



Sexually Transmitted Infections: An Evidence-Based Online Course

Module I: STIs as a global public health challenge: past, present and future

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Abbreviations and acronyms

AIDS	Acquired immune deficiency syndrome
AMR	Antimicrobial resistance
BV	Bacterial vaginosis
CA	Candida albicans
CS	Congenital syphilis
CT	Chlamydia trachomatis
GU	Genital ulcer
GUD	Genital Ulcer Disease
HIV	Human immunodeficiency virus
HSV	Herpes simplex virus
HTLV-1	Human T-cell Lymphotropic Virus Type 1
LAP	Lower abdominal pain
LGV	Lymphogranuloma venereum
LN	Lymph nodes
MG	Mycoplasma genitalium

MSM	Men who have sex with men
NG	Neisseria gonorrhoeae
ON	Ophthalmia Neonatorum
PID	Pelvic inflammatory disease
POC	Point-of-Care
RDTs	Rapid Diagnostic Tests
STD	Sexually transmitted disease
STI	Sexually transmitted infection
TP	Treponema pallidum
TV	Trichomonas vaginalis
UD	Urethral discharge
VD	Vaginal discharge
VDS	Vaginal discharge syndrome
VL	Viral load



By the end of this module, the learner should be able to:

Core knowledge

Define STIs and use appropriate terminology.

Describe key characteristics, burden, and public health importance.

Clinical understanding

Identify main etiologies and clinical presentations of common STIs.

Recognize complications, including PID, infertility, ectopic pregnancy, congenital infections, and genito-anal cancers.

Prevention and transmission

Explain how STIs spread and key determinants of transmission.

Differentiate prevention strategies (primary, secondary).

Clinical management

Apply principles of STI management in clinical settings.

Use syndromic management algorithms (e.g., vaginal discharge).

Screening and control

Describe STI screening and partner services.

Identify opportunities to improve syphilis diagnosis and treatment.

Understand basic STI surveillance principles.



Module outline:

- STI Definition
- STI key characteristics, burden and importance
- Etiology and clinical presentation of STI, Importance of terminology
- STI: complications and sequelae: PID - Ectopic pregnancy – Infertility, Perinatal, infant infections (congenital syphilis), Genito-anal cancers
- STI determinants, dissemination and prevention
- STI at clinical settings
- Management of sexually transmitted infections
- Key algorithms for syndromic management of VDS
- STI screening and partner services as secondary prevention
- Opportunities to strengthen syphilis diagnosis and treatment
- STI surveillance
- Summary



Sexually transmitted infections (STIs) : Introduction 1/2

- Spread from one infected person to another through sexual intercourse.
- Some infections may also be transmitted from mother to child during pregnancy and childbirth.
- Another way that infections are passed on is through the sharing of blood products or tissue transfers.
- Some diseases caused by STIs include syphilis, AIDS (acquired immune deficiency syndrome) and cervical cancer.



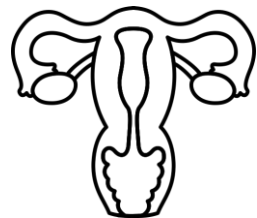
Sexually transmitted infections: Introduction 2/2



- Frequently without symptoms
- Considerable morbidity
- High incidence and prevalence
- High rate of complications
- Bigger problem in women and young people
- Facilitate HIV (human immunodeficiency virus) transmission



Why do sexually transmitted infections matter?



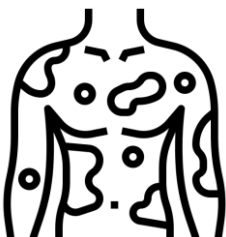
Reproductive tract disease

- Pelvic inflammatory disease (PID)
- Ectopic pregnancy
- Sub- and infertility



Adverse pregnancy outcomes

- Miscarriage and stillbirth
- Preterm birth (PTB) and low birth weight (LBW)
- Newborn infection (e.g. congenital syphilis (CS); Ophthalmia Neonatorum (ON))



Intersection with other conditions

- Dermatological manifestations (e.g. warts)
- Systemic (e.g. arthritis; neurovascular)
- Urological (e.g. prostatitis; epididymitis)



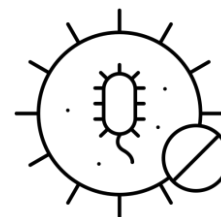
Psychosocial wellbeing

- Stigma, discrimination, relationship strain
- Mental health impact
- Substance use



HIV acquisition and transmission

- Increased susceptibility to HIV
- Increased tissue VL (viral load) and shedding



Antimicrobial resistance

- *Neisseria gonorrhoeae* (NG) and *Mycoplasma genitalium* (MG)
- Persistent or recurrent infection and disease
- WHO priority pathogen for new antibiotics (NG)



