by practitioners it is necessary to provide for effective forms of control.

The system of quality control may include the following stages:

First stage — internal control — should be done directly at the medical institution by administration, possibly — by chief of department. This control should be regular and consist of control of the correctness of use of the existing recommendations for diagnostics and treatment by each physician. The form of this control is monitoring of case histories (outpatient's cards). This control can result into administrative decisions on the level of medical institution.

Second stage — external control, namely analysis of case histories (outpatient's cards) by external independent experts with further statistical analysis. This would allow gathering data about completeness and correctness of fulfilling the recommendations for STI patient management, revealing and analyzing cases of inadequate use of recommendations, updating existing recommendations. Information, gathered at this stage could be analyzed on the regional and country level. This form of control has retrospective character.

Third stage — external control — is questionnaire (possible anonymous) of doctors with further statistical analysis by external independent experts. This stage would allow revealing doctors' attitude for practical use of recommendations, finding out preferred variants and schemes of management of the patients, convenience of use of recommendations in practice, and also the level of professional skills. Data gathered at this stage could be analyzed on the regional and country level.

Naturally every stage has certain advantages and disadvantages, that's why it is necessary to use all three stages in monitoring system.

Implementation of constantly working three stage quality control system for STI patient management could become an instrument for effective control for fulfilling the recommendations, and it would help to assure healthcare quality.

Thus, it is necessary to acknowledge need for development and implementation of STI patient management algorithms. At the same time it is important that such document would be developed with participation of all STI patient managing specialists.

THE USE OF BEDSIDE MICROSCOPY FOR EXAMINING UROGENITAL SMEARS IN THE OPTIMIZATION OF DIAGNOSIS OF SEXUALLY TRANSMITTED INFECTIONS

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■ **Sexually transmitted infections (STIs), especially in women, may result in infertility, lingering pelvic pain and pelvic adhesions, which may need surgical intervention. For these reasons, timely diagnosis of such infections is of paramount importance. The microscopy of genital smears performed by a physician during a patient visit (bedside microscopy) has been found to substantially reduce the time needed for a specific diagnosis, and in most cases, the physician can prescribe a proper treatment on the patient's first visit. In contrast, the traditional method of sending samples to a laboratory is time consuming for both the physician and the patient. Specificity of bedside microscopy in the hands of a skilled physician borders on 100%. If needed, a repeated sample can be taken immediately. With bedside microscopy, there is an opportunity to use limited laboratory resources more purposefully for further analyses. Moreover, physicians using bedside microscopy have greater authority with their patients.**

Within the Russian-Swedish project "Improvement of diagnosis and treatment of sexually transmitted infections" in the St. Petersburg and Leningrad regions, many dermatovenereologists and gynecologists were trained in bedside microscopy of urogenital smears.

Introduction

Sexually transmitted infections (STIs) are the primary cause of reproductive tract diseases. Most of these infections are asymptomatic. If STIs are not diagnosed and treated in time, they can lead to such complications as pelvic inflammatory diseases, infertility, ectopic pregnancy, as well as complications of

Table 1

Timetable for smear preparation and microscopy of vaginal, cervical and urethral smears from women and urethral smears from men

Procedure	Duration (in minutes)	
	Smears from women	Smears from men
Microscopic examination of a native smear at magnification 40x (if possible) or 100x and 400x	1	–
Drying on air	0,5	0,5
Staining a smear with methylene-blue by Löffler, rinsing in tap water and drying with paper tissue or hot air blast	1	1
Microscopic examination of a stained smear at magnification 100x and 1000x	1–2	0,5–1
Total	3,5–4,5	2,0–3,0

pregnancy and infection of the fetus and newborn. Timely diagnosis of STIs is one proven way of reducing morbidity and complications because it allows both diagnosis and immediate treatment upon the patient's first visit to the physician.

Sampling is part of the clinical investigation in the work of many practitioners. However, by tradition, in most cases investigations of smears are made at a laboratory, which calls for the necessity of repeated patient visits to the physician and long waiting periods for results from the laboratory. Consequently, both patient and physician lose valuable time and the interval between the patient's first visit to the physician and the initiation of treatment can be quite long.

Bedside microscopy used for analyzing urogenital smears in a consulting room permits early diagnosis of STIs while the patient is present. It also allows the physician to prescribe the treatment on the patient's first visit long before results from laboratory investigations become available. Thus, this method can reduce the possibility of infection with a sex partner and further dissemination of the infection.

