FACTORS WHICH INFLUENCE PHYSICIAN APPROACHES TO, DISCUSSIONS ABOUT AND TESTING WOMEN FOR *CHLAMYDIA TRACHOMATIS* IN NOVA SCOTIA

by

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Abstract

Background: Annual screening of sexually active women aged 15 -24 years for *Chlamydia trachomatis* has been widely advocated.

Goal: Examine relationships between physician characteristics and reported rates of sexual history taking, testing patients for chlamydia, and contact tracing activities taken.

Study Design: Two hundred and forty one physicians in Nova Scotia completed a mailed questionnaire.

Results: Contextual factors associated with the patient visit, demographic characteristics of the physician, and their beliefs, attitudes and perceptions were associated with rates of sexual history taking, and of annually testing for chlamydia. Further, physicians in Nova Scotia did not perform as well as might be expected with respect to contact tracing activities.

Conclusion: The frequency of sexual history taking and patient testing were below recommended levels. Both modifiable and non-modifiable characteristics held by physicians were associated with these reported rates. Physicians may be failing to adequately assess and manage patients infected with chlamydia.

Chapter 1 – Introduction

Chlamydia trachomatis is the most common curable sexually transmitted infection (STI) worldwide. In Nova Scotia, 1,761 cases of infection were reported in 2006, for a rate (186.8 per 100,000) which was higher than the overall Canadian rate of 169.9 per 100,000.(1) The prevalence of infection in the general population can be as high as 6% in women, with rates of 15% to 25% seen in subpopulations of sexually active adolescent females.(2) Of the 1,189 reported cases in this province in 2004, 78% occurred in women aged 15-24 years.(3) However, the true number of infected individuals in Nova Scotia is not known with certainty, as many cases are asymptomatic and testing is not performed systematically at the population level.

Undetected and unresolved infections in women may lead to serious health related consequences including pelvic inflammatory disease, ectopic pregnancy, chronic pelvic pain and tubal infertility.(4-6) Chlamydial infection also increases the risk of acquiring human papilloma virus and of acquiring and transmitting human immunodeficiency virus infection.(4, 5, 7, 8) Pregnant mothers may infect their children during childbirth resulting in premature delivery, low birth weight and neonatal eye, ear, lung or genital infections.(4) Complications from unresolved infections result in significant use of health care resources and it has been estimated that the cost per untreated case averages US $1,334.(9) Although the total cost of chlamydia infection and associated morbidity in Canadian women has never been determined, it has been estimated that the medical costs associated with untreated chlamydia infections in this country may exceed 100 million dollars annually.(10) In the province of Ontario, it has been estimated that chlamydia infection in 15-25 year old women costs the province in excess of $50 million annually.(11)

Annual screening of sexually active women aged 15-24 years has been widely advocated and has the potential to greatly reduce the social, physical and economic burden of this preventable and easily treated disease.(12-14) However, primary care physicians may not be effectively detecting and managing chlamydia infections in women of this age group. In Nova Scotia it has been observed that women aged 15-24 years are more likely to be infected, but less likely to be tested for chlamydia by their

physicians than are older women.(15) This tendency may relate to the fact that physicians in Nova Scotia have reported barriers to discussing prevention of STIs and pregnancy with their adolescent patients, thereby impeding access to chlamydia screening and treatment.(16) Impaired communication between the patient and the physician may combine with other physician related factors, such as insufficient knowledge of the epidemiology of the disease, its detection and proper treatment, resulting in a failure to provide appropriate and effective management of chlamydial infections in women in Nova Scotia.

This study surveyed general and family practice physicians in Nova Scotia who were expected to deliver primary health care services to women at risk for infection with *Chlamydia trachomatis.* This research examined relationships between physician characteristics and rates of testing and approaches to management and counseling of sexually active 15-24 year old female patients about chlamydia. It was expected that patterns and approaches to patient management would vary not only with physician characteristics such as age and gender, but with attitudes, beliefs and preconceptions regarding chlamydia and STIs. The questions which were addressed in this research were:

1- What was the frequency with which general / family practice physicians in Nova Scotia questioned their 15-24 year old female patients regarding sexual history?
2- What was the frequency with which physicians in Nova Scotia tested sexually active 15-24 year old women for *Chlamydia trachomatis*?
3- What factors predisposed or enabled testing for *Chlamydia trachomatis* in 15-24 year old women by physicians in Nova Scotia?
4- What contact tracing related actions did physicians in Nova Scotia most frequently take following confirmation of a positive test of chlamydia?

In order to ensure the delivery of effective health care services to infected women, it is important to develop a thorough understanding of the factors which influence physician approaches to testing and patient counseling for chlamydia. This research was addressed from the framework provided by Green's PRECEDE-PROCEED model of predisposing, enabling and reinforcing factors of behaviour.(17) Predisposing factors are personal characteristics which motivate a physician to complete a specific behaviour, such as testing an individual or initiating a discussion about sexual health. Predisposing

factors to be evaluated in this research include knowledge, attitudes, beliefs and perceptions about chlamydia infection. Enabling factors are environmental in nature and provide access to skills, services or resources to permit or facilitate action. Reminders, professional guidelines and chart based checklists are examples of enabling factors which may be found in a physician's environment. Reinforcing factors reward the individual for actions taken and influence their subsequent behaviours. These reinforcing influences may be provided by patients, colleagues or peers, may provide feedback on performance or feedback on rates of disease. The strength of the PRECEDE-PROCEED framework is that it permits an evaluation of the influences on behaviour at the collective level. An analysis of physician behaviours from this framework can provide insight into the factors and influences which preclude effective communication and service delivery to at risk patients.

In addition to an understanding of how, when and where health service delivery was deficient for detecting infections and counseling patients about chlamydia, this study attempted to examine why this occurred. This information might enable a more complete understanding of the reasons why chlamydia remains prevalent in Nova Scotia, could guide STI policy development or improve compliance with recommended screening levels. This research provides insight into the extent to which underlying factors influence the detection and management of sexually transmitted infections. This knowledge could be used to improve the use of STI health resources in the province or assist health policy makers to develop more effective health services delivery systems for chlamydia and related STIs. The research might also help guide physician training efforts and continuing education programs at all levels of medical education. Most importantly, this research could potentially lead to improvements in the physical and reproductive health of women in the province of Nova Scotia.

Males are equally likely to be infected with chlamydia and have been labeled a "forgotten reservoir of infection".(18, 19) Although it is uncertain whether screening of asymptomatic males will lead to a reduction in infections in women, the 2006 Canadian Guidelines on Sexually Transmitted Infections recommends screening for all sexually active males under 25 years of age.(19) Due to limitations inherent in a project of this nature, infection in males was not a component of this research. Inclusion of males in this project would have greatly expanded the scale and scope of this work, and would

have added significant additional length to the physician questionnaire. Further, males aged 15-24 years have been observed to have less frequent visits to family physicians, confounding physician's abilities to diagnose, treat and provide preventative counseling to this cohort.(18, 20)

1.1 Literature Review

Sexually transmitted infections are not unlike other infectious and non-infectious diseases which threaten the health of society today. As has been observed for many diseases, socio-economic, behavioural and physiologic risk factors play a strong and significant role in the epidemiology of infection with STIs like chlamydia. Sexually active young adult women and men do not always adhere to 'safe sex' practices, and many chlamydial infections are asymptomatic and go untreated. Further, physicians face many and diverse challenges in their efforts to provide effective and timely health care to potentially infected patients. Communication on the topic of sexual health and STIs is complicated for both the physician and their 15-24 year old patients. Often, these factors work in concert, sometimes preventing infected individuals from receiving the care they require. This literature review documents some of these issues and describes the current epidemiology of chlamydia and screening programs focused on its detection.

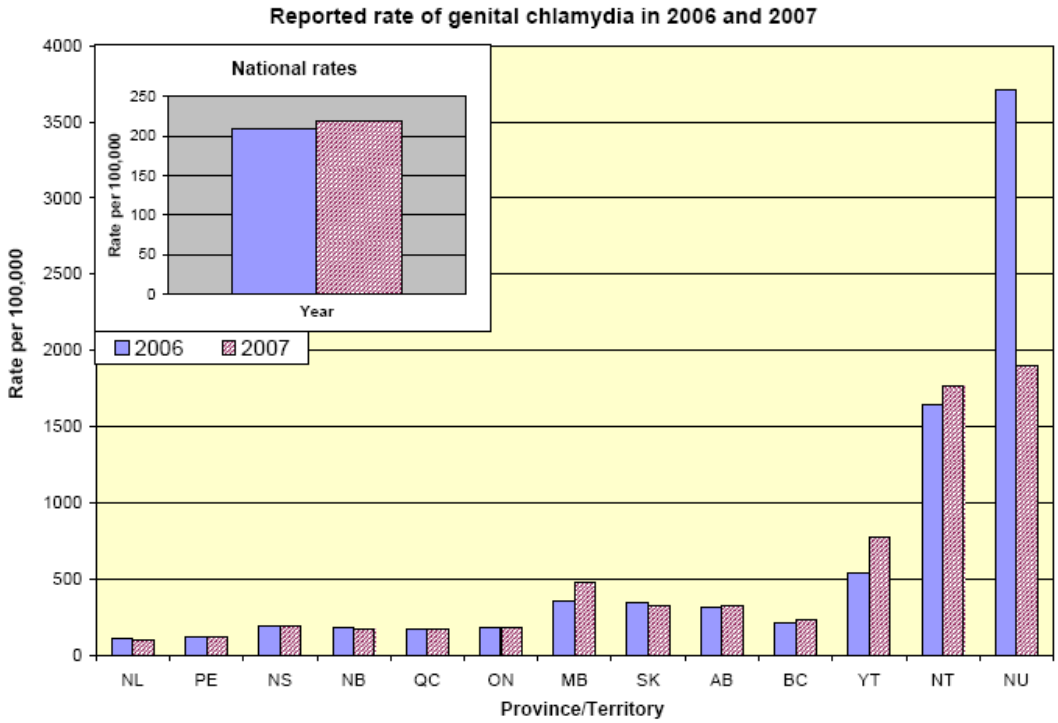
1.1.1 Epidemiology of Chlamydia trachomatis