Causes of sexually transmitted infections

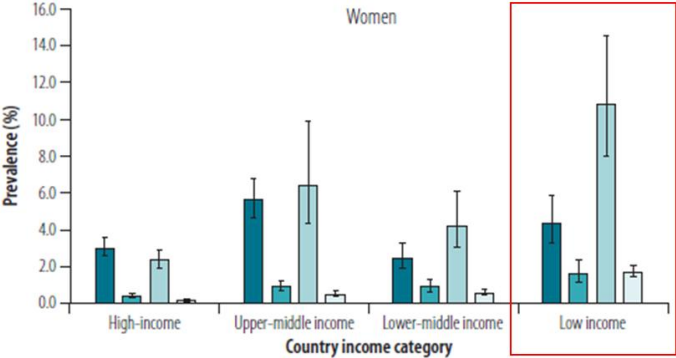
- ❑ Caused by more than 20 micro-organisms (some bacterial other viral)
- ❑ Most present in form of 5 syndromes
 - *Urethral discharge (UD)*
 - *Genital ulcer (GU)*
 - *Vaginal discharge (VD)*
 - *Swollen glands*
 - *Lower abdominal pain (LAP)*





Why is the global STI burden high?

Highest burden in settings with the lowest resources



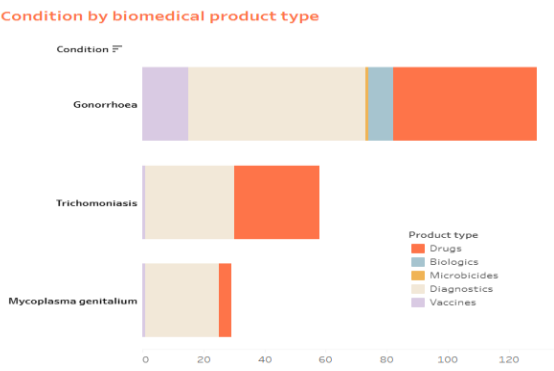
- Issues of equity, equitability and vulnerability as important drivers
- Competing priorities for limited available resources

Syndromic management approach remains standard of care



- Implementation is often suboptimal leaving infections untreated
- Asymptomatic infections sustain burden of transmission

Limited investment in technological interventions to date



- Quality-assured STI Rapid Diagnostic Tests (RDTs) and Point-of-Care (POC) tests are limited
- Development of effective vaccine only in the early phases



Reproductive tract infections (RTI)

- Iatrogenic infections
e.g. post abortum
- Endogenous Infections
e.g. *Candida albicans* and *bacterial vaginosis*
- Sexually Transmitted Infections (STI)
e.g. gonorrhea, syphilis, herpes



Importance of terminology

- **WHO uses the umbrella term STIs for infections spread *predominantly* through sexual contact**
 - Sexually transmissible infection vs. sexually transmitted infection (STI) vs. sexually transmitted disease (STD)
 - Sexual contact can be anal, oral or vaginal

Sexually transmissible infections		
Bacterial	Viral	Other
Bacterial vaginosis (BV)	Adenovirus	Amebiasis
Candidiasis	CMV (Cytomegalovirus)	Giardiasis
Enteric disease (SSYC (<i>Salmonella, Shigella, Yersinia, and Campylobacter</i>))	Ebola virus	Scabies
GBS (Group B Streptococcus)	EBV (Epstein-Barr virus)	Pediculosis
<i>Mycoplasma hominis</i>	HAV (Hepatitis A virus), HCV (Hepatitis C virus)	Enterobiasis
<i>Neisseria meningitidis</i>	Mpox (monkeypox) virus	
<i>Ureaplasma parvum</i>	Poxvirus (mollusca)	
<i>Ureaplasma urealyticum</i>	Zika virus	

