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Diagnosis of sexually transmitted infections in female prostitutes in Dakar, Senegal

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Objective: To study the validity and performance of a number of rapid indicators for the diagnosis of sexually transmitted infections (STIs) in female prostitutes in Dakar, Senegal; characteristics of these indicators were rapidly obtainable, easy to perform, accurate, useful at district level, and reasonable cost.
Methods: An STI prevalence study in female prostitutes (n = 374) seen at the STD clinic in Dakar, Senegal was done; a history, clinical examination, simple laboratory tests, and "gold standard" microbiological tests were performed. For a number of sociodemographic data, actual or past symptoms of STI, clinical signs, and rapid laboratory tests, validity variables, performance characteristics, and likelihood ratios for detection of gonococcal or chlamydial cervical infection were determined.
Results: Cervical infection (chlamydial or gonococcal) was present in 24.9% of prostitutes; 46% had trichomoniasis and 29.4% had syphilis. Young age, abnormal vaginal discharge, endocervical mucopus, a positive leucocyte esterase test on urine, and 10 or more leucocytes in Gram stained smears of vaginal, cervical, or urine samples were significantly associated with cervical STI. Some of the rapid indicators had high sensitivity, others high specificity but none had acceptable overall validity. None of the indicators had at the same time a sensitivity above 50% and a positive predictive value above twice the background prevalence of cervical infection. 10 or more leucocytes in the cervical smear had a likelihood ratio of 1.83 increasing pretest probability of 24.9% to post-test probability of 38%, the best result obtained by any of the rapid indicators.
Conclusions: Rapid indicators of cervical STIs are insufficiently valid, which largely restricts their usefulness to high STI prevalence situations for instance, in prostitute populations and in STD patient management.
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Introduction

Awareness is increasing that sexually transmitted infections (STIs) are very common in most of the developing world, particularly in rural areas where facilities for diagnosis and treatment are usually inadequate.[1] Consultation rates for STIs are higher for men than for women, but complications and sequelae of STI are much more frequent and severe in women. This is largely due to an asymptomatic or not specifically symptomatic course of STIs in women.[2]

Sexual transmission in the heterosexual population is the major mode of spread of the HIV epidemic in sub-Saharan Africa. Many studies now support the hypothesis that STIs, both those that manifest as genital ulcers and as genital discharges enhance HIV transmission.[3] Therefore, effective STI case management should result in HIV prevention; this was demonstrated in a randomised community intervention trial in Tanzania.[4]

Many developing countries are facing major health problems resulting in high morbidity and mortality, but trained personnel, laboratory facilities, and funds are all extremely limited. Health centres must satisfy the needs and the demands of 80–90% of the population living in rural and periurban areas. They are staffed by medical or auxiliary workers and act as the first referral services for primary health care. They are expected to deliver integrated community health care, including curative and preventive services. Diagnostic facilities are either limited (microscopical tests only) or non-existent. Even in centres with access to better laboratory facilities, delays in reporting of test results and limitations of the techniques used for STI detection hinder timely treatment of STI. Long waiting times, fee for services, scarcity of drugs, and overall poor performance often render services ineffective.[5] It is important that patients who seek care for STI related problems, and their sexual partners, be adequately diagnosed and managed and, if necessary, referred to a higher level of care.

Protocols have been developed for the management of symptomatic patients with STIs.[5,6]

In view of the often asymptomatic nature of STIs, it would be valuable to apply STI management protocols, based on "rapid indicators" of infection in high risk populations such as female prostitutes.

Such rapid indicators for the detection of STI can be developed based on: (1) information collected through history taking; (2) findings from the clinical examination; and (3) results of "simple" or "rapid" laboratory tests.

Table 1 "Rapid indicators" for sexually transmitted infections in female prostitutes in Dakar, Senegal

Sociodemographic data:
Age
Marital status
Use of condoms
Symptoms obtained through clinical history:
Dysuria
Genital ulcer
Abnormal vaginal discharge
Signs obtained through clinical examination:
Abnormal vaginal discharge
Malodour
Abnormal cervical discharge
Endocervical pus (on swab test)
Cervical friability
Rapid laboratory tests:
Leucocyte esterase test on urine
Microscopic examination of urine sediment for:
leucocytes
trichomonads, *C albicans*
Vaginal swab for:
leucocytes, trichomonads, *C albicans*
Gram stain for leucocytes
Endocervical swab with Gram stain for:
leucocytes
intracellular Gram negative diplococci
Rapid plasma reagin (RPR) card test on serum

The objective of the present study was to define and validate a number of "rapid indicators" for the diagnosis of STI in female prostitutes. Characteristics of these indicators were: rapidly obtainable, easy to perform, accurate, useful at district level, and reasonable cost.

