarding and/or rebound tenderness, if there is an intra-abdominal mass palpable. Prior to referral set up an IV line and apply any resuscitatory measures necessary
- Those that do not have a suspected acute gynaecological or surgical emergency treat for acute pelvic inflammatory disease as detailed below
- Provide comprehensive STI care
- Review the patient in 72 hours:
 - Patient is better – continue treatment for a full 14 days as described below
 - Patient is not better – refer patient after setting up intravenous line and applying any resuscitatory measures necessary
- Review the patient in 14 days:

² **NOTE:** In the syndromic management of genital ulcers one is guided by the prevalence of the different causes of genital ulcer disease. Chancroid may be extremely rare in some parts of the world and then there is no need to treat for it. In places where Donovanosis (granuloma inguinale) is frequently encountered the syndromic approach should cover for this infection

- Patient is better – no further treatment necessary, discuss results of tests (if tests have been performed), give post-test counselling for HIV, reinforce education and counselling
- Patient is not better – refer patient after setting up intravenous line and applying any resuscitatory measures necessary

(vi) Syndrome of acute inguinal lymphadenitis (bubo) ³

- In patients presenting with acutely swollen and painful inguinal lymph nodes examine carefully for genital ulcers and septic lesions on the legs, thighs, lower abdomen, perineum and buttocks. If no ulcers are present then it is likely that the patient has lymphogranuloma venereum; if genital ulcers and a bubo are present then it is likely that the patient has chancroid; if septic skin lesions are present on the lower limbs, lower abdomen then these may be causing the suppurative lymphadenitis.
- Treat all patients with inguinal buboes for chancroid and lymphogranuloma venereum
- If there is fluctuation in the bubo (i.e., pus collection) then aspirate pus with a wide-bore needle and repeat aspirations every 2 to 3 days
- Provide comprehensive STI care
- Review the patient in 14 days:
 - Patient is better – no further treatment necessary, discuss results of tests (if tests have been performed), give post-test counselling for HIV, reinforce education and counselling
 - Patient is not better – refer patient for specialist opinion and investigation

(vii) Syndrome of acute scrotal swelling

- In a patient with acute scrotal swelling exclude a surgical condition first: **refer immediately** all men with scrotal swelling if there is a history of trauma (haematocele), the testis is elevated or rotated (testicular torsion), or if there is a suggestion of strangulated inguinal hernia. Prior to referral apply any resuscitatory measures necessary
- Those that do not have a suspected surgical emergency treat for gonococcal and chlamydial infection
- Provide comprehensive STI care
- Review the patient in 72 hours time:
 - Patient is better – continue treatment for a full 14 days as described below
 - Patient is not better – refer patient after setting up intravenous line and applying any resuscitatory measures necessary
- Review the patient in 14 days:
 - Patient is better – no further treatment necessary, discuss results of tests (if tests have been performed), give post-test counselling for HIV, reinforce education and counselling
 - Patient is not better – refer patient for specialist opinion and investigations

³ **NOTE:** It is necessary to be aware of other causes of acute suppurative inguinal lymphadenitis when managing persons with buboes: cases of bubonic plague may present with bubo.

- (viii) Syndrome of neonatal conjunctivitis with discharge (ophthalmia neonatorum)
- a. Treat all neonates with purulent neonatal conjunctivitis for gonococcal and chlamydial infection
 - b. Treat parents for gonococcal and chlamydial infection
 - c. Provide comprehensive STI care to parents
 - d. Review the neonate in 72 hours time:
 - Baby is better – continue treatment for a full 14 days as described below
 - Baby is not better – refer for specialist opinion and management
 - e. Review baby in 14 days:
 - Baby is better – no further treatment necessary, reinforce parent education and counselling
 - Baby is not better – refer for specialist opinion

8.10 Treating STIs by aetiology

8.10.1 Gonococcal infection

- (i) Uncomplicated gonococcal urethritis, cervicitis, conjunctivitis (in adults)

Any ONE of the following regimens may be used:

- Ciprofloxacin, 500 mg orally, as a single dose, **OR**
- Ceftriaxone, 250 mg by intramuscular injection, as a single dose, **OR**
- Azithromycin, 2 g orally, as a single dose

If the prevalence of penicillin resistant *N. gonorrhoeae* is known to be low then amoxycillin 3g PLUS probenecid 1g may be given in a single oral dose

- (ii) Gonococcal proctitis or pharyngitis

- Ceftriaxone, 250 mg by intramuscular injection, as a single dose

- (iii) Disseminated gonococcal infection

- Ceftriaxone, 1g by intramuscular or intravenous injection, daily for 7 days, **OR**
- Spectinomycin, 2g by intramuscular injection, twice daily for 7 days

For gonococcal meningitis and endocarditis these drugs may be used in the same doses but the duration of treatment should be 4 weeks

- (iv) Gonococcal ophthalmia neonatorum

- Ceftriaxone, 50mg/kg (maximum 125mg) by single intramuscular injection

8.10.2 Chlamydial infection

(i) Non-pregnant adults

Any ONE of the following regimens is recommended:

- Doxycycline 100 mg orally twice daily for 7 days, OR
- Azithromycin 1 g orally as single dose

Alternatively the following may be used:

- Amoxicillin 500 mg orally three times a day for 7 days, OR
- Erythromycin 500 mg orally four times a day for 7 days, OR
- Ofloxacin 300 mg orally twice daily for 7 days, OR
- Tetracycline 500 mg orally four times a day for 7 days

(ii) Pregnant women

The following may be used in pregnant women with chlamydial infection:

- Erythromycin 500 mg orally four times a day for 7 days, OR
- Amoxicillin 500 mg orally three times a day for 7 days

NOTE: Tetracycline and the tetracycline analogs and the fluoroquinolones should not be used in pregnancy.

