

Designing & Evaluating Clinical Algorithms for STI Case Management

Francis J. Ndowa
WHO
RHR/STI

Training Course in Sexual and Reproductive Health Research
Geneva, 2010



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Session outline

- STI case management
- STI syndromic case management
- Algorithms development
- Implementation
- Algorithms evaluation
- Exercise (Group + presentation)



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Objectives of an STI programme

- to interrupt the transmission of sexually transmitted infections
- to prevent development of disease, complications and sequelae
- to reduce the risk of HIV infection



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Objectives of STI case management

- to provide appropriate antimicrobial therapy in order to:
 - obtain cure of infection
 - decrease infectiousness
- to limit or prevent high risk behaviour
- to ensure that sexual partners are treated in order to interrupt the chain of transmission



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

STI case management: Requirements

- **Accurate diagnosis**
- **Treat at first encounter**
- **Rapid cure with effective drugs**
- **Simplicity**
- **Integrated approach**
- **Condom promotion**
- **Education/Counselling**
- **Partner notification**



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Comprehensive STI case management

- History taking (symptoms)
- Examination (signs)
- Treatment
 - Client and sexual partner(s)
- Counselling for STIs and PITC for HIV
(provider initiated testing and counselling for HIV)
- Condom promotion



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Factors that influence patients' choice of facility

- **Accessibility**

- proximity
- affordability

- **Acceptability**

- non-stigmatising
- non-judgmental staff attitudes
- convenient opening hours
- affordable fees

- **Quality of services**

- efficiency of service delivery
- competence of staff
- effectiveness of therapy
- availability of drugs



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Diagnostic approaches to STI



- clinical

Disadvantages

- neither sensitive nor specific
 - mixed infections cannot be detected
-

- laboratory

- simple tests not available/do not exist
 - cost: existing rapid test expensive
 - delay: results not readily available
-

- syndromic

- costs of over-treatment
- side-effects of over-treatment



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

STI syndromic case management: definition

- Syndromic diagnosis:
identification of consistent group of symptoms and easily recognised signs (syndromes)
- Syndromic treatment:
treat the main organisms responsible for causing the syndrome



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

How syndromic management works

Through a series of flow-charts:

- guides the health-care worker through the correct identification and treatment of an STI-associated syndrome
- offers a package of comprehensive care from history taking, examination, to counselling/education on risk reduction and partner notification and treatment



