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# GUIDELINES FOR THE PREVENTION OF GENITAL CHLAMYDIAL INFECTIONS - P&C

## Report on two WHO Working Groups

chlamydia trachomatis

Hornbaek (Denmark)
4-7 November 1988

Geneva (Switzerland)
21 April 1989



1989

EUR/HFA target 4

# TARGET 4

## Reducing disease and disability

By the year 2000, the average number of years that people live free from major disease and disability should be increased by at least 10%.

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CHLAMYDIA INFECTIONS - prevent/control
CHLAMYDIA TRACHOMATIS

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# PREFACE

A working group on chlamydial infections met in Hornbaek, Denmark, from 4 to 7 November 1988, and another group met in Geneva, Switzerland, on 21 April 1989. The members of the working group were drawn from laboratories, clinical medicine and public health; this report, whose purpose is action against chlamydial infections, is the result of their collective efforts. The report is based on a paper from the National Board of Health and Welfare in Sweden[a] and on the proceedings of the first conference of the European Society for Chlamydial Research held in Bologna in 1988.

Genital chlamydial infections are common among young people, and they are an important cause of salpingitis, infertility, ectopic pregnancies and other complications. The economic loss due to these infections in the European Region is estimated at several thousand million US dollars per annum.

Chlamydial infection is a major cause of sexually transmitted diseases (STDs) and a serious public health problem. However, methods of controlling it are now available. Health education and contact-tracing are essential parts of a control programme, as is the provision of adequate information to decision-makers. All of these are included in this report.

[a] The Swedish paper was written by a group of clinicians, laboratory staff, midwives and public health workers under the chairmanship of Professor P.A. Maardh, and with Dr M. Wahren acting as Rapporteur. Dr L. Weström drew up the cost estimates.

## SUMMARY

Strong measures are urgently needed in Europe to combat the chlamydial epidemic. Chlamydia trachomatis, an intracellular parasite, is now recognized as a major cause of STDs. In some countries, it is estimated that up to 30% of young people will be infected with this organism during their lifetime.

In the European Region, comprising 830 million inhabitants, about 10 million new cases of chlamydial infection occur each year. Predominantly the agent causes acute inflammatory diseases of the genito-urinary tract in both men and women, although a substantial proportion of infected people do not have symptoms that would make them seek medical aid. Screening programmes therefore are very important.

Despite the absence of symptoms in some people, the sequelae of infection can be serious. About 25% of women who have had acute salpingitis become infertile, chlamydial infections probably being the commonest cause. Of the 1 000 000 estimated cases of salpingitis occurring annually in the Region, about 600 000 are caused by Chlamydia trachomatis, and about 120 000 of the women concerned will be left infertile. Furthermore, the sharp increase in the occurrence of ectopic (extrauterine) pregnancies seen in most European countries is to some extent another consequence of genital chlamydial infection.

Chlamydia trachomatis can spread from mother to child at birth causing eye infections and pneumonia in the newborn child. The pneumonia may lead to the distressing condition of chronic obstructive lung disease (asthma). Even more sinister is the possibility that individuals with a genital chlamydial infection may be more susceptible to human immunodeficiency virus (HIV) infection, and more readily able to transmit HIV to healthy people.

Apart from direct health problems, chlamydial infections also cause a substantial economic loss due to infertility, hospitalization and absenteeism. In fact a control programme that helped to prevent 50% of cases of chlamydial infection would result in a net economic gain per annum for the Region of about US $3 thousand million. The saving made by reducing the frequency of salpingitis by only 10% would itself pay for a control programme. So from the economic point of view a programme to control chlamydial infections will always be cost-effective. It should include:

- development of national diagnostic services: if this can be done within the public health laboratory system, the laboratory will be able to report on the number of diagnosed cases;
- development of facilities for clinical diagnosis and management;
- screening to identify carriers, for example in family planning and antenatal clinics;
- establishment of surveillance systems for the disease and its complications, coupled with a reporting and information system which should provide information to pharmacists, social workers, the military and - not least - teenagers;
- training of medical and health personnel and social workers;
- monitoring and evaluation of control measures.

Stronger and more vigorous measures by Member States against genital chlamydial infections will also have an impact on other STDs. An effective control programme will greatly reduce the health, social and economic burden of STDs.

## Introduction

*Chlamydia trachomatis* organisms (chlamydiae) which infect the genital tract are transmitted by sexual contact. The infections frequently lead to complications and serious sequelae, particularly in women. One of the major complications is salpingitis (inflammation of the Fallopian tubes). The size of the problem has been well documented in Sweden, where a few years ago 10 000 salpingitis cases were diagnosed each year, of which 6000 at least were due to chlamydial infection. The direct medical cost annually of looking after these patients and investigating and treating infertility arising from the infection has been estimated at more than SKr 350 million (see Annex 1). This figure, which may be higher or lower in other countries, does not include the cost of *in vitro* fertilizations (test-tube babies), adoptions or working days lost.

The high prevalence of chlamydial infections in Europe makes them a major public health problem. Indeed, unless there is a dramatic change in their occurrence, it is estimated that up to 30% of young adults will be infected during their lifetime. This means that substantial resources in terms of health and medical services are needed for the control of chlamydial infections. Inevitably it affects the economics of health care, from general practice up to highly specialized medical services.

People with genital infections who develop changes in the genital tract causing a break in the mucosal barrier are more likely to be susceptible to HIV. Furthermore, if they are HIV carriers, the virus is more likely to be transmitted to their sexual contacts. This makes it all the more urgent to reduce the prevalence of genital infections, including those caused by chlamydiae. Indeed, behavioural changes that reduce the occurrence of chlamydial infections should also reduce the spread of HIV.

Chlamydial infections can now be diagnosed and treated effectively. The diagnosis may be suggested by the history and clinical findings; where possible, it should be confirmed by identifying the organism. However, awareness, recognition, prevention and control of chlamydial infections lag far behind diagnosis and treatment. They should be included as part of a comprehensive STD control programme.

It is important to recognize that many of those infected are young and may be either inhibited from seeking medical attention or unaware of the problem. All involved in the organization and provision of health and medical services should appreciate the need for discretion, tact and the utmost confidentiality. Clear information on the infection and its consequences is required, to encourage patients to assume greater responsibility for their own and other people's health.

The health system should strengthen its facilities for adequate diagnosis and treatment of STDs, inform, educate and support patients by providing social services. It should also introduce surveillance of chlamydial infections and other STDs so that the impact of intervention measures can be calculated.

This report describes the diseases caused by genital chlamydial infection and their sequelae, emphasizing those groups who are at increased risk of infection. It takes into account the fact that clinical examination rarely allows a definitive etiological diagnosis (determination of the causes of illness or symptoms) to be made and that the diagnosis may sometimes remain

uncertain even when good laboratory services are available. Nevertheless an etiological diagnosis which defines the infectious agent should be attempted, since it allows for better surveillance and more efficient tracing of sexual contacts.

## The infectious agent, disease spectrum and sequelae

### Infectious agent and disease spectrum

Chlamydiae are bacteria with a complicated life cycle. The genus contains two species: Chlamydia trachomatis and Chlamydia psittaci. Chlamydia trachomatis attacks the lining of mucous membranes and proliferates intracellularly, especially in columnar epithelial cells.

Table 1. Taxonomy of chlamydiae: biological subdivision

| | |
|---|---|
| Genus | Chlamydia |
| Species | Chlamydia psittaci<br>Several biotypes and serovars cross-reacting with antigens of Chlamydia trachomatis and Chlamydiae pneumoniae (in the complement fixation test). |
| | Chlamydiae pneumoniae<br>The Taiwan Acute Respiratory (TWAR) agent IOL-207 and a few other strains belong to this species. |
| | Chlamydia trachomatis<br>Biotype trachoma, 12 serotypes: A, B, Ba, C-K<br>Biotype lymphogranuloma venereum, 3 serotypes: $L_1$-$L_3$ |

Chlamydia psittaci is widespread in the animal kingdom: mammals and birds are potential sources of contagion. In humans it causes infections (often acquired from birds) that chiefly affect the respiratory tract, pneumonia being the most common (ornithosis/psittacosis, popularly known as parrot fever).