Methods

In Dakar, Senegal, prostitutes are required by law to register with the public health authorities and to present regularly for screening examinations. The population studied is all prostitutes (n=374) who presented at the special STD clinic of the capital city during the period 13–29 March 1990. The rapid indicators for STIs studied are summarised in table 1.

They consisted of (a) sociodemographic data; (b) actual or past STI symptoms obtained through history taking; (c) signs based on clinical examination; (d) rapid laboratory tests.

These rapid STI indicators were validated against reference (gold standard) laboratory tests indicating presence or absence of STI.

From each woman a detailed history was taken including current and past symptoms of STI. All were examined for genital ulceration and, using a bivalve speculum, for vaginal and cervical discharge. Presence of abnormal vaginal discharge was noted, including colour, quantity, and consistency. After cleaning the exocervix with a swab, the presence of yellow mucopus, collected from the endocervix, was visualised on a white swab.[6] Specimens were taken for laboratory testing: from each woman first voided urine, five genital specimens, and venous blood was taken.

Leucocyte esterase was assayed on first voided urine using Nephur test+leuco strips (Boehringer Mannheim, Germany). The urine was centrifuged and microscopically examined for leucocytes, trichomonads, and *Candida albicans*.

A specimen was taken from the posterior fornix of the vagina with a sterile cotton swab. Each swab was placed in a tube containing 0.25 ml saline from which a wet mount was made and examined for leucocytes, *Trichomonas vaginalis*, and *C albicans*. Another specimen was taken and a vaginal smear made for Gram staining.

Specimens were obtained from the endocervical canal with a sterile cotton alginate swab and a cervical smear was made for Gram staining. A smear was considered positive only when typical intracellular Gram negative diplococci were seen.

The swab was also used to culture *Neisseria gonorrhoeae* on modified Thayer–Martin medium. Cultures positive for *N gonorrhoeae*, based on a positive Bactident cytochrome oxidase test (Merck, Darmstadt, Germany) and typical morphology on Gram stain were tested for β lactamase production using the Nitrocephin test (Oxoid, Basingstoke).

A second endocervical specimen was taken for culture of *C trachomatis* with a cotton swab on a plastic shaft (Medical Wire and Equipment Co, Corsham); swabs for culture were placed in 2 SP transport medium, directly frozen at −25°C and within 4 hours frozen at −70°C. Specimens for *C trachomatis* culture were transported to the Institute of Tropical Medicine, Antwerp on dry ice.

Another endocervical swab, delivered together with the specimen collection kit, was taken for Chlamydia antigen tests (Chlamydiazyme, Abbott Laboratories, North Chicago, IL, USA). Chlamydia antigen testing was done in batches of 100 to 150. Confirmatory testing for *C trachomatis* was performed on enzyme linked immunosorbent assay (ELISA) positive specimens using a blocking reagent. Subjects were considered to have a *C trachomatis* infection if either the antigen test was positive and confirmed by blocking or if cell culture was positive.

Results of rapid indicators were then compared with results obtained by reference laboratory tests for determining relative risks for infection, sensitivity, and specificity and likelihood ratio in detecting infection.[7] This ratio is often used in clinical epidemiology and contrasts the proportion of patients with and without the target disorder who display a given level of a diagnostic test result. As a result, a likelihood ratio expresses the odds that a given level of a diagnostic test result would be expected in a patient with (as opposed to one without) the target disorder in the following formula: pretest odds for disease × the likelihood ratio = the post-test odds for the disease. Likelihood ratios were calculated using a nomogram for Bayes' theorem.[7]

Relative risks, p values, and confidence intervals were calculated using EPI-INFO version 6.[8]

Results

SOCIODEMOGRAPHIC DATA

A total of 374 prostitutes were included in the study. Average age was 31.7 years (range 16–58 years). Sixty five per cent were of Senegalese nationality. Education level was low with 51% having not received any formal education. Ability to speak and write in French (as a proxy

Table 2 Prevalence (%) of sexually transmitted infections in prostitutes (n=374)

STI	No of cases	% Prevalence
N gonorrhoeae	60	16.0
C trachomatis	47	12.6
N gonorrhoeae and/or *C trachomatis*	93	24.9
Syphilis (RPR+TPHA positive)	110	29.4
T vaginalis	172	46.0
One or more STI	218	58.3

for education level and social class) was present in 33% of Senegalese and 21% of foreign prostitutes respectively.