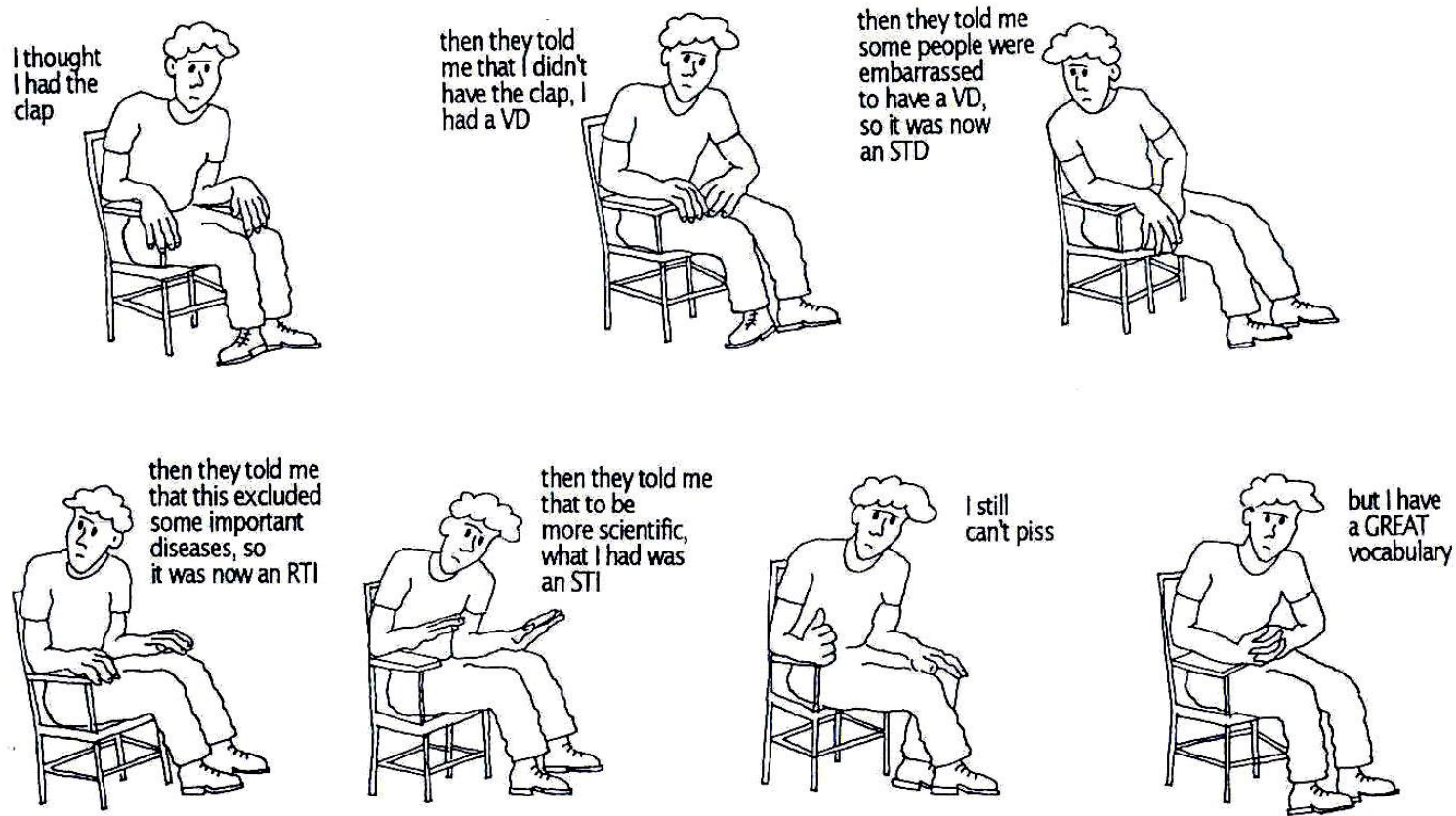
Sexually transmitted infections	
Bacteria	Virus
Chancroid*	HIV (human immunodeficiency virus)
Chlamydia	HPV (human papillomavirus)
Donovanosis	herpes simplex virus (HSV)-2 / HSV-1*
Gonorrhoea	HTLV-1 (Human T-cell Lymphotropic Virus Type 1)
LGV (Lymphogranulom a venereum)	
<i>M. genitalium</i>	Protozoa
Syphilis	Trichomoniasis

STD: result of an untreated STI that progresses to cause symptoms or complications

*If genital infection



Challenges of changing STI terminology: The patient perspective



*VD - Venereal Disease



Sexually transmitted and endogenous infections

Urethral discharge



Genital ulcer



Vesicles Genital ulcer



Swollen glands



Vaginal discharge



HPV infection/Genital warts





How sexually transmitted infections present

Chlamydia, gonorrhoea, trichomoniasis

Main symptoms

- Urethral or vaginal discharge (rectal)
- Other symptoms may be LAP, dysuria and itch
- Discharge appearance not predictive of aetiology
- Asymptomatic infections (women > men; rectal, oral)

Main aetiology

- Men with UD: NG > CT (Chlamydia trachomatis) >> other aetiology
- Women with VDS (Vaginal discharge syndrome): BV > CA (Candida albicans) > CT and TV (Trichomonas vaginalis) > NG
- Mixed infections common in women

Syphilis (TP), HSV, chancroid

Main symptoms

- Genital ulcer(s) – skin and/or mucosal
- Systemic manifestations may be present (e.g. rash; LN (Lymph nodes))
- Ulcer appearance not predictive of aetiology
- Ulcers may not be recognised

Main aetiology

- Men and women with GUD (Genital Ulcer Disease): HSV > TP (Treponema pallidum) >> chancroid and LGV
- Mixed infections may occur

Syndromic management is standard of care in most settings, but the pipeline of POC STI tests is expanding rapidly



Human papilloma virus (HPV)



- One of the deadliest STI
- Virtually all cervical cancer cases are linked to genital infection with the virus
- Cervical cancer is the fourth most common cancer in women globally with around 660 000 new cases and around 350 000 deaths in 2022
- The new vaccine that prevents the infection could reduce these cervical cancer-related deaths.



STI: complications and sequelae

- PID - Ectopic pregnancy - Infertility
- Perinatal, infant infections (congenital syphilis)
- Genito-anal cancers
- Facilitate HIV transmission





STIs are preventable

UNFPA, WHO and UNAIDS

Position statement on condoms and the prevention of HIV, other sexually transmitted infections and unintended pregnancy

June 2015

Condoms are a critical component in a comprehensive and sustainable approach to the prevention of HIV and other sexually transmitted infections (STIs) and are effective for preventing unintended pregnancies. In 2013, an estimated 2.1 million people became newly infected with HIV and an estimated 500 million people acquired chlamydia, gonorrhoea, syphilis or trichomoniasis.¹ In addition, every year more than 200 million women have unmet needs for contraception,² leading to approximately 80 million unintended pregnancies.³ These three public health priorities require a decisive response using all available tools, with condoms playing a central role.