Another recently designated species is Chlamydiae pneumoniae, which according to the results of serological studies seems to be a widespread infectious agent in humans. Transmitted from person to person, chlamydiae pneumoniae often produces subclinical infections but may also cause upper respiratory tract disease and pneumonia. In serological tests, such as complement fixation and ELISA, cross-reactions may occur with Chlamydia psittaci antigen, which in the past seems to have led to an overdiagnosis of ornithosis. Furthermore, cross-reactions between Chlamydia pneumoniae and Chlamydia trachomatis may account for inexplicable results obtained in seroepidemiological studies of the latter. It is worth pointing out that - irrespective of the cross-reactions - serology is of very limited value in making a diagnosis in an individual patient.

The serovars A, B, Ba and C of Chlamydia trachomatis cause trachoma. This is an eye disease that affects hundreds of millions of people, mainly in Africa, Asia and South America. In many countries trachoma remains the most common cause of blindness. The biotype $L_1$-$L_3$ of Chlamydia trachomatis causes the STD known as lymphogranuloma venereum (LGV). LGV is rare in Europe and the few cases diagnosed annually almost always turn out to have been contracted elsewhere. The following text will deal with Chlamydia trachomatis infections, especially those caused by serovars D-K.

Up to the 1960s there were occasional reports of a link between infections of the eye and the genital tract, caused by what was then called the TRIC (trachoma inclusion conjunctivitis) agent. However, it was not until 1957 that the TRIC agent, now known as Chlamydia trachomatis, was cultured. As the 1970s unfolded, it became evident that serovars D-K of Chlamydia trachomatis could cause infections of the lower genital tract, namely urethritis and cervicitis, as well as complications arising from these infections, such as inflammation of the epididymis and oviducts (Fallopian tubes). In addition, it was shown that serovars D-K of Chlamydia trachomatis caused infections of the eyes and lungs of newborn children (Table 2).

In the early 1970s, when the incidence of gonorrhoea had reached its peak, the number of genital chlamydial infections exceeded the number of gonococcal infections in many European countries. This disparity between genital chlamydial infections and gonorrhoea has continued and widened, and there is now no doubt that chlamydiae are the most common cause of STD in Europe, the principal victims being sexually active people under 25. Nevertheless, it was not generally accepted until the end of the 1970s that genital chlamydial infection produced an STD that behaved like gonorrhoea. It is now clear that in many respects the clinical manifestations and the epidemiology of genital chlamydial and gonococcal infections are similar. Furthermore, many patients with gonorrhoea are also infected with Chlamydia trachomatis.

The diseases caused by Chlamydia trachomatis are summarized in Table 2.

Clinical manifestations

Many people with a genital chlamydial infection, particularly women, have no symptoms. When symptoms or signs do appear, the most common are discharge from the urethra or vagina and pain on urination. The vaginal discharge originating from the cervix in chlamydial cervicitis is frequently non-characteristic.

Chlamydial infections are often clinically benign but may have a prolonged course. Minor bleeding between menstrual periods can be a sign that the uterus is infected. In women, infection may spread not only to the upper genitalia but also via the Fallopian tubes to the abdominal cavity, possibly resulting in clinical manifestations which can be confused with appendicitis and cholecystitis/pleuritis. It is important to emphasize that even when a genital chlamydial infection gives rise to complications such as endometritis and salpingitis, the systemic effects, indicated by fever and leukocytosis, are usually mild. On the other hand, a pronounced increase in the erythrocyte sedimentation rate often occurs.

Table 2. Diseases caused by Chlamydia trachomatis and their sequelae

| Men | Women | Children |
|---|---|---|
| Diseases | | |
| Urethritis | Urethritis | Neonatal conjunctivitis |
| Epididymitis | Cervicitis | Pneumonia |
| Proctitis | Endometritis | |
| Conjunctivitis | Salpingitis | |
| Lymphogranuloma venereum (LGV) | Periappendicitis | |
| | Perihepatitis | |
| | Conjunctivitis | |
| | Lymphogranuloma venereum (LGV) | |
| Sequelae | | |
| Impaired fertility (?) | Infertility | Obstructive lung disease |
| Postinfectious (reactive) arthritis, including Reiter's syndrome | Impaired fertility | |
| | Ectopic pregnancy | |
| Lesions in the genital and intestinal tracts, with lymphoedema and stenoses (after LGV) | Chronic abdominal pain | |
| | Postinfectious (reactive) arthritis, including Reiter's syndrome | |
| | Lesions in the genital and intestinal tracts, with lymphoedema and stenoses (after LGV) | |

In men, chlamydial infection of the urethra commonly causes a discharge and dysuria. However, the symptoms may be mild, in which case the patient may delay in seeking advice. Furthermore, in about 5-10% of cases the infection is asymptomatic, although for most of these examination of a "first-catch" urine specimen will reveal threads and leucocytes. The infection may spread to the epididymis and result in pain, tenderness and swelling of the scrotum. If adults have prolonged, unilateral inflammation of the eye, chlamydial infection should be suspected.

Sequelae

If chlamydial infection damages the Fallopian tubes, infertility may result. After a single episode of salpingitis about one patient in ten becomes infertile because of tubal damage. After two or three episodes infertility ensues in about 20% and 50% of cases respectively. Indeed, the risk of infertility increases sharply with each bout of infection of the tubes, although it seems unrelated to the causes of salpingitis. However, since Chlamydia trachomatis probably causes more than half of all cases of salpingitis, it obviously plays a major role in infertility.

The risk of ectopic pregnancy increases tenfold after salpingitis. One in four women who have had salpingitis becomes infertile, has an ectopic pregnancy or suffers from chronic abdominal pain. A therapeutic abortion and also the insertion of an intrauterine contraceptive device increase the risk of salpingitis and the development of the sequelae just mentioned, because a lower genital tract infection may spread more easily to the Fallopian tubes. There appears to be a similar risk if cervicitis exists and a device is removed without antibiotic cover.

Transient subfertility seems a plausible sequel of chlamydial epididymitis. However, bilateral inflammation of the epididymes due to chlamydial infection is rare, and there is no proof that chlamydiae cause sterility in men.

The above-mentioned sequelae and others, such as reactive arthritis, are summarized in the second part of Table 2.

Epidemiology

Chlamydia trachomatis is transmitted in much the same manner as Neisseria gonorrhoea.

Incidence of infection

The incidence of chlamydial infections is unknown in most countries of Europe because they are neither notifiable nor reported. Furthermore, due to asymptomatic infections and the frequent lack of microbiological confirmation in symptomatic cases, it is difficult to obtain reliable data. In men, however, the annual number of cases of non-gonococcal urethritis (NGU) makes it possible to estimate the incidence of chlamydial infection since about half of all NGU cases are of chlamydial origin. For example, reported NGU in England and Wales increased from 22 000 cases in 1960 to 110 000 in 1986 (Fig. 1). It is worth noting that the incidence of gonorrhoea reached a peak in 1971 and since then has decreased continuously. In the European Region about 1 000 000 cases of salpingitis are currently estimated to be occurring annually, about 600 000 of them caused by Chlamydia trachomatis; infertility is expected to result in 120 000 cases.

In some countries the incidence of Chlamydia trachomatis and Neisseria gonorrhoea infections can be estimated from a laboratory reporting system. For example the data for Sweden for the period 1983-1987 are shown in Table 3. The true incidence of chlamydial infection is probably much higher than reflected by the 38 000 positive tests reported in 1987, for the reasons outlined above, and probably exceeds 100 000 cases annually.