World Health Organization

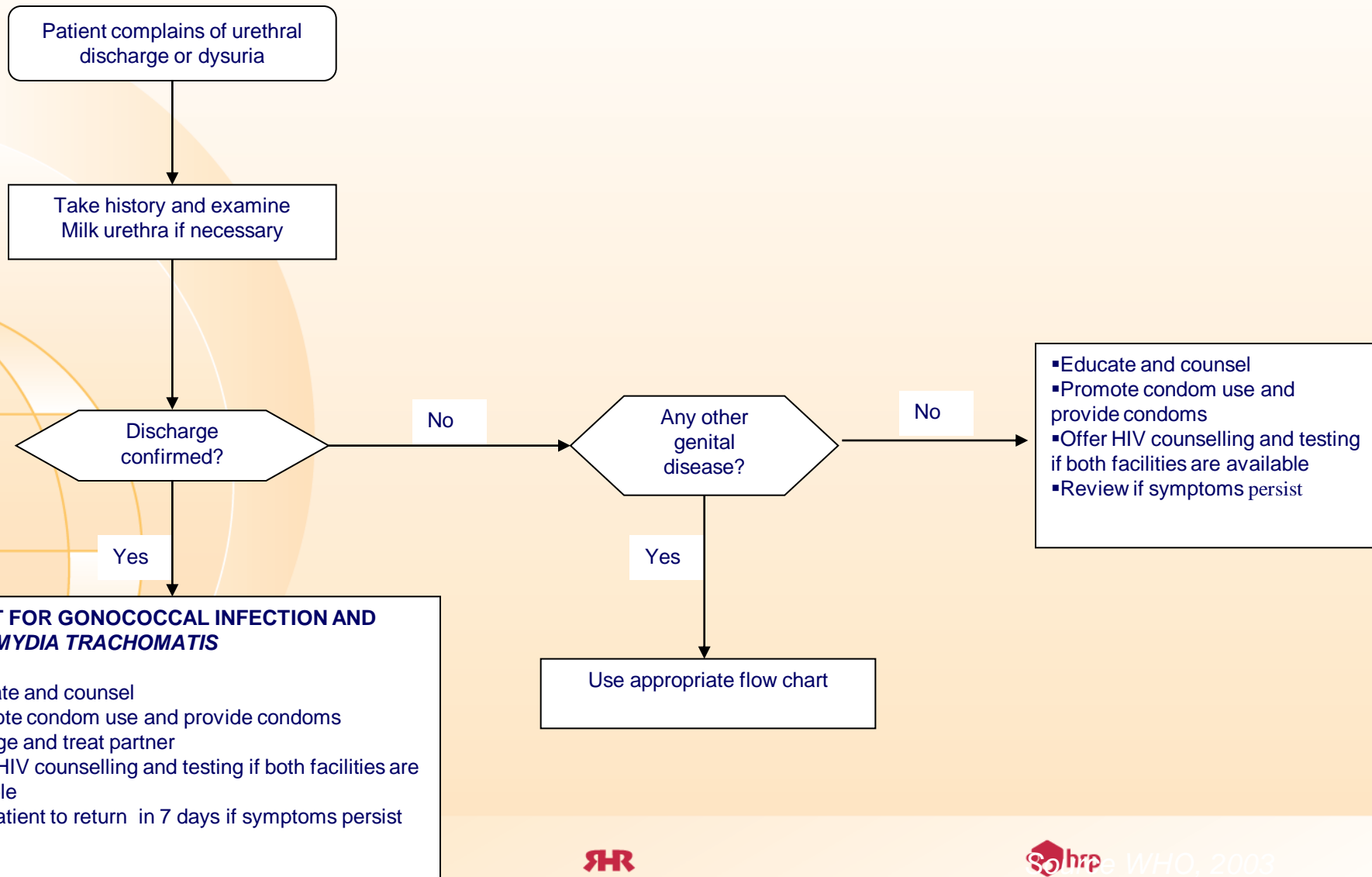


Reproductive Health and Research

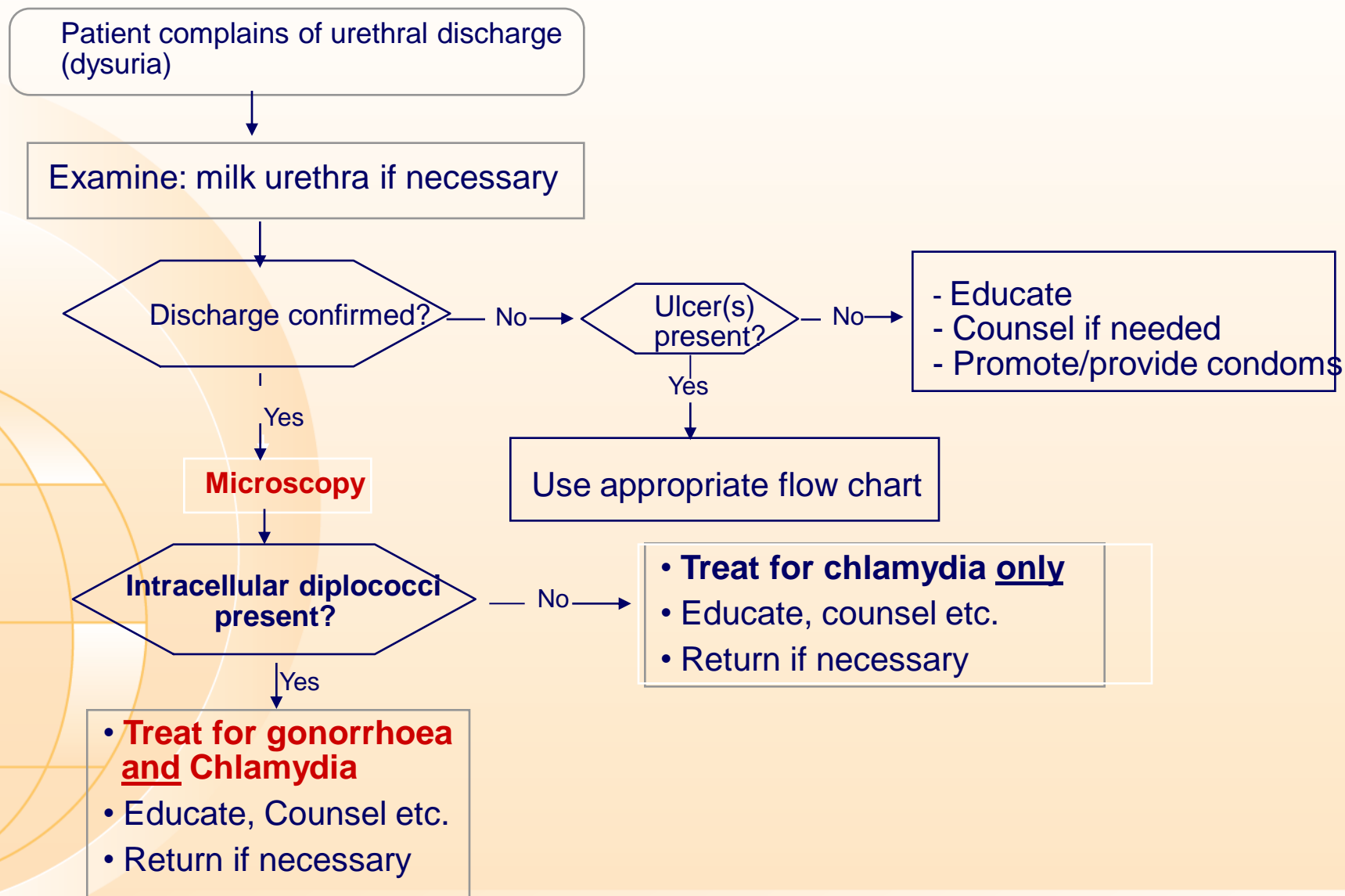


UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

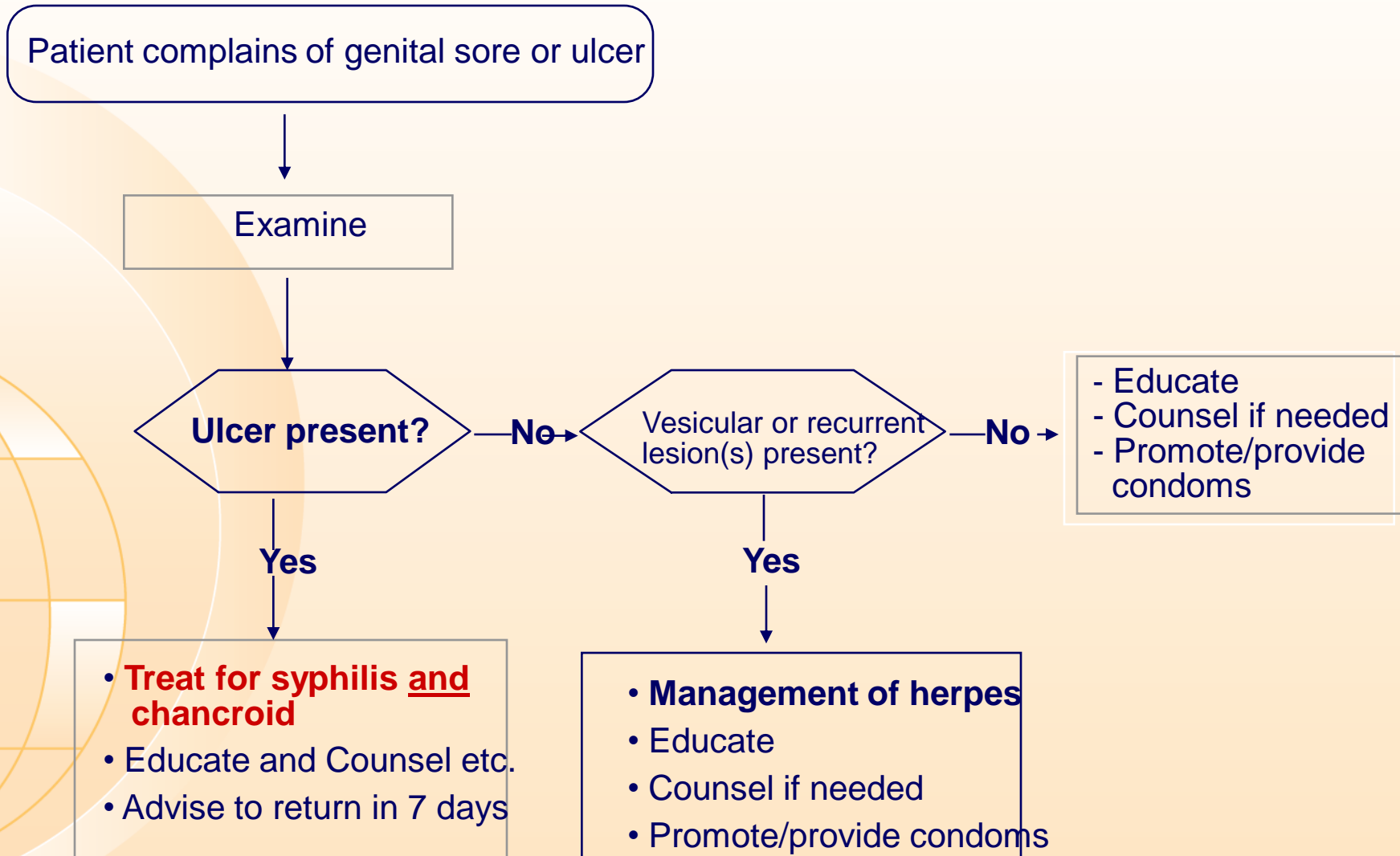
Urethral Discharge



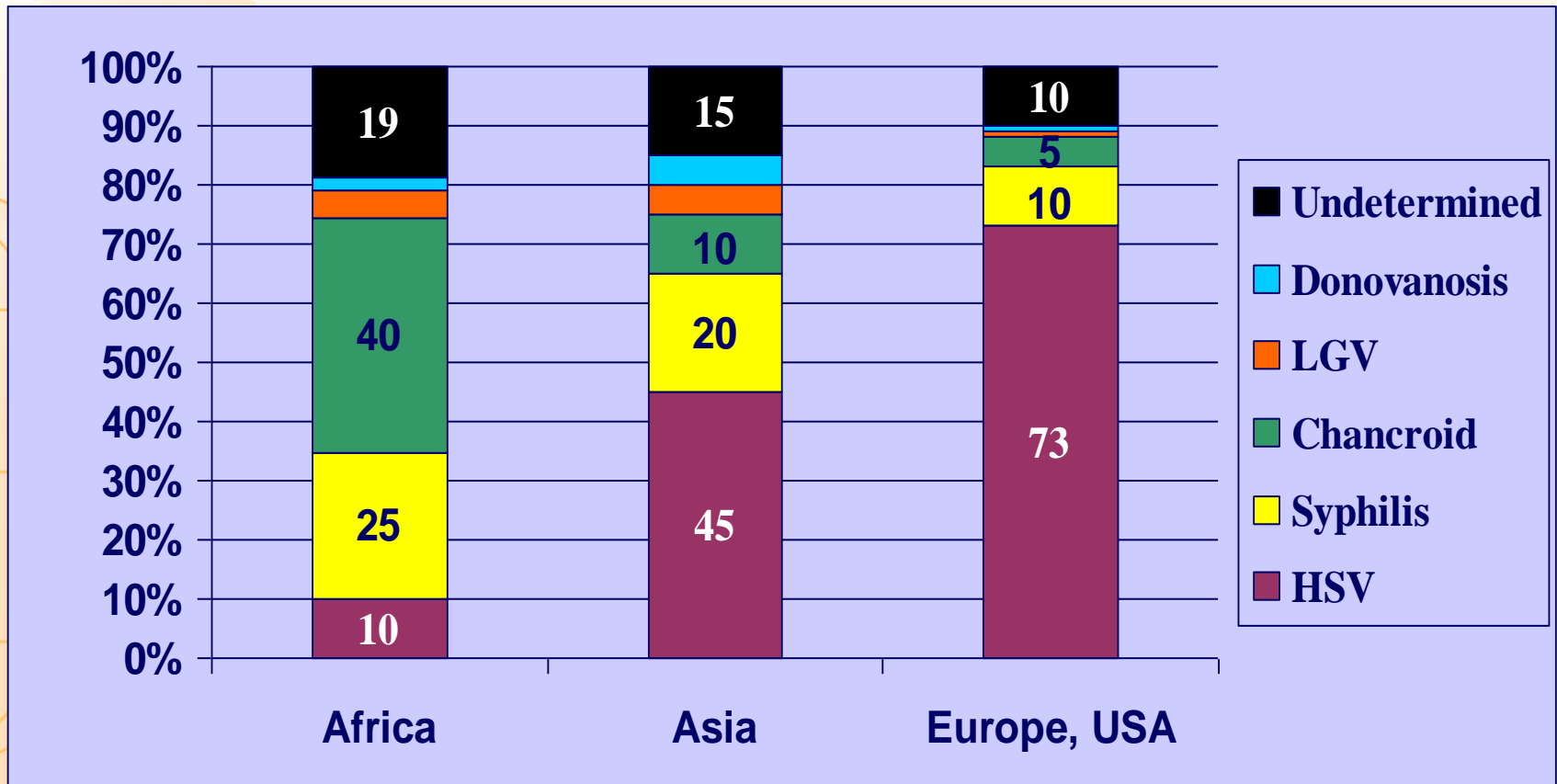
Urethral discharge (with microscope)



Genital ulcers