(iii) Chlamydial ophthalmia neonatorum

- Erythromycin 50mg/kg/day in 4 divided doses for 14 days

Alternatively, the following may be used

- Sulphamethoxazole 200mg/trimethoprim 40mg, orally twice daily for 14 days

(iv) Chlamydial infantile pneumonia

- Erythromycin 50mg/kg/day in 4 divided doses for 14 days, OR
- Sulphamethoxazole 200mg/trimethoprim 40mg, orally twice daily for 21 days

8.10.3 Candidiasis

(i) Non-pregnant women

Therapy for candidiasis is:

- Miconazole 200 mg intravaginally daily for 3 days

Alternatively, use,

- Clotrimazole 200 mg intravaginally daily for 3 days, OR
- Clotrimazole 500 mg intravaginally as a single dose, OR
- Fluconazole 150 mg orally as a single dose, OR
- Nystatin 100 000 IU intravaginally daily for 14 days

(ii) Treatment during pregnancy:

- Miconazole 200 mg intravaginally daily for 3 days, OR
- Clotrimazole 200 mg intravaginally daily for 3 days

8.10.4 Trichomoniasis

Therapy for trichomoniasis is:

- Metronidazole 2g in a single oral dose, OR
- Tinidazole 2g in a single oral dose

Alternatively use,

- Metronidazole 400 mg orally twice daily for 7 days, OR
- Tinidazole 500 mg orally twice daily for 5 days

8.10.5 Bacterial vaginosis

(i) Non-pregnant women

Therapy for bacterial vaginosis is:

- Metronidazole 400 mg orally, twice daily for 7 days

Alternatively, use,

- Metronidazole 2 gram orally, as a single dose, OR
- Clindamycin vaginal cream 2%, 5 gram applied intravaginally each night for 7 nights, OR
- Metronidazole gel 0.75%, 5 gram applied intravaginally twice daily for 5 days, OR
- Clindamycin 300 mg orally twice daily for 7 days

(ii) Treatment during pregnancy:

- Metronidazole 200 mg orally three times daily for 7 days (AFTER FIRST TRIMESTER)

Alternatively, during pregnancy, use,

- Metronidazole 2 gram orally as a single dose (AFTER FIRST TRIMESTER), OR
- Clindamycin 300 mg orally twice daily for 7 days, OR
- Metronidazole gel 0.75%, 5 gram applied intravaginally twice daily for 5 days (AFTER FIRST TRIMESTER)

8.10.6 Syphilis

- (i) Early syphilis (primary, secondary and early latent syphilis)

Long-term follow up is essential. Primary, secondary and latent syphilis of less than 2 years duration (i.e., early latent syphilis) is treated as follows:

- Benzathine benzylpenicillin 1.8g (2.4 million IU) by intramuscular injection in a single session, OR
- Procaine penicillin 1g by intramuscular injection daily for 10 days

For non-pregnant persons allergic to penicillin, use,

- Doxycycline 100 mg orally twice daily for 15 days, OR
- Tetracycline 500mg orally 4 times a day for 15 days

For pregnant women allergic to penicillin use,

- Erythromycin 500 mg orally four times a day for 15 days

- (ii) Late latent syphilis and latent syphilis of unknown duration

- Benzathine benzylpenicillin 1.8g (2.4 million IU) by intramuscular injection in a single session weekly for 3 consecutive weeks, OR
- Procaine penicillin 1g by intramuscular injection daily for 20 consecutive days

For non-pregnant persons allergic to penicillin, use,

- Doxycycline 100 mg orally twice daily for 30 days, OR
- Tetracycline 500mg orally 4 times a day for 30 days

For pregnant women allergic to penicillin use,

- Erythromycin 500 mg orally four times a day for 30 days

- (iii) Late syphilis (Gummatous syphilis, cardiovascular syphilis and neurosyphilis)

- Aqueous benzylpenicillin, 4 million IU intravenously 4 hourly for 14 days, OR
- Procaine benzylpenicillin 1.2 million IU intramuscularly daily for 14 days
- Concomitant treatment with prednisolone 20mg orally 12 hourly for 3 doses given at the time of commencing penicillin is recommended to prevent the Herxheimer reaction.

For non-pregnant persons allergic to penicillin, use,

- Doxycycline 100 mg orally twice daily for 30 days, OR
- Tetracycline 500mg orally 4 times a day for 30 days

For pregnant women allergic to penicillin use,

- Erythromycin 500 mg orally four times a day for 30 days

(iv) Latent syphilis discovered during pregnancy

- Benzathine benzylpenicillin 1.8g (2.4 million IU) by intramuscular injection in a single session weekly for 3 consecutive weeks, OR
- Procaine penicillin 1g by intramuscular injection daily for 20 consecutive days

For pregnant women allergic to penicillin use,

- Erythromycin 500 mg orally four times a day for 30 days

If a mother is found to have syphilis during pregnancy and has been treated adequately before 28 weeks of gestation the risk of congenital syphilis is very low. However the child should be carefully monitored and if necessary referred to a specialist. Some experts advise giving all neonates born to mothers with positive syphilis serology whether adequately treated or not, benzathine benzylpenicillin 50000 IU/kg in a single intramuscular injection soon after birth.

(v) Early congenital syphilis (up to 2 years of age) and all infants with syphilis and an abnormal CSF

- Aqueous benzylpenicillin 50000IU/kg intravenously 12 hourly for 7 days and then 8 hourly for 3 days, OR
- Procaine benzylpenicillin 50000 IU/kg intramuscularly daily for 10 days

(vi) Congenital syphilis of more than 2 years duration

- Aqueous benzylpenicillin 50000IU/kg 4 to 6 hourly intravenously for 14 days

For children over the age of 1 month who are allergic to penicillin give,

- Erythromycin 7.5 to 12.5mg/kg orally 6 hourly for 30 days

8.10.7 Group B streptococcal infection

Group B streptococcus (GBS) is a commensal in the gastrointestinal tract and genital tract of up to 40% of healthy individuals. If symptoms are related to infection GBS, usually *Streptococcus agalactiae*, then treatment should be given. Symptoms related to infection are: vaginal discharge,

pelvic inflammatory disease, severe neonatal septicaemia and rarely genital ulceration. When GBS vagina carrier state is detected in pregnancy the indications for treatment are premature rupture of membranes, prolonged rupture of membranes and maternal fever and previous GBS-infected neonate. The recommended treatment in this situation is:

- Aqueous benzylpenicillin 1.8g intravenously 4 hourly until delivery

Treatment of GBS in the non-pregnant female is indicated only if a gram stain of vaginal secretions is indicative of pyogenic infection, i.e., presence of numerous pus cells and predominance of Gram-positive cocci in chains. The recommended treatment in this situation is:

- Amoxicillin 500mg orally 8 hourly for 7 days

8.10.8 Chancroid

The recommended treatment for infection caused by *Haemophilus ducreyi* is:

- Ciprofloxacin 500 mg orally twice daily for three days, OR
- Erythromycin 500 mg orally four times a day for 7 days, OR
- Azithromycin 1 gram orally as single dose

Alternatively, use,

- Ceftriaxone 250 mg by intramuscular injection as single dose

Management of lesions: no special treatment is required; patients should be told wash lesions frequently with soap and water and to keep them clean and dry. Fluctuant buboes should be aspirated if necessary.