Five per cent of the prostitutes were married. The mean number of years in prostitution was 5.8 years (range 0–22 years). The mean number of clients per week was 5.0 (range 0–35 clients per week).

The question of age at first intercourse was answered by 338 prostitutes only: average age was 16.0 years (range 10–25 years). On recent number of clients and recent condom use (n= 362 answered), 797 partners were declared for the past week (mean 2.2 per women) and condom use in 710 of these encounters (in 89%). Of 202 prostitutes who had at least one client in the past week, condom use with every client was reported by 84% of them; of 26 prostitutes mentioning seven or more clients in the past week, 96% said they used condoms with every client.

SYMPTOMS, SIGNS, AND SIMPLE LABORATORY TESTING

A current ulcer or one during the past month was reported by 7.1% of the prostitutes; vaginal discharge or dysuria currently or in the past month was reported by 36% and 4% of women respectively. On clinical examination, four women (1%) had genital warts, and one women had a genital ulcer, already present for 21 days.

Abnormal vaginal discharge was found in 132 (36%) of the prostitutes, malodour in 142 (38%), endocervical mucopus in 73 (21%), cervical friability in 96 (28%), and abnormal cervical discharge in 93 (26%).

The finding of abnormal vaginal discharge is influenced by douching ("toilette vaginale"). This is a frequent habit among prostitutes and 68% mentioned vaginal douching on the morning of the examination day.

Leucocyte esterase test was positive in 172 (46%) of 372 samples available for testing; two cross positivity were seen in 80 (22%) and three cross positivity in 34 (9%) of samples.

Gram stains showed 10 or more leucocytes per high power field in the vaginal smears in 38 (10%), in the cervical smears in 160 (43%), and in the urinary sediments in 62 (17%) of prostitutes. Gram stains showed five or more leucocytes in the cervical smears in 256 (69%) and in the urinary sediments in 136 (37%).

T vaginalis was detected in 172 (46%) of urine specimens.

STI PREVALENCE

Prevalence of STIs in prostitutes is given in table 2. Cervical cultures for *N gonorrhoeae* were positive in 55 and urethral cultures in 27 subjects; 60 subjects (16.0%) were positive on either the cervical or urethral gonococcal culture.

Chlamydial antigen tests were positive in 38 (10.2%) of cervical samples and cell culture was positive in 26 (7.0%). Overall prevalence of *C trachomatis* infection was 12.6% (47 subjects).

Prevalence of infection with *N gonorrhoeae* and/or *C trachomatis* was 24.9% (93 subjects).

Syphilis prevalence was 29.4% and trichomonal infection was found in 46% of prostitutes; one or more of the above STIs was detected in 58.3% of the prostitutes.

In table 3, the association of rapid indicators and infection with *N gonorrhoeae* and/or *C trachomatis* is given as univariate analysis (showing odds ratios with 95% confidence intervals).

Of the sociodemographic variables, only young age (less than 25 years old) showed a significant association with cervical infection. Reported symptoms showed no significant association. Among the signs seen at clinical examination abnormal vaginal discharge, endocervical mucopus (positive swab test), and abnormal cervical discharge were significantly associated with cervical infection.

Among the simple laboratory tests leucocyte esterase testing of urine showed a significant association with cervical infection; three cross test positivity was not statistically significantly associated, most likely related to too small sample size. Leucocytes counts both at a 10 or more, or at a five or more cut off point, in Gram stained smears of vaginal, cervical, or urine samples, were strongly associated with cervical infection.

Trichomonal infection showed no association with gonococcal or chlamydial infection.