The aim of this study is to evaluate the advantages of bedside microscopy of urogenital smears.

Materials and methods

Investigation of vaginal smears. Native smears were investigated. Sampling was performed with disposable plastic 10-µl loops. Microscopy was conducted with the use of a light microscope at 40x magnification (if possible) or at higher magnifications (100x and 400x).

Investigation of cervical and urethral smears. Material was taken from the cervix with a cotton swab after mucus was thoroughly removed from. From the urethra of both men and women, material was taken using the disposable plastic 1-µl loops. This material was then applied on a slide, dried on air and stained with methylene-blue by Löffler [2]. Next, the smears were rinsed in tap water and dried with paper tissue or hot air blast. Light microscopy was performed at the magnification of 100x and 1000x.

Results

The timetable for smear preparation and microscopy is presented in Table 1.

The duration of microscopy for a patient largely depends on the condition of the patient and the physician's experience. After gaining experience through training and self-education, the physician can examine material taken from a patient in 3–4 minutes. If there are no changes in the smears, this time can be even shorter. An experienced physician in bedside microscopy can perform a routine examination and prescribe treatment while the patient is dressing.

The conclusions that a physician can draw from the results of bedside microscopy are presented in Table 2.

Healthy patient

All clinical and microscopic parameters are normal.

Bacterial vaginosis (BV)

BV is one of the main causes of vaginal discharge in women of fertile age [6]. The diagnosis is based on Amsel's criteria [15, 16] though it has been shown that for the diagnosis of BV it is sufficient to reveal «clue» cells (more than 20 in the specimen) and the absence of lactobacilli in the smears from the vagina [17].

Candidal vulvovaginitis

Candida spp. is one of the main causes of vulvovaginitis. The association between the clinical course of the disease and the amount of revealed

Table 2

Conclusions that physician can draw from the results of bedside microscopy [3]

Gender	Sampling site	Microorganisms and "clue" cells	The number of leukocytes in the field of the microscope	Conclusion
Men	urethra	Not revealed	< 4	Healthy
		N. gonorrhoeae	> 4	Gonococcal urethritis
		Other microorganisms	> 4	Nongonococcal urethritis
Women	vagina	Lactobacillus	The number depends on the day of the menstrual cycle	Healthy
		«clue» cells	Normal	Bacterial vaginosis
		Candida spp.	Increased	Candidal vulvovaginitis
		T. vaginalis	Increased	Trichomonal vaginitis
		Other microorganisms	Increased	Nonspecific vaginitis
	cervix	Not revealed	< 20	Healthy
		N. gonorrhoeae	> 10–20	Gonococcal cervicitis
		Other microorganisms	> 10–20	Nongonococcal cervicitis
	urethra	Not revealed	< 5	Healthy
		N. gonorrhoeae	> 5	Gonococcal urethritis
		Other microorganisms	> 5	Nongonococcal urethritis

yeasts is not always apparent, however. At the beginning of inflammation, yeast blastospores are found in a large quantity and during the progression of the infection pseudomycelium is usually revealed. Direct microscopic smears can reveal 6 of 10 positive cases. However, investigation of Candida is not generally recommended in routine practice because they can be detected in 20 – 40 % of healthy women [6].

Trichomoniasis

T. vaginalis also often causes vaginal inflammation. The method of native smear microscopy is considered very accurate for the diagnosis of this infection and can reveal 5–8 of 10 cases of the disease [7]. Most authors confirm that the use of different methods of staining with the purpose of trichomonas detection significantly decreases the sensitivity of microscopy [8–10] and complicates the diagnosis. It is important to keep in mind that the diagnosis of trichomoniasis is based on the detection of motile protozoa — trichomonas. Trichomonas are extremely influenced by environmental factors, especially temperature changes. Because of this, transportation of samples to a laboratory, even if situated nearby, can lead to false-negative results. Further, diagnosis based on detecting "atypical", "flagellum-free" or "immotile" trichomonas is incorrect because this is the result of artifact detection, which does not have precedence in international practice. Such a diagnosis is evidence of the inadequacy of the personnel performing the analysis.