8.10.9 Lymphogranuloma venereum

The recommended treatment for infection caused by *Chlamydia trachomatis* Types L 1, 2 and 3, that cause lymphogranuloma venereum is:

- Doxycycline 100 mg orally twice daily for 14 days, OR
- Erythromycin 500 mg orally four times a day for 14 days

Alternatively use,

- Roxithromycin 300mg orally daily for 14 to 21 days, OR
- Azithromycin 1g orally daily for 14 to 21 days

Fluctuant buboes should be aspirated if necessary. If complications such as urethral strictures or fistulae are present patients should be referred for specialist opinion.

8.10.10 Granuloma inguinale (Donovanosis)

The recommended treatment for infection caused by *Klebsiella granulomatis* (previously known as *Calymmatobacterium granulomatis*), that causes granuloma inguinale (also known as Donovanosis) is:

- Azithromycin 1 gram orally initially then 500 mg orally daily for 14 days, OR
- Doxycycline 100 mg orally twice daily for 14 days

Alternatively, use,

- Erythromycin 500 mg orally four times daily for 14 days, OR
- Tetracycline 500 mg orally four times daily for 14 days, OR
- Trimethoprim (160 mg) / Sulphamethoxazole (800 mg) (i.e., two tablets) orally twice daily for 14 days

Some experts believe that the above recommended treatment regimens be continued for 14 days after lesions have healed. In persons with HIV infection it is advisable to add parenteral gentamicin 6mg/kg intravenously daily for 7 days adjusting the dose accordingly in persons with abnormal renal function to the above regimens

8.10.11 Genital herpes simplex virus infection

There is no known cure for genital herpes, but the course of symptoms can be modified if systemic therapy with acyclovir, or its analogues, is started as soon as possible following the onset of symptoms.

(i) For the first clinical episode use:

- Aciclovir, 200 mg orally, 5 times daily for 5 days. OR
- Aciclovir, 400 mg orally, 3 times daily for 5 days, OR
- Famciclovir, 250 mg, 3 times daily for 5 days, OR
- Valaciclovir, 1 g, 2 times daily for 5 days

(ii) Infrequent but severe recurrences

Treat episodically with,

- Aciclovir, 200 mg orally, 5 times daily for 5 days. OR
- Famciclovir, 250 mg, 3 times daily for 5 days, OR
- Valaciclovir, 1 g, 2 times daily for 5 days

(iii) Suppressive treatment

This is given to patients who have frequent or severe recurrences:

8.30

- Aciclovir, 400 mg orally, 2 times daily for 6 months, OR
- Famciclovir, 250 mg, 2 times daily for 6 months, OR
- Valaciclovir, 1 g, daily for 6 months

8.10.12 Pelvic inflammatory disease (PID)

(i) Mild or moderate acute PID

Treatment should be given for gonococcal, chlamydial and anaerobic bacterial infection concomitantly. Give,

- Ciprofloxacin 500 mg orally single dose, OR, ceftriaxone 250mg intramuscularly single dose, PLUS
- Doxycycline 100 mg orally twice daily for 14 days, PLUS
- Metronidazole 400 mg orally twice daily for 14 days, OR, Tinidazole 500mg orally twice daily for 14 days

The patient should be reviewed in 72 hours after starting treatment and if she has improved continue treatment; if she has not improved refer her to a health facility where specialist surgical or gynaecological opinion may be obtained

(ii) Severe acute PID

Patients with severe acute PID should be hospitalised and treated as follows:

- Ceftriaxone 250 mg by intramuscular injection daily for at least two days AFTER the patient has improved, PLUS,
- Doxycycline 100 mg orally twice daily for 14 days (or, Tetracycline 500 mg orally 4 times a day for 14 days), PLUS,
- Metronidazole 400 mg (or 500 mg) orally twice daily for 14 days

Alternatively use,

- Clindamycin 900 mg by intravenous injection every 8 hours for at least 2 days AFTER the patient has improved, PLUS,
- Gentamicin 1.5 mg /kg intravenously every 8 hours for at least 2 days AFTER the patient has improved
- FOLLOWED BY:
- Doxycycline 100 mg orally twice daily for 14 days (or, Tetracycline 500 mg orally 4 times a day for 14 days), PLUS
- Metronidazole 400 mg (or 500 mg) orally twice daily for 14 days
- OR,
- Ciprofloxacin 500 mg orally twice daily for at least 2 days after the patient has improved, PLUS,
- Doxycycline, 100 mg orally twice daily, or tetracycline, 500 mg orally, 4 times daily for 14 days, PLUS,

- Metronidazole 400 mg (or 500 mg) orally or by intravenous injection, twice daily, OR, Chloramphenicol, 500 mg orally or intravenously injection, 4 times daily

If the patient is pregnant or lactating, do not use doxycycline and give instead:

- Roxithromycin 300mg orally daily for 14 days, OR, erythromycin 500mg orally 4 times a day for 14 days.

8.10.13 Genital warts

Warts may be removed by chemical or physical means.

(i) Patient applied methods of treatment

Podophyllotoxin 0.5% solution or gel applied to each wart twice daily for 3 days, followed by 4 days of no treatment, and the cycle repeated weekly for up to 6 cycles times. Total volume of podofilox should not exceed 0.5ml per day, OR, Imiquimod 5% cream applied to each wart 3 times a week for as long as 16 weeks. The treatment area should be washed with soap and water 6-10 hours after application.

(ii) Provider administered

Podophyllin 25% in compound tincture of benzoin, applied carefully to the warts, avoiding normal tissue. External genital and perianal warts should be washed thoroughly 4 hours after the application of podophyllin. Treatment should be repeated at weekly intervals, OR, Trichloroacetic acid (TCA) (80-90%) applied carefully to the warts avoiding normal tissue, followed by powdering of the treated area with talc or sodium bicarbonate (baking soda) to remove unreacted acid. Repeat application at weekly intervals.