Sexually transmitted infections represent a significant and growing threat to the health of populations around the world and have become the most common notifiable infectious disease worldwide.(21) *Chlamydia trachomatis* has been identified as the most prevalent bacterial STI recognized, accounting for over 90 million infections annually.(22-24) It is the most widespread bacterial STI in North America, with 1,030,911 cases reported to the Centers for Disease Control and Prevention (CDC) in 2006.(25) From data collected as part of the U.S. National Longitudinal Study of Adolescent Health, the prevalence of chlamydial infection in the general population was estimated to be 4.19% (95% CI, 3.48%-4.90%), with an infection rate for all ages of women of 4.74% (95% CI, 3.93%-5.71%). This study found the highest rates among African-American women at 13.95% (95% CI, 11.25%-17.18%), while white women experienced significantly lower rates at 2.52% (95% CI, 1.90%-3.34%). Regionally there are differences in infection rates, with higher rates of infection in the southern US and lower rates of infection in the northeast.(25)

In Canada, 71,661 cases of chlamydia were reported for both men and women to the Public Health Agency of Canada in 2007, with 1,761 of those reported cases occurring in Nova Scotia. (1, 26-28) Three regions in Canada, the Northwest Territories, Nunavut and the Yukon experience rates of infection significantly elevated over the 2007 national average.(29) Figure #1 displays the rates of reported infection for all ages and both sexes across Canada, by province.(29) This figure demonstrates not only the difference in reported rates across this country, but how Nova Scotia compares to the other Canadian provinces and territories. Canada's Northern communities have relatively small populations and experience very elevated rates of infection. Their rates may result from a combination of socio-economic factors, behavioural risk factors and access to preventative health services. It is possible that these rates of infection in remote communities and subpopulations skew the overall regional rates significantly upward.

The Public Health Agency of Canada reports that since 1996, chlamydia infection rates have been on a steady incline, rising from 168.10 to 191.86 reported cases of infection per 100,000 people.(30) While chlamydia historically accounts for approximately 48% of all bacterial STIs reported in this country, and is currently the most commonly reported notifiable disease in Canada, and it has been estimated that less than 10% of all infections are diagnosed, reported and receive treatment.(8, 28)

Figure 1, Reported Rates of Infection, Canada, 2007

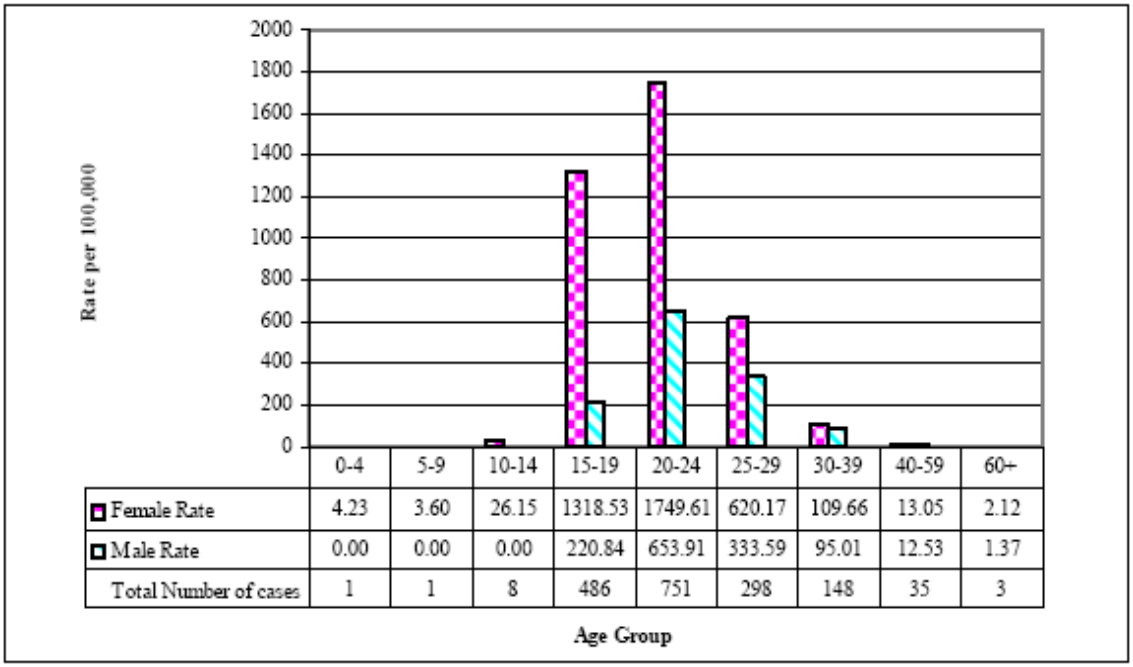


From Public Health Agency of Canada, 2008(29)

Research consistently shows that STIs disproportionately affect sexually active 15- 24 year old women. Of the 1,589 reported cases in Nova Scotia in 2004, 75% (1,190) occurred in women and 58% (926) in women aged 15-24 years.(31) In 2006, Nova Scotian women aged 15-19 and 19-24 years experienced infection rates 7 and 9.4 times the average provincial rate of infection.(1) Reportable disease databases, surveillance reports and risk factor studies all demonstrate that women in this age group account for 70%, or more, of diagnosed infections.(32-37) Figure #2 displays the age specific incidence of chlamydia infection by gender in Nova Scotia for the year 2006.(1) This chart demonstrates that there are large differences in rates of reported infection between men and women and that women aged 15-24 years account disproportionately for reported infections. The higher infection rates in women may be due to higher testing rates, higher incidence of asymptomatic infection in males, or both. It is also possible that reproductive or gynecological preventative health services for women result in more screening tests being completed. Diagnostic testing for chlamydia in Nova Scotia is completed by the laboratory at QEII Health Sciences Centre. During the year of 2008,

12,230 tests were performed on women aged 16-25 years of age, accounting for 57% of all tests submitted. Of all 916 tests which returned a positive result, 78.5% were from woman between 16-25 years of age. (38)

Figure 2, Age Specific Incidence of Chlamydial Infection by Gender, Nova Scotia, 2006



	0-4	5-9	10-14	15-19	20-24	25-29	30-39	40-59	60+
Female Rate	4.23	3.60	26.15	1318.53	1749.61	620.17	109.66	13.05	2.12
Male Rate	0.00	0.00	0.00	220.84	653.91	333.59	95.01	12.53	1.37
Total Number of cases	1	1	8	486	751	298	148	35	3

From Notifiable Diseases in Nova Scotia: Surveillance Report 2006 (1)

1.1.2 Risk Factors for Infection

Many behavioural, socio-economic and health related factors must be considered when attempting to understand infection rates and the disparity between rates experienced by differing segments of the population. Women aged 15-24 years may be at higher risk for infection with STIs due to behavioural factors including; having multiple sexual partners, male sexual partners of an older age, or lack of barrier protection during intercourse.(33, 37, 39) Adolescents may also modify their behaviours due to social pressures and peer influence. Alcohol and drugs use may impair decision making for adolescents and young adults presented with opportunities to engage in sexual acts. Further, evidence suggests that the adolescent female reproductive tract is more physiologically and immunologically susceptible to infection with STIs.(40, 41) The adolescent female cervix undergoes a period of prominent ectropion, where a portion of the cervical epithelium exhibits active metaplasia. These tissues are the primary site for invasion by chlamydial

bacteria.(42) Finally, cellular and humoral immunity to re-infection with chlamydia organisms is insufficient to provide adequate levels of protection. Therefore, unless behavioural factors are modified, re-infection in young adult women is likely.

