Chlamydia trachomatis Infection: Prevalence and Risk Factors in Men in Multnomah County Jail

by
KAREN MARKS, MD

A thesis submitted to the
Department of Public Health and Preventive Medicine and
the Oregon Health Sciences University
in partial fulfillment of the requirements for the degree of

Master of Public Health

April 1999

Graduate School of Basic Sciences
Oregon Health Sciences University

CERTIFICATE OF APPROVAL

This is to certify that the MPH thesis of

Karen Marks, MD

has been approved

[redacted]

Professor in charge of thesis: Katrina Hedberg, MD, MPH

[redacted]

Committee Member: Don Austin, MD, MPH

[redacted]

Committee Member: Gary Oxman, MD, MPH

[redacted]

Committee Member: Michael Skeels, PhD, MPH

[redacted]

Committee Member: Mary Ann Ware, MD

[redacted]

Associate Dean for Graduate Studies

TABLE OF CONTENTS

Acknowledgments i

Abstract ii

List of Tables and Charts iv

Introduction 1

Background 3

Methods 10

Results 18

Discussion and Summary 35

References 43

Appendices

Appendix A: Multnomah County Corrections Health 48

Appendix B: Oregon State Public Health Laboratory *Chlamydia* Test Procedures 50

Appendix C: Additional Data Analysis 52

Appendix D: Forms and Questionnaires 54

Appendix E: *Chlamydia* case definition 58

Acknowledgments

The author extends her thanks to Dr. Katrina Hedberg, thesis advisor, for her unfailing support, expertise and enthusiasm. Special thanks goes to Lexi Fickenscher, MPH intern, for her invaluable assistance in interviewing this challenging population. The cooperation and support of the staff of Multnomah County Corrections Health and the Corrections Officers was greatly appreciated. Thanks to Region X Chlamydia Project and Doug Harger for both helpful information and funding for *chlamydia* laboratory testing. Excellent editing and constructive criticism were received from the thesis committee, Drs. Ware, Skeels, Oxman and Austin. Above all, thanks to my family, Steven, Jessicah and Lucas, for their support and patience.

Abstract

Chlamydia trachomatis Infection: Prevalence and Risk Factors In Men In Multnomah County Jail

By Karen Marks

Background. - *Chlamydia trachomatis* infection is the most common bacterial sexually transmitted disease in the US; *C. trachomatis* infections are frequently asymptomatic. Screening efforts have been primarily focused on women because of the potential for serious sequelae. Nonetheless, asymptomatic infections in men serve as an important reservoir for new infections, and screening and treating men may dramatically affect prevalence in women. One of the difficulties of enacting male screening programs is finding appropriate screening sites. Corrections facilities may serve as useful screening sites because 1) they have large populations of young men and 2) these men are at high risk for sexually transmitted diseases because of sex and drug behaviors.

Objective. - To determine the prevalence and risk factors for chlamydial infection in young men age 18-30 years in short-term detention facilities in order to target future chlamydial infection screening efforts.

Setting. - Adult corrections facilities of Multnomah County Jail in the Portland Metropolitan Area of Oregon in the Spring and Summer of 1998.

Participants. – 653 men 18-30 years, within 7-21 days of arrest.

Design and Methods. - Prevalence study using consecutive in-person interviews for behavioral risk factors, collection of first-void urine specimens, and testing for chlamydial infection with EIA (enzyme immunoassay), with DFA (direct fluorescent antibody) used as a confirmatory test.

Results. – The overall age adjusted prevalence rate for chlamydial infection by confirmed EIA was 5.4% for men 18-30 years. Prevalence decreased significantly with increasing age (χ^2 for linear trend, 10.5, p=0.001). The rate was 10.0% in men 18-20 years and 7.4% for men 21-23 years. When both confirmed EIA and suspects (EIA positive and DFA negative) were included, the *Chlamydia* case prevalence rate was 13.8% for men 18-20 years and 11.9% for men 21-23 years.

Four risk factors proved to be associated independently with chlamydial infection by logistic regression. These included: reporting symptoms (OR 3.4, 95% CI 1.2-9.4, p=0.02), age less than 24 (OR 3.1, 95% CI 1.3-7.5, p=0.01), reporting sex under the influence of drugs and/or alcohol (OR 2.6, 95% CI 1.0-6.4, p=0.02), and reporting intermittent condom use rather than none or consistent use (OR 2.3, 95% CI 1.2-4.5, p=0.04).

We found two effective screening strategies for men 18-30 years who remain in jail at least 14 days: 1) screening of men 18-23 years over a year would find 68% of all confirmed positive in 18-30 year old men, while testing 45% of the population;

2) screening of men 18-23 years as well as men 24-30 years who report inconsistent condom use over a year would find 82% of all confirmed positive in 18-30 year old men, while testing 57% of the population.

Conclusions. - Young men as they pass through corrections facilities are an accessible group with a high prevalence of chlamydial infections. Increased risk was associated with age < 24 years, symptoms present, intermittent condom use and sex under the influence of drugs and/or alcohol. Testing and treating this group may lower community chlamydial rates, benefiting the sexually active community at large.

LIST OF TABLES

Page

Table 1: Spring and Summer cohort sizes and % of population in study based on number of men arrested by age and release rates 19

Table 2: Study population rates of testing and refusal by race/ethnicity 20

Table 3: *Chlamydia* positivity rate in 18-30 yr old male inmates tested in combined spring and summer cohorts 21

Table 4: Annual age adjusted rates for male population 18-30 yr, if all male inmates tested 14 days after arrest 22

Table 5: *Chlamydia* prevalence in the adult male population of Multnomah County Jail in 1998 by age groups 23

Figure 1: *Chlamydia* prevalence in the adult male population of Multnomah County Jail 1998 24

Figure 2: Racial/Ethnic distribution of the study population 25

Table 6.0: Risk factors for *Chlamydia* positivity 28

Table 6.1: Risk factors (continued) 29

Table 7: Logistic regression model: risk factors associated independently with chlamydial infection 30

Table 8: Chlamydial infection screening options 31

Table 9: Multnomah County Comparison Populations 34

INTRODUCTION

Chlamydia trachomatis infection is the most common bacterial sexually transmitted disease (STD) in the US with an estimated 4 million infections per year. Direct and indirect costs of treatment of chlamydial infections and their complications in women are over $2.4 billion annually in the United States.[1] Since 1987 chlamydial infection has been a reportable disease in Oregon and accounted for 45% of all communicable disease case reports received during 1990-1997.[2] The incidence of 200 cases per 100,000 persons per year has been fairly stable since 1991. Reported rates for women are much higher than for men, probably reflecting the low rates of testing among men.[3]

C. trachomatis screening efforts have been primarily focused on women because of possible serious sequelae, such as chronic pelvic pain, infertility or ectopic pregnancy. However, the prevalence in women is likely to remain high until the other half of the equation is addressed. Asymptomatic infections in men serve as an important reservoir for new infections and when treated may dramatically affect prevalence in women.[4] The highest risk age group of 15-19 year old females may have older male partners and partner notification efforts are not always effective. Therefore screening efforts for men should be explored.

Because of limited utilization of preventive health services by young men, one of the difficulties of enacting a male screening program is finding an appropriate screening site. Young men do not attend family planning clinics, get routine pap smears, or need prenatal care. The usual method of testing (urethral swab) has deterred even symptomatic men from seeking treatment. The development of sensitive urine screening tests has removed this barrier and presents a more acceptable method to do widespread screening of chlamydial infection in men.

A unique opportunity for public health screening efforts presents itself in the population of our jail systems. This population includes a large number of high-risk sexually active young men. Because the men are in jail for only a short time (the average length of stay in

Multnomah County Corrections is 18 days)[5], and treatment of STDs while these men are incarcerated can play an important role in public health role in control effects, reducing the potential for spread in the outside community when the inmate is released. The potential for routine *C. trachomatis* infection screening of incarcerated men should be explored and prevalence and risk factor information is needed to establish effective and efficient screening approaches.

We conducted a cross sectional study of men age 18-30 years incarcerated in the adult facilities of the Multnomah County Corrections System in 1998.

The objectives of our study were:

- To determine the prevalence of chlamydial infection in young men age 18-30 in short term detention facilities.
- To determine risk factors among this population for chlamydial infection.
- To further define screening criteria in order to target future chlamydial infection screening efforts.

BACKGROUND

Clinical manifestations and epidemiology

C. trachomatis, an obligate intracellular microorganism, infects superficial mucosal cells in the genitourinary tract when sexually transmitted and persists for long periods of time -- months to years, if untreated. In women, the most common site of infection is the cervix and cervicitis usually results. Only 10-30% of women with cervical chlamydial infection report symptoms, which generally include abnormal vaginal discharge, intermenstrual bleeding, bleeding after vaginal sex, and lower abdominal cramping.[6]

Chlamydial infections are responsible for 25-50% of the 2.5 million cases of clinical pelvic inflammatory disease (PID) that are reported annually in the US. Untreated cervical chlamydial infection ascends to the upper reproductive tract 40% of the time and sets the stage for the development of PID.[7] Up to 60% of chlamydial PID is completely asymptomatic and can have devastating effects. PID has been causally linked to ectopic pregnancy, tubal infertility, and chronic pelvic pain. These conditions very likely result from *C. trachomatis* induced inflammation and subsequent scarring of the fallopian tubes and adnexa. The frequency with which such long-term sequelae occur is not known, but it is estimated that 18% of women with untreated chlamydial PID (whether is it symptomatic or not) will develop chronic pelvic pain, 11% will experience an ectopic pregnancy, and 18% will develop tubal infertility.[7] Recently a randomized trial of *C. trachomatis* infection screening and treatment in high-risk, asymptomatic women was shown to result in a 40% reduction in the incidence of PID among those screened.[8]

Infection during pregnancy increases the risk of endometritis, both after delivery and after elective abortion. Each year more than 155,000 infants are born to *C. trachomatis* infected mothers, and the organism is transmitted to the fetus in over half of deliveries. Neonatal

infection can result in ophthalmia neonatorum and pneumonia. Conjunctivitis occurs in 15-25% of infants born to infected mothers and pneumonia in 3-16%.[9]

In men, *C. trachomatis* infections are responsible for 30-40% of the 4-6 million visits each year for nongonococcal urethritis and half of over 150,000 cases of acute epididymitis. *C. trachomatis* invades the lining of the urethra and in up to 60% of infected individuals, symptomatic urethritis results, manifested by dysuria, burning, and /or clear urethral discharge. Complications are rare in men.[6]

Both men and women with genital chlamydial infections are at higher risk for acquiring infection with HIV. Diverse observational studies have indicated a twofold to fivefold increased risk for HIV infection among persons who have other STDs including genital ulcer diseases and nonulcerative, inflammatory STDs.[10-12]

Treatment of Chlamydial Infections

Treatment effectively eradicates *C. trachomatis* infection, but it has traditionally required an extended course of medication. A full 7-day course of tetracycline or doxycycline results in a cure in 92-100% of women and 97-100% of men. Single-dose therapy with azithromycin is as effective as doxycycline and is a suitable alternative when noncompliance is a concern.[13-14]

Referral of sexual contacts of cases (partner notification) is important, since 68-70% of sexual partners are infected as measured by PCR, a DNA amplification test.[15] Although partner notification efforts are made routinely, they are by no means always successful. In follow-up studies of adolescent women successfully treated for chlamydial infections, 18-21% are re-infected 24 months later.[16-17] The benefits of screening and treating women are probably limited by high rates of reinfection from male partners.