Note:

Some experts advise against the use of podophyllin for anal warts

Large amounts of podophyllin should not be used because it is toxic and easily absorbed

Do not use in pregnancy and lactation (the safety of podophyllin, podophyllotoxin and imiquimod during pregnancy has not been established)

(iii) Physical therapy

Lesions can be destroyed by cryotherapy with liquid nitrogen, solid carbon dioxide, or a cryoprobe, treatment repeated every 1-2 weeks, OR by electrosurgery, OR, surgical excision.

All women with genital warts should have a Papanicolaou smears performed annually.

8.10.14 Molluscum contagiosum

The lesions of molluscum contagiosum may resolve spontaneously. If not, then each lesion should be pricked with a sharpened “orange-stick” or needle and the contents of the lesion

expressed. This alone may be sufficient, or each lesion can then be touched carefully with liquefied phenol.

Lesions of molluscum contagiosum may become extensive and large in immunosuppressed persons with HIV infection. If the lesions are very extensive and are very large then the patient should be referred for specialist attention.

Electrocautery or cryotherapy may also be used to destroy lesions.

8.10.15 Genital scabies

Patients with scabies may be treated as follows:

- Gammabenzene hexachloride 1% applied from neck down to toes and washed off after 8-12 hours in children and 24 hours in adults. Single application is sufficient.

Caution: Do not use gammabenzene hexachloride in pregnancy and lactation – use benzyl benzoate instead:

Alternative in pregnancy, lactating mothers or children less than 6 months of age:

- Benzyl benzoate emulsion 20% applied from neck down to toes and washed off after 24 hours. Two applications are made 24 hours apart. For children dilute the benzyl benzoate 1:1 with water and for infants dilute the benzyl benzoate 1:3 with water.

Other effective treatments include,

- Lindane, 1% lotion or cream, or permethrin 1% lotion rubbed gently into the affected areas and washed off after 8 hours. Lindane must not be used during pregnancy or lactation
- Crotamiton 10%, lotion, applied to the entire body from the neck down, nightly for 2 nights and washed off thoroughly 24 hours after the second application.
- Sulphur 6%, in petrolatum applied to the entire body from the neck down, nightly for 3 nights; patients may bathe before reapplying the product and should bathe 24 hours after the final application.

8.10.16 Pediculosis pubis

Patients with pediculosis pubis (pubic lice) and their sexual partners should be treated as follows:

- Gammabenzene hexachloride 1% applied to hairy areas below umbilicus and washed off after 24 hours. Two applications are made 10 days apart.

Do not use gammabenzene hexachloride in pregnancy and lactation; use benzyl benzoate as described above.

Alternative treatments include,

- Lindane, 1% lotion or cream, or permethrin 1% lotion rubbed gently into the affected areas and washed off after 8 hours. Lindane must not be used during pregnancy or lactation
- Pyrethrins 0.165% plus piperonyl butoxide 2% foam applied to pubic hair and washed off after 10 minutes; repeated in 7 days.

Spirit-based preparations such as malathion should be avoided totally.

Re-treatment is indicated after 7 days if lice are found or eggs are observed at the hair-skin junction. Although not strictly necessary, it might be a good practice to recommend that clothing or bed linen can be washed and well dried, or dry cleaned.

8.11 Other components of preventive management

8.11.1 Health Education

All STIs are preventable. Prevention may be achieved through practicing safe sexual behaviour and engaging only in safe sexual activities. These are listed in Table 8.3. When managing persons with STIs and those with suspected STIs it is important to spend some time in educating the patient on the nature of the infection and its complications, the links between STIs and HIV acquisition and transmission, the modes of transmission of infection, and ways of preventing becoming infected. Good health seeking behaviour should be promoted. Education messages should include:

- abstinence from casual sex,
- having sex only with one's lifelong mutually faithful partner,
- using condoms if one is to have sex with casual partners,
- attend quickly in future if symptoms suggestive of STI develop

The provision of education at the time of consult is appropriate as patients may be most receptive to individualised education as they have engaged in risky behaviour and activity.

8.11.2 Counselling

Changing people's behaviour in general is difficult and changing sexual behaviour is even more challenging. During the STI consultation attempts should be made to determine the reason why the patient engaged in risky activity that led to the infection this time and also whether the patient perceives that he/she is at risk for infection. Possible reasons may be,

- separation from their regular partner for business or other activity,
- use of alcohol or drugs
- lack of information on methods of prevention
- inability to negotiate condom use or to say "no"
- whether the patients understands that he/she has placed himself/herself at risk for STIs and HIV through the activity

Having ascertained the factors leading to unsafe behaviour and activity it is possible to counsel the patient to cope with individual situations that may lead to risk taking behaviour and to prevent infection occurring again.

8.11.3 Information and education on the proper use of condoms

Condom promotion is an important component of patient management. Patients should be taught how condoms (both male and female condoms) are used correctly and how used condoms may be safely disposed off. Use of male condoms may be demonstrated on a model of a penis and female patient should be taught how to insert female condoms.

8.11.4 Provision of condoms

All patients should also be provided with condoms during the consultation and should be informed how to obtain condoms in future.

8.11.5 Information on partner treatment

All patients should understand that the infection has been acquired from another person and that the other person also needs to be treated. The asymptomatic nature of infection should be emphasised. Patients should be encouraged to inform their partner or partners to seek care and the index patient could be given contact tracing cards to pass on to the partners. This is known as the patient-facilitated contact tracing system. If a system of active contact tracing (provider-facilitated contact tracing) is in place then details of the patient's partner(s) need to be obtained and contacts may be traced actively.

8.11.6 Date for follow-up examination

A date for follow up examination should be given and the patient should be encouraged to abstain from sex until he/she has been reviewed and re-assessed. At the follow up visit education is reinforced and condom use is promoted. If laboratory tests had been performed the results of tests should be discussed and information on partner notification and treatment should be obtained.

8.11.7 Voluntary counselling and testing for HIV infection if possible and appropriate

During the STI consult patients should be educated about the sexual transmission of HIV. Patients should understand that HIV is acquired and transmitted sexually in the same way that other STIs are transmitted. Patients should receive information and counselling and should be offered a test for syphilis and for HIV. In many developing countries the main mode of transmission of HIV is sexual intercourse and the high prevalence rates of HIV and other STIs suggest that a person who has one type of STI may well have another, i.e., HIV. Voluntary counselling and testing for HIV (VCT) is an important public health intervention in reducing HIV transmission.