Agents causing genital ulcer disease (GUD) by Region until 1990's



World Health Organization

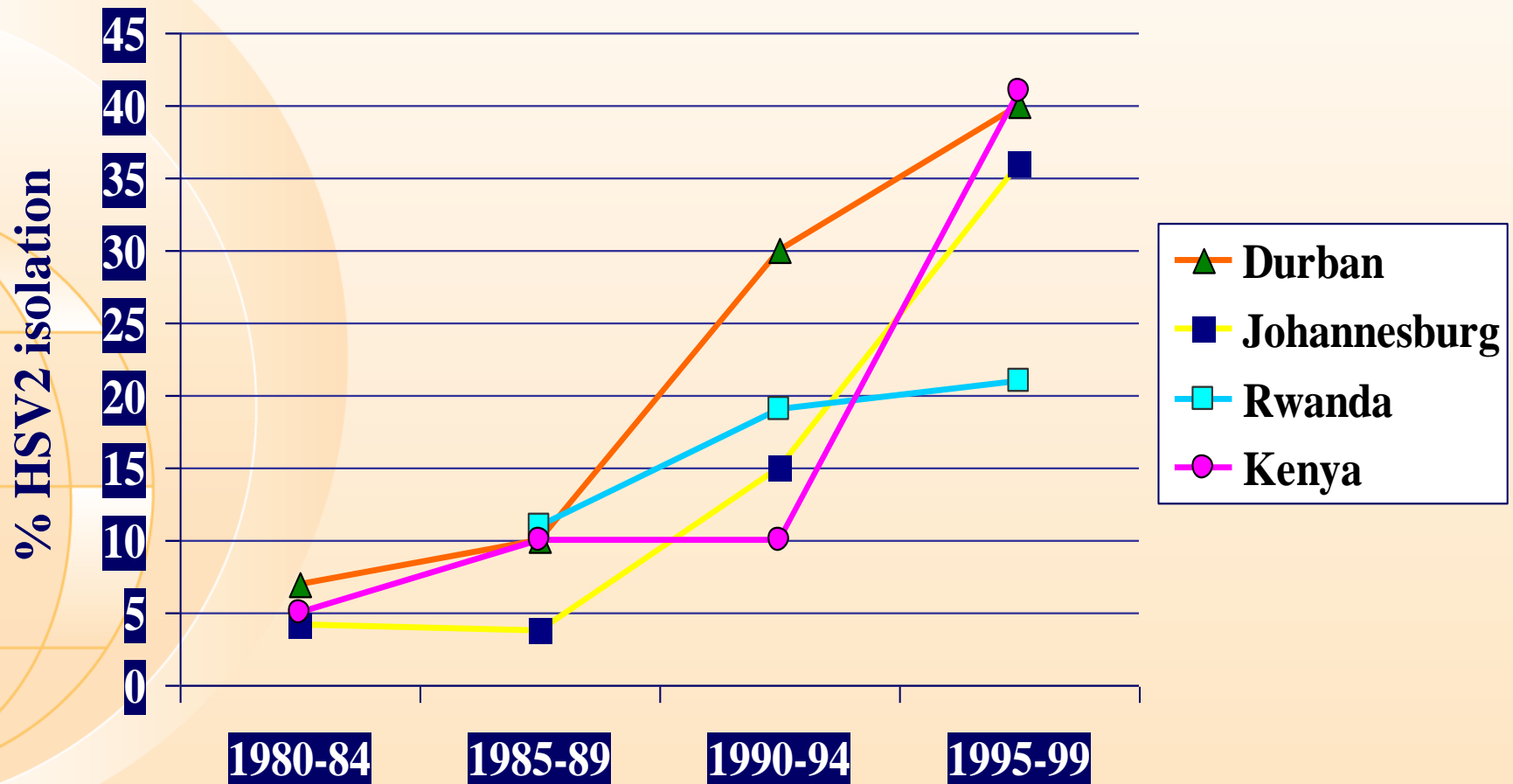


Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Proportion of genital ulcers in which HSV-2 was isolated in Africa over time



World Health Organization



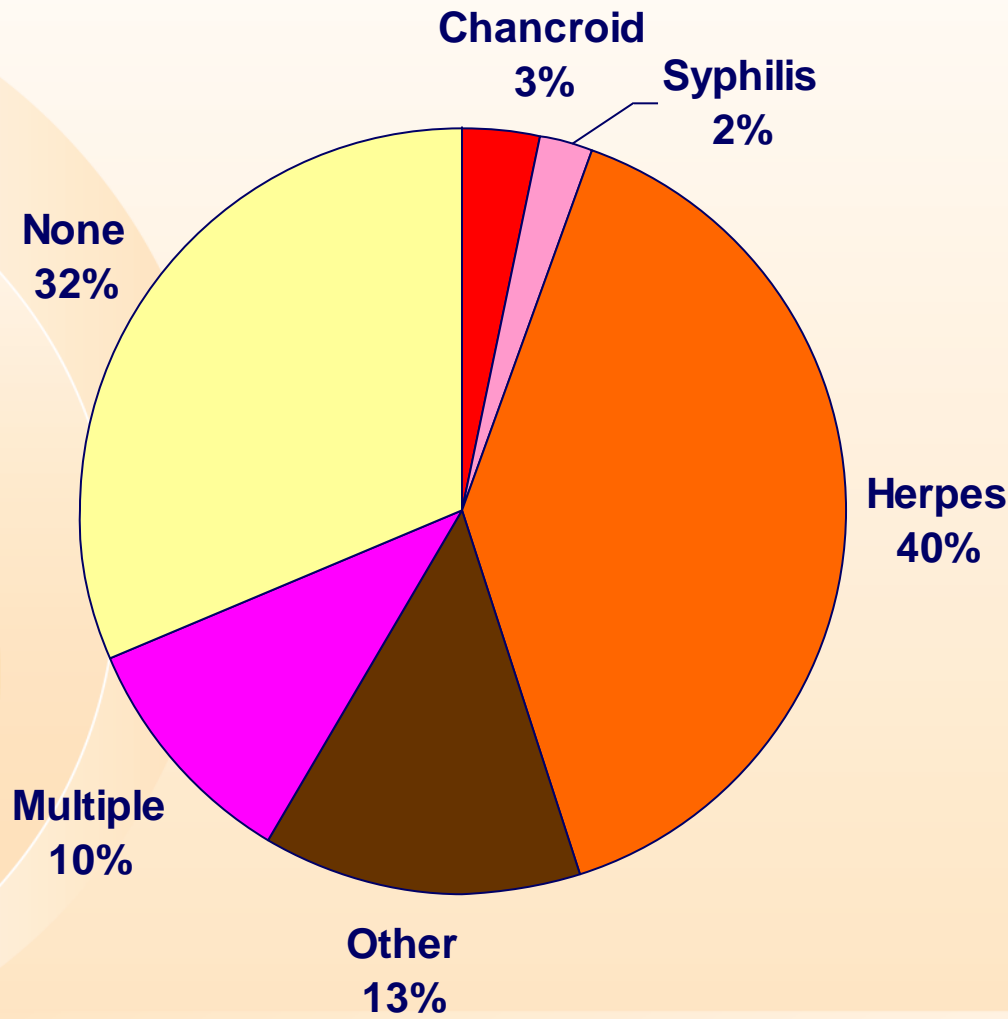
Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Mayaud & Mc Cormick, Br Med Bull 2001