Risk Factors for Chlamydial Infection

Although risk factors for *C. trachomatis* infection are similar to those for other STDs, *C. trachomatis* is distinct in that the reported prevalence of infection is substantial among sexually active female adolescents in general (>5%), regardless of race, place of residence, or socioeconomic status.

Age is the strongest demographic predictor of *C. trachomatis* infection. Men and women under 25 years old account for the large majority of cases, and reported prevalence of infection is highest among young women age 15-19 years.[18] The recent development of more sensitive urine tests has allowed population studies which have shown similar rates in young men in these age groups.[15] *C. trachomatis* infection is more prevalent among Blacks than among Whites or Hispanics. Other patient characteristics that have been associated with a higher prevalence of infection include a history of prior STD, new or multiple sex partners, inconsistent use of barrier contraceptives, cervical ectopy, and being unmarried. Actual risk will depend on the number of risk factors and local epidemiology of chlamydial infection.[19]

Laboratory Screening Tests for Chlamydial Infections

Traditionally, *C. trachomatis* infection has been diagnosed by detection of chlamydial inclusions in tissue culture cells. However, cell culture methods for isolating *C. trachomatis* are expensive and employ complicated cell preparation techniques. They are therefore not routinely performed.[20]

A variety of nonculture tests are now available, offering the advantages of easier handling and processing, lower costs, wider availability, and more timely results. Commercially available tests employ enzyme immunoassay (EIA), direct fluorescent antibody (DFA), DNA probe, polymerase chain reaction (PCR), or ligase chain reaction (LCR) to detect *C.*

trachomatis in urethral, cervical or urine specimens. The DNA amplification techniques are the new gold standard for chlamydial infection diagnosis, with up to 30% greater sensitivity than culture.[21-23]

Whereas screening men with culture and swab EIA requires obtaining specimens with urethral swabs, which is unacceptable to many asymptomatic men, urine specimens allow testing of males by a non-invasive procedure. The first urine screening test to be studied was urine dipstick for leukocyte esterase (LE) activity, an indicator of urethritis or upper urinary infections. The sensitivity of LE testing for chlamydial infection is variable (40-100%)[1] and the low positive predictive value of LE in asymptomatic young men (11% in one study) necessitated the use of confirmatory tests.[24]

Testing urine specimens with EIA is more sensitive (61-80%) and specific (97-99%) than LET.[24-25]False-positive EIA results may result from cross-reaction with other urinary pathogens, but confirmation of positive tests using blocking antibody or DFA increases specificity to close to 100%. The PCR and LCR assays appear to have the highest sensitivity (98-99%) and specificity (99.8%) for *C. trachomatis* using male urine specimens but use of these assays increases the cost per confirmed case.[21,26-27] OSPHL cost estimates for EIA urine testing is $8.75, which includes confirmatory DFA. Cost for LCR urine testing is estimated to be $13-15.[22]

Even with highly specific tests, the likelihood that a positive result indicates true infection varies with the prevalence of infection in the population being screened. Assuming a sensitivity of 80% and specificity of 98%, the positive predictive value of a test will range from 82% when prevalence of chlamydial is high (10%), to only 45% when prevalence is low (2%). As a result, positive results must be confirmed with a test using a different analytical principle to prevent false-positive results in low-risk patients.[19]

When screening with EIA, a threshold of 100,000 organisms is needed to indicate a positive result. Results are much more sensitive with LCR or PCR where as few as a 100 organisms can be detected. This is an important distinction because asymptomatic populations probably have lower number of organisms.[15]

Cost Effectiveness of Screening and Current Recommendations

The substantial long-term morbidity from chlamydial infection in women, the high prevalence of asymptomatic infection, and the availability of reliable screening tests and effective treatments all suggest that screening and treatment for asymptomatic chlamydial infection may be a useful strategy.

Screening during pelvic examination is recommended for all sexually active female adolescents and for other women at high risk for chlamydial infection. Cost-effectiveness analyses have concluded that screening for *C. trachomatis* infection with nonculture tests is cost-effective during routine gynecologic visits and during pregnancy when prevalence of infection in the population of women exceeds 6-8%.[28] The cost effectiveness of universal screening of sexually active adolescents and young women under the age of 25 has also been demonstrated.[29]

There is insufficient evidence to recommend for or against routine screening in high-risk men.[19] Screening is less likely to have a perceived benefit for asymptomatic men, but screening young men using urine-based tests (EIA, PCR or LCR) may be useful strategy to prevent spread of infection in communities where *C. trachomatis* is common. Screening asymptomatic adolescent males with urine EIA was calculated to be cost-saving, primarily by reducing infections in female partners, but has not been compared to the current strategy of screening women.[25]

Corrections Studies

The United States has the highest rate of incarceration in the world with one and a half million people imprisoned on any given day, and more than 22 million people flowing into and out of correctional institutions each year.[30] At any given time, approximately 567,000 persons are incarcerated in local jails (i.e. county or city correctional facilities housing persons serving short-term sentences or awaiting trial).[31]

Inmates are over-represented by groups at high risk for STDs: e.g., the poor, young, undereducated, and substance abusers. The majority of prisoners are minorities (62% of prisoners are African American or Hispanic) and most have limited access to health care before incarceration.[30]

Inmates in correctional facilities have high levels of STDs.[32] A study at the main jail facility for men in Los Angeles County found the rate of infectious syphilis was 507 cases per 100,000 persons. This was more than 11 times higher than the rate in the general county population.[33] Routine testing for STDs in US correctional facilities in 1993-4 showed that up to 17% of inmates had syphilis, up to 32.5% were positive for gonorrhea infection and up to 4.4% were positive for chlamydial infection.[34] Female detainees are at high risk of STDs because many are involved with drugs and exchange sex for drugs or money. For example, among women prisoners at Rikers Island in New York, 57% were jailed because of drug-related offenses and 80% of all women had cocaine in their urine at the time of their arrest in 1988. In this population were positivity rates of 27% for *C. trachomatis*, 16% for syphilis, and 8% for gonorrhea.[35]

The prevalence of STDs among incarcerated persons reflects the high prevalence of STDs in the social networks from which they come as well as behavioral risk factors.[36] Determinants of STDs and HIV risk have been classified into two categories: individual and population. The individual factors relate to behaviors more or less under the control

of the individual that influence or increase risk of STD. These factors include partner choice, frequency of partner change, and use of condoms, among others. Factors that lie outside the control of the individual and function more at the level of the population include sociogeographic, economic, and epidemiologic factors present in the community in which the individual lives. Attributes of communities such as poverty, substance abuse, norms for sexual behavior, sex roles, and the prevalence of STDs and HIV infection can increase the frequency of and risk associated with individual behaviors.[37]

The National Commission on Correctional Health Care recommends that all inmates be screened for STDs and that a comprehensive STD education program be provided.[38] In 1997, a CDC survey found that most jail facilities treat STDs based on symptoms or by arrestee request and do not routinely screen asymptomatic persons. Less than half of the facilities surveyed had a policy of offering routine STD testing to arrestees for any STD.[39]

Our study was designed to measure the prevalence rate and risk factors for chlamydial infection in the Multnomah County Corrections male inmate population. The results of this study should be useful for policy makers to determine whether an ongoing selective screening and treatment program would benefit chlamydial infection control efforts in this region.

METHODS

The study was conducted within the adult corrections facilities of Multnomah County Jail in Portland, Oregon in the Spring and Summer of 1998. At the time this study was conducted, the investigator was Medical Director of Multnomah County Corrections Health (MCCH). (Appendix A describes this Corrections Health program.) The study's design was approved by the joint Institutional Review Board (IRB) of the Oregon Health Division (OHD) and the Multnomah County Health Department. Since the research fulfills a requirement for a Master of Public Health thesis from the Oregon Health Sciences University, approval by this institution's IRB was also obtained.

Study population

All 18-30 years old men, who remained in custody 7 to 21 days after their arrest, were offered screening for chlamydial infection. A computer-generated list of inmates eligible for a routine health screening conducted by MCCH nurses was used to identify potential study subjects. This list provided the date of birth, housing assignment and date of arrest of the inmate, and was used to identify men meeting the study's inclusion criteria of age and length of incarceration.

In-person interviews of inmates on the health-screening list were conducted one day each week at Multnomah County Inverness Jail (MCIJ) and a second day at Multnomah County Detention Center (MCDC) by the two primary interviewers (the primary

investigator and a MPH intern). Interviews were conducted at Multnomah County Corrections Facility (MCCF) as time allowed by a MCCH community health nurse and Spanish translator. All interviewers were White and females conducted 95% of the interviews. The bulk of the interviews were done at MCDC and MCIJ. Days for interviewing and testing were chosen for convenience of the interviewers.

Interviews were conducted in all housing areas at MCDC, MCIJ and MCCF with the exception of the disciplinary unit and the psychiatric unit at MCDC. These excluded areas housed 20 inmates out of a total of 2000 inmates in the three facilities.

Men meeting the study's criteria were interviewed consecutively except when they could not be accessed. Lack of access occurred when the inmates were in court, in legal, medical or dental appointments or when the housing area was closed for security reasons by the Corrections Officers.

After preliminary analysis in the mid Spring of 1998 it became apparent that more subjects in the lower end of the age range numbers were needed for statistical power. Therefore in the late Spring and Summer, only inmates 24 years and younger were interviewed to obtain significant numbers in each year age group. For this Summer cohort MCIJ was used as the primary interview and testing site because of the difficulty of interviewing at MCDC. There were no significant differences between these sites in the rate of *chlamydia* positivity, race or in the age distribution of the subjects.