Male and female condoms are the only devices that both reduce the transmission of HIV and other sexually transmitted infections (STIs) and prevent unintended pregnancy.

Laboratory studies show that condoms provide an impermeable barrier to particles the size of sperm and STI pathogens, including HIV.^{4,5} Condoms, when used consistently and correctly, are highly effective in preventing the sexual transmission of HIV. Research among serodiscordant couples (where one partner is living with HIV and the other is not) shows that consistent condom use significantly reduces the risk of HIV transmission both from men to women and women to men^{6,7} and from men to men.⁸ Consistent and correct use of condoms also reduces the risk of acquiring other STIs and associated conditions, including genital warts and cervical cancer.⁹ With a failure rate of about 2% when used consistently and correctly, condoms are very effective at preventing unintended pregnancy.¹⁰

Condoms have played a decisive role in HIV, STI and pregnancy prevention efforts in many countries.

Condoms have helped to reduce HIV transmission and curtailed the broader spread of HIV in settings where the epidemic is concentrated in specific populations.¹¹ Distribution of condoms has been shown to reduce rates of HIV and other STIs in sex workers^{12,13} and men who have sex with men.¹⁴ In India^{15,16} and Thailand¹⁷ increased condom distribution to sex workers and their clients in combination with other prevention interventions were associated with reductions of transmission of both HIV and other STIs. Zimbabwe¹⁸ and South Africa are two high-prevalence countries where increased condom use was found to contribute to reductions in HIV incidence.¹⁹

A recent global modelling analysis estimated that condoms have averted around 50 million new HIV infections since the onset of the HIV epidemic.²⁰ For 2015, 27 billion condoms expected to be available globally through the private and public sector will provide up to an estimated 225 million couple years protection from unintended pregnancies.^{21,22}

Condoms remain a key component of high-impact HIV prevention programmes.

Recent years have seen major scientific advances in other areas of HIV prevention. Biomedical interventions including antiretroviral therapy (ART) for people living with HIV can substantially reduce HIV transmission. While the success of ART may alter the perception of risk associated with HIV, studies have shown that people living with HIV who are enrolled in treatment programmes and have access to condoms report higher condom use compared to those not enrolled.^{23,24}

Condom use by people on HIV treatment and among serodiscordant couples is strongly recommended.^{25,26} Only when sustained viral suppression is confirmed and very closely monitored, and when the risk of other STIs and unintended pregnancy is low, it may be safe not to use condoms.^{27,28}

Oral pre-exposure prophylaxis (PrEP)—where antiretroviral drugs are used by HIV-negative people to reduce their risk of acquiring HIV—is also effective in preventing HIV acquisition, but is not yet widely available and

- **When used correctly and consistently, condoms are**
 - Very effective for STIs transmitted via genital fluids
 - Partially protective for infections spread by skin-to-skin contact (risk reduction)
- **Condom innovations to “revive” the field**
 - Improved comfort and sensation; ‘smart condoms’; etc.
- **The female condom** although effective and safe, it is not as widely used in national programs because of its higher cost when compared to male condoms



Determinants of STIs



- Social or economic conditions, and some sexual behaviours increase a person's vulnerability to STIs.
- Populations most-at-risk for STIs vary from setting to setting, depending on local culture and practices.
- Interventions to prevent and care for STIs should be intensified for such populations
- Services must minimize stigmatization and discrimination.



Determinants of STI epidemic: Macroenvironment

Socioeconomic factors

- poverty
- gender inequality

Cultural

- health seeking behaviours
- silent on sex issues

Epidemiological

- STIs prevalence

Demographic

- population age structure
- sex ratio
- Political commitment



Determinants of STI epidemic: Microenvironment

Biological

- gender
- age
- other STIs

Hormonal

- use of hormonal contraceptive
- pregnancy

Immunological

Behavioural

- age at coital debut
- multiple sexual partners
- anal sex
- sex during menstruation
- dry sex
- vaginal douching
- male circumcision
- drug or alcohol use



How STIs disseminate?