Behaviours risk factors can account for a large portion of young adult infection, for males and females alike. The Canadian Youth, Sexual Health and HIV/AIDS Study found that 19% of female grade 9 students reported having had sexual intercourse with 46% of females in grade 11 having done so. Further, about 16% of these sexually active females report multiple sexual partners, and between 64% and 75% of grade 11 students reported condom use at last intercourse.(43) Other research reveals that 43% of teens aged 15 to 19 reported having had sexual intercourse at least once, with one third of 15 to 17 year olds and two thirds of 18 to 19 year olds having done so.(44) In Nova Scotia, sexual activity in teens rose to 49% in 2005, with approximately one third reporting more than one sexual partner annually and only 50% reporting condom use at last intercourse.(45, 46) This evidence suggests that adolescent and young adult women are exposed to many behavioural and physiologic risk factors which put them at elevated risk for acquiring and transmitting STIs, and explains to some extent why 15-24 year old women account for a high proportion of reported infections. If those risk factors remain unchecked, re-infection is likely.

When counseled about abstinence and condom use following treatment for an STI, behaviours may change but may not be maintained. In a cohort of predominantly African-American 15-24 year old women followed through an STI clinic in Indianapolis, it was observed that although abstinence and condom use improved slightly following counseling, the effect did not last. At 1 month follow up, 25% of women reported abstinence following treatment, but only 18.7% did so by the 3 month follow up consultation. Similarly, condom use increased from 45% to 64% at 1 month follow up, then declined to 58% by the three month visit. Approximately one half of women returning at 1 month for follow up reported coitus with a partner established prior to the initial consultation, and among those who did not abstain from sexual activity, the median period to resumption of coital activity was eight days.(47) This research suggests that the health care provider can have an impact on the sexual health of adolescents and young adults, but re-infection is common.

1.1.3 Re-infection

A significant problem contributing to the burden of chlamydia related disease is re-infection following successful treatment. A study of adolescent women attending school based health centres revealed an eight year cumulative incidence rate of re-infection within 1 year of 26.3% (95% CI 23.4–29.2%).(48) Adolescents who were younger at first infection showed a greater likelihood of becoming re-infected within 1 year. This study highlights both the high propensity for adolescent youth to become infected with an STI, and how likely they are to become re-infected within a short period of time. Research has demonstrated that for minority groups of reproductive aged women, an educational program was effective in reducing the rate of recurrent infection with *Neiserria gonorrhea* and *Chlamydia trachomatis*. (49) In this randomized clinical trial, a 52% reduced rate of re-infection was observed among participants who had received risk reduction counseling provided by nursing staff.

The same cohort of Indianapolis women previously discussed were also followed for re-infection at subsequent visits to county STI clinics or community-based adolescent health clinics. Of those who returned for follow-up testing at 1 month, 58 of 195 (29.7%) were again infected. At 3 month follow-up, 59 of 157 (37.6%) were re-infected. Overall, 97 of 236 (41.1%) of returning women were again infected within 12 months of an initial STI. Statistical predictors of re-infection were African-American race, gonorrhea as the initial infection, two or more sex partners in the previous 3 months, and inconsistent condom use.(50) More than 77% of this cohort was of African-American descent, living in a large urban centre and accessing health services through community or STI clinics. Sexually transmitted infections, like chlamydia have been observed with increased frequency in certain subpopulations, where socio-demographic factors play a large role in their health status and infection rates.

1.1.4 Socio-economic Factors Associated with Chlamydia

As has been observed with respect to many conditions impacting human health, socio-economic status and chlamydia infection are highly correlated, where asymptomatic chlamydial infection is more highly prevalent in economically disadvantaged populations.(25, 35, 51-55) *C. trachomatis* infections in the United States are more

prevalent in the southern states, in medium to larger major metropolitan areas and in populations of lower socio economic standing. (56) African-American women aged 15-24 years were observed to have significantly higher infection rates (8,000 per 100,000) than their Hispanic (2,900 per 100,000) and non-Hispanic white (1,300 per 100,000) counterparts. (52, 53) A survey of 4,086 university students in California revealed that the incidence of chlamydia infection, diagnosed via urine PCR tests, for African-American students was 6.7%, for Asian/Pacific Islanders was 4.6%, and for Hispanics was 3.4%, compared to 1.2% for Whites.(54) The Centers for Disease Control and Prevention (CDC) also reports disparate rates of infection among women. In 2006, the rate of reported chlamydia in African-American females (1,760.9 per 100,000) was seven times greater than that of white females (237.0 per 100,000) and more than twice that of Hispanic females (761.3 per 100,000), while rates among American Indian/Alaska Native females was 1,262.3 per 100,000 and the rate among Asian/Pacific Islander females was 201.2 per 100,000. (55) From data collected through a US federally funded job training program for economically disadvantaged youth aged 15-24 years, a positive chlamydia test was observed to be significantly associated ($p<.001$) with race. In this study, 12% of African-American and 11.3% of Hispanic women tested positive for chlamydia.(51)

Other research has found higher STI infection rates among women living in economically disadvantaged situations. In the city of Hamilton, Ontario, the prevalence of chlamydial infection in 16-30 year old women, as detected via self-collected vaginal swabs, was 6.0%. However, among those women tested, the highest infection rate (18.2%) was found in women attending street health centres. Alternatively, only 2.8% of women tested at university health clinics and 3.4% of women tested at family physician's offices were positive for infection.(57) Through findings reported in The Enhanced Surveillance of Canadian Street Youth, the Public Health Agency of Canada has determined that street youth have up to 10 times higher rates of infection than youth in the general population.(58)

Aboriginal populations have been characterized by elevated chlamydia infection rates. Although accounting for only 6.5% of the provincial population, fully one-third of reported cases of chlamydia in the province of Manitoba occurred in persons of Aboriginal ethnicity.(59) This information further suggests that a significant number of chlamydia

infections would be diagnosed in certain specific subpopulations of adolescent women, were they to access a health care provider for testing and treatment. Therefore, screening programs designed to target socially disadvantaged youth would be expected to do much to reduce the burden of infection, morbidity of disease and social and economic consequences related to infection. However, given that chlamydia is observed in 15-24 year old women of all socio-economic levels, routine screening has been widely advocated and is thought to be effective, but only if completed routinely.

1.1.5 Routine Screening Programs

There is a large body of evidence to support routine annual screening of sexually active 15-24 year old women as an effective strategy in reducing the social, physical and economic impacts of chlamydia associated morbidity. These screening programs have been observed to reduce reproductive morbidity from pelvic inflammatory disease, tubal infertility and ectopic pregnancy.(6, 60, 61) Further, it has been demonstrated that these programs are cost effective and cost saving.(60, 62, 63) The Canadian Public Health Association, the US Preventative Services Taskforce, the US Centers for Disease Control and Prevention, and many other health policy organizations around the globe all strongly recommend routine annual screening for all sexually active females under the age of 25 years.(12, 13, 19) To this effect, the Canadian Guidelines on Sexually Transmitted Infections, 2006 have been published to assist physicians in the management of all STIs.(19) In the United Kingdom, an expert advisory group to the Chief Medical Officer suggested that a screening program for chlamydia should be based around the opportunistic testing of women by their primary care physicians.(14, 64) Many state and provincial health departments, health maintenance organizations (HMOs) and health provider organizations and policy groups further promote annual screening as a means of reducing the burden of disease and morbidity associated with chlamydial infection. However, research on physician practice patterns and the increasing “silent epidemic” of chlamydia suggest that these recommendations are not being applied on a large or consistent scale, in Canada or elsewhere. As a result, infected women may not be correctly diagnosed, may not receive proper, timely or effective treatment and have the potential to suffer the long term health complications relating to an unresolved infection.

In Nova Scotia, a province wide public health policy change in December, 2006, moved to increase the age of first Pap testing from 18 to 21 years of age, or 3 years after the first reported onset of sexual activity after 18 years. (65) Given that the onset of sexual activity for many females is much earlier than 18 years, this policy decision may have unanticipated health and economic repercussions. Although the benefits of routine screening have been widely advocated and routine screening guidelines have been published, physicians may not always comply with recommendations and testing rates remain at sub-optimal levels.

1.1.6 Physician Response to Guidelines

Many agencies and organizations have promulgated guidelines as an aid in health care service delivery. These statements are intended to assist both physicians and patients with respect to specific clinical situations and presentations. Successfully employed, these guidelines have the potential to improve patient care, simplify service delivery and reduce inefficiencies in resource utilization. However, physicians do not always respond positively to guidelines, and studies of their behavioural responses to them have been mixed.(66) The British Columbia Centre for Disease Control and Health Canada surveyed a large sample of BC general and family practice physicians to evaluate their knowledge of and adherence to STI/HIV guidelines. While only 58% had a copy of the guidelines, 70% considered those guidelines useful. Physicians in practice ten or fewer years more likely reported the guidelines as very useful.(67)

Meta-analysis on physician responses to guidelines has noted several barriers to adherence.(68) Among 46 surveys, physicians cited a lack of awareness to guidelines 54.5% of the time. Of 31 surveys measuring lack of familiarity, the percent of respondents citing this as a barrier was as high as 89%, with a median of 56.5%. Lack of agreement was observed to be as high as 91% among 33 surveys. In these surveys, lack of credibility and perceived reductions in autonomy were observed as barriers to agreement in 85% and 7% respectively. Further, it was noted that some barriers to adherence to guidelines were attributed to patient related factors. When patients were resistant, perceived no need for guideline recommendations, or found guidelines embarrassing of offensive, 10% of physicians reported lack of adherence to established guidelines. Alternatively, adherence to guidelines may be influenced by factors not under the physician's control. A lack of resources or facilities, such as counseling materials,

staff or consultants, poor reimbursement or increased liability, were reasons cited for physician failure to adhere to established practice guidelines.(68) With respect to STI screening, guidelines have shown limited influence on physician behaviours. Even when there is a known need to screen for infection and policies and programs have been put in place to promote screening, compliance remains low and potentially infected individuals remain at risk.