Table 4 shows data on sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for a number of rapid indicators, found to be significantly associated

Table 3 Association of "rapid indicators" (%) with N. gonorrhoeae and/or C trachomatis infection

Indicator	Infected (n=93)	Uninfected (n=281)	Odds ratio (95% confidence intervals)	Value
Sociodemographic data:				
Age <25 years	26	12	2.44 (1.31–4.56)	<0.01
Married/not currently married (%)	5	4	1.26 (0.34–3.95)	0.774
Never used condoms	93	91	1.15 (0.46–3.28)	0.921
Symptoms:				
Vaginal discharge	24	18	1.47 (0.80–2.69)	0.240
Dysuria	8	3	1.82 (0.75–7.65)	0.082
Signs:				
Abnormal vaginal discharge	53	31	2.59 (1.54–4.33)	<0.001
Malodour	44	36	1.40 (0.84–2.31)	0.209
Abnormal cervical discharge	46	19	3.66 (2.13–6.32)	<0.001
Cervical friability	24	29	0.76 (0.42–1.36)	0.4
Endocervical mucopus (on swab test)	26	18	2.64 (1.50–4.64)	0.001
Rapid laboratory tests:				
Leucocyte esterase				
3+	14	7	2.00 (0.90–4.40)	0.097
2+	39	16	2.31 (1.65–3.23)	<0.001
1+	62	41	3.37 (1.93–5.91)	<0.001
Leucocytes ≥10 (Gram stain)				
vaginal smear	26	5	6.56 (3.06–14.18)	<0.001
cervical smear	66	36	3.45 (2.04–5.85)	<0.001
urine sediment	32	11	3.68 (2.00–6.76)	<0.001
Leucocytes ≥5 (Gram stain)				
cervical smear	81	65	2.30 (1.24–4.29)	0.007
urine sediment	55	31	2.73 (1.64–4.55)	<0.001
Trichomonas	51	44	1.28 (0.78–2.10)	0.371

Table 4 Sensitivity (Se), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV) of a number of rapid indicators to diagnose N gonorrhoeae and/or C trachomatis infection

Indicator	*Frequency (%)*	*Se*	*Sp*	*PPV*	*NPV*
Age <25 years	19	26	88	35	78
Signs:					
Abnormal vaginal discharge	36	53	69	31	77
Endocervical mucopus	23	37	82	42	78
Abnormal cervical discharge	23	46	81	45	82
Rapid laboratory tests:					
Leucocytesterase					
2+	22	39	79	45	80
1+	46	62	59	34	82
Microscopy:					
≥10 leucocytes					
vaginal smear	10	26	95	63	79
cervical smear	43	66	64	38	85
urine	17	34	89	48	80
≥5 leucocytes					
cervical smear	69	81	35	29	85
urine	37	55	69	38	82

Table 5 Likelihood ratio of leucocytes in the cervical smear to diagnose N gonorrhoeae and/or C trachomatis infection

	N gonorrhoeae and/or C trachomatis infection				
	Present		*Absent*		
	Number	*Proportion*	*Number*	*Proportion*	*Likelihood ratio*
>10	60	0.6593	100	0.3597	$\frac{0.6593}{0.3597}=1.83$
5–9	14	0.1539	82	0.2950	$\frac{0.1539}{0.2950}=0.52$
0–4	17	0.1869	96	0.3453	$\frac{0.1869}{0.3453}=0.54$
Total	91		278		

Pretest probability: 24.9%.
Pretest odds: 0.33.
Post-test probability = 0.33 × 1.83 = 0.6039 = 38%.

Table 6 Likelihood ratio of abnormal vaginal discharge to diagnose cervical N gonorrhoeae and/or C trachomatis infection

	N gonorrhoeae and/or C trachomatis infection				
	Present		*Absent*		
	Number	*Proportion*	*Number*	*Proportion*	*Likelihood ratio*
Yes	48	0.5533	84	0.3066	$\frac{0.5533}{0.3066}=1.74$
No	42	0.4667	190	0.6934	$\frac{0.4667}{0.6934}=0.67$
Total	90		274		

Pretest probability: 24.9%.
Pretest odds: 0.33.
Post-test probability = 0.33 × 1.74 = 0.5568 = 36.5%.

with *N gonorrhoeae* and/or *C trachomatis* infection in the univariate analysis.

None of the rapid indicators has a high validity in terms of both high sensitivity and high specificity. For a rapid indicator to be useful in diagnosing cervical STI it should have a high sensitivity and a PPV well above the background prevalence of infection. Again no rapid indicator fulfils these criteria; 10 or more leucocytes on the cervical smear seems to score best with 66% sensitivity and 38% PPV, a 50% increase in prediction over the 25% background prevalence of cervical STI.

Likelihood ratios were calculated for the most valid rapid indicators for the presence of infection by either *N gonorrhoeae* and/or *C trachomatis* (highest sensitivity and specificity)—that is, the quantification of leucocytes in a cervical smear and the presence of abnormal vaginal discharge on clinical examination.