Fig. 1. Trends in the reported incidence of gonococcal and nongonococcal urethritis in men in England and Wales, 1951–1986

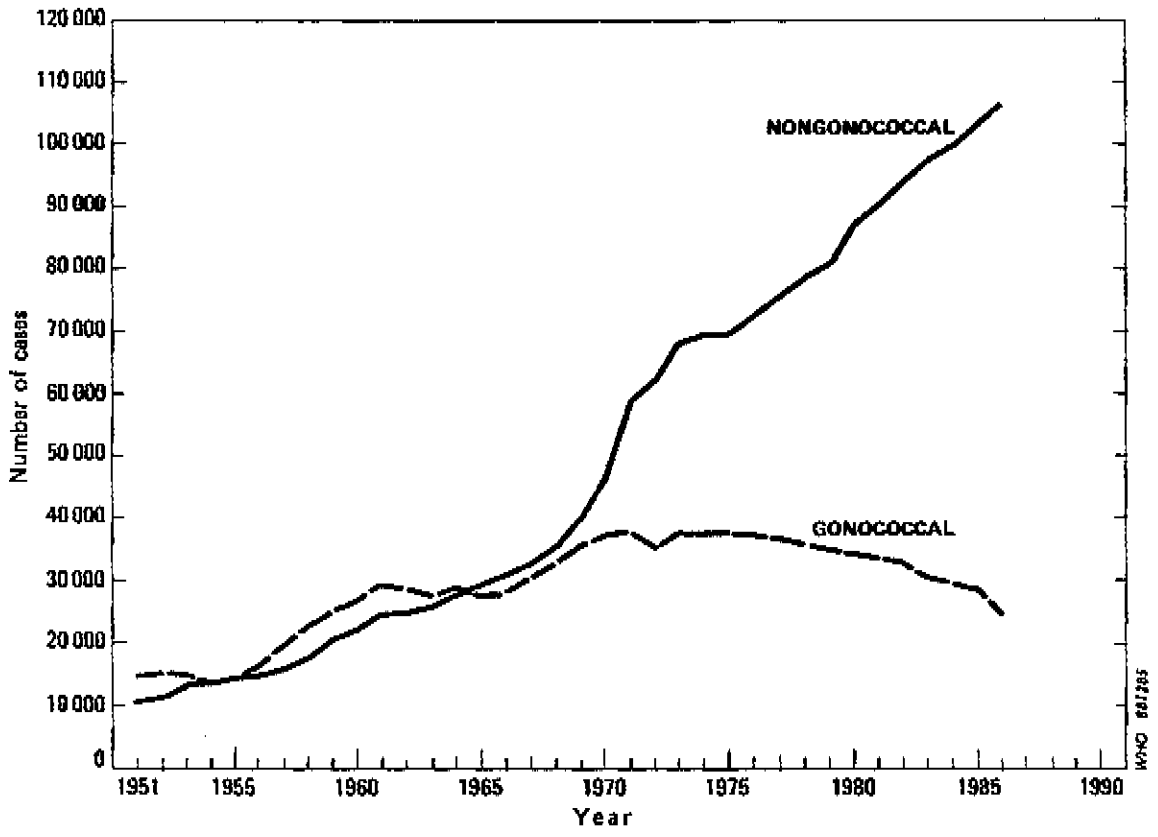


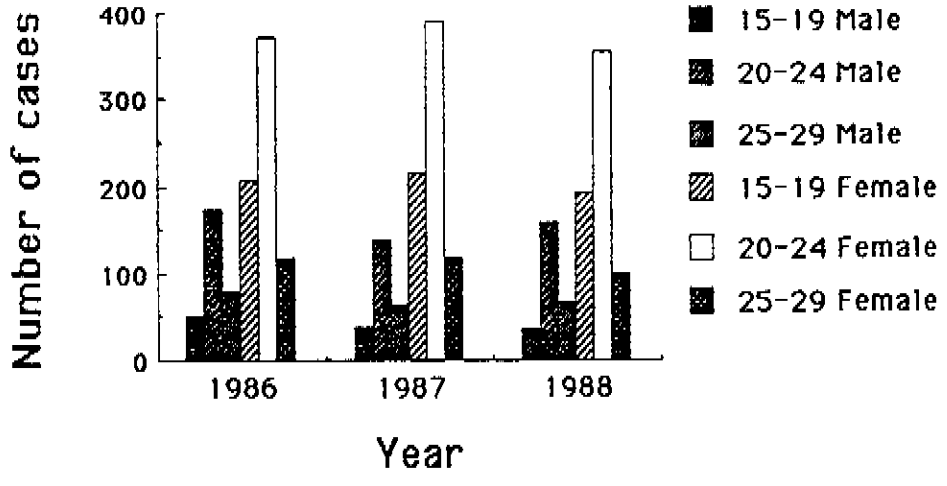

Table 3. Chlamydia trachomatis and Neisseria gonorrhoea infections reported by Swedish bacteriological laboratories 1983–1987 (to the nearest thousand)

| Organism | 1983 | 1985 | 1987 |
|---|---|---|---|
| Chlamydia trachomatis | | | |
| Specimens examined | 167 000 | 317 000 | 448 000 |
| Persons infected | | | |
| Total | 19 000 | 32 000 | 38 000 |
| Women only | 12 000 | 21 000 | 27 000 |
| Neisseria gonorrhoea | | | |
| Specimens examined | 470 000 | 444 000 | 367 000 |
| Persons infected | | | |
| Total | 9 000 | 6 000 | 3 000 |
| Women only | 4 000 | 3 000 | 1 000 |

The doubling in the number of chlamydial infections reported could reflect a true increase in incidence, but also greater availability and use of diagnostic services, particularly for women. The fact that genital chlamydial infections are reported more frequently for women than for men may be explained by more samples being taken from symptomatic women than symptomatic men, more screening being undertaken among women (for example in family planning clinics), and poorer contact-tracing where men are concerned.

These data have also been analysed for different age groups (Fig. 2). It is clear that genital chlamydial infections are first and foremost a health problem of the young. In recent years there has been a tendency for chlamydial infections to occur more often in young adults than in teenagers.

Fig. 2 Number of diagnosed male and female cases of infections by Chlamydia trachomatis in the county of Uppsala, Sweden, 1986-1988




Prevalence of infection

Prevalence data on genital chlamydial infections vary widely for different population and patient groups (Table 4). The wide range noted within the groups to some extent reflects differences in geographical location, but is doubtless also due to the availability and quality of diagnostic facilities.

Infection routes and contagiousness

In industrialized countries Chlamydia trachomatis is generally sexually transmitted, although infection may also be transmitted from the genital tract of an infected mother to the newborn child during passage through the birth canal. If delivery is by caesarean section the spread of infection is less common. Children of infected mothers run a 30-40% risk of contracting neonatal ophthalmia and a 10-20% risk of developing pneumonia due to chlamydiae. However, effective systemic treatment of infected mothers before delivery prevents conjunctivitis and pneumonia in the newborn, and systemic treatment of those infants developing conjunctivitis should prevent pneumonia.

Chlamydial infections in newborn children must be assumed to have been contracted from the mother, even if maternal infection cannot always be proven. As with trachoma, infection could spread among members of a household, but it would be a rare event. The incubation time is normally 5-14 days, with symptoms appearing in the second week.

Table 4. Prevalence of genital chlamydial infections in different population groups (data compiled from some European countries, 1980-1987)

| | Chlamydia-infected (%) |
|---|---|
| **Mass examinations (screening)** | |
| Women | |
| attending youth health centres[a] | 10-20 |
| attending maternity clinics | 1-13 |
| first-time pregnant | 5-20 |
| applicants for abortion | 3-18 |
| attending family planning clinics | 3-12 |
| prostitutes | 10-33 |
| healthy controls | 1- 4 |
| Men | |
| military recruits[b] | 10-20 |
| **Patients with signs of infection** | |
| Men | |
| Urethritis | 20-60 |
| Epididymitis | 40-80 |
| Women | |
| Cervicitis | 20-40 |
| Salpingitis | 20-70 |
| Urinary tract infection | 5-10 |
| Newborn children | |
| Conjunctivitis | 15-30 |

[a] Predominantly for the age group 15-19.
[b] Two studies only (Sweden).

The contagiousness of genital chlamydiae is not exactly known. Chlamydial infections can be shown in about half of the sexual partners of infected people. However, the risk of transmission is hard to assess because factors such as asymptomatic infection, frequency of sexual contact, method of contraception and use of antibiotics are variable and often unknown.

Genital chlamydial infections may persist for long periods, in some cases for several years. Without being involved in sexual contact outside a stable relationship, therefore, a person may suddenly develop symptoms from an infection contracted long before. However, this is probably not a common event. Eye infection has been described in older children and may be a further example of persistence, in that case since birth.