Data Collection

Two forms were used for data collection. (Appendix D) The standard Region X *Chlamydia* Project form was used for demographic and risk factor collection and laboratory reporting. (The Region *Chlamydia* Project was established in 1988 through Federal funds to implement uniform selective screening and treatment criteria for chlamydial infections in the Public Health Service Region X (Washington, Oregon, Alaska and Idaho)). This form included questions such as: race/ethnicity, presence of symptoms, new sex partners, two or more partners, previous STDs, condom used during last sex, gender of sex partners, and use of contraception. The second form used was a confidential behavioral risk factor questionnaire constructed by the investigator. This questionnaire contained questions regarding number of partners, frequency of use of condoms, exchange of sex for money or drugs, sex under the influence of drugs or alcohol, use of cocaine or intravenous drugs, needle sharing and sex with intravenous drug users.

All interviewers received standardized training on the data collection methods. Men were interviewed in a large open dorm room with an officer and usually other inmates present in the room. All attempts were made to keep confidentiality by choosing a table away from others in the room and asking questions in a low voice. In the first weeks of the study, some interviews were conducted in the medical clinic (not associated with a scheduled clinic visit) but were soon changed to the dorm situation for convenience of the Corrections Officers and efficiency of the interview process.

Each inmate was informed of the nature of the screening test, reassured it was not a drug screen, and given written information about the study. Translators and Spanish questionnaires and consent forms were available for Spanish speaking inmates. After explaining the purpose and content of the study and the consent form, and allowing time for the consent form to be read, inmates were asked to sign the consent form. If informed consent was granted, the Region X *Chlamydia* Project form and the behavioral risk factor questionnaire were completed by the interviewer. The interviewer asked the inmate questions and recorded the answers as the inmate viewed the questions on the forms. The inmates were then given standard instructions for first void urine collection and asked to provide an unobserved 15-20 cc urine specimen. A copy of the informed consent form as well as an educational pamphlet on STDs were given to the inmate with information that further STD/HIV testing was available at no cost while incarcerated. They were also informed if they were found to have a chlamydial infection, they would receive treatment in the jail within a week. They were instructed to call the Multnomah County STD clinic for results if they were released (phone number was on the consent form) or that a Multnomah County epidemiologist might attempt to contact them if the test was positive. Those who refused testing were offered an educational pamphlet on STDs and informed that HIV testing and a medical provider visit for STD testing were available at no cost while incarcerated. Identifying information for those who refused was recorded on a Region X *Chlamydia* Project form.

Laboratory Methods

The urine specimens were maintained at 4°C until processing and transported to the Oregon State Public Health Laboratory (OSPHL) where testing was completed within 7 days of collection. The OSPHL uses Syva MicroTrak Enzyme Immunoassay (EIA) (Behring) for all *C. trachomatis* testing. The EIA is 80% sensitive, 97% specific on male urine specimens as compared to culture. If the EIA is positive or in a high negative gray zone (absorbance values which lie 45% below cut off point for positives), a second test, Syva MicroTrak Direct Fluorescent Antibody (DFA) (Behring), is used to confirm the results. The DFA is 82% sensitive, 98% specific on male urine specimens as compared to culture.[22] (Appendix B)

Laboratory results were reported as follows based on the EIA and DFA results:

Positive EIA and DFA stain positive

Negative EIA negative or negative gray zone and negative DFA stain

Suspect EIA positive and DFA negative

Unsatisfactory specimen not collected or labeled properly, more than 7 days old

Ligase chain reaction (LCR) (98.0% sensitive, 99.8% specific for male urine specimens) has been used in the past for limited study purposes, but was economically unfeasible to use with current funding provided by the Region X *Chlamydia* Project.

Follow-up and Treatment

All laboratory results were sent to MCCH on the original Region X *Chlamydia* form. Clients with positive or suspect results were considered to be cases of *C. trachomatis* infection according to Region X and CDC guidelines (Appendix E) and were to be treated with oral antibiotics. On the same day results were available, nursing staff administered observed single dose treatment with 1 gram of Azithromycin to insure compliance and to expedite completion of treatment before release. Inmates were urged to have their sexual contacts seen for testing and treatment. MCCH medical provider follow-up appointments were scheduled to discuss prevention methods, screening and treatment for other STDs. Standard partner notification through the Multnomah County STD was pursued as their staffing allowed. Results were also available to the Region X *Chlamydia* Project where information was entered into a data base.

Data management

Data were entered by the principal investigator into a Macintosh computer utilizing Excel (Microsoft) software. An unduplicated inmate identification number, date of birth and race were the personal identifying data. Other information entered included location of testing, date of testing, interviewer, and reported risk factors from the two questionnaires. No one but the investigators had access to either the study's risk factor questionnaire or the data set.

Data Analysis

Computer software programs Excel (Microsoft), Epi Info (Centers for Disease Control and Prevention, Atlanta, GA) and SPSS (SPSS, Inc.) were used for the analysis of all data.

Spring and Summer cohorts, consents and refusals, interview sites and interviewers were compared for significant differences by Pearson's correlation and chi-square analysis. Internal reliability using Cronbach's alpha coefficient was calculated on four self-reported risk factor questions.

The overall prevalence of chlamydial infection for different age groups in the adult male sample population was determined. Positive and suspect test results were analyzed separately. Prevalences by age groups were compared by relative risks with confidence intervals using the oldest age group as reference. Chi-square for linear trend was used to determine trends in prevalences among the age groupings.

Age adjusted prevalence rates were used to adjust for over-sampling in the younger age ranges. These rates and cohort sample percentages were based on the age distribution of all men arrested and release rate statistics. Day 14 was selected as a mid-point in the 7 to 21 day range of data collection. Using actual numbers of men arrested during Spring and Summer of 1998, facility populations for these time periods, and a release rate based on a Multnomah County Sheriff's Department study of 1995, we calculated expected numbers of men in jail for at least 14 days in each age group.[5] Since approximately 75% of

inmates are released before day 14, the number of men arrested was multiplied by 0.25 to determine the expected number of men in jail for at least 14 days. Since approximately 44% of men are housed at MCIJ, for the limited Summer cohort, total number arrested was multiplied by 0.44 and then 0.25 to find the estimated number of men at MCIJ on day 14.

Suspects were eliminated from the data set before race and other risk factors were analyzed. This decision was based on a study by the OSPHL finding only 20% of their laboratory's *Chlamydia* suspect results (EIA positive, DFA negative) were positive by LCR.[22] (Appendix C) Relative risks with confidence intervals were determined for age, race and other risk factors.

Those risk factors whose univariate relative risk was significant to $p \leq 0.05$ were entered into a logistic regression model to determine independent risk factors associated with *C. trachomatis* infection.

In order to identify screening strategies, we examined combinations of the independent risk factors. Screening criteria was sought to maximize the number of *chlamydia* cases detected while minimizing the number of men tested.

Chlamydia test results from 1998 were obtained from OHD for other Multnomah County clinic sites for comparison purposes. Theses sites included the screening site at the Juvenile Detention Hall (JDH) as well as clinical testing sites of the Multnomah County Public Health Department including STD, primary care and family planning clinics.

RESULTS

Study Population

A total of 961 men in the target age population were in jail 14 days after arrest (677 during the Spring and 284 during the Summer). Of these, 736 (76.6%) were approached consecutively for in-person interviews and testing. Of these 112 (14.6%) refused and 624 (84.8%) were consented to interview and testing. (An additional 29 were interviewed but excluded from the analysis due to the following: incomplete data (5), repeated testing (11), inappropriate interviewers (10), or age <18 or >30 (3).) (Appendix C)

The 624 were comprised of the following: The Spring cohort consisted of 426 (62.9%) of males 18-30 years in jail for at least 14 days. A limited Summer cohort included 198 (69.7%) males 18-24 years at MCIJ incarcerated at least 14 days. (Table 1) Combining those tested and those refusing, we were able to access 74.4% of the total population in the Spring cohort and 81.7% in the Summer cohort. (Table 1)

Inmates in court or in other visits could not be accessed for interviews. Men were inaccessible for disciplinary reasons (unit housed only 10 people) or because of acute psychiatric problems (unit also housed 10 people) but their numbers were small.

Table 1: Spring and Summer cohort sizes and % of population in study based on number of men arrested by age and release rate

Corrections Population 1/15/98-3/15/98
Compared with study sample - spring cohort

Age, y	Arrested	Est. in jail on Day 14	Tested	% Tested	Refused	% Refused	% Total Population*
18	147	37	25	67.6	4	10.8	78.4
19	172	43	41	95.3	4	9.3	104.7
20	211	53	40	75.5	5	9.4	84.9
21	218	55	47	85.5	9	16.4	101.8
22	181	45	35	77.8	5	11.1	88.9
23	205	51	41	80.4	9	17.6	98.0
24	217	54	40	74.1	9	16.7	90.7
25	200	50	40	80.0	9	18.0	98.0
26	219	55	30	54.5	4	7.3	61.8
27	274	69	26	37.7	5	7.2	44.9
28	224	56	20	35.7	5	8.9	44.6
29	233	58	23	39.7	4	6.9	46.6
30	203	51	18	35.3	6	11.8	47.1
Total	2704	677	426	62.9	78	11.5	74.4

*Note: Since the percentage released is based on the average length of stay, the % Total Population who were tested and refused may be >100%

Corrections Population 5/15/98-8/30/98
Compared with study sample - summer cohort

Age, y	Arrested	Est. in jail on Day 14 @ MCIJ	Tested	% Tested	Refused	% Refused	% Total Population*
18	324	36	28	77.8	0	0.0	77.8
19	371	41	29	70.7	5	12.2	82.9
20	377	41	25	61.0	5	12.2	73.2
21	411	45	40	88.9	10	22.2	111.1
22	374	41	22	53.7	5	12.2	65.9
23	391	43	26	60.5	4	9.3	69.8
24	332	37	28	75.7	5	13.5	89.2
Total	2580	284	198	69.7	34	12.0	81.7

*Note: Since the percentage released is based on the average length of stay, the % Total Population who were tested and refused may be >100%

The age distribution in the study group and refusal group was similar.

The rates of testing and refusals differed for Whites, Blacks and Hispanics though not significantly. (Table 2) Hispanics and Blacks agreed to testing more often Whites, with testing rates of 92%, 85% and 81% respectively.

Table 2: Study population rates of testing and refusals by race/ethnicity

	Tested N (%)	Refused N (%)	Total N	RR	Sig
White	268 (81%)	64 (19%)	332 (100%)	Reference	
Black	150 (85%)	26 (15%)	176 (100%)	1.05	
Hispanic	175 (92%)	16 (8%)	191 (100%)	1.14	
Other	31 (84%)	6 (16%)	37 (100%)	1.04	
Total	624	112	736		

No significant differences in age or chlamydial positivity rates were found between Spring and Summer cohorts, interview sites or interviewers as measured by correlation and chi square analysis.