1.1.7 Physician Screening Performance

It is provincial health policy in Manitoba that all sexually active men and women under the age of 25 years who present themselves to a health provider be advised to be tested for chlamydia. However, only 20% of 15-19 year old, and 29% of 20–24 year old women who were seen by a sample of Manitoba physicians in 1997 were tested for chlamydia.(69) This study further estimated that 89% of these women visited a physician that year for a routine physical exam. As the physicians included in this study were involved in a provincially supported STI treatment program, it is likely that these numbers overestimate the actual number of women seen and not properly assessed by their physicians in Manitoba. Women treated in hospitals, on an in-patient or an outpatient basis, and aboriginal people treated on reserves were not included in this study, and it is known that rates of infection are higher in aboriginal and remote communities than the general population.(70) Similar studies in other locations have shown similar results.(71, 72)

A 1991 survey of family practice physicians and residents at six large teaching hospitals in Toronto revealed that only 35% of those responding would routinely screen all asymptomatic sexually active women during an examination.(73) Interestingly, 54% of the first year residents elected to screen in this situation, while only 33% of second year residents and 20% of staff physicians did so. This difference in screening rate was the only statistically significant demographic characteristic noted in the survey. These low screening rates may have been due to the fact that 69% of the physicians were unaware of the national chlamydia screening guidelines. Further, of those who were aware of the guidelines, only 39% claimed to follow them. This data must be interpreted with some caution. Universal screening of all women was not recommended in the “1989 Canadian Guidelines for Screening for Chlamydia trachomatis Infection”. However, those

guidelines did recommend routine screening of all 15-25 year old sexually active women.(74)

Unpublished research indicates that in 2003, 27% of a sample of sexually active 15-19 year old women in Nova Scotia received STI testing, despite the fact that 90% of them had seen a physician that year.(75) Two studies of STI management by physicians in Nova Scotia have been published. One examined physician behaviours in a single rural county in 1990, using a case series review of medical records.(37) This research found that female adolescents aged 15-19 years were less likely to be tested by their physicians than 20-29 year old women, but were more likely to be infected. One third of those women tested were aged more than 29 years, although these women rarely returned a positive test. The second study examined testing and counseling approaches in a sample of Nova Scotia physicians in 1997.(76) This study found that a high percentage, 85% of male and 97% of female, of physicians would test a pregnant 17 year old woman for chlamydia. This study asked physicians whether they would test patients in two other settings, not including an adolescent female presenting for a routine annual examination where most opportunities to sample are suspected of being missed. When questioned if they would ask 15 year old boys and girls about sexual activity, between 16% and 74% responded that they would do so ≥ 75% of the time. There is currently limited research that has been conducted on physician testing performance in the province of Nova Scotia. Although a large body of research has been completed in the United States, it is difficult to apply this research in a context which describes this province, due to differences in population demographic characteristics and the structure of health insurance and management organizations.

In the United States, health care provider practices have not been observed to comply with established guidelines, and many clinicians do not routinely screen their sexually active adolescent patients for STIs. A questionnaire based survey of physicians in Colorado revealed that 26.3% of providers report always performing a chlamydia test on sexually active adolescent females, with 54% regularly testing those patients. (77) Only 6% of male respondents and 17% of female respondents indicated that they would test sexually active adolescent females aged 13-19 years during a routine physical examination. These low numbers are interesting given that 73% of those providers report regularly taking a sexual history from those patients. This study surveyed all

providers who would be expected to perform gynecological examinations, including obstetrician-gynecologists, pediatricians, internists, nurse practitioners and physician assistants, in addition to family practice providers. Only 46% of respondents in this survey were family practice providers. Therefore, these estimates could over estimate the rates of testing completed for the majority of women patients seen by their family practice physician.

A similar study conducted in Pennsylvania found that one-third of providers screen asymptomatic, sexually active adolescent women during routine gynecological exams.(78) This statistic is concerning given that 71% of respondents did not agree with the statement, “Chlamydia is too uncommon in my patient population to screen asymptomatic teenage women for it.” One contributor to this low screening rate may have been that one-third of physicians were unsure if the test would be reimbursable through the patient’s HMO. Less than one-half (47%) of physicians in a California study indicated that they would routinely screen sexually active women under the age of 25 years for chlamydia, even though there had been many initiatives to improve STI screening directed toward primary care physicians in that state.(79) Interestingly, nurse practitioners were almost twice (80%) as likely to screen the same cohort of adolescent women in this study. When patients presented with evidence of cervical infection, testing rates increased to 88%-95%. Again, the low screening rates are concerning given that 80% of providers did not agree that chlamydia prevalence was too low to warrant screening in their patient populations and 73% routinely took a sexual history during the exam.

Only 35% of participants reported screening sexually active adolescent females aged 15-19 years annually for chlamydia in a baseline survey of California primary care physicians, while a national survey of physicians in the US found that less than one-third of non-pregnant females were routinely screened for chlamydia by their primary care providers.(80, 81) Regarding those California physicians, 84% of the California HMO’s recommended screening 15-25 year old sexually active women annually, ensuring that providers would be reimbursed for submitting a test. Further, of those physicians tested, only 38% would take a sexual history from those patients, even though 75% felt that their patients were comfortable discussing items of a sexual nature. A survey of primary care providers completed by the Group Health Cooperative, America’s second largest

healthcare organization found that 42% of primary care physicians would annually screen sexually active adolescent females for chlamydia. This number is far below screening guidelines, and is interesting given that 70% of respondents indicated they were “mostly or very comfortable discussing sex with females aged 14-20”. (82) From data collected by the CDC’s National Center for Health Statistics during the 2005 National Ambulatory Medical Care Survey, it was estimated that among OB/GYNs a chlamydia test was not completed at 84% of preventative care visits for 15-25 year old non-pregnant women. For primary care physicians (general, family, internists and pediatricians), the percent not tested was 99.1%.(83)

This research suggests that the screening practices of general practice physicians and specialists alike may not capture or identify each individual with a chlamydia infection whom they examine. Due in part to the highly asymptomatic nature of chlamydial infection, individuals who do not know they are infected are themselves potentially infective to other people with whom they have sexual contact. Although screening, counseling and testing are all important components of an overall strategy for reducing the prevalence of chlamydial infection in the general population, there is more that can be done. To be effective, public health actions regarding chlamydia must go beyond treating individual infections and risk reduction counseling. Contact tracing evolved as a means of identifying those persons who have had contact with someone infected with a contagious disease. By actively identifying potentially infected persons, the potential for transmission of infection can be reduced and new cases can be prevented.

1.1.8 Contact Tracing

Chlamydia trachomatis is classified as a reportable disease in Nova Scotia and provincial legislation specifies that physicians must act to protect the public once having diagnosed a reportable disease.(84). According to the communicable diseases regulations made under sections 74 and 106 of the *Nova Scotia* Health Protection Act, “Immediately upon discovering an occurrence of a communicable disease, a physician must take steps to prevent the transmission of the communicable disease to others and must take such action as is required by these regulations.”(85) As a result, physicians in Nova Scotia are required to report cases of chlamydia to the Medical Officer of Health within 24 hours.(85) Since one person has the potential to infect others, all known or

determined contacts with which the initial infected individual has had contact with must be notified of their potential exposure. This process of tracking down individuals exposed in this manner is called contact tracing.

Contact tracing has been described as the process of identifying relevant contacts of a person with an infectious disease and ensuring that they are aware of the exposure. For sexually transmissible infections, relevant contacts include those with whom the index case has had sex during the infectious period.(86) The process begins with requesting a list of potential contacts from the index case and notifying those contacts that they have been exposed to the infection. In the case of chlamydia, those initial contacts can be tested for infection, or treated presumptively with antibiotics. The Department of Health Promotion and Protection provides assistance to physicians in Nova Scotia in completing this task. This has been done in an effort to ensure that physicians have the resources to do contact tracing properly and routinely. Given that contact tracing requires physicians to obtain a detailed list of sexual contacts from an infected individual, communication issues regarding contact tracing discussions are similar to discussions and testing for STIs in general.

Research on physician performance with respect to performing contact tracing activities is limited. However, what research is available has shown that physicians do not always perform well with respect to completing contact tracing for STIs. One survey of general practitioners in Australia observed that 97% (n=213) of physicians indicated that the patient was primarily responsible for partner notification of chlamydial exposure.(87) Other research on Australian physicians has shown that 42 of 43 (97.6%) physicians surveyed indicated that they “always” or “mostly” told patients diagnosed with chlamydia to notify their partners of the infection. Further, over one half (54.5%) of respondents felt that contact tracing was only “sometimes” or “never” the responsibility of the physician, with 48.7% indicating public health officials should carry out contact notification.(88) Although this survey was carried out on a small number of physicians, the response rate was 67.7% and it reported results similar to those found in other studies. In the United Kingdom, physicians have indicated that they would also prefer to have patients inform their partners of potential exposure, instead of completing contact tracing. In this sample of primary care nurses and general practitioners, 56% responded ‘always’ and 32% ‘usually’ to the question, ”For contact tracing do you; advise patient to inform

partner?"(89) This study did not report what percentage of the 172 respondents were physicians, or how the responses might have varied between doctors and nurses.