As diagnostic methods for chlamydiae are not ideally sensitive, genital infection considered to be of recent origin may in fact be of long standing, having been missed earlier. Chlamydiae detected in children more than one year old, therefore, are not necessarily the result of sexual abuse.

It should be stressed again that it is important to establish the exact causes of STDs wherever possible, whether or not they are chlamydial. In this way treatment and contact-tracing will become more effective, preventing complications and the further spread of infection.

## Epidemiological strategy

### Definitions

Index case or patient: a person who harbours Chlamydia trachomatis and has symptoms or one of the diseases listed in Table 2.

Infected person (a case): a person who harbours Chlamydia trachomatis in the presence or absence of discernible clinical disease (Table 2) and serves as a potential source of infection. An infected person is considered to be a case and it is recommended that cases should be reported to the public health authorities.

### Detection of infected people

Infected people can be identified in three ways: by examining patients who have symptoms or signs suspected of being of chlamydial origin; by contact-tracing; and by screening population groups expected to have a high prevalence of infection.

Apart from seeking chlamydiae in patients with symptoms, there are good reasons for searching actively for infection among individuals in high-risk groups, the more so since many are asymptomatic or have symptoms so mild that they are not motivated to visit a physician. These infected people are also infectious, and unless they are actively traced and treated the number of chlamydial infections in the community cannot be expected to fall. Priority should be given to detecting chlamydiae in sexually active young people, that is those under 25, including pregnant women and people attending family planning clinics and youth health centres.

To sum up, chlamydiae should be sought in the following individuals and circumstances:

- women with signs of cervicitis (discharge, bleeding);
- women with signs of urethritis (burning sensation and/or pain on urination);
- women with vaginal discharge, especially of recent onset;
- women with suspected salpingitis;
- young, sexually active women with bleeding between menstrual periods;
- young, sexually active women with signs of appendicitis or cholecystitis;
- women under 35 about to undergo invasive gynaecological treatment, such as curettage or abortion;

- women under 35 about to have intrauterine contraceptive devices inserted, replaced or removed;
- young pregnant women;
- men with urethral discharge and a burning sensation and/or pain on urination;
- men with inflammation of the rectum (proctitis);
- young men complaining of symptoms referable to the prostate, especially after a change of partner;
- young men with epididymitis
- young people with reactive arthritis;
- young people with signs of cystitis, especially if bacteriuria has not been demonstrated;
- young people who are about to change, or who have changed, sexual partners;
- adults and infants with prolonged inflammation of the eyes (ophthalmia);
- the sexual partners of people infected with chlamydiae;
- people with STDs other than chlamydial infection (e.g. gonorrhoea, herpes, warts, trichomoniasis);
- people attending STD clinics;
- people under investigation for infertility;
- newborn children with conjunctivitis;
- infants suffering from prolonged afebrile cough.

Contact-tracing

Contact-tracing, an integral part of the management of any sexually transmitted disease, is especially important in combating the chlamydial epidemic, because so many chlamydial infections are asymptomatic. The aim of contact-tracing, in which both regular and casual partners are sought, is to interrupt the further spread of the epidemic and at the same time provide an opportunity for treatment and the consequent prevention of complications. Both oral and written information about chlamydial disease, routes of transmission and ways of avoiding not only chlamydial infections but the other STDs should be given to the patient as an integral part of treatment.

The physician is always responsible for seeing that contact-tracing is done, even if the task is delegated. It may require the efforts of a designated contact-tracer provided by the health authority, but in any event, the first step is to convince the patient of the need to contact his or her partner(s) directly. Since the patient may have been infected for years

without symptoms, the time-limit set for tracing should be judged individually. A good method is to offer partners an opportunity to visit the same health unit as the patient.

The current partner of a chlamydia-infected person should be treated regardless of the outcome of examination or the result of diagnostic tests.

Monitoring

To gauge the size of the chlamydial problem and assess the effect of control measures, health authorities should launch pilot studies on the frequency of infections in high-risk groups, and collect epidemiological data both locally and nationally. Furthermore, routine data should be collected at STD clinics and other health facilities, and sent to a central authority. In Sweden, notification is compulsory under the Control of Infectious Diseases Ordinance, while in a number of other countries reporting of to a central authority is done voluntarily. Other voluntary systems can also be used to monitor the epidemiological situation: for example, laboratories can report on the number of people with chlamydial infection according to age, sex and site of infection, and the number of specimens and persons examined.

Monitoring of such conditions as urethritis, epididymitis, cervicitis and salpingitis gives an indirect indication of the occurrence of chlamydial infections. The value of STD reporting based on clinical syndromes is illustrated by the case of England and Wales (see Fig. 1). From the end of the 1960s, a sharp and continuous increase in the number of non-gonococcal urethritis cases was reported. As it became clear that chlamydiae were responsible for about half of the cases, this reporting gave an indirect indication of the size of the chlamydial epidemic.

If a reporting system is to be kept functional, the reports must be collected and analysed and the information communicated rapidly and regularly to health authorities and the reporting units.

The cost to the patient of examination and treatment

In an epidemic that insidiously creates so much havoc, the cost of diagnosis and treatment must not hinder the patient from seeking health care, especially as those affected are mainly young people and may in any case be reluctant to submit to examination, especially if the infection is asymptomatic.

The responsible physician: requirements and action

Collection of specimens

As mentioned earlier, the collection of specimens for investigation will often have to be considered. Indeed, people who suspect that they are infected have the right to undergo examination and have specimens taken. There must therefore be clearly worded instructions about sampling routines and specimen-handling.

The physician should take the following steps:

- examine the patient and take specimens for laboratory investigation;
- verify the reliability of test results with an expert chlamydial microbiologist;

- in the event of positive laboratory findings, tell the patient the nature of the infection, possible routes of transmission, treatment and means of protection;

- persuade the patient that treatment will be beneficial to himself or herself and to others, and that his or her partner must be examined;

- treat the patient;[a]

- explain the necessity of abstaining from sexual intercourse during treatment and until symptoms clear and recommend abstinence if symptoms should recur, until medical help is sought;

- notify the appropriate health authorities of the case ("infected person") once its existence has been established (note that the patient is to be identified by code and not by name, to maintain confidentiality);

- begin contact-tracing, for which the physician is primarily responsible (note that a partner with a positive laboratory finding becomes a case and must be followed up in precisely the same fashion as the index case or patient whose infection was first notified);

- examine, collect specimens from and treat the partner (contact);

- offer a follow-up examination 6-8 weeks after treatment, although post-treatment checks for Chlamydia trachomatis are not indicated routinely at present.

Rights and obligations of the infected person

Anyone who is infected or suspects that he or she is infected should have the right:

- to be examined (inclusive of laboratory testing) and treated (preferably free of charge);

- to have confidentiality guaranteed;

- to receive appropriate information and health education advice.

Anyone who is infected or suspects that he or she is infected should be required:

- to consult a physician for a medical examination;

- to agree to the examination and follow the physician's advice.

Information to the infected person

If a physician determines or suspects the presence of an STD in anyone being examined or treated, he or she should explain the nature and contagiousness of the disease and give appropriate advice on the measures required to prevent the further spread of infection. Furthermore anyone who has, or is suspected of having, a Chlamydia trachomatis infection should be given written as well as oral information on chlamydial infections and other

[a] See page 22.

STDs. The importance of this information is that it explains why the infected person must cooperate in keeping the infection from spreading and producing sequelae. Easily understandable educational material should be available in every country.

Suggested message from a doctor to a patient with Chlamydia trachomatis

"We have just found out that you have a chlamydial infection. Chlamydiae are small germs that are transferred from one person to another as a result of sexual intercourse. They are probably responsible for your symptoms, and can be killed by certain antibiotics. To make sure the chlamydia organisms do not harm you, it is important for you to take the whole of the medication prescribed for you and to follow my advice.

"During the time you are taking your medicine and for as long as you have symptoms, you should not have sexual intercourse. Your own infection will heal better if you abstain. Remember, you could also infect your partner.

"If you still have or begin to have symptoms after completion of treatment, you should visit your doctor as soon as possible.

"Your partner is probably infected too. Your partner should be encouraged to be examined and treated by a doctor.

"The aim of these recommendations is to protect you and your partner from serious complications due to chlamydial infection. Examples of complications are childlessness and chronic abdominal pain in women, and urethritis and inflammation of the testicles and joints in men."