Gonorrhea

The diagnosis of gonorrhea based on microscopic examination is accurate if the man has urethritis. This method reveals between 95 and 100 % of gonococcal urethritis in men [5]. In women, however, microscopy reveals only 50 % of gonococcal infection though the specificity of this method remains very high (this is the reason why bacteriologic analysis is necessary for women). When performing microscopy, the physician can suspect gonorrhea if there are many leukocytes and diplococci located intra- and extracellularly in smears taken from the urethra in men and from the cervix and urethra in women. Definitive diagnosis of gonorrhea is made in the laboratory, where smears are stained by Gram and cultural examination.

Urethritis/cervicitis

Diagnosis of urethritis can be made only by microscopic investigation. Patient complaints about urethral discharge without microscopic confirmation (an increase in the amount of polymorphonuclear leukocytes) cannot be a basis for the diagnosis of urethritis. Conversely, detection of a high number of leucocytes during microscopy, even without complaints about discharge, is evidence of urethritis [11–13]. At the same time, the number of leucocytes more than 4 in a field at 1000x magnification using a light microscope with the investigation of no less than five fields is sufficient to confidently render a diagnosis of urethritis in men and more than 5 leucocytes in a field in women. Cervicitis can be diagnosed only with the presence of mucopurulent discharge from the cervix together with an increase in the number of leucocytes

(more than 10 or 20 in a field at 1000x magnification with investigation of no less than 5 fields) [12, 14]. Only cervical discharge or only a large number of leucocytes in smears from the cervix are not sufficient for the diagnosis of cervicitis. The combination of these two characteristics is needed.

Control of sampling

The physician who conducts the microscopic examination can control quality the sampling. This is also very important for subsequent laboratory analyses. It was demonstrated that two thirds of physicians trained in bedside microscopy could not find the sample material they put on the slide. This was especially the case for smears from the female urethra.

The most common mistake is incorrect sampling from the cervix. If an endocervical sample is taken while the mucus has not been removed from the exocervix, then material from the vagina rather than the cervix is actually placed on the slide. In microscopy, a high number of leucocytes from the vagina and stratified squamous epithelial cells can be detected instead of columnar epithelium and leucocytes from the cervix. After receiving such results from the laboratory, a physician can mistakenly interpret the results as an indication of cervicitis.

The importance of the laboratory

Bedside microscopy cannot substitute or in anyway reduce the role of the laboratory. On the contrary, the physician who uses this method has even higher demands on the laboratory, which can possibly increase the quality of diagnostic teamwork. When urethritis or cervicitis is diagnosed, the physician should examine the patient for chlamydial infection. If diplococci are detected in a sample from the urethra or cervix, it is necessary to send this sample for bacteriological analysis with susceptibility testing of detected diplococci. Thus, demands on laboratory services are rising. In other words, this makes the quality of laboratory analyses higher, especially if physicians take samples in a more thorough way.

Conclusion

Bedside microscopy is a part of the clinical examination that can reveal the cause of the patient's complaints immediately upon his or her first visit. If the physician is experienced, he or she can perform microscopic analysis quickly and efficiently while the patient is dressing. In most cases physicians can make a diagnosis and prescribe a proper treatment on the patient's first visit. The specificity of this method in the hands of an experienced physician approaches 100 %. The cost-effective nature of bedside microscopy is significant. This method is inexpensive and helps to save both physician's and patient's time. The fact that physicians can perform microscopy by themselves makes it possible that laboratory resources are used for more labor-intensive analyses. When physicians conduct microscopy themselves, they tend to pay closer attention to the quality of sampling. Further, in the case of unsatisfactory smears, they can repeat sampling. It was shown that the physicians using bedside microscopy have good authority with their colleagues.

The results reported in this article are based on the Russian-Swedish project "Improvement of the diagnosis and treatment of sexually transmitted infections" that was carried out in the St. Petersburg (2002 – 2007) and Leningrad regions (1998 – 2007). For this period, many dermatovenereologists and gynecologists have been trained in bedside microscopy. In Russia, this method is successfully being used in many youth centers. In the Vsevologskyi and Viborgskyi districts of Leningrad, all specialists involved in the management of STI patients were trained. At the D. O. Ott Research Institute of Obstetrics and Gynecology, a teaching and methodological center was founded in which physicians from different regions of Russia are trained in bedside microscopy during a 144-hour course.

During the work on the project, a number of standard protocol and guidelines have been produced

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