Another study completed in Australia reports similar levels of contact tracing being performed by physicians. Eight-one percent of the 212 physicians surveyed reported that they undertook contact tracing for STIs. However, of those physicians performing this activity, 51% did so for 'all' STI cases, with 40% doing so for 'most' and 8% reporting 'rarely' completing contact tracing actions.(90) (The terms (always, most and rarely) were not quantified in the published report.) More of these physicians (96%) reported instructing the patient to notify their own contacts. Female GPs under the age of 55 years, of age and working in group practices were more likely to engage in contact tracing activities when compared to all physicians who did not perform this activity. Barriers identified by physicians which prevented their completing contact tracing were many and varied, with lack of contact details, lack of clinic policies and insufficient time or training predominating.

In the United States, approximately 80% of physicians reported always asking their patients to notify their partners once diagnosed with an STI and very few (~4%) always practiced contact tracing.(91) Although more than 50% of participating physicians agreed that completing contact tracing fulfilled their duty to warn partners of infected individuals, approximately 76% indicated that it would be overly time consuming to complete. In this study, factor analysis was employed to examine survey responses to a range of partner notification strategies. Reasons associated with physician decisions not to complete contact tracing were concern for not being compensated for doing so, lack of training and discomfort with the process of asking a patient about their sexual contact history. Informing a patient to notify their sexual contacts is much easier to do than initiating a discussion about the sexual behaviours of the patient, especially for patients of a differing gender and adolescence or younger age, when compared to the physician. Further, physician discomfort in discussing this issue with patients was more related to the physicians own discomfort when discussing sex.(91)

This research, and many articles not cited, highlight that opportunities are being missed to screen for and treat chlamydia, thereby preventing the morbidity associated with infection. Even when it is clear that patients are at risk, when there exists a known need

to screen, and when programs are in existence to promote screening for at-risk groups, testing and infection rates still fail to approach established goals. Contact tracing is similarly an activity that is not universally completed by physicians for a variety of reasons. One of the main reasons behind the difficulty initiating discussions about issues related to sexual health appears to be provider comfort with issues related to the sexual behaviours of their patients. This difficulty is compounded by secondary factors such as age and gender differences between provider and patient which complicate the discussion. Therefore, it is important to more thoroughly examine the factors which may be influencing those physicians in their decision to initiate a discussion or recommend testing to a patient for an STI, like chlamydia. Perhaps just as importantly, physicians may not be fulfilling their duties as protectors of the public health as they frequently rely on the patient to notify partners of their exposure. It would appear that any physician's actions are influenced by many factors, from standard demographic characteristics like gender or age, to items of a more personal or philosophical nature, such as attitudes about sexuality and beliefs or preconceptions.

1.1.9 Physician Demographics and Service Delivery

Much research has been conducted on the topic of physician demographic factors which impact health care service delivery. This research has been studied not only in the context of sexual health, but across all facets of health care. Physician demographic characteristics, personal beliefs and attitudes toward sexuality do impact what preventative services are provided to patients. These characteristics may relate to general knowledge of the epidemiology of STIs and the sexual behaviours of patients, or the ability to initiate effective communication strategies with patients. In order for a physician to adequately treat a patient with an STI, such as chlamydia, they must first be aware of the disease, its impact on healthcare, and appropriate methods of diagnostic testing, treatment and follow-up. Those physicians must then initiate a discussion about sexual health and obtain consent from the patient regarding testing, then correctly complete the test and initiate effective treatment or partner notification. Unfortunately, there are many links in this chain of events which are prone to failure, even when they are within the capacity of the provider to modify or improve.

Among a small sample (n=26) of family practice physicians in rural Nova Scotia, Langille, *et.al.* report female providers as having demonstrated greater knowledge of both the general epidemiology of STIs and of the sexual practices of their adolescent patients, when compared to male physicians.(15) In this survey, only 50% of male physicians could answer correctly on 7 of 10 questions about chlamydia and the sexual behaviours of adolescents. However, this study included only 6 female providers and was based in one rural Nova Scotia community, making generalization difficult. In the Group Health Cooperative study, providers who perceived themselves to be fairly knowledgeable about chlamydia were 2.3 times as likely to screen at-risk adolescents annually for it than those with less perceived knowledge.(82)

A survey of physicians in Hamilton, Ontario, revealed that only 36%-47% of treatment protocols for pelvic inflammatory disease and bacterial vaginosis were in accordance with STI treatment guidelines provided by federal or provincial health departments.(92) Female physicians were significantly more likely to be consistent with the guidelines, as were more recent graduates from medical college. Due to the relatively small number of respondents selected from the telephone directory of one metropolitan area (pop. 430,000), including OB/GYNs, urologists and family practitioner, it is difficult to make broad generalizations from this study. Further, this survey examined knowledge of the1998 guidelines for management of PID, urethritis, cervicitis, vaginitis, genital warts and HIV infection, not simply chlamydia.

A large survey of physicians in Pennsylvania found that, among other factors, female physicians had greater knowledge about STIs than their male colleagues.(93) In this study, 73% of female providers demonstrated good knowledge of STIs, based on achieving better than 75% correct answers to a questionnaire, compared to 51% of males. In fact, female physicians were 2.5 times as likely to score above 75% on the STI questionnaire, than male physicians. Younger physicians had better questionnaire scores than did older physicians, where 76% of physicians less than 40 years of age demonstrated good knowledge on the questionnaire, compared to 54% of physicians 40 years old and older. Other factors which were associated with good STI knowledge in this sample included working in an urban practice setting and knowledge of national STI guidelines provided by the Centers for Disease Control and Prevention. This was a large and powerful study, based on 1998 STI management guidelines and included

obstetrician/gynecologists, pediatricians and internal medicine specialists in the survey, in addition to family practice providers. OB/GYNs would be expected to demonstrate increased knowledge of sexual health problems, like chlamydia, thereby upwardly biasing these results. These factors make it difficult to apply these results broadly, and more specifically to the family practice physicians in rural Nova Scotia settings.

Studies evaluating the relationship between physician age and management of STIs suggest that younger physicians have greater knowledge of STIs, possibly due to their more recent training in medical school. It is believed that younger physicians are better able to counsel patients regarding risks and prevention and have greater ability to discuss issues of a sexual nature with their adolescent patients. (93-95) This information may reflect alterations in the academic training of physicians due to changing rates, risks and societal perceptions about STIs and sexuality. Also, non-urban physicians are significantly less likely to council their patients regarding STIs, citing lack of access to educational resources on risks and prevention.(67, 93)

The role, responsibility and impact of primary care physicians in the provision of counseling for patients about sexual health issues have been greatly debated. Although physicians must play an active role in testing, they must also be expected to take responsibility for risk assessment and STI counseling with their patients. Taking a history from a patient is part of any health visit, and is crucial to effective medical care. However, doctors may not always request a history of sexual practices from their patients and thereby miss opportunities to screen for chlamydial infections. Therefore, it is very important that physicians collect sexual histories and discuss sexual risks with their adolescent patients.

1.1.10 Taking a Sexual History and Providing Counseling

Given that the patient's age and whether or not they are sexually active are the two greatest predictors of infection with *C. trachomatis*, it is evident that these questions should be asked during any physical encounter with an adolescent or young adult woman. Again, family practice physicians are often not obtaining this information as they fail to initiate a sexual history taking with their adolescent patients. The result is that

opportunities to screen for chlamydia are being missed in a group at high risk for infection.

A large survey of primary care physicians, nurse practitioners and physician assistants providing gynecological care to female adolescents in Colorado found that overall, 71.9% of respondents regularly took sexual histories from their patients.(77) However, those who always took a sexual history accounted for only 26.3% of respondents. Physicians were less likely than nurses to take a sexual history, at 67.7% and 88.6% respectively, while OB/GYNs were more likely (90%) to take a sexual history than family practitioners (62%). Female providers report an increased frequency of regularly taking sexual histories from women during appointments, especially adolescent women. Female physicians were between 2.8 and 5.5 times more likely to discuss sexual history with a female patient when compared to their male colleagues and were 2.5 times as likely to test for chlamydia in those patients.(77) While physician gender was most strongly correlated with sexual history taking, provider comfort initiating and discussing STIs was positively associated with doing so.