8.11.8 Summary

The following are essential components of the comprehensive case management of STIs and all patients seeking STI care should receive each of the following:

1. Making a diagnosis of the STI and providing treatment for the infection
2. Health education
3. Counselling
4. Information and education on the proper use of condoms
5. Supply of condoms
6. Information on partner treatment
7. Date for follow up examination
8. Voluntary counselling and testing for HIV infection if possible and appropriate

8.12 Managing STIs during pregnancy

The integration of STI prevention and management activities within reproductive health care programmes is an important strategy in the control of STIs. The following STI control activities should be undertaken at the antenatal care clinic:

- Provision of STI care for symptomatic and asymptomatic pregnant women
- Detection and management of STIs in pregnant women
- Prevention of congenital syphilis through the detection and treatment of maternal syphilis prenatally
- Prevention of ophthalmia neonatorum through the detection and treatment of maternal gonococcal and chlamydial infection prenatally and through the use of ophthalmia prophylaxis
- Promoting health seeking behaviour through public education

The following STIs can be passed on to the foetus/neonate from the infected mother:

- Syphilis
- Gonorrhoea
- Chlamydial infection
- Herpes simplex virus infection
- Hepatitis B virus
- Human papilloma virus infection
- HIV infection

All pregnant women attending for antenatal care should have a history taken and should be carefully examined. A diagnosis of STI may be made on the syndromic or aetiologic basis. If a diagnosis of STI is made then the patient should be managed according to the guidelines described. Comprehensive case management should always be given. If the patient does not have

symptoms then a diagnosis of STI can be made using laboratory tests. All pregnant women should have a serologic test for syphilis and in places where the prevalence of HIV infection is significant then they should be offered voluntary counselling and testing for HIV.

8.12.1 STI drugs that should not be used during pregnancy

A number of drugs are harmful to either the mother during pregnancy or to the foetus. These should not be used during pregnancy and lactation. The STI drugs that should not be used during pregnancy and lactation include:

- Doxycycline
- Tetracycline
- Ciprofloxacin
- Norfloxacin
- Podophyllin

It is advisable not to use metronidazole during the first trimester of pregnancy.

8.13 STIs in children

During the past decade, sexual abuse of children and adolescents has come to be recognized as a serious public health problem. The management of the victims is emerging as an important aspect of child and adolescent health care throughout the world. A standardized approach to the management of sexually transmitted infections in children and adolescents who are suspected of having been sexually abused is important because the infection may be asymptomatic. An STI which remains undiagnosed and untreated may result in complications at a later stage.

All children suspected of having been sexually abused should be screened routinely for STIs, and all children diagnosed with an STI should be investigated for the reason for the infection. The identification of a sexually transmissible agent in a child beyond the neonatal period, in the vast majority of cases, is suggestive of sexual abuse. However, exceptions do exist: ocular, rectal or genital infection with *C. trachomatis* (Types D-K) in young children may be due to perinatally acquired infection, which may persist for up to 3 years. In addition, bacterial vaginosis and genital mycoplasma have been identified in both abused and non-abused children. Genital warts, although suggestive of assault, are not specific for sexual abuse without other evidence. When the only evidence of sexual abuse is the isolation of an organism or the detection of antibodies to a sexually transmissible agent, findings should be carefully confirmed and considered.

Health workers who suspect abuse must consider the options available for specialized counselling, social support and redress. It must be stressed that the psychological and social support services should be included for complete management of these patients.

Children should be examined carefully and gently and should be assured that they will not be hurt. The sexually abused child has already been traumatized both physically and emotionally and the examination should not add to this agony. It is preferable not to use any form of

instrumentation and definitely not to use a speculum to examine the cervix. Specimen collection should be carried out painlessly and swabs for collection of specimens should not be inserted into the vagina or penis.

At the initial examination a history should be taken and the child should be examined. An inspection of the external genitalia should be carried out and findings should be recorded.

Specimens should be taken of any discharge that is present in the vagina and anus and the urethral meatus. Specimens should be sent for gram stain and microscopy, culture for *N. gonorrhoeae* and identification of *C. trachomatis* (Types D-K) and *T. vaginalis*. A sample of venous blood should also be collected for baseline testing for syphilis, hepatitis B virus and HIV. These tests will need to be repeated three weeks and three months after the sexual abuse.

At the initial visit, if it is very soon after the sexual abuse, swabs and smears may reveal negative results as the organisms may not have had enough time to multiply to sufficient concentrations to be able to be identified and hence the swabs and cultures will need to be repeated at least one week after the event.

The perpetrator of the crime, if possible, should also be examined for STIs and have an HIV test performed.

8.14 HIV Infection

Infection with the human immunodeficiency virus (HIV) the causative agent of the acquired immune deficiency syndrome (AIDS) has spread fast in many developing countries. The spread has been phenomenal in Sub-Saharan Africa and in particular in countries in Southern Africa. HIV prevalence rates in some Southern African countries have been recorded as being as high as 35% of the total population. The spread of HIV in these countries is mainly through unprotected sex, and men and women are equally affected. Infection in children occurs mainly through mother-to-child transmission. As HIV infection is yet another STI the methods of preventing acquisition and transmission of HIV are the same as described for the prevention of other STIs (described above).

In this section emphasis is placed on some important aspects of HIV infection only. It is not intended that this primer covers all aspects of HIV infection and readers are advised to refer to standard texts on the subject.

8.14.1 Diagnosis of HIV infection

The diagnosis of HIV infection is based on the finding of HIV antibody or antigen in persons suspected of being infected. The laboratory tests employed for identifying HIV antibody are the enzyme linked immunosorbent assay (ELISA) and the rapid tests. In most parts of the world where the prevalence of HIV infection is high confirmatory tests such as the Western Blot and the immunofluorescent antibody tests are not available on any wide scale. Usually two rapid tests based on different principles and using different antigens, or one rapid test and an ELISA test are used to establish the diagnosis. Tests for measuring CD4 lymphocyte counts and HIV plasma

viral loads and virologic tests such as PCR, are not generally available other than in large hospitals and research centres.

Many developing countries have established voluntary counselling and testing centres for HIV. These are drop-in clinics where pre- and post-test counselling is provided and where rapid tests for HIV antibody are carried out.