Aetiology of GUS by M-PCR and culture in Masaka, Uganda



World Health Organization



Reproductive Health and Research

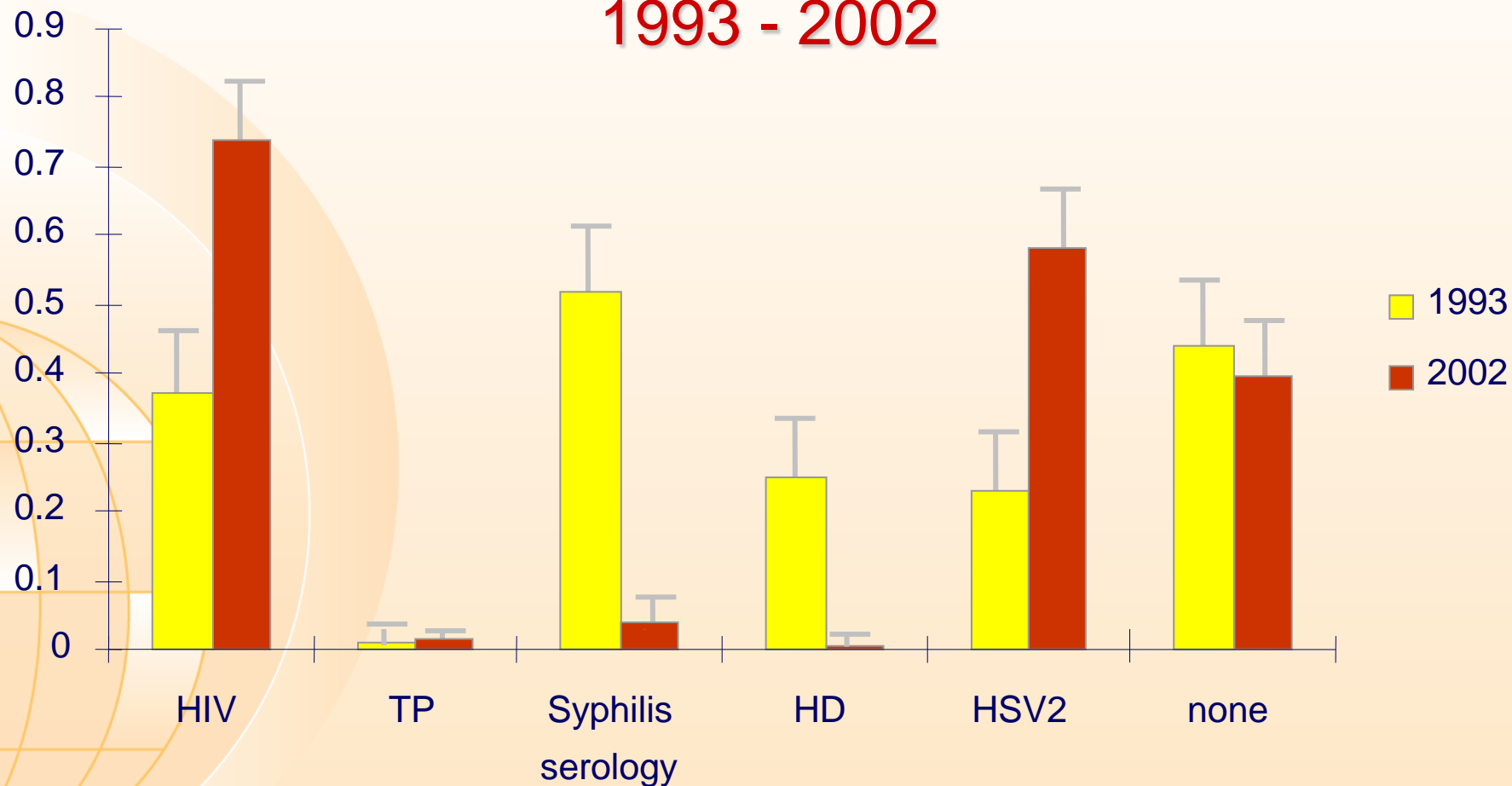


UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Source: Dr. Anatoli Kamali, Uganda

Botswana

Changes in the aetiology of GUD 1993 - 2002



*In 1993 a study was done by the National AIDS Control Program in Botswana in collaboration with the STD Research Unit, South African Institute for Medical Research, Johannesburg among 108 GUD patients.

Source: M. Rahman, ISSTD, Ottawa 2003



World Health Organization



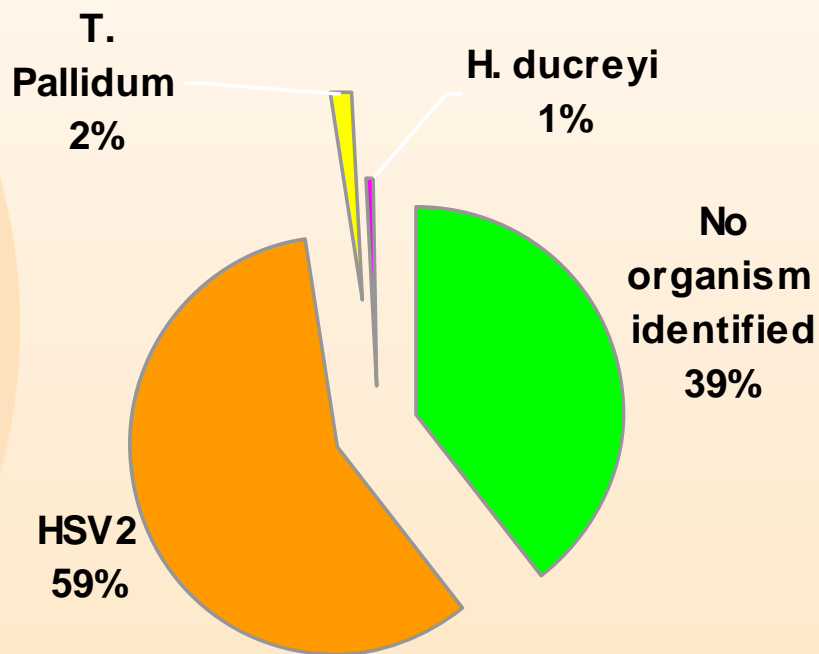
Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Botswana