The finding that women are more likely to take a sexual history is reported elsewhere. Seventy-five percent of female physicians in a Nova Scotia survey reported asking 15 year old girls about sexual activity, compared to 34% of male physicians. Further, those female providers were much more likely to provide sexual counseling to adolescent women (82% female vs. 47% male). The 257 Nova Scotia family physicians in this survey were asked to respond to questions specifically about chlamydia through mock clinical scenarios.(76)

Research on sexual dysfunction found higher rates of sexual history taking. Of a small sample (n=78) of physicians in a large multispecialty teaching hospital, 88% of respondents reported taking a sexual history from their patients.(96) However, of those physicians taking a sexual history, only 13% reported asking about sexual dysfunction in each patient. This research found that having a patient of the female or opposite sex, created significant discomfort regarding questioning about sexual dysfunction issues. Further, both extremes of older and younger patients also became a barrier to questions about sexual dysfunction. This work suggests that although providers may have collected histories, the quality of information collected can be improved. This research

again included specialty physicians expected to see patients for urogenital health problems and may over estimate the performance of family practice physicians in small rural settings.

Physician bias has been evaluated as a factor influencing STI preventative care service delivery.(97) Although 69-70% of a sample of Australian general practitioners reported being comfortable managing STIs in heterosexual or adolescent patients, only 40-46% of those providers were comfortable serving sex workers, indigenous persons, IV drug users and gay or lesbian patients. Physicians greater than 55 years of age, rural practitioners and those having received post graduate training in STIs were more comfortable serving patients with an STI. Those who reported reduced comfort levels were less likely to counsel patients regarding STIs and less likely to take a sexual history during the consultation.

Physicians may not treat all patients equally. They may instead make conscious or unconscious decisions to provide preventative services to patients based on some factor or characteristic which may occur during the consultation, or for reasons relating to preconceptions and attitudes toward sexual activity and the sexual practices of their patients. A questionnaire based survey of physicians in Washington State found that 87% of respondents asked about risk when a patient inquired about contraception, while 83% asked HIV related questions to patients with a preexisting history of STIs.(95) Only 38% and 26% employed verbal or written patient admission forms to identify needs for risk assessment. Approximately one-half (53%) answered positively to the statement, “I ask questions about sexual and behavioural risk as a routine part of the patient history”.

In another context, 34% responded positively to the statement, “Regardless of apparent risk, I ask specific questions to see if the patient engages in behaviours that put him or her at increased risk”. Those with advanced training in STI/HIV prevention counseling, female gender and nurse practitioners were most likely to take a proactive investigative stance with regard to discussing sexual behaviours with patients. Specifically with regard to providing STI testing, most clinicians in this sample provided testing selectively, not universally, based on the following cues; patient in high risk group (62%), clinical cues (63%) and sexual behaviours (53%). Again nurses were more than twice as likely as physicians to provide testing for HIV universally to patients. (95) Although this research

examined physician behaviours with respect to all STI, included a wide range of patient populations and included nurses, family practitioners and specialists, it further documents that screening services are based on one, or more, clues provided by the high risk patient and the discretion of the physician, and not guidelines published by health authorities. Again, while it appears that initiating a discussion about sexual health is problematic for the physician, it is also problematic for some patients. When both the doctor and the patient have barriers to initiating a discussion about health, opportunities to improve health are missed.

1.1.11 Communication Between Doctor and Patient

Understanding barriers to communication between the doctor and patient may help to understand suboptimal testing rates for chlamydia. These barriers include characteristics of the physician, the patient and of the nature of the patient-physician interaction. Verbal and nonverbal communication between the patient and the physician has been shown to exert a direct and significant influence on whether a patient is evaluated for an STI.(16) Studies of physician-patient interactions report a broad variety of factors which influence effective communication with patients presented for preventative care discussions and routine annual examinations. These factors may facilitate or inhibit communications and can significantly influence what topics are discussed, what services are offered and which procedures or tests are completed during the appointment.

Society holds complex and often conflicting attitudes about sex and sexuality, and physicians are often reluctant to discuss ‘personal’ issues with their patients. Issues of a sexual nature are often reported by physicians as difficult to discuss with patients, as there may be embarrassment on behalf of the physician, or the physician may believe that the patient will be embarrassed by the topic. Physicians may be influenced by their personal attitudes and values relating to sexuality, values which are often in conflict with the behaviours of their patients. Physician bias has also been investigated in the context of sexual healthcare service delivery. Research from Australia suggests that sexual health care is biased by physician attitudes, beliefs and anxieties.(97)

In a study of general practitioners in Belgium, 18.3% of respondents reported feeling uncomfortable taking a sexual history, while 52.4% of those practitioners reported

concern for embarrassing their patients.(98) Other factors reported to act as barriers to communication were language and comprehension difficulties (74.2%), differences in ethnic origin (68.4%) and large age gaps between patient and doctor (31.4%). Regarding characteristics of the doctor, 69.4% of physicians reported feeling inadequately trained to provide STI counseling, reported unfamiliarity with certain sexual practices (43%), cited inadequate time for STI discussion during routine examinations (60.8%), or found it difficult to raise STI issues with patients having no symptoms (79.3%).(98) These barriers are significant given that patients often visit a new GP to address their STI and chlamydia infection is frequently asymptomatic. In this study, only 44.3% of physicians reported providing some form of counseling on a regular basis. Physicians were least likely to request a sexual history from a sexually active 24 year old woman and most likely to do so for a 45 year old man asking for an HIV test, or a 33 year old homosexual man with anal fissures. These numbers are interesting given that more physicians perceived that men were more embarrassed when taking a sexual history than were women.

Some of this work is contrary to other published findings. Langille *et al.* found that 85% of a small sample of rural physicians in Nova Scotia reported a high level of personal comfort talking with adolescents about sexuality in general.(76) Additionally, 89.4% of physicians reported that the presence of a patient's partner, or parent (94.2%) in the exam room was a barrier to communication associated with sexual health issues.(99) As a result of these communication barriers, primary care physicians often fail to conduct adequate STI consultations with their patients. This research supports the idea that physicians will need to adopt a more proactive investigatory role with their patients to meet challenges presented by STIs in today's context.

A focus group based survey of British healthcare providers found similar barriers to chlamydia screening, citing lack of evidence of the benefits of screening, lack of knowledge of when or how to take a specimen, lack of time and a greater reluctance to discuss STI testing with patients. (100) Even in the context of conducting a cervical exam and Pap smear, many GPs were reluctant to discuss chlamydia testing. After a presentation of evidence supporting high rates of infection in their patient populations and the benefits of opportunistic testing, many GPs indicated that testing was either not relevant to their practice, while others reported lack of time to prepare and take a

cervical sample. This sample of providers unanimously reported that their patients would be upset by opportunistic screening when the exam was unrelated to sexual health. Factors cited which may have influenced this study were a short examination period (10 minutes), lack of urine based diagnostic tests and the requirement to undertake time consuming contact tracing procedures following positive tests.

A sample of family practice physicians in Texas serving a patient population dominated by adolescent female Hispanic patients, described factors which inhibit or facilitate communications about STIs.(99) Preventative care discussions were facilitated by factors which included; a predetermined context of the exam, new patient, especially a younger female patient, presence of parent at the exam, ethnicity, recognition of the developmental stage of the patient and reminder systems. Communication barriers included; competing demands for time, lack of time, prenatal examination and economic factors. Specifically within the context of sexual issues, context of the exam, age of patient, new patient, parent presence and recognition of a developmental stage were statistically significant factors, with parent presence the most significant factor facilitating a discussion about sexuality. Conversely, competing demands were the only significant barrier to sexuality discussions. This study was however limited by self reports collected from 42 family practice physicians working in clinics offering residency programs in the state of Texas. Further, all physicians enrolled in the study were provided “SafeTeens” study cards for recording data, thereby biasing the study.

1.1.12 Adolescent Discussions

Adolescents are often reluctant to talk to physicians about their behaviours relating to drug or alcohol use, depression, sexual or physical abuse or sexual practices.(99) This reluctance may stem from shame, embarrassment or confusion and fear of reprisal or punishment, especially in a small rural community. Adolescent approaches to seeking sexual healthcare advice is multi-factorial and is poorly understood, and adolescents are often reluctant to discuss their sexual practices, or request testing for STIs.(16) Research on Australian youth suggests that adolescent women would prefer to not openly discuss their sexual history with their primary care physicians.(101) This research found that adolescent women would provide misleading information regarding their sexual history when asked by a primary care physician during a general health

examination, preferring instead a blanket policy to screen all women based on age, not communicated sexual history. Although only a small sample of women were interviewed (n=24) in this study, the research team elected to cease interviews prematurely due to data saturation. These women felt that when the consultation was related to a sexual health concern, then discussing chlamydia screening was more appropriate. However, these women indicated that discussing items like their number of sexual partners would be a barrier to consenting to be tested.