8.14.2 Social and psychological support for persons with HIV infection

Persons found to be HIV positive are counselled to live a positive life style and to protect their partners from infection. Enrolling in support groups assists infected persons cope with continuing to be productive and supporting their families. Usually support groups play an important role in mitigating against stigma and discrimination and channel social support to those in need. Essential needs of infected persons are housing and shelter, job security, food security, education for their dependents and health care for themselves and their families.

8.14.3 Preventing opportunistic infections

Persons with HIV infection are prone to developing opportunistic infections as a result of the cell-mediated immune suppression that occurs. Much can be done to prevent such infections from occurring. Reducing the risk of exposure to opportunistic pathogens is an important aspect in preventing the occurrence of opportunistic infections. Table 8.7 summarises the methods that may be employed to reduce exposure but where the transmission is associated with deep-rooted cultural practices, change may be difficult to achieve (See Chapter 4) – a fact also true for areas of severe poverty

(i) Cotrimoxazole chemoprophylaxis

A number of infections can be prevented by using cotrimoxazole chemoprophylaxis on a long-term basis. Studies have shown that primary prevention of infections such as *Pneumocystis* pneumonia, pneumococcal pneumonia, cerebral toxoplasmosis, non-typhoid salmonellosis, isosporiasis and nocardiosis, is possible with long-term cotrimoxazole use. It is recommended therefore that all HIV infected persons who have CD4 lymphocyte counts of 200/mm³ or less should be commenced on:

- Cotrimoxazole (sulphamethoxazole 800mg and trimethoprim 160mg) orally once daily

This treatment should be continued indefinitely or until such a time when it is known that the CD4 lymphocyte counts are more than 200/mm³.

If CD4 lymphocyte counts are not available HIV infected persons should be commenced on long-term cotrimoxazole prophylaxis if they have AIDS (WHO Stage IV) or have symptoms related to HIV infection, i.e., WHO Stages II and III and have peripheral blood absolute lymphocyte counts less than 1200/mm³.

Table 8.7: Mode and transmission of some pathogens that cause opportunistic infections and general methods of lowering risks of exposure to the pathogens	
Mode of transmission	Reducing level of exposure
Toxoplasmosis	
<ul style="list-style-type: none"> ▪ Ingestion of cysts found in meat, cat excreta and soil 	<ul style="list-style-type: none"> ▪ Do not eat raw or undercooked meat and cook meat well ▪ Wash fruits and vegetables well before eating them raw ▪ Wash hands well after contact with raw meat or soil ▪ Wash hands well after contact with cat or litter box
Cryptosporidiosis	
<ul style="list-style-type: none"> ▪ Ingestion of spores found in faeces of humans and animals ▪ Ingestion of contaminated water ▪ Ingestion of food contaminated with spores from infected food handlers 	<ul style="list-style-type: none"> ▪ Avoid contact with human and animal faeces ▪ Wash hands well after changing baby's diapers, after gardening, and after handling pets ▪ Avoid contact with kittens and puppies aged less than 6 months ▪ Avoid swimming in water that may be contaminated with human or animal faeces ▪ During outbreaks, boil water that is to be consumed ▪ In the hospital situation use gloves to prevent transmission of infection from patient to patient
Microsporidiosis	
<ul style="list-style-type: none"> ▪ Ingestion of spores found in faeces 	<ul style="list-style-type: none"> ▪ Hand washing ▪ Good general hygiene
Bacterial enteric infections	
<ul style="list-style-type: none"> ▪ Ingestion of bacteria in food and water 	<ul style="list-style-type: none"> ▪ Avoid consuming undercooked and raw meat and unpasteurised milk ▪ Drink previously boiled water ▪ Eat freshly cooked food ▪ Protect foods from insects and animals ▪ Avoid cross contamination at home by simple measures such as hand washing and practicing good hygiene ▪ Avoid transmission between patients by making sure all health workers practice regular hand washing and use gloves
Bartonellosis	
<ul style="list-style-type: none"> ▪ Transmission of infection from animals through scratches and bites 	<ul style="list-style-type: none"> ▪ Avoid close contact and "rough play" with pets ▪ Avoid being scratched by cats
Histoplasmosis	
<ul style="list-style-type: none"> ▪ Inhalation of fungal spores 	<ul style="list-style-type: none"> ▪ Avoid creating dust when working with surface soil ▪ Avoid cleaning chicken coops heavily contaminated with droppings
Herpes simplex virus, Cytomegalovirus, Human papilloma virus	
<ul style="list-style-type: none"> ▪ Sexual transmission ▪ Exposure to secretions of infected persons 	<ul style="list-style-type: none"> ▪ Avoid unprotected sex
Varicella zoster virus	
<ul style="list-style-type: none"> ▪ Respiratory route 	<ul style="list-style-type: none"> ▪ Avoid contact with persons who have VZV

	▪ Vaccinate VZV susceptible household contacts
Human herpes virus Type 8	
▪ Oral (saliva) ▪ Sexual ▪ Injection drug use	▪ Avoid unprotected sex ▪ Avoid using injectable drugs for recreational purposes
Hepatitis B and C viruses	
▪ Injection drug use ▪ Introduction of blood and blood products	▪ Avoid using injectable drugs for recreational purposes ▪ Screen all blood and blood products for HBV and HCV prior to use

8.14.4 Prevention of TB

Tuberculosis is the commonest opportunistic infection encountered in persons with HIV infection. All immunosuppressed persons should be examined carefully and investigated if necessary for active TB. Latent TB is diagnosed in HIV-infected persons who do not have symptoms or signs of TB but have a positive tuberculin skin test, i.e., tuberculin skin reaction greater than 5mm using 5TU in a Mantoux test. Some experts recommend that all HIV infected persons who have latent TB, i.e., no clinical or radiologic evidence of TB but a positive tuberculin skin test, be treated for latent TB. However caution is necessary when interpreting results of the tuberculin test in persons who have received BCG vaccination previously. The following is the recommended treatment for latent TB:

- Isoniazid 300mg orally daily for 6 to 9 months

8.14.5 Secondary prevention of cryptococcal meningitis

Cryptococcal meningitis is a common opportunistic infection in immunosuppressed persons. Without treatment cryptococcal meningitis is a rapidly fatal condition. Patients with cryptococcal meningitis should be treated for this with:

- Amphotericin B 0.7mg/kg intravenously daily for 14 days, PLUS
- Flucytosine 15-25mg/kg intravenously or orally 6-hourly for 14 days, FOLLOWED BY
- Fluconazole 400mg orally daily for 8 weeks

In mild cases fluconazole may be used as single drug treatment in the following doses: 800mg intravenously or orally initially, followed by 400mg orally daily for 8 weeks then 200mg orally daily for life.