Aetiology of genital ulcer disease 2002



N=137

TPHA/RPR - 15%
HIV - 30%

Source: M. Rahman, ISSTD, Ottawa 2003



World Health Organization



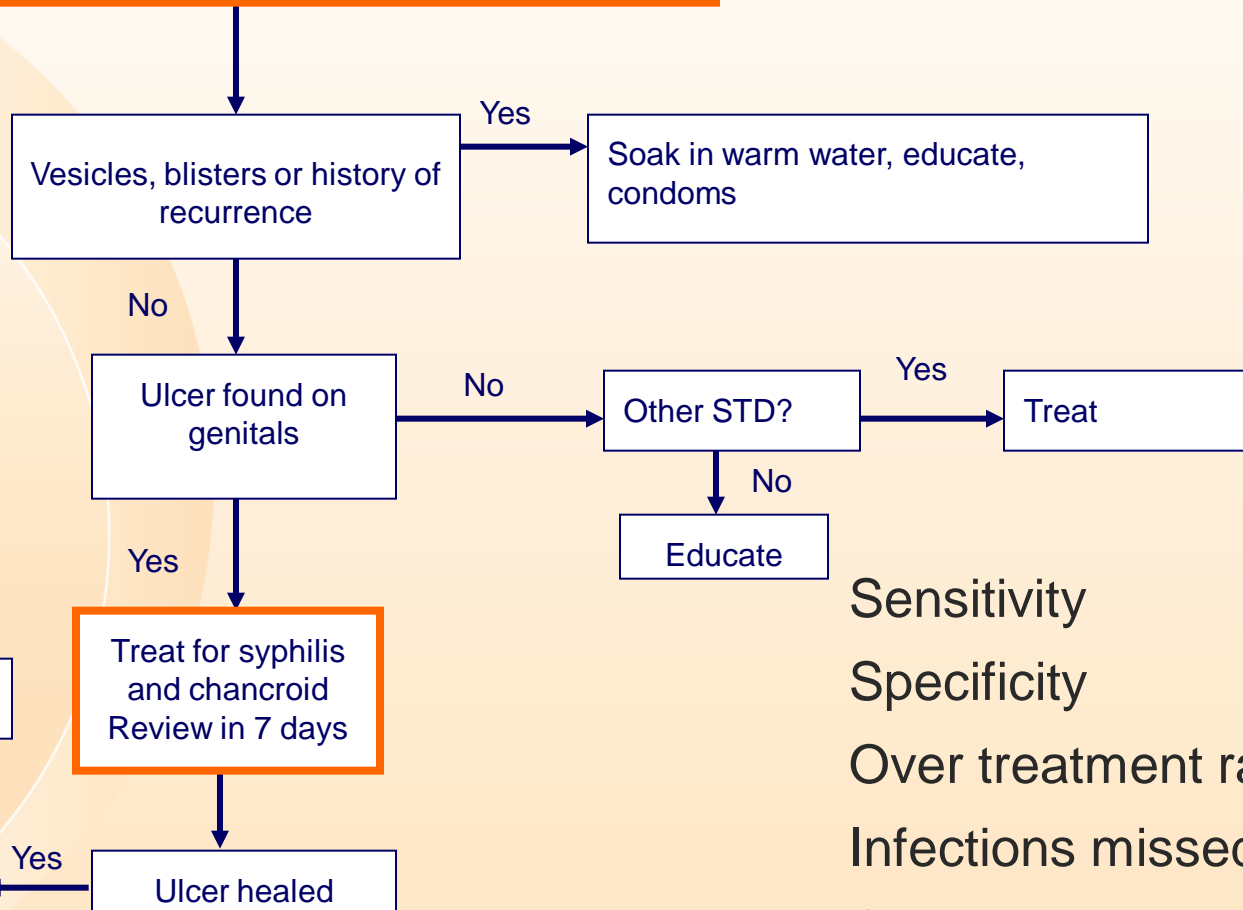
Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Current genital ulcer algorithm in Botswana

Complaint sores/ulcer on genitals



Sensitivity	33%
Specificity	45%
Over treatment rate	99%
Infections missed	67%
Cost per infection Tx.	\$88.0



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Piloted genital ulcer algorithm in Botswana

Complaint of sores/ulcer on genitals

Only vesicles present?

Yes

Treat for **herpes**
return in 7 days if symptoms persist

No

Ulcer found on genitals

No

Other STI?

Yes

Treat for syphilis, chancroid and
herpes
Ask patient to return in 7 days

Ulcer healed

Yes

Other STI?

No

Ulcer improved but not
healed continue therapy
for 7 days and return

Ulcer not improved
REFER

Sensitivity	99%
Specificity	13%
Over treatment rate	36%
Infections missed	1%
Cost per infection Tx.	\$4.5