Overall, this research suggests that 15 to 24 year old women are a population at elevated risk for acquiring sexually transmitted infections, for reasons that relate to behavioural and physiologic characteristics. If infected, and not treated, these women have increased potential to develop significant and costly genitourinary and reproductive morbidity that may also be transmitted to their children during child birth. Given the largely asymptomatic nature of chlamydial infections, the physician must play a leadership role during an examination with regard to counseling about and testing for disease. However, there are many reasons why this does not happen with regularity. Preconceptions, beliefs and attitudes on the part of the physician may predispose them to not consider testing a patient for disease. There may also be a reluctance to engage the patient in a discussion about STIs for fear of embarrassment on behalf of either the patient or the physician. It is also possible that physicians lack the necessary materials, training or time during routine appointments to compete the required actions. Finally, physicians may not receive the kind of feedback they require which rewards them for performing tests for STIs and stimulates them to change their patterns of action. Therefore, it is essential to investigate physician performance from a perspective that permits an understanding of the influences which dictate their behaviours.
By examining those personal rewards, inhibitions and motivations, the rates of performance can be more easily understood. Theoretically, once identified, mechanisms to overcome those inhibiting factors may be put in place. Similarly, reward mechanisms can be employed to promote certain desirable physician behaviours, or environmental improvements can be designed to facilitate completion of the behaviours. All of which might lead to more testing, counseling and contact tracing actions being performed. Greene's Precede-Proceed model provides a framework for conducting such an analysis of those predisposing, enabling and reinforcing factors which drive human behaviours. It

is an excellent model from which to examine the behaviours of physicians and patients alike.

1.1.13 The PRECEDE-PROCEED Model

Although the referenced studies have examined physician related factors which influence STI management, few studies have done so from a theoretical framework that facilitates an analysis of the determinants of physician behaviours. Many factors and influences work in concert to determine what information is exchanged between a doctor and patient and what tests or procedures are completed during the appointment. Some of these influences occur at the individual level, while some, such as health policy, apply to a broader scale. Individually, physicians may feel that some of these factors are under their control, while others are not. These determinants may underlie and direct physician behaviour by shaping their interests, beliefs, attitudes and abilities regarding patient care. Other factors occur at a more superficial level and may be more readily recognized by the physicians, or those who evaluate their performance.

The PRECEDE-PROCEED model was initially developed as a framework for the design of health promotion programs.(17) This framework was intended to facilitate the design of health interventions to achieve specific tailored outcomes by first understanding those underlying factors which influence and shape an outcome. This framework would then facilitate the design of an initiative which specifically addresses a need, given the current environmental conditions. The PRECEDE component defines the predisposing, reinforcing and enabling factors involved, while the PROCEED component defines policy, regulatory and organizational constructs.(102) Within this framework, predisposing factors include knowledge, attitudes and confidence. With regard to this research project, these factors relate to physician knowledge about STIs and the need for testing appropriately. They include physician beliefs regarding sexual activity and the sexual practices of young adult women, and evaluate physician commitment to the preventative practices they employ. Predisposing factors may also include screening and treatment guidelines established and promoted by health policy, advocacy or research groups.

Enabling factors make it possible for individuals or populations to change their behaviours and would include resources, conditions of living, societal supports, and

skills that facilitate the occurrence of behaviours. These are often physician office level factors, such as exam room documentation or patient prompts that discuss STI and promote the need for testing at risk groups. With respect to chlamydia testing, enabling factors facilitate the completion of a test and may include testing kits and materials that are user friendly and cost effective to stock. Some technical ability is required to complete the collection of cervical specimens for laboratory submission. Further, having sufficient time during an examination to complete the required discussions and sample collection enables the physician to act when prompted by patient history or physical examination.

Reinforcing factors provide feedback and may serve as a reward for having achieved a specific outcome, or the completion of a specific action. The reward, not necessarily monetary in nature, promotes repetition of the behaviour in the future. Examples of reinforcing factors include quantitative information regarding program success or infection rates, completed check lists or patient feedback of a positive nature. For others, it may simply be limited to personal satisfaction with having achieved success or for completion of a specific behaviour. (103)

These three factor levels are not mutually exclusive, and their influence on behaviours is conditional, such that their effects are not the same in all instances. The utility of the PRECEDE-PROCEED model is that this domain captures the complex and multidimensional influences that inhibit or motivate, prevent or facilitate and punish or reward individuals for their performance with respect to any task.(15, 104, 105) The following flow chart (Figure #3) demonstrates how these factors interact to result in the physician taking a sexual history, discussing STIs, performing a chlamydia test on a patient or completing contact tracing following confirmation of infection.

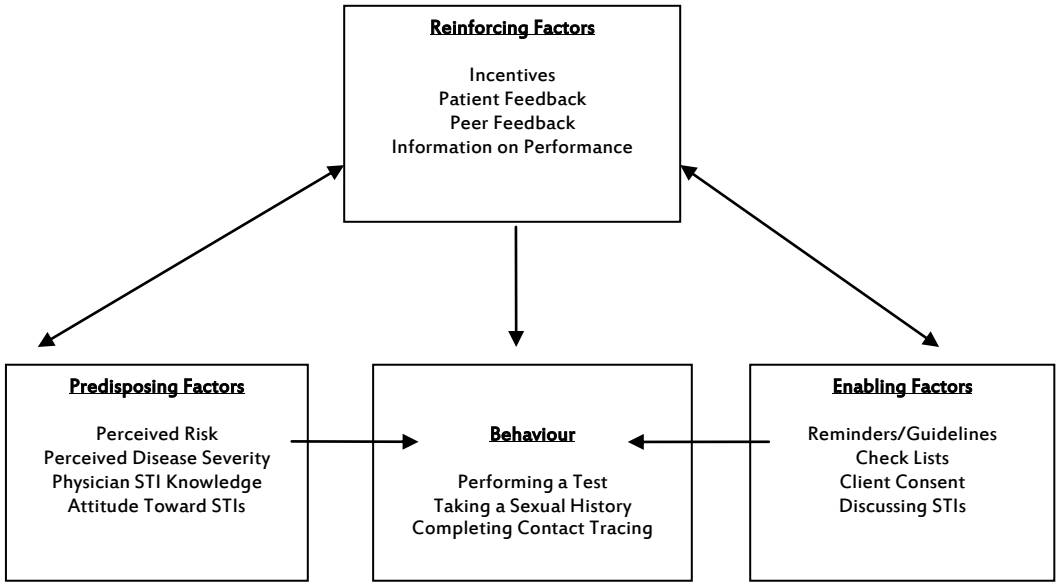
There is limited research which applies the framework to the actions of physicians, and none which does so for physician management of STIs. However, primary prevention practices of physicians have been investigated using this paradigm. In one focus group consisting of 13 general and internal medicine physicians, time limitations during examinations was cited as a primary reason for not pursuing preventative care discussions with patient. (106) Instead, prioritization of issues was deemed essential, resulting in attendance to the presenting health complaint. Screening, dietary or exercise

consultations, and alcohol or smoking discussions were addressed only if time permitted. Regarding attempts to promote a behaviours change on behalf of the patient, physicians cited a lack of training, knowledge and skill in the behaviours change process as a barrier. Also cited were poor reimbursement, and low counseling self-efficacy. Physicians indicated that more resources, including personnel such as dieticians or counselors to address preventative practices, would be ideal and permit them to focus on priority issues. However, this was not possible due to financial constraints of private practice.

The PRECEDE-PROCEED model has also been applied to studies of nursing behaviours with respect to teaching women to complete breast self examination (BSE). In this study, predisposing factors associated with teaching BSE included nurses having enhanced knowledge about breast cancer screening and the technique of BSE more years of experience as a nurse teaching BSE, and greater personal confidence in performing BSE. Predisposing factors included having an acquaintance with breast cancer which may promote an awareness of the disease and its detection. Confidence in performing a BSE was identified as an enabling factor. (107) Intuitively, these factors make sense in promoting the specific behaviours. However, this study focused on nurses, who are predominantly female, instructing women of roughly similar ages to examine their breasts. Further, breast cancer has been identified and promoted as a large scale public health awareness item. This is very different from the limited focus and attention STIs, like chlamydia have received publicly. Also, the previously highlighted issues surrounding discussions of sexual health are very different from BSE.

The application of the PRECEDE-PROCEED framework is outlined in table #3. In this flowchart, the relationship between predisposing, reinforcing and enabling factors and the behaviours is demonstrated. Note that all three factor types feed directly into the identified behaviours. Further, the three factor types are not mutually exclusive and may provide feedback loops which modify the relative influence each has on the outcome.

Figure 3, The PRECEDE-PROCEED Framework



Chapter 2 - Methodology

2.1 Overall Objective & Research Questions

Research on the subject of sexual health clearly demonstrates the continued need to actively and universally screen 15-24 year old women for *Chlamydia trachomatis*. However, primary care physicians in Nova Scotia may not be screening adequately, leaving women at risk for the negative health consequences of infection. Research on this topic strongly suggests that screening rates could be ameliorated through improved communications between the patient and the physician. Communication on the subject of sexual health care however, is complex, multi-factorial and heavily influenced by knowledge, beliefs, and attitudes, on behalf of both the doctor and the patient. Physicians must therefore take a leadership role in discussions with their patients in order to more effectively screen individuals for health concerns relating to behaviours, activities and demographic risk factors.