As relapses frequently occur lifelong chemoprophylaxis with fluconazole 200mg orally daily is recommended for secondary prevention of cryptococcal meningitis. There is no role for primary prevention of cryptococcal meningitis with fluconazole.

8.14.6 Antiretroviral therapy

Highly active antiretroviral therapy (HAART) has become widely available throughout the world. Most countries have developed strategies for making these life-saving drugs more

accessible. The general principles of HAART are to use 3 antiretroviral agents as initial therapy; two nucleoside reverse transcriptase inhibitors PLUS EITHER a non-nucleoside reverse transcriptase inhibitor OR a protease inhibitor. Recently it has been shown that protease inhibitors that are “boosted” with ritonavir (also a protease inhibitor), are more efficacious and may be administered in a twice-daily dose instead of a thrice-daily dose. Numerous drug combinations are therefore possible. Recommended drug combinations are:

- Zidovudine 300mg orally 12-hourly, PLUS Lamivudine 150mg orally 12-hourly, PLUS, EITHER
- Nelfinavir 1250mg orally 12-hourly, OR
- Indinavir 800mg / Ritonavir 100mg orally 12-hourly, OR
- Saquinavir 1000mg / Ritonavir 100mg orally 12-hourly, OR
- Lopinavir 400mg / Ritonavir 100mg orally 12-hourly

Alternative treatment regimens include:

- Stavudine 40mg orally 12-hourly (if body weight more than 60kg) or 30mg orally 12-hourly (if body weight less than 60kg), PLUS
- Didanosine 400mg orally daily (if body weight more than 60kg) or 250mg orally daily (if body weight less than 60kg), PLUS
- Nevirapine 200mg orally daily for 2 weeks then 200mg orally 12-hourly
- **OR**
- Stavudine 40mg orally 12-hourly (if body weight more than 60kg) or 30mg orally 12-hourly (if body weight less than 60kg), PLUS
- Lamivudine 150mg orally 12-hourly, PLUS
- Efavirenz 600mg orally daily

8.14.7 Indications for commencing HAART

Antiretroviral therapy may be commenced in HIV positive adults **that are able and prepared to adhere to the treatment regimen**, if the following criteria are met:

- Patient is in WHO Stage IV HIV infection (Table 8.8), OR
- Patient is in WHO Stage I, II or III and has a CD4 count less than 200/mm³, OR
- Patient is in WHO Stage II or III and has a peripheral blood lymphocyte count of less than 1200/mm³
- Patients with HIV infection who have a HIV plasma viral load of more than 10000 copies/mL

8.14.8 Adherence counselling

An important prerequisite of HAART is that the patient is prepared, willing, and able, to adhere to treatment. HAART is only efficacious if adherence to the recommended regimens is 95% or more. Persons who stop and start HAART risk developing resistance and treatment failure. It is therefore important to counsel patients on treatment adherence. The following drug-related factors affect treatment adherence:

Table 8.8: WHO Staging System for HIV Infection and Disease in Adults
<p>Clinical Stage I:</p> <ol style="list-style-type: none"> 1. Asymptomatic 2. Persistent generalised lymphadenopathy <p><i>Performance Scale 1: Asymptomatic, normal activity</i></p>
<p>Clinical Stage II:</p> <ol style="list-style-type: none"> 1. Weight loss less than 10% body weight 2. Minor mucocutaneous manifestations (seborrhoeic dermatitis, prurigo, fungal nail infections, recurrent oral ulcerations, angular stomatitis) 3. Herpes zoster within the last 5 years 4. Recurrent upper respiratory tract infections, e.g., bacterial sinusitis <p><i>And/or Performance Scale 2: Symptomatic but normal activity</i></p>
<p>Clinical Stage III:</p> <ol style="list-style-type: none"> 1. Weight loss more than 10% body weight 2. Unexplained chronic diarrhoea for more than 1 month 3. Unexplained prolonged fever, intermittent or constant, for more than 1 month 4. Oral candidiasis 5. Oral hairy leukoplakia 6. Pulmonary tuberculosis within the past year 7. Severe bacterial infections such as pneumonias, pyomyositis <p><i>And/or Performance Scale 3: Bed-ridden for less than 50% of the day during the last month</i></p>
<p>Clinical Stage IV:</p> <ol style="list-style-type: none"> 1. HIV wasting syndrome – weight loss of more than 10%, and either unexplained chronic diarrhoea for more than 1 month, or chronic weakness or unexplained prolonged fever for more than 1 month 2. <i>Pneumocystis carinii</i> pneumonia 3. <i>Toxoplasmosis of the brain</i> 4. Cryptosporidiosis with diarrhoea for more than 1 month 5. Extrapulmonary cryptococcosis 6. Cytomegalovirus (CMV) disease of an organ other than liver, spleen or lymph nodes 7. Herpes simplex virus (HSV) infection, mucocutaneous for more than 1 month, or visceral of any duration 8. Progressive multifocal leukoencephalopathy (PML) 9. Any disseminated endemic mycosis such as histoplasmosis, coccidioidomycosis 10. Candidiasis of the oesophagus, trachea, bronchi or lungs 11. Atypical mycobacteriosis, disseminated 12. Non-typhoid salmonella septicaemia 13. Extrapulmonary tuberculosis 14. Lymphoma 15. Kaposi's sarcoma 16. HIV encephalopathy – disabling cognitive and/or motor dysfunction interfering with activities of daily living, progressing slowly over weeks or months, in the absence of concurrent illness or condition other than HIV infection that could account for the findings <p><i>And/or Performance Scale 4: Bed-ridden for more than 50% of the day during the last month</i></p>

- Frequency of administration – once daily dose regimens are the best; twice daily administration carries less adherence and thrice daily dosing is worse still
- Taking of medication with or without food – certain ARVs are best taken with food (e.g., lopinavir, nelfinavir, saquinavir and tenofovir); while others need to be taken on an empty stomach (e.g., didanosine and indinavir). Adherence is best with “food-neutral” medications as there is no perceived nuisance
- Pill burden – the more the pills that have to be taken the less the patient will adhere to the regimen. With the development of fixed-dose combinations of two or three drugs, the number of pills to be taken may be reduced
- Gastrointestinal tolerance – some drugs, such as, lamivudine, stavudine, tenofovir, efavirenz and lopinavir/ritonavir are well tolerated when administered orally

A number of psychosocial factors have been identified that affect adherence to prescribed drugs. Patients with the following characteristics may not adhere to treatment regimens:

- Emotional instability
- Inability to fit medication schedule into daily routine
- Those that miss clinic appointments
- Poor patient-clinician relationship
- Lack of patient education
- Alcohol and drug users
- Those without domestic support
- Persons who experience side effects to medications

Therefore when counseling patients on treatment adherence it is important to consider all these factors.