Basic Reproductive rate

$$R_0 = B \times c \times D$$

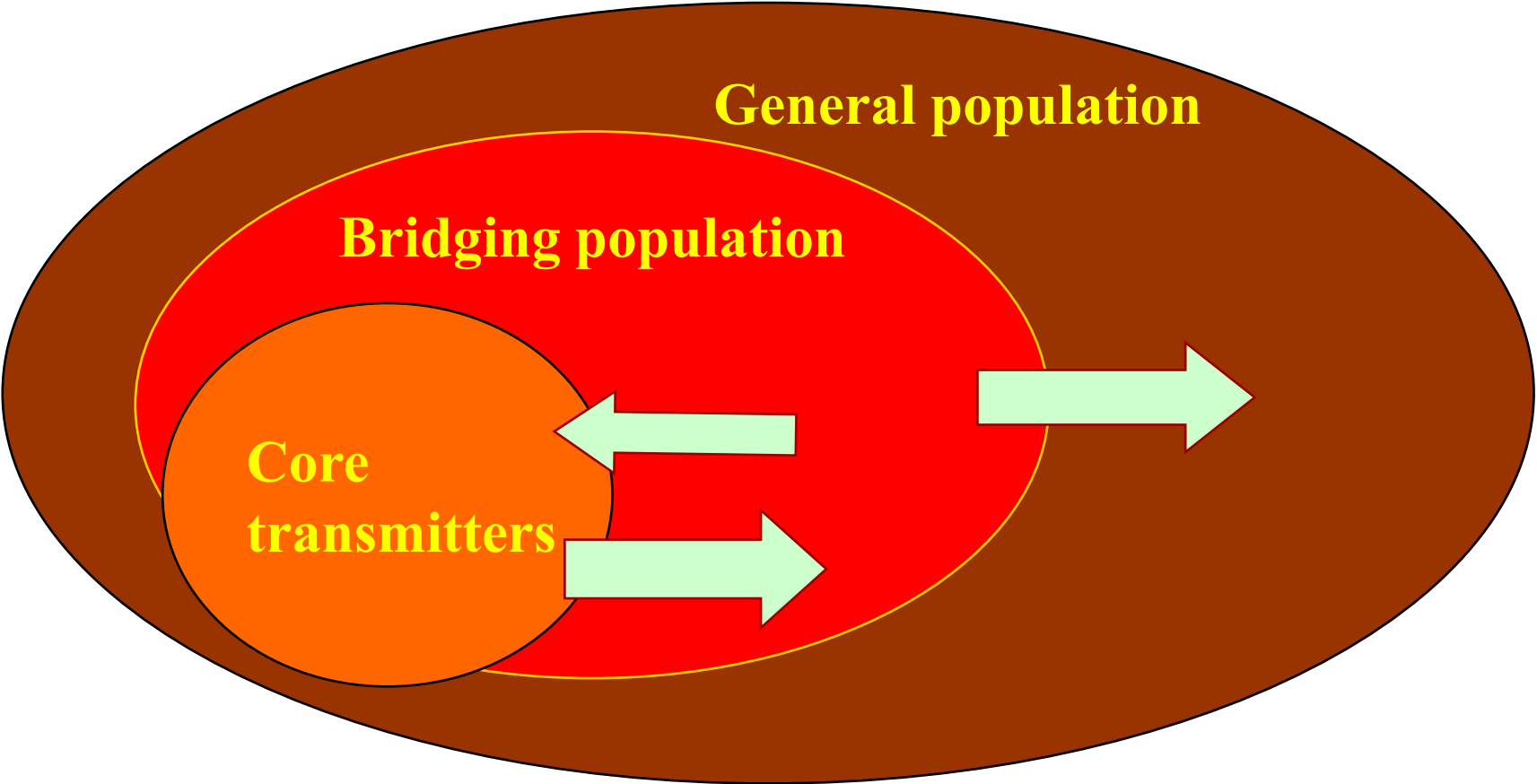
Transmission efficiency

Rate of sex partner change

Duration of infectiousness



STI transmission dynamics at population level





HIV and STI at clinical settings

- Identification and early intervention with people living with HIV, particularly those recently infected.
- HIV testing and counselling of STI patients, detection of acute HIV infection.
- Regular STI screening and treatment to reduce genital viral load.
- Clinical interventions as an extension of prevention work, reinforcing prevention messages and promoting condoms.



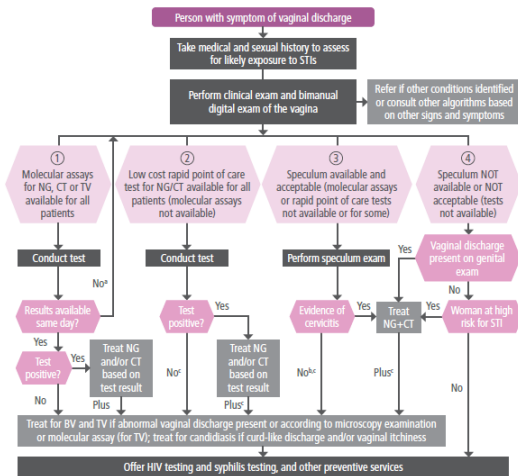
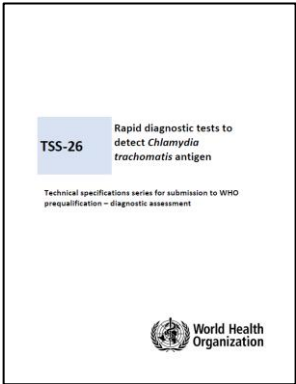
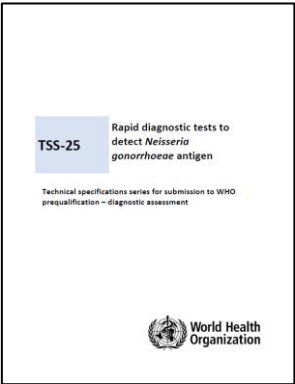
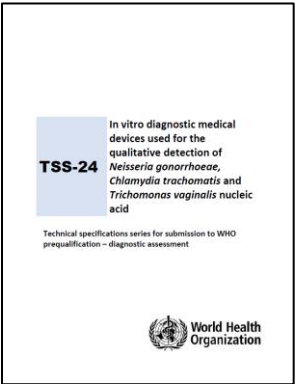
STI services must include