Health education

The aim of STD prevention is to make it possible for people to maintain a healthy sexual and reproductive life. It is important, therefore, for all concerned with prevention to understand that regardless of the level of knowledge, language spoken or sexual preference, there must be no discrimination against any individual in the provision of treatment and preventive measures. STD prevention can be considered in terms of training, information and counselling. These should be coordinated with the various elements of the campaign against AIDS.

Training of personnel

To impart breadth and quality to the preventive services, they must be staffed by specially trained health educators and counsellors. These should be recruited from vocational groups whose work puts them in daily touch with young people and adults in connection with education about sex and cohabitation.

Teachers, school health care staff, military officers and youth leaders are examples of people who come into close contact with the young and are therefore highly suitable for training.

A large part of prevention work should be directly connected to the counselling provided at different health care units. It is especially important to train midwives, welfare officers and the doctors and nurses who work at family planning clinics, youth health centres, gynaecological clinics, primary care centres and STD clinics.

Cooperation between some of these latter groups of staff is essential to permit the development of procedures for examination and treatment of patients and contact-tracing.

A training programme for health educators and counsellors should include information on: chlamydial and other STDs; psychosexual development; homosexuality, bisexuality; male/female sexuality; sex roles linked to use of contraceptives; methods of communication; and sexual morality past and present.

Information to students, military recruits, immigrants and others

The school is a significant link in the chain of prevention and teachers and school health care staff can play an important role as health educators. By tradition, women have been more involved in family life education, but it would be desirable to recruit more men for this work, to create a balance between male and female aspects of the subject in the classroom. It may also be easier for pupils to talk about homosexuality and bisexuality if colleagues of both sexes are involved.

Mothers and fathers are important targets for information; parent/teacher meetings at the school provide a good opportunity for talking about teenage sexuality. When parents can become involved in the activities of the teenager, an open home atmosphere is created that helps the teenager to mature. If the parents lend their support during this time of transition, the young person will be encouraged to avoid too spontaneous and early sexual contacts.

Recruits join the armed services at a time of transition from youth to adulthood. Many will be leaving home for the first time and actively searching for a sexual partner. Health education about sex and cohabitation, including information about STDs, should be given to recruits, paramedics attached to the various units, and commanding officers. Information on HIV infection given to recruits should not be presented in isolation but as part of the whole STD spectrum, which of course includes chlamydial infections. Furthermore, it should highlight the proper use of the condom as an important method of reducing the risk of acquiring not only chlamydial infection but other STDs. The value of the condom in this respect should also be stressed with other groups.

Immigrants and refugees form another group which, though in no way homogeneous, must be a target for information tailored to different lifestyles. The children of many immigrant parents may be influenced to lead the same sort of life as their new-found friends, a situation that sometimes causes conflict. To discuss family planning, sex roles and different attitudes to sexuality calmly and quietly with these parents is important for the future of their children.

Many adult immigrants as well as local people lack a basic knowledge of physiology, so the level of information must be adapted to the individual if it is to be understood. The key figure here usually turns out to be the interpreter, who should be invited to health education courses in order to be prepared, factually and linguistically, to explain difficult and delicate problems. The information material should be translated and supplied to immigrants with the help of their organizations and newspapers.

New facts and scientific health education material can be provided regularly to the mass media, to take advantage, for example, of young people's affinity for trend-setters and pop groups and also television's ability to reach a large audience. Occupational health services, student health services and various educational associations can all be drawn into the preventive programme.

Counselling

Readily accessible and agreeable counselling and treatment are an integral part of prevention. The units concerned should make an effort to reach both sexes. If possible, the examination, specimen-taking, treatment and contact-tracing should all be done at the same session. The layout and ambience of the health care unit should be pleasant and appointment times should be sufficiently generous to allow examination and conversation in an unhurried atmosphere.

The location of a unit can be announced in doctors' surgeries, pharmacies, schools, on public bulletin boards, and so on. The preventive services may be listed in telephone directories under a new individual heading, and the telephone answering service should operate at times convenient to callers.

Special STD clinics are used mainly by people who know, or think they know, that they are infected. As genital chlamydial infections are so widespread and often symptomless, other types of medical unit also need to be involved in control work, such as family planning clinics and health centres.

Birth control counselling is important in prevention because it provides an opportunity for a face-to-face talk about self-esteem, sex roles and contraceptives. The counsellor can discuss the role of the contraceptive not only in preventing abortions but also in preserving fertility. Discussion of chlamydial infections and the offer of testing and treatment should be a natural part of the gynaecological examination. A health care unit wishing to reach both sexes with information should market its services more vigorously, so that men too are made to feel welcome.

The face-to-face talk is the foundation of prevention, regardless of whether it is done in small groups at school or at specially designated medical institutions. In a calm and protective ambience, the free and open discussion of personal values is more likely to develop the desired degree of self-insight and self-confidence.

Finally, since most of those infected by chlamydiae are young people, it is important for preventive work to focus on this particular group of the population.

Organization of control measures

Functions of health authorities

The health authorities should be able to provide the following services:

- examination of suspected cases
- laboratory diagnosis
- treatment of infected people

- sexual contact-tracing
- monitoring of the epidemic (including screening)
- counselling of infected people and their partners
- education of the public
- training of health and medical personnel and others.

Coordination

Chlamydial infections are common. Typically, in a district inhabited by 250 000 people there will be about 70 000 in the 15-25 age group, many of them at risk of acquiring an STD: about 3000 of these will develop a genital chlamydial infection each year.

Infected people, whether or not they have symptoms, may visit many different parts of the health care system, including:

- STD clinics
- gynaecological clinics
- urological clinics
- health centres
- youth health centres
- student health services
- rheumatology clinics
- ophthalmological clinics
- family planning centres
- maternity centres
- school health centres
- drug addiction treatment units.

Coordination is essential because of this wide variety of facilities, and also because many of them are not prepared for the diagnosis, treatment and tracing of chlamydial infection.

The kind of organization chosen to control the chlamydial epidemic will depend on local conditions and on how much of a problem chlamydial infection poses, remembering that chlamydiae are only one of several sexually transmissible agents. The United Kingdom, for example, has a well organized network of STD clinics, each under the charge of a genito-urinary physician. Those in other clinical disciplines are encouraged to channel patients with known or suspected STDs to these clinics, which are usually in a position to provide a more comprehensive diagnostic and follow-up service.

Within a district, one medical officer may be needed as a focal point to monitor the eight functions listed above, to make sure that the services are sustained and to coordinate the various contributions. One method of coordinating is to form an STD executive committee, whose members represent the primary health, maternity, STD, microbiology and medical services.

It is appropriate to invite people potentially infected with chlamydiae to undergo examination and treatment at the health care units that they would normally attend, for example to obtain contraceptive advice, or be treated for urethral and/or vaginal discharge.

Annexes 1 and 2 contain Swedish estimates of the cost of control measures against chlamydial infection. Assuming that the measures costed are implemented, the benefits to be gained (even if considered from the economic point of view only) will clearly outweigh the costs for all related health authority activities.

The introduction of interdisciplinary teamwork at an STD clinic, for example between an STD specialist, a gynaecologist and a urologist, can help provide a more effective service to both women and men. Furthermore, STD clinics should have special responsibility for training and for the transfer of knowledge to other professionals.

In countries where youth health centres exist, they may provide information, education and health care relating to sex and cohabitation. In some instances, these centres have excelled at such work, and could play an important role in the control of chlamydial and other STDs.

A sizeable proportion of all patients seen at gynaecological clinics should be invited regularly to give specimens for chlamydial screening. However, these units are not often in a position to examinate and treat the male partner. Here again, the responsibility for making sure that partners are traced will rest with the responsible physician.

Quite a lot of young women attending maternity clinics or seeking contraceptive advice will be infected with chlamydiae: one important function of maternity clinics is to protect women and newborn infants against such infection. Acting in partnership with family planning and gynaecological clinics, the maternity centres should act as focal points for outreach activity relating to STDs in women. The opportunity for examination and treatment should be offered to women at maternity and/or family planning centres. Their male partners can be referred to other physicians.