Prevalence of *Chlamydia* Infection

Of the 624 men tested, 39 (6.2%) had positive results for *Chlamydia* (EIA positive and DFA positive) and an additional 26 (4.2%) had suspect results (EIA positive and DFA negative). (Table 3)

Table 3: *Chlamydia* positivity rate in 18-30 yr old male inmates tested in combined spring and summer cohorts

	N Tested	N Positive (%)	N Suspect (%)
Age, y			
18	53	4 (7.5%)	0
19	70	9 (12.9%)	5 (7.1%)
20	65	5 (7.7%)	3 (4.6%)
21	87	7 (8.0%)	6 (6.9%)
22	57	3 (5.3%)	1 (1.8%)
23	67	5 (7.5%)	2 (3.0%)
24	67	1 (1.5%)	5 (7.5%)
25	40	0	2 (5.0%)
26	31	2 (6.5%)	1 (3.2%)
27	26	1 (3.8%)	1 (3.8%)
28	20	1 (5.0%)	0
29	23	1 (4.3%)	0
30	18	0	0
Total	624	39	26
Unadjusted Rate		6.2%	4.2%

When age adjusted by the age distribution of the total incarcerated population on day 14 after arrest, overall age adjusted prevalence was 5.4% with a positive result and 3.3% with a suspect result. (Table 4)

Table 4: Annual Age Adjusted Rates for male population 18-30 yr, if all male inmates tested 14 days after arrest

	Expected N	Expected Positive	Expected Suspect
Age, y			
18	241	18	0
19	303	39	22
20	332	26	15
21	328	26	23
22	304	16	5
23	328	25	10
24	298	4	22
25	289	0	15
26	307	20	10
27	358	14	14
28	374	19	0
29	301	13	0
30	303	0	0
Total	4066	220	136
Age Adjusted Rate		5.4%	3.3%

Prevalence decreased significantly with increasing age. Positivity rates by 3 or 4 year intervals varied from 10% among men 18-20 years old to 3.5% among those 27-30. Chi square for linear trend was highly significant (χ^2 for linear trend, 10.5, p=0.001). When both positive and suspect test results were combined (all *Chlamydia* cases), among 18-20 years prevalence was 13.8% and ages 27-30 years was 4.6% (χ^2 linear trend, 6.8, p=0.01. (Table 5 and Figure 1)

Table 5: *Chlamydia* prevalence in the adult male population of Multnomah County Jail 1998 by age groups

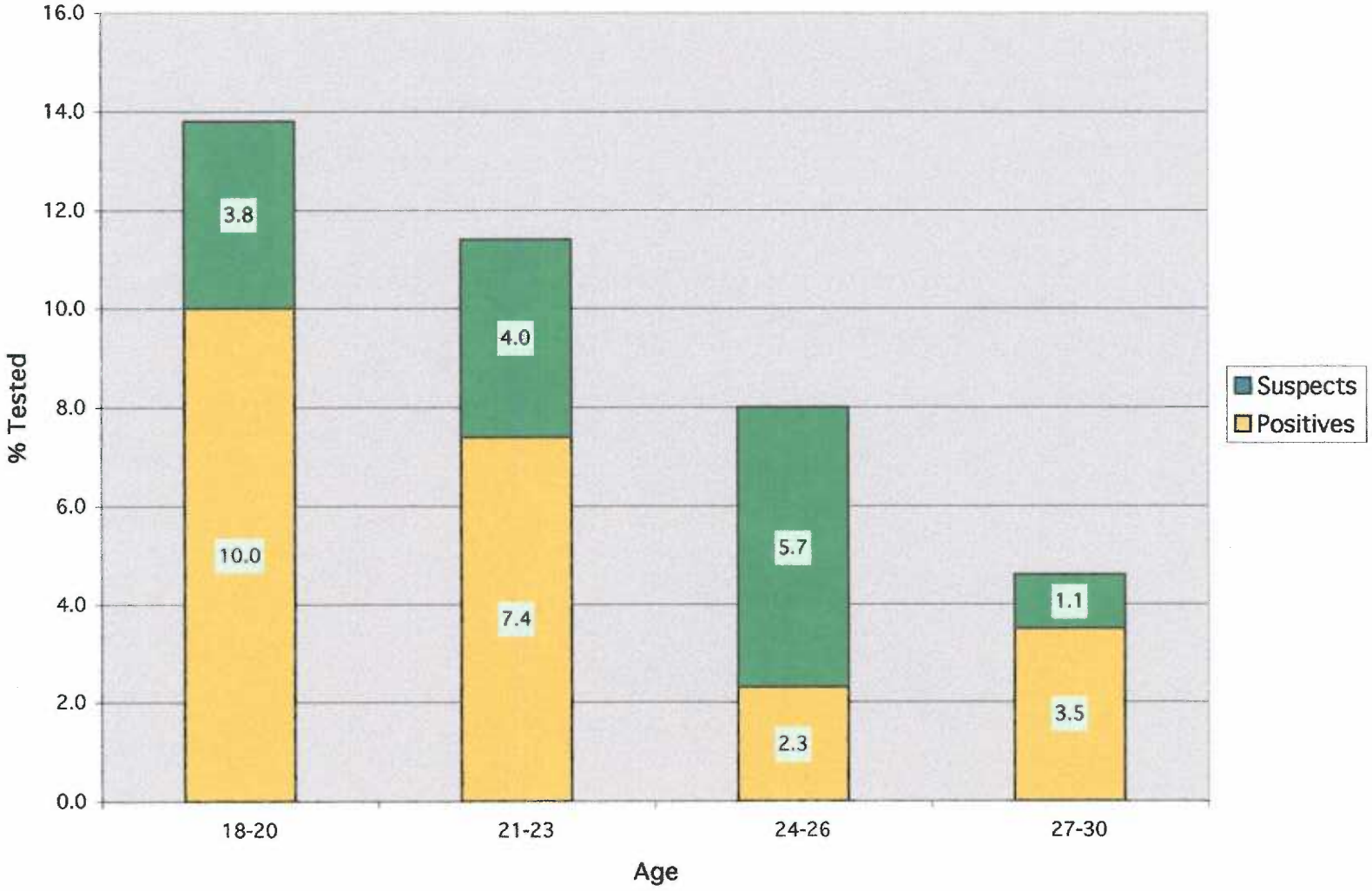
Age	Inmates	Positives	Prevalence	95%CI	Relative Risk	Chi Square for Linear Trend
18-20	180	18	10.0%	5.6-14.4	2.9	
21-23	202	15	7.4%	3.8-11.0	2.1	
24-26	130	3	2.3%	0-4.9	0.7	
27-30	86	3	3.5%	0-7.4	Reference	10.5 p=0.001
Total	598	39	6.5%	4.5-8.5		

Age	Inmates	*Chlamydia* cases	Prevalence	95%CI	Relative Risk	Chi Square for Linear Trend
18-20	188	26	13.8%	8.9-18.8	3.0	
21-23	211	24	11.4%	7.1-15.7	2.5	
24-26	138	11	8.0%	3.5-12.5	1.7	
27-30	87	4	4.6%	0.2-9.0	Reference	6.8 p=0.01
Total	624	65	10.4%	8.0-12.8		

Chlamydia lab tests
EIA positive and DFA positive = Positive
EIA positive and DFA negative = Suspect
EIA negative = Negative

Chlamydia cases = Positives and Suspects

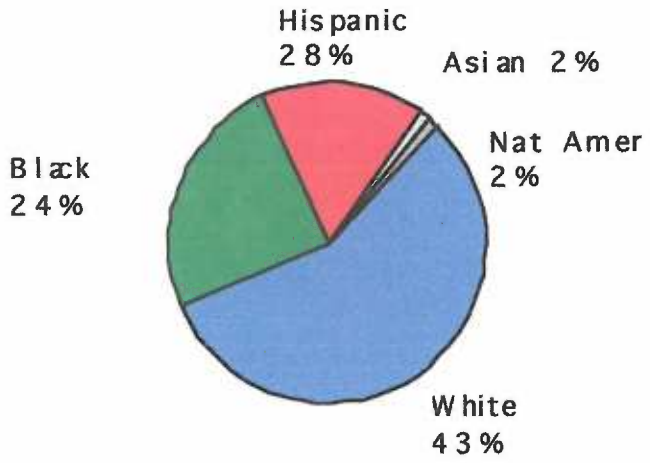
Figure 2: *Chlamydia* prevalence in the adult male population of Multnomah County Jail, 1998



Characteristics of the Study Population

Multnomah County Corrections population, like most jails, includes a higher percentage of minority races than does the wider community. The racial/ethnic distribution of the tested cohorts was 43% White, 24% Black, 28% Hispanic, 2% Asian, 2% Native American and 1% other. (Figure 2)

Figure 2. Racial/Ethnic distribution of the study population



Race information was available from the Multnomah County Sheriff's Department for the overall adult corrections population but unfortunately not for the population of interest, 18-30 years males. Therefore comparisons of race are difficult, as younger men in corrections populations may be over-represented by minorities. The racial/ethnic distribution in the overall inmate population in Multnomah County Adult Corrections Jan-April 1997 including all ages and both sexes was 56% White, 25% Black, 17%

Hispanic, 1% Asian, and 1% Native American. This was a higher percentage of whites and a lower percentage of Hispanics than in the study population.