The results of the leucocyte count in a cervical smear are given in table 5 and 10 or more leucocytes results in a likelihood ratio of 1.83. This increases the pretest probability of 24.9% (prevalence) to a post-test probability of 38.0%, not an impressive increase.

The likelihood ratio for abnormal vaginal discharge on clinical examination is given in table 6 (likelihood ratio of 1.74). This increases the pretest probability of 24.9% to a post-test probability of 36.5%, about the same increase.

Discussion

Prevalence of treatable STIs in the prostitutes studied is high which is expected in a group at high risk of STI acquisition when no effective intervention strategy is implemented. In particular, syphilis and trichomoniasis prevalences are high, pointing to ineffectiveness of the actual routine screening programme, based on vaginal wet mount examination and serological testing for syphilis. Prevalence of cervical gonococcal and/or chlamydial infection is 25%, lower than the 35% found in Ivory Coast.[9] Higher rates of STI were found in prostitutes in other African countries–that is, gonorrhoea rates were 51% in Rwanda, 35–55% in Kenya, 31% in Ivory Coast, and 16% in this study.[10 11] This relatively lower cervical STI prevalence might be related to characteristics of the Dakar prostitute population such as older age, relatively low sexual activity, and high reported condom use.

Few studies have been published on the value of "rapid indicators" of cervical infection in prostitutes although many have been done.[9 12 13] This reflects a publication bias in the sense that these validity studies showed disappointing results and often were not formally published. Significant associations of "rapid predictors" with gonococcal or chlamydial cervical infection were found for young age among sociodemographic variables, for abnormal vaginal and cervical discharge including positive swab test among clinical findings, and for simple laboratory tests that detect an increased number of leucocytes in genitourinary specimens (a positive leucocyte esterase test, 10 or more leucocytes in urine, in vaginal or cervical smear); no significant associations were found for symptoms (not for vaginal discharge or dysuria). If an association was found, it was strongest for the simple laboratory tests followed by clinical signs.

The pattern of factors associated with cervical infection in prostitutes in Kinshasa, Zaire was remarkably similar to our findings: in the absence of laboratory tests the strongest association of infection was with endocervical mucopus, cervical friability, vaginal discharge as clinical signs, no association with symptoms, and strong association with age under 25 years.[12] In Ivory Coast there was again a very similar pattern, with strongest associations for

leucocytes in cervical and vaginal smears, for endocervical mucopus, friability, and vaginal discharge as signs, young age and also a significant association with vaginal discharge and dysuria as symptoms.[9]

The next step in evaluating the usefulness of "rapid indicators" for diagnosing cervical infection is to determine their validity in terms of sensitivity and specificity: how often are they positive in infected people and negative in uninfected ones. Ideally we are looking for "rapid indicators" which would be 100% valid– that is, both sensitivity and specificity are 100% and no individuals are misclassified; in practice this never occurs and all tests have some degree of invalidity. How much invalidity is acceptable remains arbitrary but tests with 50% sensitivity (half of infected people are classified as non-infected and 50% specificity, half of non-infected people are classified as infected) are of no value as they perform no better than random classification.

Sensitivity and specificity should be considered together in determining validity of our diagnostic test because it is possible to increase one characteristic of the test—for instance, sensitivity, but it is at the expense of the other characteristic specificity. If we give the same weight to sensitivity and specificity a fully valid test scores 2.0 (100% sensitivity plus 100% specificity) and an invalid test scores 1.0 (50% sensitivity and 50% specificity). We can put a score of 1.5 as cut off point for validity to compare "rapid indicators". This score can result from values for sensitivity and specificity being equal (both approx 75%) or unequal. For diagnostic purposes most authors favour sensitivity over specificity and, for instance, a test with 90% sensitivity and 60% specificity would pass our arbitrarily defined criterion of acceptable validity (score 1.5). If we look at the "rapid indicators" associated with cervical infection in this study, none of them reaches a score of 1.5 on the validity scale (table 4); most rapid indicators cluster around 1.25 with 10 or more leucocytes on the cervical smear having the highest score of 1.30. None of these rapid indicators reaches an acceptable validity level, and no indicator is outstanding compared with the other, which means that we can expect that they will be poor predictors of cervical infection.