Laboratory diagnosis

Laboratory diagnosis of Chlamydia trachomatis infection is necessary because:

- it is not possible to establish the diagnosis solely on the basis of history-taking and/or clinical examination;
- infection with several different infectious agents is possible in the case of STDs;
- contact-tracing is more effective if there is an established etiological diagnosis;
- in the absence of such a diagnosis, it is difficult to follow the spread of the epidemic and monitor its control.

Laboratory diagnosis is also a fundamental instrument for detecting cases of chlamydial infection. It is based on demonstrating chlamydiae in genital specimens by one of the following methods:

- isolation in cell cultures;
- demonstration of chlamydial elementary bodies by immunofluorescence with specific monoclonal antibodies;
- demonstration of chlamydial antigens by ELISA;
- demonstration of specific chlamydial DNA sequences or ribosomal RNA sequences with molecular probes and by means of the polymerase chain reaction (PCR); little can be said at present about the specificity and sensitivity of these methods, although PCR has the potential for exquisite sensitivity.

Because of the increasing number of different tests for chlamydial diagnosis, quality control and studies in which the new test is compared with the standard culture technique should be performed, in order to develop a reliable national and international laboratory network. The clinician should be aware that there can be not only false-negative results but also false-positives, and should not be reticent about challenging the laboratory if the report is not in keeping with the clinical picture.

As already mentioned measurement of chlamydial antibodies is not usually helpful in making a diagnosis of chlamydial disease in an individual patient. However, in certain diseases, such as pneumonia in the newborn, the detection of IgM antibody is helpful.

Sampling for culture tests

Careful sampling is essential to reach a reliable diagnosis. Sampling should be performed according to the following suggestions in order to obtain a specimen which can be used either for tissue culture isolation or other diagnostic procedures.

Specimens should be collected from men with a cotton-tipped aluminium swab, introduced 2-3 cm into the urethra. If the urethra is "dry", the swab should be moistened with a sterile saline solution. Specimens will be easier to collect if the patient is supine. In homosexual and bisexual men, specimens should be obtained from the rectum, since a higher isolation rate may be expected in these cases than from the urethra. The best method is to use a proctoscope.

In women, specimens should be taken from the cervix and from the portio. In teenagers this has given better results than sampling from the cervix alone. The portio must be wiped with a dry pledget and any mucous present in the cervical canal absorbed with sterile cotton. The swab must be vigorously rotated in the cervical canal and then moved out towards the portio and rotated again.

The diagnosis of chlamydial infection in women can be improved by taking specimens from the urethra as well as the cervix: in certain instances, this has increased the proportion of chlamydia-positive results by 10-20%. Specimens should also be obtained from the rectum, particularly if anal intercourse is divulged or suspected.

If a chlamydia-induced eye infection is suspected in adults or infants, a sample should be taken by streaking a swab vigorously over the inside of the lower eyelid after wiping away any pus. To make a diagnosis of chlamydial pneumonia in infants it is helpful to collect a specimen from the nasopharynx by inserting a baby feeding catheter in the nose.

Sampling where there is suspected concomitant gonococcal and chlamydial infection

If specimens for gonococcal diagnosis are taken with a charcoal-treated cotton-tipped swab, this must be done after sampling for chlamydiae, otherwise carbon particles interfere with the reading of chlamydial cultures (see below). However, as the best culture result for chlamydiae is often obtained not from the first but rather from a subsequent cervical swab, specimens for gonococcal diagnosis can be taken first with a normal cotton-tipped swab, to take advantage of the cleansing effect.

Transport and storage of specimens for chlamydial culture

If tissue culture isolation is to be done, swabs should be transported in a sucrose-phosphate buffer (2-SP) containing fetal calf serum and antibiotics. This transport medium in 1.5-2.0 ml volumes in sterile plastic tubes can be stored for one month at 4°C or for four months at -20°C.

Specimens should be stored and transported to the laboratory at 4°C and investigated within 24 hours of the sampling. If the specimen cannot be dealt with the day it arrives in the laboratory, it should be frozen at -70°C or in liquid nitrogen until it is examined.

Treatment

Among the antibiotic agents currently used to treat patients suffering from chlamydial infections, tetracyclines and macrolides are most commonly used. Children, pregnant women and nursing mothers with chlamydial infections should be treated with erythromycin.

Although the length of treatment has been a moot point, it should not be less than seven days in uncomplicated genital chlamydial infections; in complicated infection a duration of at least two weeks is recommended. As nearly all cases of chlamydial cervicitis are complicated by endometritis, which is clinically difficult to diagnose, all infected women should be treated as if they had complicated infections.

Sexual intercourse should be prohibited until treatment for chlamydial infection is concluded. If symptoms persist, it may be necessary to insist on continued abstinence. Specimens should always be collected from the partner.

Whom to treat

The following should be treated:

- patients with confirmed or suspected Chlamydia trachomatis infection;
- regular partners of persons with a confirmed chlamydial infection.

Before the results of laboratory investigations have been received, or where an etiological diagnosis is not possible, antibiotic therapy should be considered for:

- all persons with signs of non-gonococcal urethritis (NGU) or those who have been treated for gonorrhoea;
- young men with epididymitis;
- women with salpingitis;
- women with mucopurulent cervicitis (mucous and purulent inflammation of the cervix);
- sexual partners of patients with NGU, cervicitis, epididymitis or salpingitis, if signs of genital infection are present;
- sexual partners of patients with chlamydial conjunctivitis;

- infants aged 6-12 weeks suffering from pneumonia of unknown etiology but suspected of being chlamydial.

Treatment of uncomplicated genital chlamydial infection (adults)

One of the following drugs should be used in the dosage indicated:

- doxycycline, 100 mg twice daily for at least 7 days;
- lymecycline, 300 mg twice daily for at least 7 days;
- erythromycin, 500 mg twice daily for at least 7 days;
- tetracycline hydrochloride, 500 mg twice daily or 250 mg four times daily for at least 10 days.

Treatment of complicated genital infection and of conjunctivitis in adults due to Chlamydia trachomatis

The treatment should be the same as for uncomplicated cases of genital chlamydial infection, but must continue for not less than 14 days. If the male accessory sex glands are involved, further prolongation of treatment may be indicated.

It should be realized that up to 40% of cases of genital chlamydial infection in females are complicated (cervicit endometritis and/or salpingitis). Without invasive investigations, uncomplicated and complicated cases cannot be differentiated. All women should therefore be given treatment as indicated for complicated cases.

Chlamydial conjunctivitis should be treated with antibiotics given systemically and not locally.

Treatment of newborn children and infants with chlamydial infections

Neonatal eye infection should be treated systemically by giving erythromycin, 50 mg/kg daily in two doses, for at least two weeks. The possibility of concurrent gonorrhoeal eye infection must always be excluded. Infants with pneumonia should be treated for at least three weeks.

Parents of infected children must be persuaded to submit to examination and treatment.

Treatment of concurrent gonococcal and chlamydial infection

The first step is to administer the customary treatment for gonorrhoea (usually for one day in care), followed the next day by treatment for the chlamydial infection as described above.

Post-treatment check-up

Patients should be instructed to make return visits after treatment. The purpose of the first return visit, 1-2 weeks after treatment, is to make sure that contact-tracing has taken place and to provide psychological support. The purpose of the second visit, after 4-6 weeks, is to ensure that the treatment has worked and that the patient has not been reinfected. In view of

the cost and practical problems involved, a test of cure (by culture) is not usually considered necessary. However, patients with persistent signs of infection should be subjected to re-examination and further diagnostic tests. For more than 95% of them, these tests will prove negative if they are undertaken immediately after completion of the treatment. The proportion of positive tests will be much greater 4-6 weeks after the end of treatment, but of course some of these will then be due to reinfection.

Infants with eye infections and/or pneumonia should be re-examined 3 and 6 months after completion of the treatment. In the case of lymphogranuloma venereum, a thorough re-examination should be undertaken because failure to respond to therapy is not uncommon.

Research

All aspects of research should be encouraged, but particularly:

- the continued development and evaluation of chlamydial diagnostic techniques;
- epidemiological studies of the extent to which chlamydial infections have spread in countries where little information is available;
- development and evaluation of chemotherapeutic agents which allow more effective and shorter treatment regimens.