This was a largely asymptomatic population with only 31 (5%) reporting dysuria or discharge. (Table 6.0)

Sexual activity within the last 60 days was reported by 495 (82.8%) of whom 33 (6.7%) were positive for chlamydial infection. Of the 103 (17.2%) who reported no sexual partner in the last 60 days, 6 (5.8%) were positive for chlamydial infection. In response to a question on gender of sex partners, 583 (97.5%) identified themselves as being exclusively heterosexual. (Table 6.0)

Univariate Analysis of Risk Factors

Univariate analysis identified age, race, presence of symptoms, and high-risk sex to be significantly associated with positive *Chlamydia* results. Men age 23 years and under were more likely than older men to have a positive test (RR 3.1, 95%CI 1.3-7.3,p=0.005). Black men more likely than Whites to be positive (RR 2.0, 95% CI 1.0-4.2,p=0.05). Symptomatic men were more likely to be positive than asymptomatic men (RR 3.3, 95%CI 1.5-7.3,p=0.003). Those who used condoms intermittently were more likely to be positive than those who never or consistently used condoms (RR 2.7, 95%CI 1.5-5.0,p=0.001). Men who had sex under the influence of drugs/alcohol were more likely to be positive than those who had sex without use of drugs or alcohol (RR 2.6, 95%CI 1.1-6.1,p=0.02). (Table 6.0)

TABLE 6.0: Risk factors for *Chlamydia* positivity in the study population

	Inmates	Positive	95%CI	Relative Risk	95%CI	Sig level
Age Grouping						
23y and under	382	8.6%		3.1	1.3-7.3	p=.005
24y and over	216	2.8%		Reference		
Race						
White	261	5.0%	2.3-7.6%	Reference		
Black	137	10.2%	5.1-15.3%	2.0	1.0-4.2	p=0.05
Native American	14	7.1%	6.3-20.6%	1.4	0.2-10.0	p=0.7
Asian	13	0.0%	0	0		
Hispanic	168	6.5%	2.8-10.3%	1.3	0.6-2.9	p=0.5
Other	5	0.0%	0	0		
Total	598	6.5%	4.5-8.5%			
Black						
Yes	137	10.2%		1.9	1.0-3.5	p=0.05
No	461	5.4%		Reference		
Symptomatic						
Yes	31	19.4%	5.4-33.3%	3.3	1.5-7.3	p=.003
No	567	5.8%	3.9-7.7%	Reference		
Number of sex partners past 60 days						
None	103	5.8%	1.3-10.3%	Reference		
One	305	5.2%	2.7-7.7%	0.9		
Two	94	7.4%	2.1-12.8%	1.3		
Three	55	16.4%	6.6-26.1%	2.8		
Four or more	41	2.2%	2.3-7.2%	0.4		
Gender of sex partner						
Male	5	0.0%	0	0		
Female	583	6.5%	4.5-8.5%	Reference		
Both	10	10.0%	8.6-28.6%	1.5	0.2-10.1	p=0.7
Frequency of condom use past 60 days						
Always	121	5.0%	1.1-8.8%	1.2	0.5-2.9	p=0.8
Sometimes	154	12.3%	7.1-17.5%	2.9	1.5-5.5	p=.001
Never	323	4.3%	2.1-6.6%	Reference		
Frequency of sex under influence of drugs/alcohol						
Always/Sometime:	406	8.1%	5.5-10.8%	2.6	1.1-6.1	p=0.02
Never	192	3.1%	0.7-5.6%	Reference		

Commonly recognized risk factors such as having a new sex partner, more than one sex partner, a symptomatic partner, or a past STD in last 12 months were not significantly associated with infection in the study population. Trading money and/or drugs for sex, cocaine use, and intravenous drug use were not significantly associated with chlamydial infection. (Table 6.1)

TABLE 6.1: Risk Factors (continued)

	Inmates	Positive	95%CI	Relative Risk	95%CI	Sig level
New sex partner in last 60 days						
Yes	162	8.0%	3.8-12.2%	1.4	0.7-2.6	p=0.4
No	436	6.0%	3.7-8.2%	Reference		
Positive *Chlamydia* in last 12 months						
Yes	23	4.3%	4.0-12.7%	0.7	0.1-4.7	p=0.7
No	571	6.5%	4.5-8.5%	Reference		
Unknown	4	25.0%	17.4-67.4%	3.8		
Cocaine use in the last 60 days						
Yes	72	0.042	0.4-8.8%	0.6	0.2-1.9	p=0.4
No	526	0.068	4.7-9.0%	Reference		
Ever given money/drugs in exchange for sex						
Yes	42	4.8%	1.7-11.2%	0.7	0.2-2.9	p=0.6
No	556	6.7%	4. 6-8.7%	Reference		
Ever used intravenous(IV) drugs						
Yes	123	4.9%	1.1-8.7%	0.7	0.3-1.6	p=0.4
No	475	6.9%	4.7-9.2%	Reference		

Multivariate Analysis of Risk Factors

On the basis of the strength of univariate association, five risk factors were chosen for inclusion in the logistic regression analysis. Four risk factors proved to be associated independently with chlamydial infection by logistic regression with $p<0.05$ and were included in the final model. These included reporting symptoms (OR 3.4, 95% CI 1.2-9.4, p=0.02), age less than 24 years (OR 3.1, 95% CI 1.3-7.5, p=0.01), reporting sex under the influence of drugs and/or alcohol (OR 2.6, 95% CI 1.0-6.4, p=0.02), and reporting intermittent condom use (OR 2.3, 95% CI 1.2-4.5, p=0.04). (Table 7)

While relative risk of positivity was greater for Blacks (RR 2.0, 95% CI 1.0-4.2,p=0.05) and Hispanics (RR 1.3, 95%CI 0.6-2.9,p=0.5) on univariate analysis, race/ethnicity did not prove to be an independent risk factor when entered into logistic regression models.

Table 7: Logistic regression model: risk factors associated independently with *Chlamydia* infection

Risk Factor	Odds Ratio	95%CI	*P*	Beta Coefficient
Symptomatic	3.4	1.2-9.4	0.02	1.2
Age less than 24	3.1	1.3-7.5	0.01	1.1
Sex under the influence of drugs/alcohol	2.6	1.0-6.4	0.02	0.9
Intermittent condom use	2.3	1.2-4.5	0.04	0.8
Constant	...	...		-3.6
Logistic Regression with p<0.05				

Choosing Screening Criteria based on Study's findings

The four independent risk factors were combined to develop the following five testing strategies for men ages 18-30 years. (Table 8)

Table 8: *Chlamydia* infection screening options

Screening Strategy	Predicted Number Positive	Predicted % Positive	Number Tested	% of Total Population Tested	Sensitivity* of Strategy
Only symptomatic in Age<24y	27	29%	92	2%	12%
All Age<24y	150	8%	1836	45%	68%
All Age<24y and report of intermittent condom use in 24-30y group	181	8%	2300	57%	82%
All Age<24y and report of sex under the influence in 24-30y group	202	6%	3364	83%	92%
Total Population Age 18-30	220	5%	4066	100%	100%
Screening Strategy	Predicted Number Cases	Predicted % *Chlamydia* Cases	Number Tested	% of Total Population Tested	Sensitivity* of Strategy
Only symptomatic in Age<24y	35	38%	92	2%	12%
All Age<24y	195	11%	1836	45%	68%
All Age<24y and report of intermittent condom use in 24-30y group	235	10%	2300	57%	82%
All Age<24y and report of sex under the influence in 24-30y group	263	8%	3364	83%	92%
Total Population Age 18-30	286	7%	4066	100%	100%

*Sensitivity in this case means the % of all confirmed positives or *Chlamydia* Cases identified by this screening strategy.

For each set of criteria, the number of positives for each increase in number tested was calculated. These calculations were based on correlation data for different risk factor combinations and information from Table 3 and Table 4. The denominator used for "% Total Tested" was 4,066 (the annual number of men age 8-30 years in jail on day 14). The denominators used for "Predicted % Positive" and "Predicted % Chlamydia Cases" were the predicted number positive if all men 18-30 were screened annually at day 14.

Being symptomatic was significantly associated with *Chlamydia* in men aged 18-23 yet screening only those who were symptomatic would have found only 12% of confirmed positives in the male population 18-30 years incarcerated fourteen or more days. This study did not find any symptomatic men age 24-30 who were positive for *Chlamydia.* This was likely due to the small number who reported symptoms (n=10) and the decreasing prevalence of *Chlamydia* with age.

Testing all men by urine EIA who are less than 24 years (24% of the population) would result in finding 150 men or 68% of those who are confirmed positive for *Chlamydia.* Considering all *Chlamydia* cases or using LCR urine testing would probably find 195 men. (LCR detects 30% more true positive chlamydial infections than EIA+/DFA confirmed testing according to an OSPHL study.[40])

If all men who are less than 24 years as well as those who report intermittent condom use in the 24-30 year age group were included, 29% of the population would be tested and 181 men would be found or 82% of those who are confirmed positive for *Chlamydia.* Considering all *Chlamydia* cases or using LCR urine testing would probably find 235 men.

Sex under the influence of alcohol or drugs is common among men arrested and even though positively associated with chlamydial infection, it is not specific. Therefore 43% of the population would need to be tested to find 202 men or 92% of the confirmed positives.

Comparison Populations

Unpublished 1998 data for other Multnomah County Health Department (MCHD) sites, obtained from the Region X Chlamydia Project Data Base, allowed comparison with our study population.[40] (Table 9)

The Juvenile Detention Hall conducts ongoing urine screening of all arrested adolescents. The MCHD McCoy STD Clinic, Primary Care and Family Planning Clinics test symptomatic patients as well as reported partners during clinic visits and is not a universal screening site.

As expected, screening the asymptomatic populations of Adult Corrections and JDH yields lower rates of *Chlamydia* positivity than obtained by those clinics where only symptomatic testing is done. Yet the comparison illuminates several interesting points. The positivity rate for males peaks at a later age (18-19y) than for females (<15y). The positivity rate for the Juvenile Detention Hall (JDH) is lower than the adult system in the age group 18-19 (6.3 versus 10.6%). The adult corrections system has a higher percentage of minorities (55-68%) than JDH (48%), and other Multnomah County Public Health clinic sites (25-48%) and is probably much higher than other clinics not associated with the public health system.

Table 9: Multnomah County comparison populations

Chlamydia **Prevalence from Adult Correction Facilities**
1/15/98-3/15/98 and 5/15/98-8/30/98 (Test-EIA Urine)

Male	Age,y	Inmates	%Positive	%Symptomatic	% Minority
	18-19	123	10.6	8.9	68.3
	20-24	343	6.1	4.1	55.1
	25-29	140	3.6	4.3	59.3

Chlamydia **Prevalence from Juvenile Detention Hall(JDH)**
1/01/98-12/31/98 (Test-EIA Urine)

Male	Age,y	Inmates	%Positive	%Symptomatic	% Minority
	<15	123	2.4	0.8	48.8
	15-17	191	5.8	7.3	52.9
	18-19	16	6.3	0.0	43.8
Female	Age,y	Inmates	%Positive	%Symptomatic	% Minority
	<15	29	27.6	37.9	44.8
	15-17	38	23.7	31.6	36.8
	18-19	1	0.0	0.0	100.0

Chlamydia **Prevalence from MCHD McCoy STD Clinic**
1/1/98-12/31/98 (Test-EIA swabs)

Male	Age,y	Patients	%Positive	%Symptomatic	% Minority
	<15	17	17.6	17.6	52.9
	15-17	76	27.6	31.6	35.5
	18-19	244	22.5	36.5	36.9
	20-24	839	15.3	41.6	28.0
	25-29	692	9.7	40.5	24.6
Female	Age,y	Patients	%Positive	%Symptomatic	% Minority
	<15	68	19.1	27.9	25.0
	15-17	162	20.4	46.3	32.1
	18-19	259	14.7	49.4	30.5
	20-24	588	8.3	47.8	23.8
	25-29	275	4.0	44.7	24.4

Chlamydia **Prevalence from MCHD Primary Care & Family Planning**
1/01/98-12/31/98 (Test-EIA swabs)

Male	Age,y	Patients	%Positive	%Symptomatic	% Minority
	<15	4	0.0	25.0	50.0
	15-17	4	0.0	0.0	0.0
	18-19	5	80.0	40.0	40.0
	20-24	11	9.1	45.5	63.6
	25-29	20	0.0	70.0	40.0
Female	Age,y	Patients	%Positive	%Symptomatic	% Minority
	<15	66	9.1	18.2	33.3
	15-17	172	7.6	16.3	38.4
	18-19	276	6.9	21.7	43.5
	20-24	899	4.3	21.1	45.3
	25-29	676	2.4	29.7	48.1

Discussion

Prevalence and Risk Factors

STD screening programs in correctional systems have consistently documented high rates of infection.[41-49] Ours was no exception. The overall age-adjusted prevalence rate for chlamydial infection by confirmed EIA was 5.4% for men 18-30 years. The rate was highest in the youngest men 18-20 years (10.0%) and men 21-23 years (7.4%).