8.14.9 Monitoring HIV therapy

Patients on HAART require close and regular follow up. Patients should be seen 2 weekly initially and if they are taking their medications as prescribed and are not experiencing side effects then they could be seen monthly or 3-monthly. Patients should be monitored for response to treatment. Ideally the HIV plasma viral load should be monitored. Clinical monitoring should also be carried out. Patients should be counseled on treatment adherence and living a positive lifestyle and continuing with cotrimoxazole chemoprophylaxis.

Treatment may need to be changed if treatment failure or toxicity to drugs occurs.

8.14.10 Post occupational exposure prophylaxis against HIV infection

Occupational exposure to HIV by health workers carries a small but definite risk of becoming infected. Health care workers may be exposed to infection in the following ways

- Needlestick injury or injury with a sharp object that has been used on a patient with HIV infection

- Mucosal exposure of mouth or eyes by splashing of blood and other fluids of an HIV-infected person
- Non-intact skin exposed to blood or secretions
- Intact skin exposed to a large volume of blood or secretions of an HIV-infected individual

It has been shown that 0.33% of needlestick accident victims exposed to an HIV-infected source become infected with HIV; seroconversion is associated with:

- Deep injury
- Visible blood on the piercing device
- Needle placement in the patient's vein or artery
- The source has late stage HIV disease

Studies and meta-analyses have shown that in health workers who have been accidentally exposed to HIV the immediate administration of antiretroviral agents may prevent infection from occurring. Any ONE of the HAART treatment regimens described may be prescribed. Treatment should be commenced immediately after the injury and continued for one month. The HIV status of the source and of the injured health worker should be determined by rapid tests. If the source is HIV negative treatment may be discontinued; if the health worker is HIV positive at the time of the injury he/she should be referred for continuing care; if the source is HIV positive or if the source cannot be tested and the health worker HIV negative then HAART should be continued for a month. The health worker should also be investigated for hepatitis B immune status and passive and active immunization against hepatitis B should be instituted.

Pre- and post-test counselling should be provided and the health worker should be re-tested for HIV infection at 6 weeks, 3 months and at 6 months after the injury. The health worker should be advised to use condoms whenever he/she has sex until the end of the period of observation.

All health facilities should adopt a policy for the prevention of occupational accidental exposure to blood borne pathogens that should include universal precautions for the prevention of exposure to potentially infectious material.

- All personnel should be taught how to safely handle sharp objects and how to safely dispose of them.
- Messages should promote avoiding re-capping of needles, using "sharps bins" for disposing of sharps, and taking care while performing procedures.
- Health facilities should ensure the continuous supply of education materials, disposable syringes and needles, and sharps bins.

8.14.11 Prevention of mother-to-child transmission of HIV

Over one-third of HIV infected pregnant women will transmit the infection to their offspring. Transmission of infection occurs mainly at the time of labour and through breast-feeding. In areas of high HIV prevalence it is advisable to encourage pregnant women to be tested for HIV infection during the pregnancy. This should be carried out with pre- and post-test counseling. Pregnant women found to be HIV positive should be given HAART as described provided they

fall into the categories for which HAART is indicated. Those that do not need to commence HAART should be followed carefully and they should be offered prophylactic treatment with nevirapine during labour. The following recommendations are made for the prevention of mother-to-child transmission of HIV:

Mother: Nevirapine 200 mg orally in single dose to HIV positive mother at the start of labour, PLUS

Neonate: Nevirapine 5 mg/kg in a single oral dose to neonate at 48 to 72 hours after birth.

If the mother receives nevirapine less than two hours before delivery then give the baby nevirapine 5 mg/kg orally as soon as possible after birth **AND ALSO** at 48 to 72 hours later

It is advisable that the baby is not breast-fed.

Under study conditions this regimen is associated with about 50% reduction in transmission of HIV from mother to child.

8.15 Further Reading

Good reference texts and guidelines that cover tropical and infectious diseases and sexually transmitted infections in detail are available and some examples of such texts and guidelines are:

Guerrant, R.L., Walker, D.H. and Weller, P.F. (Eds). *Essentials of Tropical Infectious Diseases*. 2001. Churchill Livingstone. N.Y.

Bartlett, J.G. *Pocket Book of Infectious Disease Therapy*. 2002. Lippincott, Williams and Wilkins. Philadelphia.

King K. Holmes, P. Frederick Sparling, Per-Anders Mardh, Stanley M. Lemon, Walter E. Stamm, Peter Piot, Judith N. Wasserheit. (Eds). *Sexually transmitted Diseases*. Third Edition. 1998. McGraw Hill Professional. New York.

Therapeutic guidelines – Antibiotic. Version 11. 2000. Therapeutic Guidelines Limited. Melbourne, Victoria 3051, Australia.

Guidelines for the Management of Sexually Transmitted Infections. World Health Organization. 2002. Geneva, Switzerland.

Clinical guidelines for the management of sexually transmitted infections among priority populations. Royal Australasian College of Physicians, Australasian Chapter of Sexual Health Medicine. Sydney, Australia. 2004.

In addition, readers will find the following publications useful:

Latif, A. HIV infection and sexually transmitted infections in Southern Africa. *Annals Austral Coll Trop Med*. 2002; 3; 4-13.

Elizabeth L Corbett, Richard W Steketee, Feiko O ter Kuile, Ahmed S Latif, Anatoli Kamali, Richard J Hayes. HIV-1/AIDS and the control of other infectious diseases in Africa. *Lancet*

2002; 359: 2177–87.

Grosskurth H, Gray R, Hayes R, Mabey D, Wawer M. Control of sexually transmitted diseases for HIV-1 prevention: understanding the implications of the Mwanza and Rakai trials. *Lancet* 2000; 355: 1981–87.

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