World Health Organization

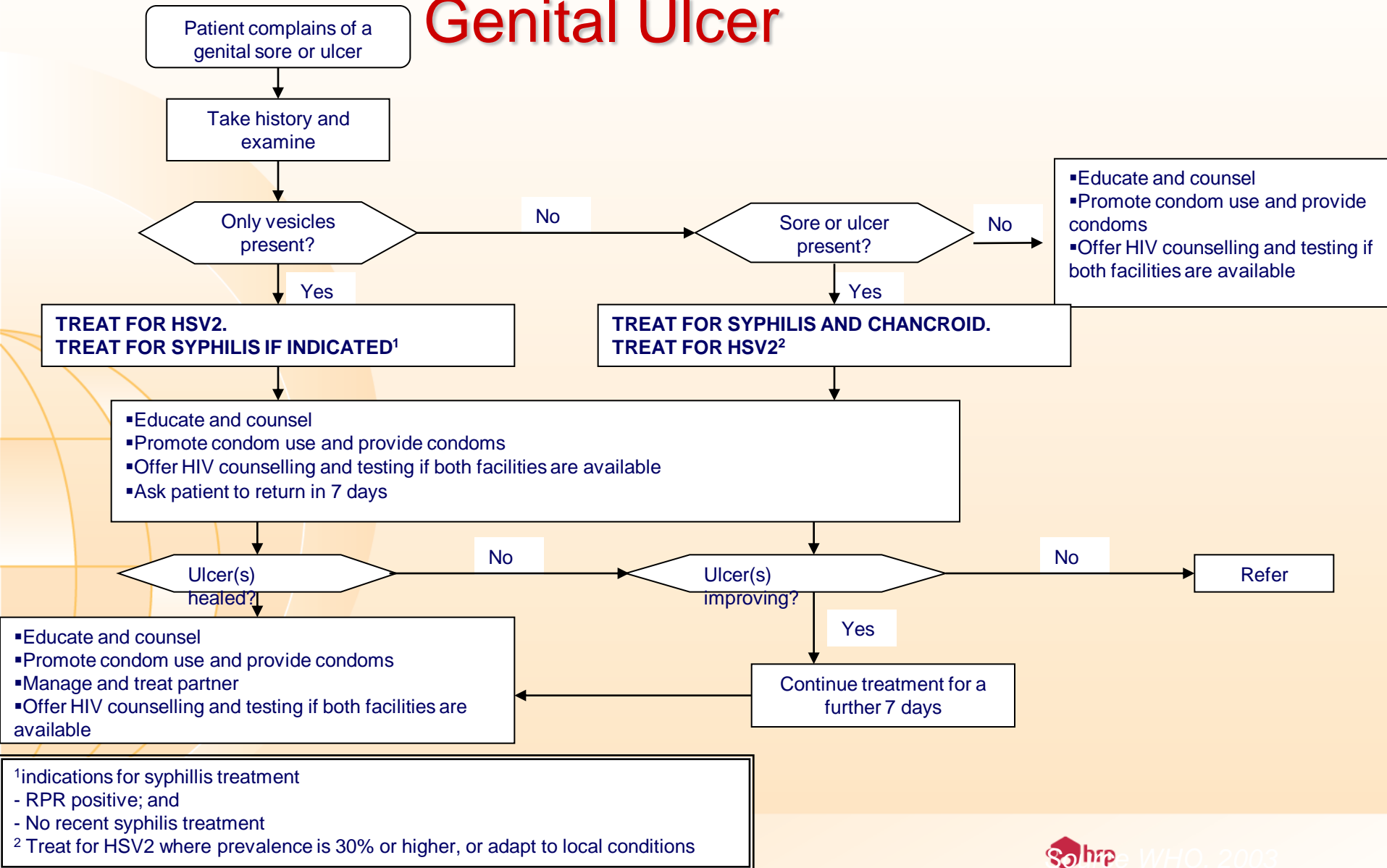


Reproductive Health and Research

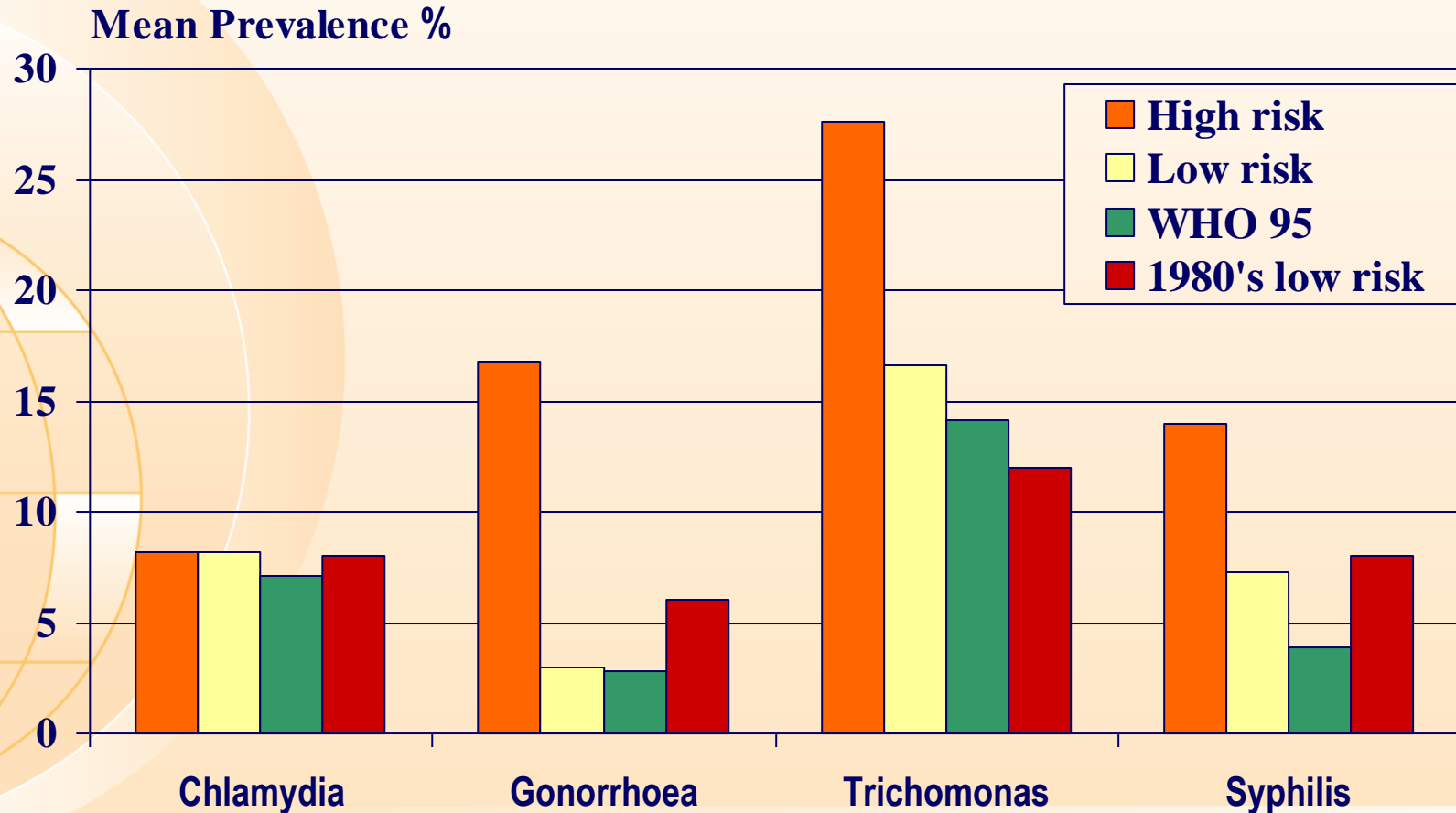


UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Genital Ulcer



Prevalence of Selected STIs among Female Populations in Africa in the 1980's and 1990's



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Table of selected 1990's studies; Wasserheit & Holmes, 1992; Gerbase et al, Lancet 1998

Vaginal discharge syndrome

VAGINITIS

- most common causes
- easy to diagnose
 - lab tests
 - clinically
- serious complications?
 - (pregnancy)
 - (endometritis, PID)

CERVICITIS

- less common causes
- not easy to diagnose
 - no simple tests
- complications ++
 - PID
 - ectopic pregnancy
 - infertility



World Health Organization

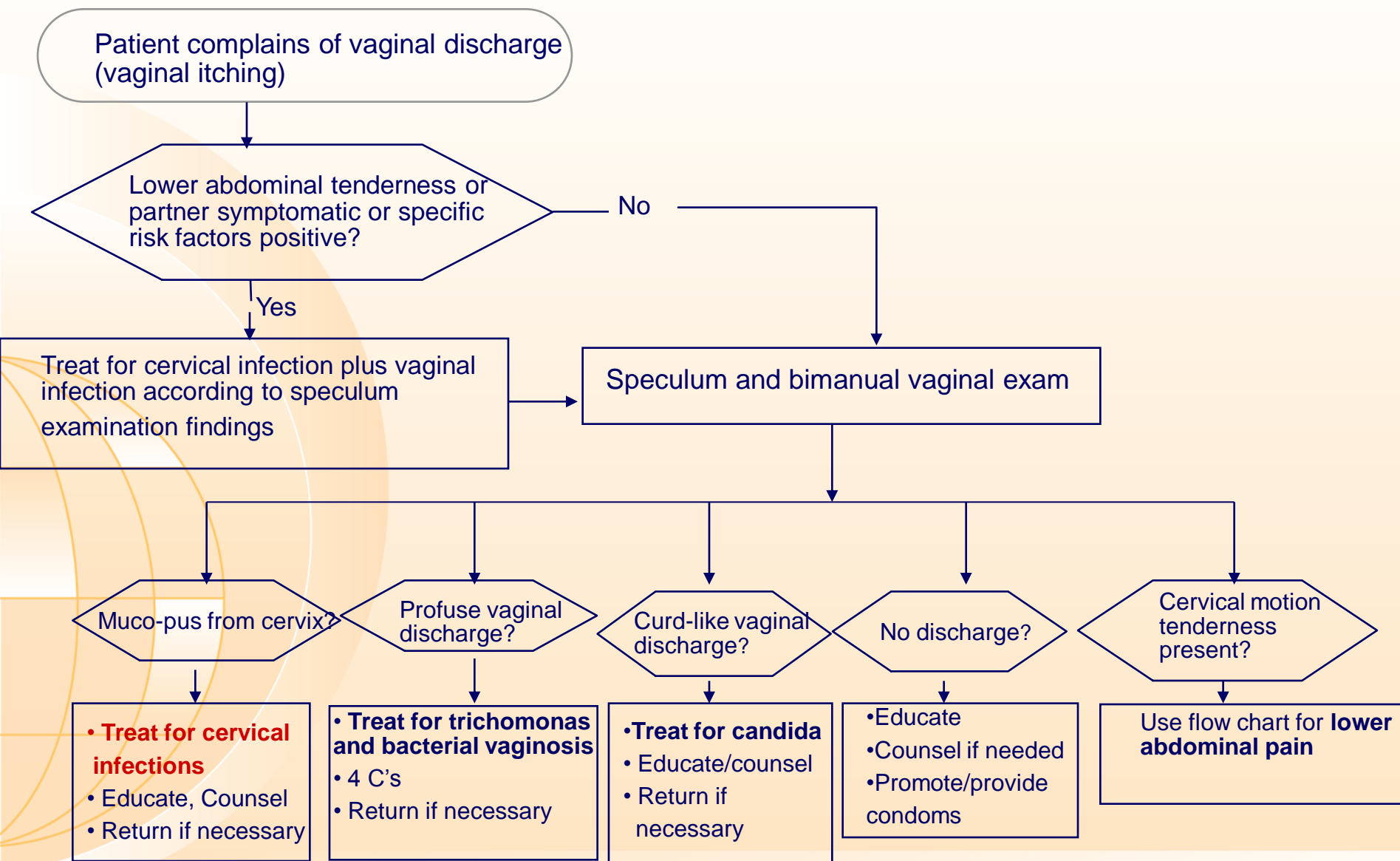


Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Vaginal discharge (with speculum only)



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Vaginal discharge (with speculum and microscope)

Patient complains of vaginal discharge or vaginal itching

Lower abdominal tenderness
or partner symptomatic or specific
risk factors positive?