- ✓ Counselling
- ✓ Offer to test for HIV
- ✓ Advice on safer sex
- ✓ Condom promotion
- ✓ Delayed sexual debut for young people
- ✓ Fewer sexual partners
- ✓ Information on the role of male circumcision in the prevention of HIV infection
- ✓ Access to antiretroviral treatment



Management of sexually transmitted infections

- **Syndromic treatment is standard of care in most settings**
 - Combination of antibiotics covering the most likely aetiology of UD, VDS and GUD
 - Antibiotics in syndromic regimens are different from targeted treatment recommendation
 - Cheap, easy-to-implement and integrate
 - Significant over- and under-treatment; no AMR (antimicrobial resistance) monitoring and unclear management of treatment failure
 - Recent new POC STI tests may optimize syndromic management but require further guidelines and guidance

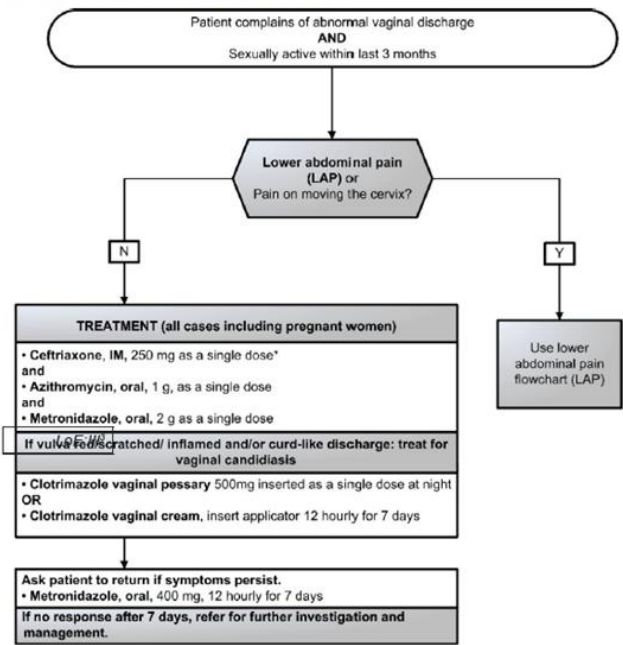


NG, *N. gonorrhoeae*; CT, *Chlamydia trachomatis*; TV, *Trichomonas vaginalis*; BV, bacterial vaginosis.
*If molecular assay was performed and results were not available on same day, revise the syndromic treatment initially provided according to the test results when available
*perform rapid point of care test or molecular assay if available to confirm NG/CT and treat if positive; if negative do not treat and ask woman to return if symptoms recur
*If woman complains of recurrent or persistent discharge refer to a centre with laboratory capacity



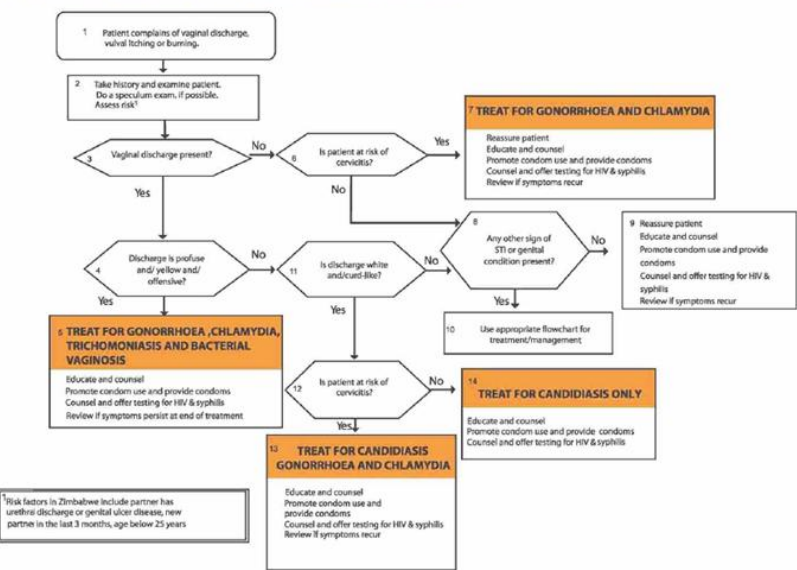
Diverse algorithms for syndromic management of VDS