In fact, the next aspect of evaluation of "rapid indicators" is their operational value—that is, how well do they predict infection when positive and absence of infection when negative. Predictive value of the rapid indicators depends on their validity and also on the prevalence of the condition in the population studied. Gonococcal and chlamydial cervicitis being highly prevalent in prostitute populations, predictive values of rapid indicators in table 4 must be judged against the background prevalence of 25% in Dakar prostitutes. The highest PPV of 63% is found for 10 leucocytes or more in the vaginal smear, and most of the indicators have PPV values of 35–45%; this is a substantial gain over the background prevalence but still more than half of those identified as infected by the indicator are in fact not infected.

In the selection of a rapid indicator which is useful for detection of cervical STI in female prostitutes, PPV and sensitivity are of major importance; the indicator should have a PPV well above the prevalence of infection in the target group and it should have an acceptable sensitivity.

If we arbitrarily accept that the PPV of a rapid indicator should be at least double the prevalence of infection (yielding a PPV of at least 50% in this study) and at the same time have a sensitivity of at least 50% (half the infected people detected), none of the rapid indicators reaches this level, showing their rather poor performance in detection of cervical STI in prostitutes.

If we accept a PPV of 50% above the prevalence of infection (yielding a PPV of 38% in this study) with a sensitivity of at least 33% (one in three of infected people detected), rapid indicators that qualify as useful for detection of cervical infection are endocervical mucopus (positive swab test) and abnormal cervical discharge as "signs" at examination, leucocyte esterase strong positivity, 10 or more leucocytes on Gram stain of cervical smear, and 10 or more (and five or more) leucocytes on the Gram stain of the urine sediment.

Likelihood ratios are another method of expressing validity and operational values of a test, often used in clinical epidemiology. Post-test probabilities of 38% for 10 or more leucocytes in the cervical smear and of 36% for the clinical sign of abnormal vaginal discharge are substantially higher than the 25% prevalence of infection, but if these levels are high enough to use these rapid indicators for STI detection remains a matter of judgment.

To overcome the shortcomings in validity of the different rapid indicators diagnostic algorithms have been developed combining various indicators, leading to decision trees with various degrees of complexity[9 12–14]; some are based on symptoms, others on signs, on a combination of signs and simple laboratory tests and some on differential scores (given to sociodemographic variables, symptoms, signs or a combination of them).

A score based algorithm in Kinshasa prostitutes, based on differential point scores for age and a number of clinical signs had a 71% sensitivity, 56% specificity, and 42% PPV in a situation of 31% prevalence of cervical STIs[12]; these performance characteristics are not impressive and not better than those of an individual rapid predictor. In Ivory Coast, score driven and combined score driven and clinical algorithms had sensitivities between 79% and 86%, specificities between 32 and 54%, and PPVs between 40 and 48% when the prevalence of cervical STIs in the prostitutes was 35%.[9] In Benin, when comparing algorithms based on clinical signs and wet mount (called clinical algorithm) with score driven algorithms (based on point scores given to behavioural variables, symptoms, and signs), the complex score driven algorithms had a higher sensitivity, lower specificity, and identical or slightly lower PPV than the clinical algorithms, which are much simpler to perform.[13] Reports of better per-

formance of some algorithms over the others is related to the relative importance given by authors to sensitivity compared with specificity and to PPV.

This study clearly demonstrated that the problem with "rapid indicators" for detection of cervical STI in prostitutes is their low validity. Therefore the crucial determinant in the performance of detection strategies is not so much the use of rapid indicator(s) single or combined, or clinical or score based algorithms but the prevalence of STI in the target population.

At high STI prevalence (for instance above 20%), as all detection methods perform similarly, a clinical algorithm might be used; it corresponds with standard good medical practice, has a high sensitivity, and acceptable PPV[9 13 15]; score based algorithms are impractical as they have to be validated each time for different target groups of women and across geographic and cultural areas.

But at high STI prevalence, epidemiological treatment of the target population (also called mass treatment) should also be considered as an option: it has maximal sensitivity (100%) and a PPV equal to the prevalence of cervical STI.

At lower STI prevalence, all detection strategies for cervical STIs in women perform poorly. In a situation of STD care—that is, when a woman comes to the health service with genital complaints, a clinical algorithm could be used and the patient managed accordingly.[16] Active case detection (screening or case finding, for instance, at prenatal or family planning consultations) is much more problematical owing to the poor performance of available detection strategies.

Reliable, rapid, and inexpensive tests for the detection of *N gonorrhoeae* and *C trachomatis* are still urgently needed.

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