No

Yes

Treat for cervical infection plus vaginal
infection according to speculum exam
findings

Speculum + bimanual vaginal examinations +
wet mount/gram stain microscopy of vaginal
specimen

Muco-pus from cervix?

Trichomonas?

Candida?

No discharge?

**Cervical motion
tenderness present?**

• **Treat for cervical
infections**
• Educate, Counsel
• Return if necessary

• **Treat for trichomonas
and bacterial vaginosis**
• 4 C's
• Return if necessary

• Treat for candida
• Educate/counsel
• Return
if necessary

Educate
Counsel if needed
Promote/provide condoms

Use flow chart for **lower
abdominal pain**



World Health Organization

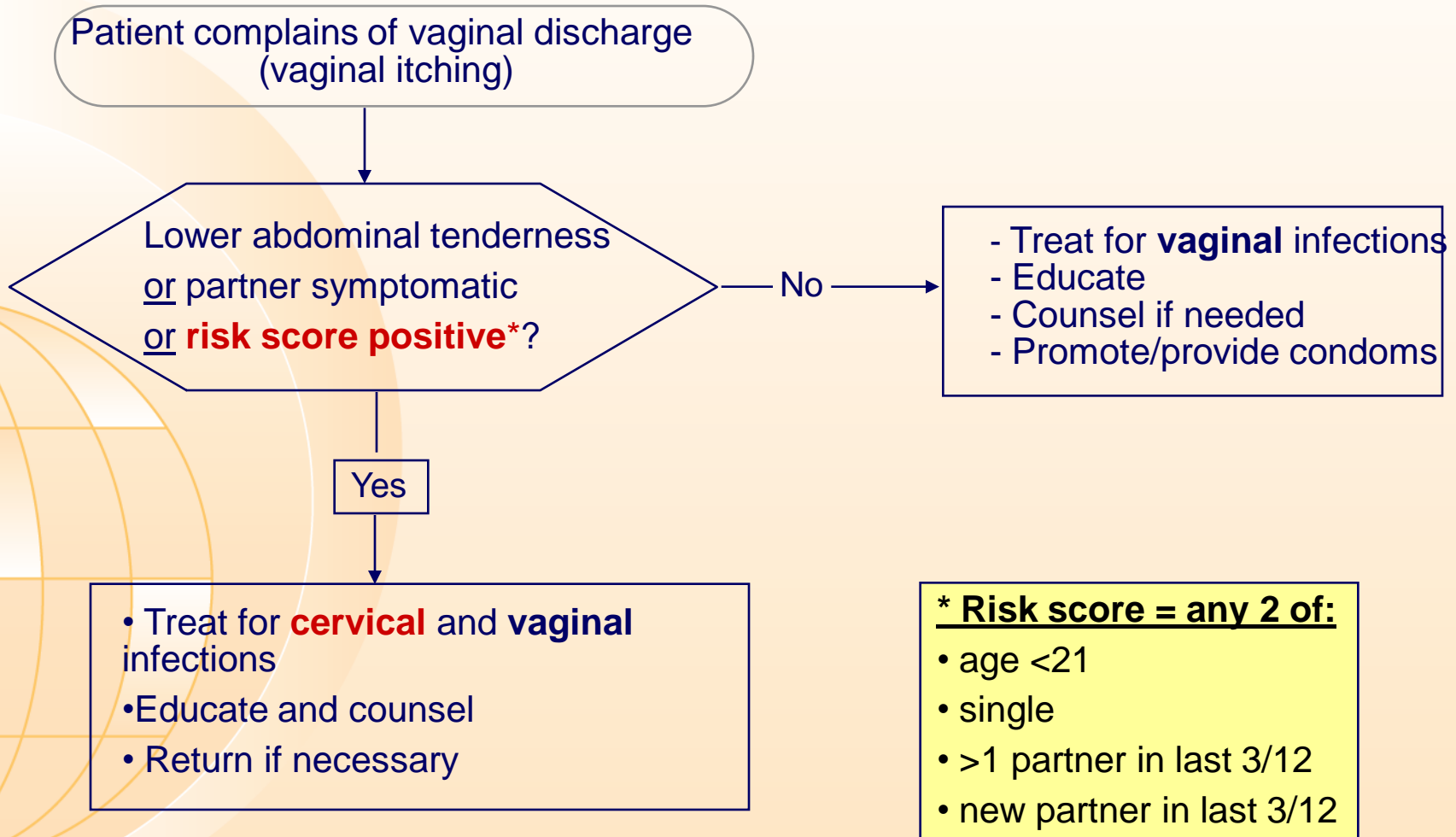


Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Vaginal discharge (without microscope, using risk score)



Vaginal discharge

Patient complains of vaginal discharge, vulval itching or burning

Take history and examine
Assess risk¹

Abnormal vaginal discharge or vulval erythema?

No

Any other genital disease?

No

- Educate and counsel
- Promote condom use and provide condoms
- Offer HIV counselling and testing if both facilities are available

Yes

Use appropriate flowchart for additional treatment

Yes

Lower abdominal tenderness?

No

High GC/CT prevalence setting² or risk assessment positive?

No

TREAT FOR BACTERIAL VAGINOSIS AND TRICHOMONAS VAGINALIS

Yes

Use flowchart for lower abdominal pain

Yes

TREAT FOR GONOCOCCAL INFECTION, CHLAMYDIA TRACHOMATIS, BACTERIAL VAGINOSIS AND TRICHOMONAS VAGINALIS.

Vulval oedema/curd-like discharge, erythema, excoriations present?

No

- Educate and counsel
- Promote condom use and provide condoms
- Offer HIV counselling and testing if both facilities are available

Yes

TREAT FOR CANDIDA ALBICANS

¹ Risk factors need adaptation to local social, behavioural and epidemiological situation.

² The determination of high prevalence levels needs to be made locally.



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Vaginal discharge: Bimanual & speculum, with or without microscope

Patient complains of vaginal discharge, vulval itching or burning

Take history and examine patient (external, speculum and bimanual)
Assess risk¹
Perform wet mount microscopy of vaginal specimen for TV and yeast cells (optional)

Lower abdominal tenderness or cervical motion tenderness present?

Yes

Use flowchart for lower abdominal pain

No

Cervical mucopus or erosions or High GC/CT prevalence setting² or risk assessment positive?

No

TREAT FOR BACTERIAL VAGINOSIS AND *TRICHOMONAS VAGINALIS*

Yes

TREAT FOR GONOCOCCAL INFECTION, *CHLAMYDIA TRACHOMATIS*, BACTERIAL VAGINOSIS AND *TRICHOMONAS VAGINALIS*.

Vulval oedema/curd-like discharge, vulval erythema, excoriations present or yeast cells on microscopy?