12.1.2 SEXUALLY ACTIVE WOMEN

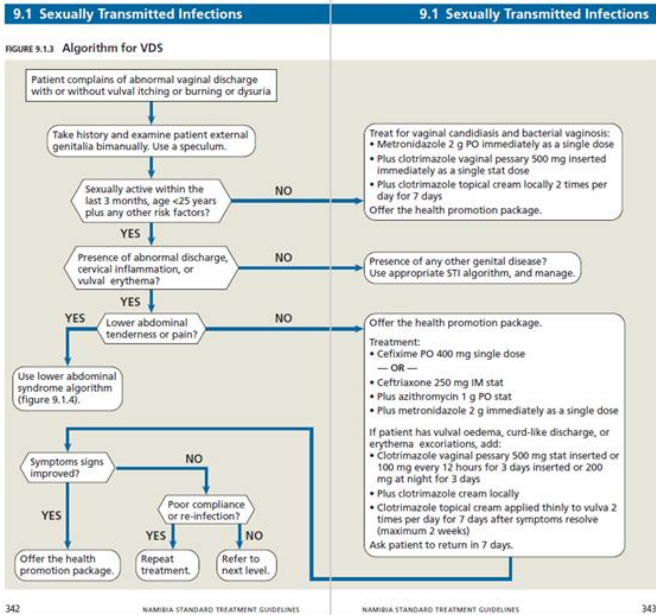


South Africa

FLOWCHART 1: MANAGEMENT OF VAGINAL DISCHARGE SYNDROME



Zimbabwe



Namibia



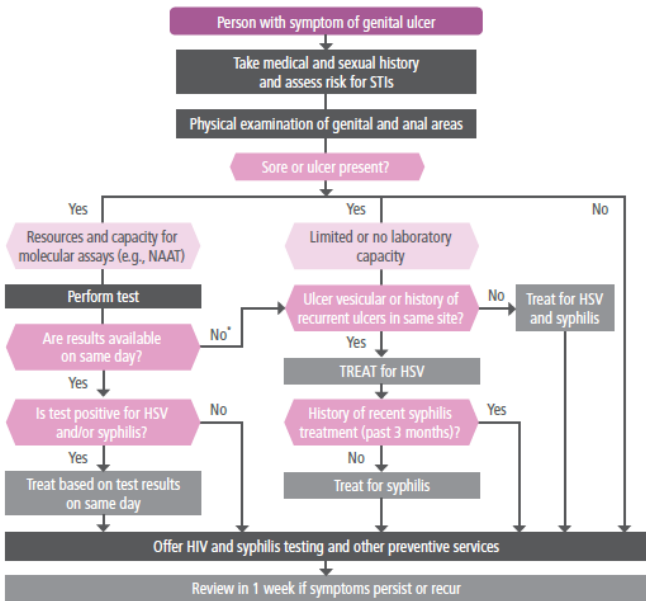
STI screening and partner services as secondary prevention

- **Screening in ANC has high impact and is cost-effective to prevent congenital syphilis**
 - Recommended by WHO including the use of rapid diagnostic tests (also for MSM (men who have sex with men) and sex workers)
 - **Diagnostic gap:** screening for active syphilis in people previously treated
 - Limited impact on population-level prevalence
- **WHO has conditional recommendation (low-certainty of evidence) for CT/NG screening in settings where prevalence is high and resources and capacity are available**
 - MSM, sex workers, adolescents and young women, pregnant women
 - Globally debated (AMR risk; limited sequelae in men; uncertain impact in women; small population-level effects)
 - Further guidance on service delivery and implementation models needed
- **Partner services recommended**
 - Further guidance on service delivery and implementation models needed



Opportunities to strengthen syphilis diagnosis and treatment

- **Rapid diagnostic test for GUD and/or secondary manifestations would constitute an important paradigm shift**
 - Importance of POC use to impact on treatment decisions
 - Several serological and molecular tests in early phases of clinical evaluation



Use case for active syphilis POC test

- Early diagnosis before seroconversion (window phase)
- Increase same-day diagnosis and treatment
- Increase recognition of secondary syphilis manifestations
- Target partner notification
- Reserve BPG for those who need it to avoid shortage
- Programme monitoring and surveillance



Components of STI surveillance

- Case reporting
- Prevalence assessment and monitoring
- Assessment of syndrome etiology
- Monitoring of antimicrobial resistance
- Special surveillance-related studies
- Estimates