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## GLOSSARY

| | |
|---|---|
| appendicitis | inflammation of the appendix |
| arthritis | inflammation of the joints |
| asymptomatic | without symptoms |
| bacteriuria | bacteria in the urine |
| biotype | a type resulting from division of a species on the basis of biological or biochemical tests |
| cervicitis | inflammation of the cervix |
| cervical canal | canal leading to the cavity of the uterus |
| chlamydial conjunctivitis | inflammation of the conjunctiva of the eye caused by chlamydiae |
| chlamydial pneumonia | inflammation of the lung caused by chlamydiae |
| cholecystitis | inflammation of the gall bladder |
| complement fixation test | a serological technique (serodiagnostic method) |
| conjunctiva | the mucous membrane covering the anterior surface of the eyeball |
| EB | elementary bodies, extracellular infectious particles of chlamydiae |
| ectopic pregnancy | pregnancy occurring elsewhere than in the cavity of the uterus, usually in the uterine tubes |
| ELISA | enzyme-linked immunosorbent assay (a method of laboratory diagnosis) |
| eosinophilia | an increased number of certain white cells (eosinophils) in the blood |
| endemic | the constant presence of a disease or infectious agent in the population of a given geographical area; may also refer to the usual prevalence of a given disease within such an area |

| | |
|---|---|
| endometritis | inflammation of the uterine mucous membrane |
| epididymitis | inflammation of the epididymis (male genital gland) |
| etiological diagnosis | diagnosis which settles the cause of a disease |
| gonorrhoeal | caused by gonococci |
| HIV | human immunodeficiency virus |
| IgM | immunoglobulin (M = macroglobulin) (type of antibody) |
| intracellular | within the cell |
| LGV | lymphogranuloma venereum, venereal disease (see p 6.) |
| lymphoedema | swelling on account of obstructed lymph flow |
| meatus | external opening (e.g. of the urethra) |
| mucopurulent cervicitis | mucous and purulent (pus) inflammation of the cervix |
| nasopharynx | nose and throat |
| neonatal | relating to the period immediately after birth |
| ornithosis/psittacosis | "parrot fever" |
| periappendicitis | inflammation of the tissue surrounding the appendix |
| perihepatitis | inflammation of the serous membrane of the liver |
| pilot survey | a preliminary investigation |
| portio | mouth of the womb |
| postinfectious syndrome | manifestations seen after an infectious disease, e.g. Reiter's syndrome |
| proctitis | inflammation of the rectum |
| proctoscope | probe for examination of the rectum |
| prostate | gland surrounding the neck of the male urinary bladder |
| reticulate bodies (RB) | intracellular, noninfectious form in the developmental phase of chlamydiae |

| | |
|---|---|
| Reiter's syndrome | disease entity involving the skin, mucous membranes and eyes that occurs in connection with joint manifestation |
| rectum | terminal portion of the gut |
| salpingitis | inflammation of the Fallopian tubes |
| SARA | sexually acquired reactive arthritis, i.e. inflammation of the joints occurring after infection of the genito-urinary tract |
| serotype (serovar = serological variant) of Chlamydia trachomatis | type of Chlamydia trachomatis identified by serological means |
| STD | sexually transmitted disease |
| trachoma | eye disease caused by Chlamydia trachomatis, biotype trachoma |
| TRIC | trachoma inclusion conjunctivitis |
| TWAR agent | Taiwan acute respiratory agent |
| urethritis | inflammation of the urethra |
| vaginitis | inflammation of the vagina |
| venereology | the study of sexually transmitted diseases |
| venereal disease | disease acquired generally through sexual intercourse |

Annex 1

# COST ESTIMATES OF INFECTIONS DUE TO CHLAMYDIA TRACHOMATIS (BASED ON SWEDISH CALCULATIONS)

## Methods

For the purposes of this outline, four kinds of cost have been calculated:

- personnel
- premises and equipment
- laboratory analyses
- pharmaceuticals.

These represent no more than the direct costs of health care and medical treatment.

## Nurse, midwife, social worker

Monthly salary SKr 10 000, plus 50% supplementary compensation; 160 hours of work per month. Hourly cost SKr 94.

## Physician

Monthly salary SKr 18 000 and similar terms of employment. Hourly cost SKr 169.

## Premises and equipment

Assuming conditions similar to those obtaining in the National Health Service generally, the cost of premises is SKr 26 per hour, and of equipment SKr 13 per hour.

## Laboratory analyses

In 1988 the Swedish State Bacteriological Laboratory charged SKr 180 per specimen for chlamydial culturing. For a county council laboratory, the cost may be anywhere between SKr 100 and SKr 180 per specimen. In view of this uncertainty, no special calculation has been made for the cost of specimen-taking material and transport (which is less than SKr 10 per specimen). A total cost of SKr 100 is likely.

## Pharmaceuticals

The cost per treatment regimen of at least 7 days is SKr 30-50.

## Calculations

### 1. Contact-tracing

The number of known infected persons per year in Sweden is about 37 000. With the classification of chlamydial disease as an STD, follow-up of partners will have to satisfy more stringent criteria.

Some 40 minutes of nurse/social worker/midwife time are estimated for each of 40 000 infected persons. The cost is for tracing the patient's contacts and calling them for examination, which is best done by the nurse/social worker at the unit where the patient has been examined.

Estimated cost:

| | |
|---|---|
| Number | 40 000 |
| Nurse/social worker | 67% of SKr 94 = SKr 63 |
| Premises and equipment | 67% of SKr 39 = SKr 26 |
| Total: 40 000 x SKr 89 | SKr 3.6 million |

2. Examination of partners

The number of partners invited/summoned to undergo examination is estimated at 60 000. These are partners of known infected persons mentioned under 1 above, or partners of infected persons found as a result of screening by youth health centres (see 3 below).

Estimated cost:

| | |
|---|---|
| Number | 60 000 |
| Nurse/social worker/midwife | 45 minutes = SKr 63 |
| Physician | 15 minutes = SKr 42 |
| Premises and equipment | 60 minutes = SKr 39 |
| Chlamydial culture | SKr 100-180 |
| Total: 60 000 x SKr 252 or 60 000 x SKr 332 | SKr 15.1-19.1 million |

3. Examinations for Chlamydia trachomatis at youth health centres, family planning clinics, district medical officers' surgeries and other units in connection with other consultations

| | |
|---|---|
| Prescription of oral contraceptives | 220 000 women |
| Insertion of IUD | 90 000 women |
| Fitting of diaphragm | 12 000 women |
| Total | 322 000 women |

Some of the 322 000 women are over 30. When screening is performed it is prudent epidemiological strategy to start by inviting the women to be examined for chlamydial infection, beginning with those aged 17-25. This should help enormously to reduce the spread of infection in the most vulnerable group.

It would be desirable to examine 100 000-150 000 young people per annum, and not girls alone, in which case some 10 000-20 000 infected cases could be expected. The partners of infected people should be followed according to 2 above.

Estimated Cost:

| | |
|---|---|
| Number | 100 000-150 000 |
| Midwife/nurse | 40 minutes at SKr 94 per hour = SKr 63 |
| Physician | 15 minutes at SKr 169 per hour = SKr 42 |
| Premises and equipment | 40 minutes at SKr 39 per hour = SKr 26 |
| Chlamydial culture | SKr 100-180 per specimen |

| | Minimum<br>100 000 examined<br>SKr 100 per specimen | Maximum<br>150 000 examined<br>SKr 180 per specimen |
|---|---|---|
| Personnel | SKr 6.7 million | SKr 10.3 million |
| Premises | SKr 2.6 million | SKr 3.9 million |
| Chlamydial culture | SKr 10.0 million | SKr 27.0 million |
| Total | SKr 19.7 million | SKr 42.0 million |
| | SKr 19-41 million | |

4. Pharmaceuticals

Estimated cost:

| | | |
|---|---|---|
| 50 000 people | SKr 30-50 per regimen | SKr 1.5-2.5 million |
| 70 000 infected people | SKr 30-50 per regimen | SKr 2.5-3.5 million |

The cost of medicine is low considering the purpose.

Summary

The above estimates are summarized in Table 1.