When suspect results (EIA positive and DFA negative) were included, the prevalence rate was 13.8% for men 18-20 years and 11.4% for men 21-23 years. Again if the same population had been tested with the LCR, which is at least 30% more sensitive than confirmed EIA, 13.8% and 9.6% respectively would probably have been found positive.

Risk factors independently associated with chlamydial infection included younger age (<24 years), reporting symptoms, reporting inconsistent condom use versus never or always using condoms, and reporting sex under the influence of drugs or alcohol. The absence of the "dose-response" relationship in condom use is surprising but can be explained. Those who always use condoms are protected while those who never use condoms are more likely to be monogamous or not sexually active. The risk factors found in this study are consistent with those found in other studies. [19]

Screening for Chlamydial Infection

CDC's Advisory Committee for HIV and STD Prevention recommended in 1997 that early detection and treatment of curable STDs, because of the strong evidence of their

cofactor role in HIV transmission, should be implemented more widely as an HIV prevention strategy in the US. According to these recommendations, chlamydial infection screening activities should target populations that yield a prevalence of ≥ 2%.[10] Our adult male correction population and probably most other correction populations easily qualify as a recommended screening site under these prevalence guidelines.

C. trachomatis screenings would also identify a high-risk sub-population, providing opportunities for increased testing, treatment, and prevention counseling for other STDs, including HIV. Indeed the second wave of the AIDS epidemic, which is building among injection drug users and their sexual partners, appears to disproportionately affect prison and jail populations. Correctional facilities house a number of injection drug users equal to or greater than that of any other congregate setting, including residential drug treatment centers.[45]

Although screening and treating high-risk young men has the potential to reduce the incidence of *Chlamydia*, the impact of routine screening in men has not been examined prospectively, or compared to the current strategy of screening women and treating male partners. A variety of other factors will influence whether screening men will significantly reduce the incidence of new infections: duration of asymptomatic period, rates of transmission from asymptomatic men to their female partners, compliance with treatment, and rates of re-infection in young men. Previous studies have led clinicians to believe that male to female transmission occurred more readily than female to male.

However, a recent study using higher sensitivity PCR testing suggests that men and women are equally likely to contract chlamydial infection from infected sex partners.[15]

Target groups for Screening

Because most *Chlamydia* infection is asymptomatic, voluntary care-seeking specifically for STD related symptoms is unlikely to lead to detection of most infections. Screening offers the potential to identify and treat as many chlamydial infections as possible, thus decreasing the incidence of future illness and the human and economic consequences of sequelae.[51]

Our study found that 85% of confirmed chlamydial infections (EIA and DFA positive) were asymptomatic in our population (71% among men 18-23 year old and 87% among men 24-30). This is consistent with other studies findings of up to 92% of males being asymptomatic.[21,52]

The high annual rate of turnover of jail inmates may be a major barrier to screening and follow-up treatment for STDs. Successful follow-up of released detainees who test positive for STDs, and successful notification of their partners who are not incarcerated is considered to be rare.[32]

In Multnomah County the majority of jail prisoners are released within days after arrest, but the release rate declines to 2% per day (of the original population arrested) five days after arrest.[5] Release rates are estimated to be stable until about 4 weeks because of

parole violation releases. During our study, which tested men 7-21 days after arrest, only 2 men with positive results (5%) did not receive treatment because of their release. The ability of Corrections Health to locate inmates while in jail enables them to effectively treat positives within this window of time.

If all inmates were tested at arrest, a rapid *Chlamydia* test would be necessary. Rapid EIA tests, which take 15 minutes, are available and have the sensitivity and specificity similar to the conventional EIA. Unfortunately, these tests are not suitable for processing large numbers of samples daily because they cannot be automated. [53]

Our screening focused on male inmates age 18-30 years, which make up 53% of the jail population. We found two effective screening strategies for men who remain in jail at least 14 days: 1) annual screening of men 18-23 years would find 68% of those confirmed positive, while testing 45% of the population; 2) annual screening of all men 18-23 years as well as men 24-30 years who report inconsistent condom use would find 82% of those confirmed positive, while testing 57% of the population. If all *Chlamydia* cases (EIA confirmed positive and suspects) were included, these numbers would increase by 30%. Use of LCR rather than EIA/DFA would also increase the confirmed positives by 30%.

Reaching the STD Core Group

From a public health perspective, preventing infection in the persons most likely to transmit to others will have the greatest impact on the incidence of infection. The

incidence of sexually transmitted diseases in a community is thought to be largely driven by the prevalence of infection in core groups containing large numbers of high frequency transmitters. If an intervention could reduce the prevalence of infection in the core group, it would have a disproportionately large effect on STD rates in the community.[54]

Studies have found behavioral risk factors and prevalence rates in male adolescents in detention that were consistent with STD core group definitions.[42] In Richert's study of STD clincs, patients were more likely to return within a year and receive a new diagnosis or treatment for a STD if they were Black (22.0%), aged 15-24 (22.17%) or male (20.7%). The combined effects of age, race and sex distinguished a group of persons with a very high likelihood of returning with a new sexually transmitted disease; 31.8% of Black men 15-19 years of age returned with a new infection.[55] The description of this STD core group matches our study population: young, male and a high percentage Black.

In addition, there is a high rate of recidivism in jails, or individuals being returned to the correctional system. These frequent repeaters give screening efforts opportunities for testing for re-infection.

Cost Effectiveness

Few cost effectiveness studies for screening chlamydial infections in men can be found in the literature. Genc studied cost effectiveness of *Chlamydia* screening in adolescent

males in Sweden and found compared with no screening, EIA screening reduced the overall costs when the prevalence of chlamydial infection in males exceeded 10%. Most of this reduction was in the cost of health care and indirect costs for women.[25]

Limitations

This study had limitations that deserve discussion. The study was conducted in jail facilities. The Corrections Health medical system works within the corrections and legal systems to obtain access to prisoners. The correction system's primary focus is not public health concerns. Law enforcement, security and increasingly, cost containment issues are foremost on the corrections agenda.[56] In all situations security issues demanded that interviews be conducted in view of an officer. All attempts were made and perceived to be successful to prevent officers hearing interviews. Yet these conditions potentially compromised confidentiality.

Our study had a very good response rate based on consecutive testing. It is acceptable that the response rate is not 100% because it was limited by time rather than selective testing.

Inmates who were not accessible because of being in court or other visits would not be expected to have different risk factor characteristics. Those not available because of severe psychiatric or disciplinary problems may have had different risk factors but were few in number. Therefore our study group can be generalized to other Northwest US urban adult male corrections populations 18-30 years old.

The rate of those who refused screening was 15%, surprisingly low for this setting. The use of a first void urine sample to screen for *C. trachomatis* provided greater patient acceptance as it spared men the discomfort of undergoing urethral swabbing and was quicker and easier for interviewers to collect. Age did not appear to be a factor among those who refused, but Whites refused more often and Hispanic less often than Blacks. This may have been influenced by cultural factors and that the interviewers were White and mostly female.

Specimen collection errors were possible. The proper collection of first void urine determines the accuracy of the *Chlamydia* test. If the collection was done improperly, or if the inmate had voided shortly before the interview was conducted, a potentially positive result would be lost. This would have caused an underestimate of the prevalence of *C. trachomatis*.

Relying on reported risk factors may have created bias in our findings. Accurate data on behaviors such as condom use, drug use or number of partners depends on accurate reporting of the risk behavior by the patient. Behavioral information such as self reported condom use may be subject to substantial reporting bias, limiting the value of self reported sexual behavior as a reliable indicator of risk for infection.[57]

Summary

Young men as they pass through corrections facilities are an accessible group with a high prevalence of chlamydial infections. Increased risk was associated with age < 24 years, presence of symptoms, intermittent condom use, and sex under the influence of drugs and/or alcohol. Effective screening criteria were defined by age < 24 years and report of inconsistent condom use in men 24-30. Testing and treating this group may lower community chlamydial rates, benefiting the sexually active community at large.

References

1. Centers for Disease Control and Prevention. Recommendations for the prevention and management of *Chlamydia trachomatis* infections, 1993.MMWR 1993;42(RR-12):1-39.

2. Oregon Health Division. Chlamydial Infections: Contemplation. CDC Summary, 1998;Vol. 47, No. 23.

3. Oregon Health Division. Chlamydial Infections: Update and New Diagnostic Tools. CDC Summary, 1996;Vol. 45, No. 21.

4. Van Duynhoven YTH, van de Laar MJW, Fennema JSA, Doornum GJJ, van den Hock JAR. Development and evaluation of screening strategies for *Chlamydia trachomatis infections* in a STD clinic. Genitourin Med 1995;71:375-381.

5. Reilly L, Wurtz B. Planning and Research Unit, Multnomah County Sheriff's Department. Private communication.

6. Hossain A. *Chlamydia trachomatis* infections. Int J Gynecol Obstet 1989;29:107-115.

7. Cates W, Rolfs RT Jr, Arol SO. Sexually transmitted diseases, pelvic inflammatory disease and infertility: an epidemiologic update. Epidemiol Rev 1990;12:199-220.

8. Scholes D, Stergachis A, Heidrich FE. Prevention of pelvic inflammatory disease by screening for cervical chlamydia infection. N Engl J Med 1996;334:1362-1366.

9. Thompson SE, Washington AE. Epidemiology of sexually transmitted *Chlamydia trachomatis* infections. Epidemio Rev 1983;5:96-123.