No

- Educate and counsel
- Promote condom use and provide condoms
- Offer HIV counselling and testing if both facilities are available

- Manage and treat partner if cervical mucopus present
- Manage and treat partner if microscopy demonstrates TV

Yes

TREAT FOR *CANDIDA ALBICANS*

¹ Risk factors need adaptation to local social, behavioural and epidemiological situation

² The determination of high prevalence levels needs to be made locally



World Health Organization

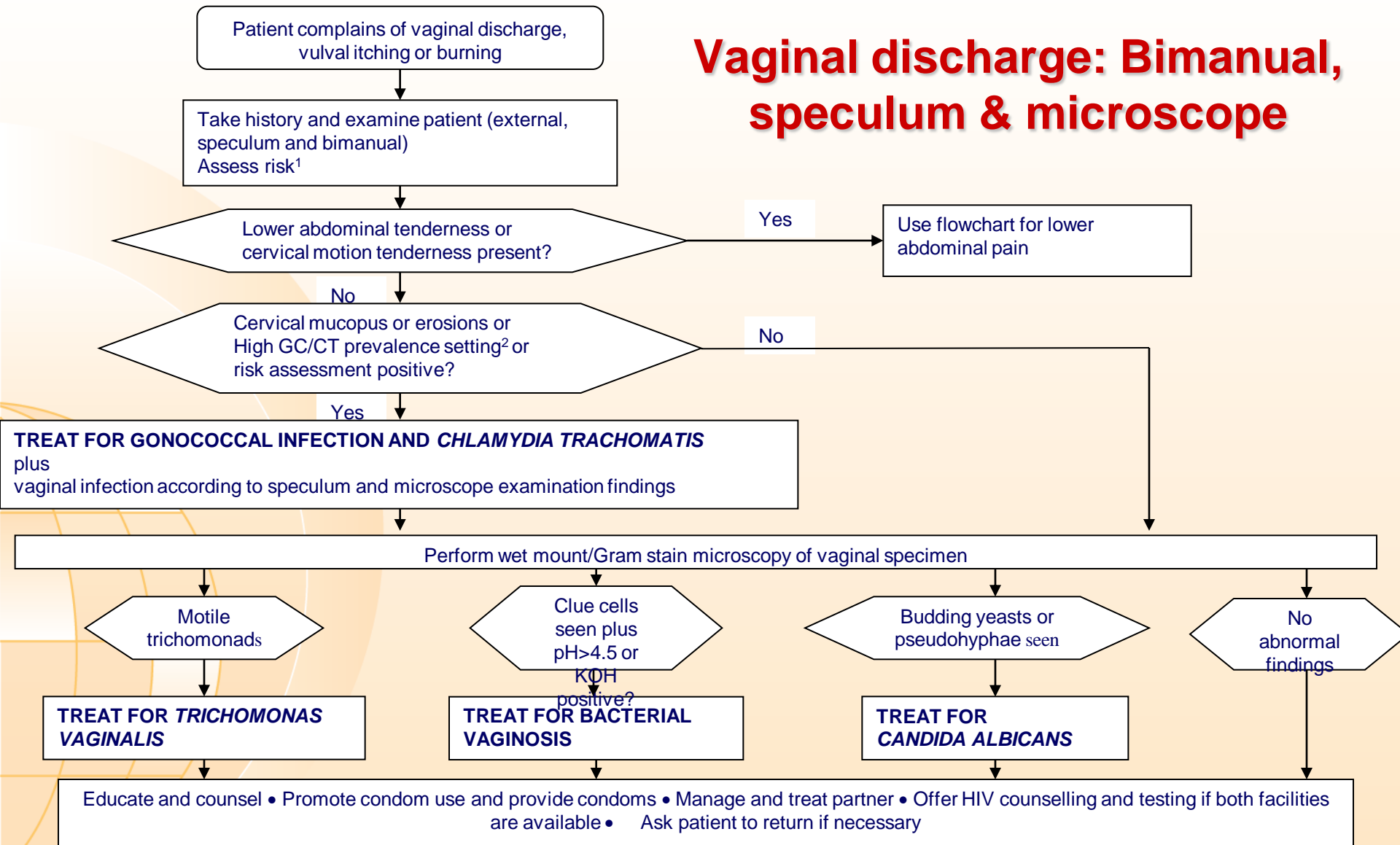


Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Vaginal discharge: Bimanual, speculum & microscope



¹Risk factors need adaptation to local social, behavioural and epidemiological situation

² The determination of high prevalence levels needs to be made locally

IMPLEMENTATION

1. Pre-requisite information

- Prevalence of STIs
- STI treatment-seeking behaviour
- Treatment practices & counselling (PI6 & PI7)
- Level of (and capacity for) training of implementers
- Drug policy, ordering and distribution system
- Stakeholders involvement
- Review of literature (need 'evidence criteria')



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

IMPLEMENTATION

2. Conduct or analyse aetiological studies

- Genital ulcer syndrome
- Male genital discharge syndrome
- Female genital discharge (+/- risk-assessment)
- Resistance patterns

3. Assess if there is need to depart from WHO or existing national/regional algorithms

4. Adaptation for high/low risk environment

- high/low prevalence area
- high risk/low risk populations



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

IMPLEMENTATION

5. Determine the role of the laboratory

- for case management (and monitoring as 'test of cure')
- for screening and case finding
- for supporting research

6. Determine levels of use/capacity

- will influence flowchart design & need pre-testing
- will influence choice of drugs
- depends on referral patterns



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

IMPLEMENTATION

7. Drug selection: criteria for the choice of drugs (WHO, 2003)

- efficacy (cure at least 95% of those infected)
- safety
- cost
- compliance and acceptability
- availability (e.g. at primary health care level)
- use in pregnancy
- broad spectrum (can cover co-existing infections)
- resistance unlikely to occur rapidly



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

IMPLEMENTATION

8. Printing and distribution (and translation) of flowcharts

9. Training

- post-service institutional training
- on-the-job training
- pre-service training
- what cadres to train

10. Drug procurement and distribution



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

IMPLEMENTATION

11. Monitoring and Supervision

- WHAT?

- clinical outcomes on returnees and non-returnees
 - » cured/ improved/ treatment failures
 - » referral/ no follow-up
- *Neisseria gonorrhoeae* susceptibility
- aetiological surveys
- quality of care (PI6, PI7)

- HOW (universal? sentinel sites? standardised protocols? consensual workshops)

- WHEN?

12. Evaluation scheme



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Monitoring & Evaluation

Evaluate programme and interventions

Assess the epidemic and the response

Train and supervise

Advocate for STI inclusion in the health-care agenda

Adopt and adapt evidence-based interventions

Strengthen STI programme management and intervention activities



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Evaluation of Algorithms

- Validity: sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV)
- Feasibility: infrastructure, personnel
- Cost: direct and indirect costs, cost/effectiveness
- Acceptability: health care provider, STI patient, programme manager



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Validity of an algorithm (1):

Comparison between:

- Outcome of the algorithm
 - Simulation studies
 - Real outcome in field conditions
- Gold standard diagnosis
 - Laboratory tests



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Validity of an algorithm (2)

- Calculation: 2 x 2 table
 - sens, spec, PPV, NPV
- Interpretation: 2 x 2 table
 - correctly treated, over treated, missed infections



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Validity of an algorithm Interpretation

Gold Standard test

+

-

+	A: (true +ve) Correctly treated	B: (false ve+) Over-treated
-	C: (false -ve) Missed infections	D: (true -ve) Correctly diagnosed as negative

Total infected

Total not infected

Algorithm



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

Validity of an algorithm Interpretation

Gold Standard test

+

-

Algorithm	+	-
	A: (true +ve)	B: (false ve+)
	-	D: (true -ve)
	Total infected	Total non infected

Sensitivity: $A/A+C$

Specificity: $D/B+D$

Positive Predictive Value: $A/A+B$

Negative Predictive Value: $D/C+D$



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction

COST PER CASE CURED

Total cost of all diagnoses + treatments

Number of cases cured

Cost per case cured decreases if

- ▲ prevalence increases**
- ▲ specificity of flowchart increases**



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction



END



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank
Special Programme of Research, Development
and Research Training in Human Reproduction