Table 1. Cost estimates of management of cases of Chlamydia trachomatis infection

| Item | Number of people | Personnel/ premises | Laboratories | SKr (millions) |
|---|---|---|---|---|
| Contact-tracing | 4 | 0 | 4 | 40 000 |
| Examination of partners | 9 | 6 - 11 | 15 - 20 | 60 000 |
| Examination at youth centres, etc. | 9 - 14 | 10 - 27 | 19 - 41 | 0 |
| Pharmaceuticals | 0 | 0 | 2 - 4 | 0 |
| Total | 22-27 | 16-38 | 40-69 | |

The cost of preventive measures - a maximum of SKr 80 million per annum - should be weighed against the cost of chlamydia-related cases of salpingitis and so on, which amounts to about SKr 200 million per annum. Training costs are not included. Implementation of the measures proposed here should ensure the additional detection and treatment each year of between 30 000 and 40 000 people infected with chlamydiae. The cost per infected person may be estimated at SKr 1000-1800, and the average cost per person examined at SKr 250.

Table 1. Cost estimate for one patient with salpingitis (based on Swedish calculations)

| Item | Cost in SKr (sub-totals rounded off to nearest thousand) | |
|---|---|---|
| Acute episode - institutional care | | |
| Mean length of stay for acute salpingitis at women's clinics in Sweden is 10 days | | |
| Laparoscopy is performed routinely on about half of all salpingitis cases in the country | | |
| Care per day at clinic | 2 450 | |
| Laparoscopy and laboratory tests | 24 500 | |
| Sick leave, average 30 days, cost per 24-hour day SKr 150 | 4 500 | |
| Next visit to physician | 550 | |
| Outpatient investigation and treatment of sexual partner, two visits, laboratory tests and drugs | 1 280 | |
| Subtotal | 33 280 | 34 000 |
| Infertility investigation - complete, including diagnosis of post-infectious tubal occlusion (closing of Fallopian tubes) | | |
| First visit by couple | 1 100 | |
| Sperm analysis of man | 800 | |
| HSG examination of woman | 750 | |
| Hühner test of couple | 1 100 | |
| Institutional laparoscopy of woman: | | |
| Length of stay, 2 days | 4 900 | |
| Sick leave, 7 days | 1 050 | |
| Subtotal | 9 700 | 10 000 |
| Infertility treatment - operative institutional care | | |
| Length of stay, 9 days | 22 050 | |
| Sick leave, 40 days | 6 000 | |
| Next visit to physician | 550 | |
| Subtotal | 28 600 | 29 000 |
| Total | | 70 000 |
| Operation for extrauterine pregnancy (ectopic pregnancy) | | |
| Length of stay, 7 days | 17 150 | |
| Sick leave, 30 days | 4 500 | |
| Next visit to physician | 550 | |
| Total | 23 200 | 23 000 |

Annex 2

COST ESTIMATE OF SALPINGITIS INFECTIONS DUE TO CHLAMYDIA TRACHOMATIS
(BASED ON SWEDISH CALCULATIONS)

Every case of acute salpingitis (inflammation of the Fallopian tubes) incurs an average lifetime cost for the disease and its consequences of SKr 37 000, at current monetary value. If the number of salpingitis cases per year is assumed to be 10 000, therefore, the total annual cost will be SKr 370 million, taking only direct costs into account. Indirect costs - loss of production, psychological suffering, adoption expenses, in vitro fertilization and certain late complications - are not included.

If a cost of SKr 1300 is estimated for the diagnosis and treatment of a woman with chlamydial cervicitis (excluding the cost of control of the partner), then:

- assuming the treatment of 12 women similarly infected, one case of salpingitis is "saved" (avoided);
- the cost per "saved" case of salpingitis amounts to SKr 15 600;
- the gain per "saved" case of salpingitis amounts to SKr 21 400.

If 60% of all salpingitis cases are caused by chlamydiae and there are an estimated 10 000 cases overall, and if half of all chlamydial salpingitis cases can be prevented, the annual gain may be estimated as follows:

60% of 10 000 = 6000; half of that = 3000 salpingitis cases at SKr 21 000 each; gain = SKr 63 million per year.

Table 2. Cost estimate for one cohort of 10 000 salpingitis cases

| | Item | | Cost in SKr |
|---|---|---|---|
| A. | Acute care | | 310 000 000 |
| B. | Infertilities | | |
| | Of the 10 000 members of this cohort population, an estimated 8000 may be first-time cases, the others represent repeat episodes | | |
| | Estimated infertility rates (%) | | |
| | First-time cases | 11.4% | 912 |
| | Others | 30.0% | 600 |
| | Subtotal | | 1 512 |
| | Of these, 1200 will probably consult for infertility | | |
| | Investigation cost | | 12 000 000 |
| | An estimated 1000 will submit to treatment | | |
| | Treatment cost | | 29 000 000 |
| | Of the 1000 treated, 500 may be expected to become pregnant. Of these, 50 will have abortions and 110 will have ectopic pregnancies | | |
| | Cost of ectopic pregnancies | | 2 530 000 |
| | 340 pregnancies carried to term; 3 children die in the neonatal period; 337 children survive | | |
| | Cost per surviving child: SKr 129 000 | | |
| C. | Other costs | | |
| | Includes hard-to-calculate costs of ectopic pregnancies, investigation and management of chronic abdominal pain, and infertility tests for those who do not become sterile. The following loose calculation may be made: | | |
| | Those remaining after the infertile cases have been excluded, 10 000 - 1500 = 8500. Of these, 6400 will conceive, giving a total of 6400 + 500 pregnancies. Of these, 1 in 16 will have ectopic pregnancies = 431 ectopic, less 110 already counted = 321 ectopic pregnancies | | |
| | Treatment cost | | 7 383 000 |
| | Consultations for other sequelae in 18% of the original population = 1800 women. Of these, 600 fit into the foregoing. The remaining 1200 average 4 consultations in outpatient care | | |
| | Cost | | 2 640 000 |
| | Approximately 200 will require institutional treatment at about SKr 25 000 per admission | | 5 000 000 |
| | Total | | 368 600 000 |

## Annex 3

## SOME COMMERCIALLY AVAILABLE TESTS FOR DIAGNOSING CHLAMYDIA TRACHOMATIS INFECTION (DATA COLLECTED FROM AUSTRIA, ITALY, SWEDEN AND THE UNITED KINGDOM[a]

| | Item | Cost in SKr |
|---|---|---|
| A. | Acute care | 310 000 000 |
| B. | Infertilities:<br>Of the 10 000 members of this cohort population, an estimated 8000 may be first-time cases; the others represent repeat episodes | |
| | Estimated infertility rates( %)<br>First-time cases 11.4% | 912 |
| | Others 30.0% | 600 |
| | Subtotal | 1 512 |
| | Of these, 1200 will probably consult for infertility | |
| | Investigation cost | 12 000 000 |
| | An estimated 1000 will submit to treatment | |
| | Treatment cost | 29 000 000 |
| | Of the 1000 treated, 500 may be expected to become pregnant. Of these, 50 will have abortions and 110 will have ectopic pregnancies | |
| | Cost of ectopic pregnancies | 2 530 000 |
| | 340 pregnancies carried to term; 3 children die in the neonatal period; 337 children survive | |
| | Cost per surviving child: SKr 129 000 | |
| C. | Other costs | |
| | Includes hard-to-calculate costs of ectopic pregnancies, investigation and management of chronic abdominal pain, and infertility tests for those who do not become sterile. The following loose calculation may be made. | |
| | Those remaining after the infertile cases have been excluded, 10 000 - 1500 = 8500. Of these, 6400 will conceive, giving a total of 6400 + 500 pregnancies. Of these, 1 in 16 will have ectopic pregnancies = 431 ectopic, less 110 already counted = 321 ectopic pregnancies | |
| | Treatment Cost | 7 383 000 |
| | Consultations for other sequelae in 18% of the original population = 1800 women. Of these, 600 fit into the foregoing. The remaining 1200 average 4 consultations in outpatient care | |
| | Cost | 2 640 000 |
| | Approximately 200 will require institutional treatment at about SKr 25 000 per admission | 5 000 000 |
| | Total | 368 600 000 |

Annex 5

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Annex 4

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