10. Centers for Disease Control and Prevention. HIV prevention through early detection and treatment of other sexually transmitted diseases – United States. MMWR 1998;47(No.RR-12).

11. Wasserheit JN. Epidemiological synergy: interrelationships between human immunodeficiency virus infection and other sexually transmitted diseases. Sex Transm Dis. 1992;19:61-77.

12. Plummer FA, Simonsen JN, Cameron DW. Cofactors in male-female sexual transmission of human immunodeficiency virus type 1.J Infect Dis 1991;163:233-239.

13. Martin DH, Mroczkowski TF, Dalu ZA. A controlled trial of a single dose of azithromycin for the treatment of chlamydial urethritis and cervicitis.N Engl J Med 1992;327:921-925.

14. Center for Disease Control and Prevention. 1998 Guidelines for treatment of sexually transmitted diseases. MMWR 1998;47(No.RR-1).

15. Quinn T, Gaydos C, Shepherd M, Bobo L, Hook E, Viscidi R, Rompaol A. Epidemiologic and Microbiologic correlates of *Chlamydia trachomatis* infection in sexual partnerships. JAMA 1996;276:1737-1742.

16. Hillis SD, Nakashima A, Marchbanks PA. Risk factors for recurrent *Chlamydia trachomatis* infections in women. Am J Obstet Gynecol 1994;170:801-806.

17. Burstein G, Waterfield G, Joffe A, Zenilman J, Quinn T, Gaydos C. Screening for Gonorrhea and *Chlamydia* by DNA amplification in adolescents attending middle school health centers. Sex Transm Dis 1998;25:395-402.

18. Centers for Disease Control and Prevention. *Chlamydia trachomatis* genital infections - United States, 1995. MMWR. 1997;46:193-198.

19. U.S. Prevention Services Task Force. Guide to clinical prevention services. 2nd ed. Baltimore: Williams and Wilkins, 1996.

20. Vogels WH, van Voorst Vader PC, Schroder FP. *Chlamydia trachomatis* infection in a high-risk population: comparison of polymerase chain reaction and cell culture for diagnosis and follow-up. J Clin Microbiol 1993;31:1103-1107.

21. Chernesky M, Lee H, Schachter J. Diagnosis of *Chlamydia trachomatis* urethral infection in symptomatic and asymptomatic men by testing first-void urine in a ligase chain reaction assay. J Infect Dis 1994;170:1308-1311.

22. Biggs C. Oregon Public Health Laboratory. Private communication.

23. Warren R. Comparative evaluation of detection assays for *Chlamydia trachomatis*. J Clin Microbiol 1993;31:1663-1666.

24. Shafer M, Schacter J, Moncada J. Evaluation of urine-based screening strategies to detect *Chlamydia trachomatis* among sexually active asymptomatic young males. JAMA 1993;270:2065-2070.

25. Genc M, Ruusuvaara L, Mårdh P. An economic evaluation of screening for *Chlamydia trachomatis* in adolescent males. JAMA 1993;270:2057-2064.

26. Jaschek G, Gaydos CA, Welsh LA, Quinn TC. Direct detection of *Chlamydia trachomatis* in urine specimens from symptomatic and asymptomatic men by using rapid polymerase chain reaction assay. J Clin Microbiol 1993;31:1209-1212.

27. Bauwens JE, Clark AM, Stamm WE. Diagnosis of *Chlamydia trachomatis* endocervical infections by a commercial polymerase chain reaction assay. J Clin Microbiol. 1993;31:3023-3027.

28. Nettleman MD, Jones RB. Cost-effectiveness of screening women at moderate risk for genital infections caused by *chlamydia trachomatis*. JAMA 1988;260:207-13.

29. Howell MR, Quinn T, Gaydos C. Screening for *Chlamydia trachomatis* in asymptomatic women attending family planning clinics. A cost-effectiveness analysis of three strategies. Ann Intern Med 1998;128:277-284.

30. US Department of Justice, Bureau of Justice Statistics. Correctional Populations in the United States, 1993. Washington, DC: 1995. Publication NJ-156241.

31. Gillard D and Beck A. Bureau of Justice Statistics: prison and jail inmates at midyear, 1997. 1998. Washington DE: U.S. Department of Justice.

32. Institute of Medicine. The hidden epidemic: confronting sexually transmitted diseases. Washington, DC: National Academy Press. 1996.

33. Cohen D, Scribner R. The potential role of custody facilities in controlling sexually transmitted diseases. Am J Public Health. 1992;82:552-556.

34. Hammett TM, Widom R. 1994 Update: HIV/AIDS and STDs in correctional facilities. Washington, D.C.: U.S. Department of Justice, Office of Justice Programs, National Institute of Justice, Department of Health and Human Services, Public Health Service, CDC. December 1995.

35. Holmes M, Safyer S. Chlamydial cervical infection in jailed women. Am J Public Health. 1993;83:551-555.

36. Moran JS. Petermand T. Sexually transmitted diseases in prisons and jails. Prison J 1989;64:1-6.

37. O'Reilly K and Piot P. International Perspectives on Individual and Community Approaches to the Prevention of Sexually Transmitted Disease and Human Immunodeficiency Virus Infection. J of Inf Dis. 1996;174(Suppl 2):S214-22.

38. National Commission on Correctional Health Care. Standards for Health Services in Jails. Chicago, Ill. 1994.

39. Center for Disease Control and Prevention. Assessment of sexually transmitted diseases services in city and county jails - United States, 1997. MMWR 1998;47:429-431.

40. Harger D. Oregon Health Division, Region X Chlamydia unpublished data.

41. Beltrami J, Cohen D. Rapid screening and treatment for sexually transmitted diseases in arrestees: a feasible control measure. Am J Public Health. 1997;87:1423-1426.

42. Kim M, Gretchen C. Sexual behavior and sexually transmitted diseases among male adolescents in detention. Sex Transm Dis. 1994;21:127-132.

43. Skolnick A. Look behind bars for key to control of STDs. Correctional and community health care collaborations. JAMA 1998;279:97-99.

44. Bickell NA, Vermund SH. Human papillomavirus, gonorrhea, syphilis, and cervical dysplasia in jailed women. Am J Public Health. 1991;81:1318-20.

45. Mahon N. New York inmates' HIV risk behaviors: the implications for prevention policy and programs. Am J Public Health. 1996;86:1211-1215.

46. Glaser J. Sexually transmitted diseases in the incarcerated. An underexploited public health opportunity. Sex Transm Dis 1998;25:308-309.

47. Center for Disease Control and Prevention. Syphilis screening among women arrestees at the Cook County Jail - Chicago, 1996. MMWR 1998;47:432-433.

48. Centers for Disease Control and Prevention. HIV/AIDS education and prevention programs for adults in prisons and jails and juveniles in correctional facilities. United States, 1994. MMWR. 1996;45(13):268.

49. Glaser JB, Greifinger RB. Correctional health care: a public health opportunity. Annals of Internal Medicine 1993;118:139-145.

50. Lin JL, Jones W, Yan L, Wirthwein KA, Flaherty EE, Haivanis RM, Rice PA. Underdiagnosis of *Chlamydia trachomatis:* diagnostic limitation in patients with low level infection. Sex Transm Dis 1992;19:259-265.

51. Weinstock H, Golan GA, Kohn R, Balladares C, Black A, Oliva G. *Chlamdyia trachomatis* infection in women: a need for universal screening in high prevalence populations? Am J Epidemiol. 1992;31:41-47.

52. Gunn RA, Podschum GD, Fitzgerald S, Howell MF, Farshy CE, Black CM, Greenspan JR. Screening high-risk adolescent males for *Chlamydia trachomatis* infection. Obtaining urine specimens in the field. Sex Transm Dis 1998;25:49-52.

53. Sellors J, Mahony J, Jang D.. Rapid, on-site diagnosis of Chlamydial urethritis in men by detection of antigens in urethral swabs and urine. J Clin Micro 1991;29:407-409.

54. Thomas JC, Tucker MJ. The development and use of the concept of a sexually transmitted disease core group. J Inf Dis 1996;174(Suppl 2):S134-43.

55. Richert C, Peterman T. A method for identifying persons at high risk for sexually transmitted infections: opportunity for targeting intervention. Am J Public Health. 1993;82:520-524.

56. HIV National Alliance of State and Territorial AIDS Directors. Focus on Prevention in Correctional Settings. HIV Prevention Community Planning Bulletin. Washington, D.C. January 1998.

57. Zenilman JM, Weisman CS, Rompalo AM, Ellish N, Upchurch DM, Hook EW. Condom use to prevent incident STDs: the validity of self-reported condom use. Sex Transm Dis 1995;22:15-21.

APPENDIX A

MULTNOMAH COUNTY CORRECTIONS HEALTH

As a division of the Health Department, Corrections Health (CH) is managed and operated under the aegis of the MCHD management and operations model as much as possible in the corrections setting. To that extent it is a primary care driven system of health services delivery. The commitment to the health department model is reflected throughout the Corrections Health program and strategic planning documentation.

CH currently provides medical, dental and psychiatric services to a total inmate population of 2365 (143 are juveniles) located throughout the greater metropolitan Portland area in six facilities. Total number of adult inmates booked in 1996 was 42,476. The average stay in the system is 14 days. The Sheriff's Department projected bed need by the year 2010 is 4,000 adult beds.

The Multnomah County Detention Center (MCDC), located downtown with a bed capacity of 726, houses unsentenced and sentenced males and females and is the booking and release facility for the adult system. Health services provided at this facility include 24 hour nursing services, five day per week physician and nurse practitioner clinics, two day per week dental clinic, 10 bed medical infirmary and a 10 bed psychiatric unit. Inmates are brought to a centralized outpatient clinic for physician, nurse practitioner and dental services. RN triage and medication rounds are made in the living units. RNs assigned to the booking area 24 hours per day do all the intake health screening (an average of 3,488 intake screening per month were completed in 1997).

Multnomah County Inverness Jail (MCIJ) is located approximately ten miles from MCDC, houses unsentenced and sentenced males and females with a capacity of 880 which expanded to 1054 in the late fall of 1998. The expansion also added a 10 bed infirmary. Nursing services are provided in this facility 24 hours per day with physician clinic five and dental clinic two days per week, respectively.

Multnomah County Correctional Facility (MCCF) is a 190 bed male, sentenced medium security facility approximately twenty miles from MCDC. Eight hour per day nursing coverage is provided and a one time per week NP clinic are provided. Inmates are sent to MCIJ for dental and x-ray services.

Medical records: A unit medical record follows the inmate throughout the system.
Pharmacy Service: A ward stock system supplied and maintained by a licensed pharmacist and a pharmacy technician is currently in place.
The Multnomah Corrections Health system is currently accredited through the National Commission on Correctional Health Care.