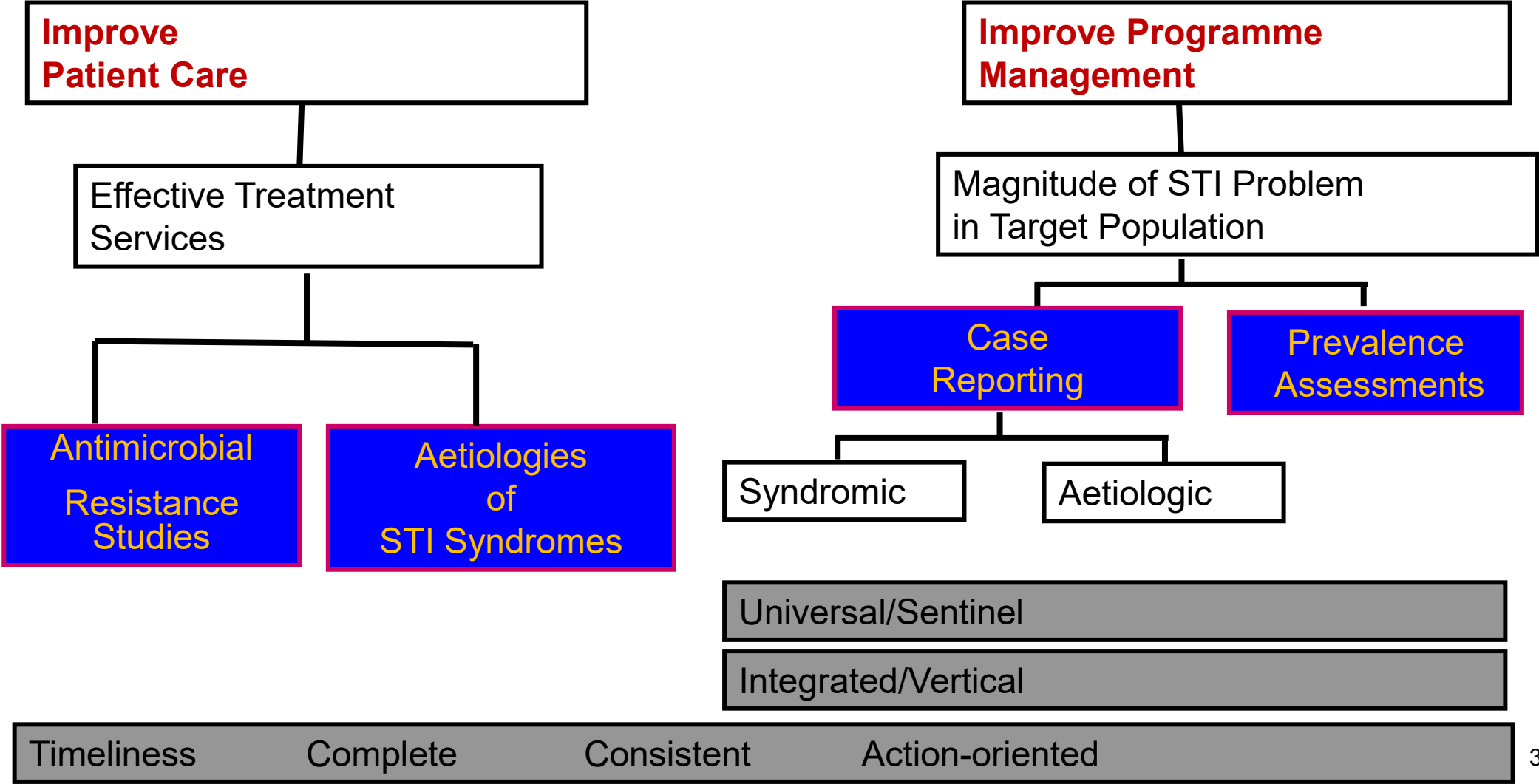


The use of STI surveillance data





The added value of STI surveillance





Summary

- **Sexually transmitted infections is not just one condition**
 - Differences in pathogenesis, clinical manifestations, health impact and public health approaches
 - Importance of high-quality evidence-based management of symptomatic people
- **Exciting times emerging for the STI field after decades of slow progress**
 - Doxycycline prophylaxis
 - Potential role for 4CMenB (Meningococcal Group B) vaccine
 - Novel screening and diagnostic tests
 - Novel treatment options



Key messages

1. **STIs remain a major global public health problem**
2. **STIs cause significant health consequences**
3. **Accurate terminology facilitate common understanding**
4. **Main clinical syndromes are** Urethral discharge, Vaginal discharge, Genital ulcer disease, Lower abdominal pain and Inguinal swelling/lymphadenopathy.
5. **Prevention, screening, and partner services are key interventions but are underutilized**
6. **Social and behavioural determinants drive transmission**
7. **STI management is evolving**
8. **Screening and partner services are critical**
9. **Surveillance is essential**
10. **New opportunities include:** Doxycycline post-exposure prophylaxis (Doxy-PEP), improved rapid diagnostics, new treatment options, potential vaccines (including broader use of meningococcal vaccines for gonorrhoea prevention)



References and Supplementary readings

- [Global Health Sector Strategies on, respectively, HIV, viral hepatitis and sexually transmitted infections for the period 2022-2030 \(GHSS\)](#)
- [Global strategy to accelerate the elimination of cervical cancer as a public health problem](#)
- [Guidelines for the management of symptomatic sexually transmitted infections](#)
- [Implementing the global health sector strategies on HIV, viral hepatitis and sexually transmitted infections, 2022–2030: report on progress and gaps 2024](#)
- Sexually transmitted infections (STIs) [https://www.who.int/news-room/fact-sheets/detail/sexually-transmitted-infections-\(stis\)](https://www.who.int/news-room/fact-sheets/detail/sexually-transmitted-infections-(stis))
- Sexually transmitted infections - Technical work <https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/stis/overview>
- Technical information: Doxycycline post-exposure prophylaxis for sexually transmitted infections prevention <https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/guidelines/stis-guidelines/doxypep>
- [The Global strategy for women's, children's and adolescents' health \(2016-2030\)](#)
- WHO issues first recommendations on doxycycline post-exposure prophylaxis to help prevent sexually transmitted infections <https://www.who.int/news/item/28-05-2026-who-issues-first-recommendation-on-doxycycline-post-exposure-prophylaxis-to-help-prevent-sexually-transmitted-infections>



Thank you!

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