Source: Multnomah County Corrections Health Review, January 1998. Barbara Cotton, Correction Health Services Management Consultant.

APPENDIX B

OREGON STATE PUBLIC HEALTH LABORATORY'S *CHLAMYDIA* TEST PROCEDURES

The OSPHL performs the assays according to the manufacturer's procedure. In the EIA assay procedure, a specimen treatment solution is used to elute and solubilize from cellular material in a urine pellet, lipopolysaccharide antigen (LPS), if present. Antibody (rabbit) to *Chlamydia* LPS is first added to the microwells and then treated specimen is added to the microwells and incubated. If *Chlamydia* antigen is present, the antibody binds to it and the resulting complex adheres to the surface of the microwell. Unbound material is removed by a wash step.

An enzyme-conjugated antibody (peroxidase-labeled anti-rabbit IgG) is added and binds to any antigen-antibody complexes that are present in the microwell. Unbound conjugate is removed by a wash step. When the enzyme substrates (TMB and peroxide) are added to the microwell, the presence of enzyme, and therefore of antigen, is indicated by the development of blue color. After a stop reagent (sulfuric acid) is added, the blue changes to yellow. Microwell absorbances are then read at 450nm with a reference wavelength of 630nm using a microwell plate spectrophotometer.

The cutoff value is determined by adding the mean of the negative control absorbance value to a constant. Samples with absorbances equal to or greater than the cutoff value are considered presumptive positive.

EIA positive results that substantially exceed the cutoff point may be more likely to be true positives than those near the cutoff point. Similarly, negative results that are close to the cutoff point may be less likely to be true negatives than those with lower values. By establishing a gray zone just above and just below the cutoff, specimens giving a low-positive or high-negative results are evaluated by a second test. The desired effect is to increase both the sensitivity and specificity of tests.

In the OSPHL, EIA positive results and those in the high-negative gray zone are confirmed by a second test: Direct Fluorescent Antibody (DFA). Monoclonal antibodies have been prepared against the major outer membrane protein present in all 15 known human serovars of *C. trachomatis* and in both forms of the organism: the infectious elementary body, and the metabolically active, replicating reticulate body. The antibodies are labeled with fluorescein isothiocynate. When specimen is applied directly to a slide well and stained, the antibody conjugate binds specifically to any *C. trachomatis* present in the smear. A rinse step removes unbound antibody. When slides are viewed under a fluorescence microscope, stained smears from *Chlamydia* positive specimens contain apple-green elementary or reticulate bodies contrasted by the reddish-brown background of the counterstained cells.

Source: Biggs, Chris. OSPHL. Private communication.

APPENDIX C

ADDITIONAL DATA ANALYSIS

Missing identification data were supplied through the corrections health computer system. Four patients who were interviewed but missing the Region X *Chlamydia* test form were listed as refusals. These patients had been interviewed, informed us they could not urinate at that time, were given the form and specimen container but apparently did not return it to any medical personnel. One patient had a *Chlamydia* results form coded for the study but the study questionnaire and consent form could not be located. (Result was negative) Any patient without complete data was eliminated from the study (N=5)

Repeat testers and those who refused: frequency histograms and summary tables were used on the identifying numbers to find repeat testers. 10 men were tested twice, 1 tested 3 times. All repeaters had been tested in the Spring then again in the Summer on another arrest. Out of the 11 repeaters, 7 were repeatedly negative, 2 were at first positive and then negative, 2 were at first suspect and then negative. One patient refused twice, once in the Spring and again in the Summer. The second test (and third) were systematically eliminated and only the first testing was used in the final data set. (N=11 in testing group; N=1 in refusal group)

Frequency histograms were used to search for outliers in responses to risk behavior questions. Approximately 12 corrections were made by referring back to the original questionnaires. (Data entry problems) Each data entry line was double checked at the time of entry. Approximately 10% of entries were rechecked a third time.

Hispanics were listed as Hispanics regardless of the fact they may have also responded White or Black or Native American. Patients were asked to choose Black or White if they were of both races.

The barrier method was used if two methods including barrier method were chosen. The active method was entered if both an active method and "none" were both chosen.

The handling of suspect results (EIA positive and DFA negative) in the data set was discussed at length with Oregon Health Division Epidemiologists and the Oregon State Health Laboratory Director. It was decided to throw out all suspects in the risk behavior analysis, despite the fact this was 40% of the patients that were treated for *Chlamydia* infection according to current Region X *Chlamydia* standards. (Case standards require antibiotic treatment for all positive and suspect cases.)

According to a cooperative study done in August 1995 between the Washington State Lab and Oregon's using EIA, LCR and confirmatory EIA on all specimens, approximately 20% of suspect cases were actually positive. (Biggs, private communication) Thus the inclusion of the 80% of suspect cases who were actually negative would bias the risk factor analysis for *Chlamydia* cases.

The data for four interviewers were used in the final data base. Several other medical providers were trained in the same technique, but through lack of time and opportunity did not interview but a total of 10 more patients. To reduce interviewer variability, these were eliminated. (N=10; 9 results negative and 1 positive; 3 Blacks, 5 Whites and 2 Hispanics).

Three men who were tested and interviewed were out of the age range of the study: one was just under 18, another two just over 31. (N=3)

Internal reliability analysis was conducted on similar but differently worded items appearing on both questionnaires. Two questions requesting number of sex partners (L#1 and S#1) had a Cronbach's alpha reliability coefficient of 0.96. (1.0 is perfect correlation) Another set of questions regarding condom use in the last 60 days (L#8 and S#2) had a Cronbach's alpha value of 0.75.

APPENDIX D

Forms and Questionnaires

CONSENT FORM

Title: Chlamydia Prevalence in Young Adult Men in Multnomah County Corrections

Investigators: Katrina Hedberg, MD, MPH, Oregon Health Department

Karen Marks, MD, Multnomah County Corrections, (503)248-3976

PURPOSE: Chlamydia is the most common bacterial sexually transmitted disease (STD) in the US. You have been invited to participate in this study because as many as 1 out of 10 young men may have chlamydia and need treatment. The purpose of this study is to find out how many men have chlamydia when they come into jail. Based on these results, free testing and treatment of chlamydia may be offered here on an ongoing basis.

STUDY POPULATION: This is a voluntary study. Everyone who is male and is either 18-24 or 25-30 years old and have recently been arrested will be asked to participate. We will continue the study until we have 400 men in each age group.

METHODS: We will ask you questions about your sexual history that you would be normally asked in a clinic visit for STDs. The answers will help us understand what the risk factors are for having this disease. Everything you tell us will be held confidential and not available to Corrections.

You will then be asked to give us a urine sample (unobserved). The urine will be sent to the State Health Laboratory for testing only for chlamydia. NO drug testing or other testing will be done. The results will be back to us within a week.

If the testing shows you have chlamydia we will offer you free antibiotic treatment and further STD testing. You will not be contacted if your test is negative, but you may ask us for the results.

You may be released before the test results are back. If so, you can give us your address and/or phone number we can contact you. You can also call the Multnomah County STD clinic 248-3700 for your results. You can then be treated by your doctor or the local county STD clinic.

If you are transferred to another corrections facility, their medical department will be contacted if your test is positive.

RISK: There is little risk in this study. The information we take from you will remain confidential. Since positive results must be reported to the Oregon Health Department, you will be asked for sexual contacts when you are treated, so that they can be treated too. You will not be named when the contact is located.

BENEFITS: Free, painless testing and treatment. The chance to be part of a study that may result in there being less chlamydia in Oregon.

ALTERNATIVES: If you choose not to be tested today, you may still request to see a medical provider while in jail or when you are released. However, urine testing is not yet widely available for chlamydia.

CONFIDENTIALITY: Your name will not be used for publication or publicity purposes. All information you provide us will be kept strictly confidential.

PARTICIPATION: Whether or not you choose to be tested will have no affect on your legal situation or housing while in jail. You can still request to see a medical provider for any reason.

Dr. Marks can answer any other questions you may have about this study. Please send your questions on a medical request form (MRF) addressed to Dr. Marks.

The person signing this consent will receive a copy.

Your signature below indicates that you have read the information above and agree to participate in this study.

Patient's signature_____Date_____

Patient's name_____Date of Birth_____

Witness_____Date_____

Investigator_____Date_____

If there is any chance you may be released in the next week, please fill in your name and address and phone number below so that you can be contacted for treatment by the Health Department.

Street Address_____Apt. No._____

City_____State_____Zip Code_____Telephone_____

NOTE: This consent form is also available in Spanish

CHLAMYDIA STUDY QUESTIONNAIRE

Date_____Location_____Interviewer's Code__ __ __ __

The following questions will be held strictly confidential for the study purposes only and will not be part of your medical record or in anyway available to corrections.

1. How many sex partners have you had in the last 60 days?
   0___1___2___3___4 or more____

2. How often have you used condoms when having sex in the last 60 days?
   always____sometimes_____never_____

3. Were you under the influence of drugs or alcohol the last time you had sex? Yes___No___

4. How often are you under the influence of drugs or alcohol when you have sex? always___sometimes____never_____

5. Have you ever asked for money or drugs in exchange for sex?
   Yes___No___

6. Have you ever given money or drugs in exchange for sex?
   Yes___No___

7. Have you used cocaine in the last 60 days?
   Yes___No___

8. Have you ever used IV drugs?
   Yes___No___

9. Have you ever shared needles during IV drug use?
   Yes___No___

10. Have you ever had sex with anyone who used IV drugs?
    Yes___No___

Note: Many of the activities above can expose you to HIV. You can request free HIV testing while in jail by completing a medical request form.

APPENDIX E

CASE DEFINITIONS FOR INFECTIOUS CONDITIONS UNDER PUBLIC HEALTH SURVEILLANCE

Chlamydia trachomatis, Genital Infections (Revised 9/96)

Clinical description

Infection with *Chlamydia trachomatis* may result in urethritis, epididymitis, cervicitis, acute salpingitis, or other syndromes when sexually transmitted; however, the infection is often asymptomatic in women. Perinatal infections may result in inclusion conjunctivitis and pneumonia in newborns. Other syndromes caused by *C. trachomatis* include lymphogranuloma venereum (see Lymphogranuloma Venereum) and trachoma.

Laboratory criteria for diagnosis

- Isolation of *C. trachomatis* by culture or
- Demonstration of *C. trachomatis* in a clinical specimen by detection of antigen or nucleic acid

Case classification

- Confirmed: a case that is laboratory confirmed

Source: MMWR 46(RR10); 1-55 Publication date: 05/02/1997