This research examined physician behaviours and their influences which underlie low chlamydia screening rates. Specifically, this study examined factors which influenced communication between doctor and patient with regard to initiating a discussion about and testing for chlamydia. This was done through an investigation of predisposing, enabling and reinforcing factors which influenced physician behaviours relating to taking a sexual history or performing a chlamydia test. Using an approach and design similar to McClure, et al., the effect of facilitators and barriers to annually performing a chlamydia test in 15-24 year old sexually active women was determined using the construct of the PRECEDE-PROCEED model.(82) Predisposing factors relating to annually testing 15-24 year old sexually active women for chlamydia included knowledge of the basic epidemiology of chlamydia and the sexual activity of young adult women, perceived responsibility to provide sexual counseling to patients of this age range, belief that the physician's services are of benefit to their patients, and perceived patient emotional comfort level when taking a sexual history or performing a chlamydia test. Enabling factors to annually testing 15-24 year old sexually active women for chlamydia included the amount of available time during appointment to discuss or perform a chlamydia test, having the skills necessary to complete a test, having facilities available to perform a test, physician level of comfort taking a sexual history from patients, and level of comfort

discussing or performing a test for chlamydia. No questions involving reinforcing factors were prepared or employed in this study.

The questions examined in this research were:

1 What was the frequency with which general / family practice physicians in Nova Scotia questioned their 15-24 year old female patients regarding recent sexual history? Further, how were demographic characteristics, attitudes or beliefs about sexual health care associated with this frequency? It was expected that sexual history taking was not adequate (completed $\leq$%75 of the time) and that younger, female physicians would more frequently request a sexual history from their patients than their older male colleagues.

2 What was the frequency with which physicians in Nova Scotia report testing sexually active 15-24 year old women for *Chlamydia trachomatis*? Further, how were demographic characteristics, attitudes or beliefs about sexual health care associated with this frequency? It was expected that physicians would not report testing rates equivalent to recommended level, and that younger, female physicians would more frequently test their patients than their older male colleagues.

3 What factors predisposed, and enabled testing for *Chlamydia trachomatis* in 15-24 year old women by physicians in Nova Scotia? Further, how were these factors associated with reported rates of performing a test and taking a sexual history from patients? It was expected that physicians reporting higher agreement to reported barriers would report lower rates of sexual history taking and test completion.

4 What contact tracing related actions did physicians in Nova Scotia report most frequently taking following confirmation of a positive test of chlamydia? Further, how were demographic characteristics such as age and gender associated with actions taken following confirmation of a positive test? It was expected that many physicians would elect not to personally complete contact tracing, would provide Expedited Partner Therapy (treating partners of infected individuals without

performing an examination on them) and request assistance from public health authorities to complete contact tracing procedures.

2.2 Overview of Methodology

A survey was completed via self-administered questionnaires sent to family/general practice physicians in Nova Scotia via post mail delivery. This approach was a modification of that suggested by Dillman.(108) To begin the study, a facsimile delivered message was sent to notify and inform all prospective participants of the study prior to the mail out of questionnaire packets. Individually addressed questionnaire packets were then mailed to all prospective participants. Each packet contained a cover letter, a return addressed envelope and the survey. Only completed returned surveys were evaluated.

In addition to collecting standard demographic information, the questionnaires posed questions relating to factors which influence physician communication of the topic of STIs, chlamydia testing performance and contact tracing with regard to 15-24 year old female patients. It assessed physician behaviours relating to counseling and testing these patients and actions taking following receipt of a positive test. Descriptive and inferential statistical techniques were employed to evaluate responses and explore associations between physician characteristics and testing, counseling and reporting rates.

2.3 Participants, Sample Size Calculation & Response Rates

Questionnaires were sent to 891 family practice / primary care physicians licensed to practice in Nova Scotia for whom post mail addresses are available through the Dalhousie University Department of Community Health and Epidemiology. Only physicians aged less than 65 years and currently licensed to practice were included in the sample. These participants include family and general practice physicians who were expected to provide sexual health care services to sexually active women aged 15-24 years throughout the province. Primary care physicians were selected as the population to study as 15-24 year old female patients would be most likely to have contact with this physician group prior to accessing any other level of health care service.(15) Physicians aged more than 65 years may currently be licensed to practice, but may be less likely to be actively engaged in clinical practice than their younger colleagues. Due to this

possibility, physicians aged 65 years or more were not to be included in the study population, as it may have contributed to bias in the sample of prospective participants.

A sample size calculation has determined that for 95% confidence, 80 % power and a 5% margin of error, 279 respondents were necessary.(109)

Surveys of physicians in Nova Scotia can be expected to generate response rates of 38%, or better, meaning that an appropriate sample size could be obtained for this research.(110-112) The Department of Continuing Medical Education, Dalhousie Faculty of Medicine, has indicated that response rates of 30-35% can be expected from surveys of physicians in Nova Scotia.(113)

In general, response rates for physician surveys have historically been poor, have been criticized for limiting the generalize ability of research and for the introduction of significant non-response bias into results. However, meta-analysis of physician based research has only found minimal amounts of statistically significant response bias in surveys regardless of response rate. Average response bias was fairly small for factors such as age (0.45 years younger), gender (1.4% more females), and specialty type (1.1% less for specialty physicians). In this analysis, female pediatricians, especially those of a younger age and non-specialty physicians were more likely to respond to surveys.(114) Other research on the effect of response bias in physician studies has demonstrated that respondents and non-respondents may differ in terms of gender. In this research, males were more likely to respond than females, but the effect of this bias on parameter estimates was minimal at 2.3%. Response bias although present was minimal for both gender and length of survey, while no response bias was observed for urbanicity.(115) However, it has also been suggested that physicians are a relatively homogeneous group in the context of training, attitudes and behaviours when compared to the general population. Thus, responding and non responding physicians may have quite similar characteristics overall. Variations in physician characteristics may not be associated with willingness to respond to surveys, compared to the general population.(115, 116)

The method of survey delivery has traditionally been believed to have an effect on response rates. However, minimal differences in response rates have been observed

between interviewer-administered and self-administered physician surveys under meta-analysis. As a result, it has been hypothesized that physicians, unlike the general public, need greater control over time, pace, and sequence of response when privacy is important or respondents have higher literacy levels.(116) Overall, the influence of the various forms of response bias remains controversial but may not pose as significant of a threat to the results of this type of research, as it may pose to research on the general population.

In order to maximize the response rate, all efforts were taken to keep the survey to a length deemed appropriate (10 min.) and to make all questions clear and simple. Further, the timing of the initial send out was coordinated to occur at an appropriate time to reduce respondent burnout.(117) Legitimacy of this survey may have been increased for physicians, given the consent and collaboration of the two main professional associations in this province; the College of Physicians and Surgeons of Nova Scotia and the Department of Continuing Medical Education, Dalhousie University. Further, the Department of Continuing Medical Education graciously agreed to send a notification fax to all potential respondents prior to the initial mail out indicating their support for this project and encouraging respondents to complete the survey.

Demographic data collected from each participant included gender, age, year of graduation from medical school, and the size of the community where practicing.

2.4 Data Collection, Confidentiality & Provider Survey Content

Physicians were provided a Dalhousie University Department of Community Health and Epidemiology return addressed stamped envelope to return the survey via post mail. No personally identifying information was solicited from participants. In the case that this material was inadvertently collected, it was immediately separated and destroyed upon receipt. This ensured respondent confidentiality. All responses were manually transcribed into a SAS statistical database and stored within the Department of community Health and Epidemiology.(118) A data summary table is included in the appendices.

This survey consisted of two parts. First, a brief personalized cover letter explaining the survey, its intent and the potential use of the information to which respondents will be contributing was provided. The affiliation of the study with the Dalhousie University Department of Continuing Medical Education and the confidentiality of responses was stressed. A return addressed postage paid envelope was provided.

In the second component, physician management practices were assessed under differing clinical scenarios of chlamydia infection in women. The survey questions were developed to simulate actual presentations of sexually active reproductive aged women for general clinical care and were developed from the current body of research on physician STI management. The questionnaire was created and pilot tested on physicians familiar with testing methods and who had experience in clinical practice, academic medical training and continuing education. These scenarios can never completely represent the complexity involved in performing a physical examination or all forms of communication that occur during one. Thus, physician responses do not completely mimic their actual performance with live patients. With any questionnaire, there are concerns for factors which influence responses and self report surveys may incorrectly estimate actual practices or behaviours. However, questions of this nature are commonly employed in physician surveys and are considered to be valid means of evaluating their performance.(119) The 2009 Sexual Health Care Physician Survey is included in the appendices.

2.5 Data Variable Description & Outcome Measures

Gender (4a) was collected as a categorical variable (male, female). Age (4b) and year of graduation (4c) were collected as continuous variables. Urban/rural practice location (4d) and practice type (4f), and was collected as categorical variables. These variables, except for urban/rural practice setting, are easily quantifiable, reliable and have minimal measurement error. Urban/rural practice setting may be prone to recall bias and measurement error on behalf of the physician. Any error in the measurement or recording of these variables would be expected to be random. Demographic data is important to collect for statistical analysis and potential stratification, and measuring for confounding or effect modification. Further, physician related research cited in this proposal clearly demonstrates differences which exist across gender, age groups and

urbanicity. The demographic characteristics of all respondents are presented in a summary table, with modes and frequencies.

The main three outcome variables for this study were frequency of taking a sexual history (1.1a), percentage of 15-24 year old female patients tested annually for chlamydia (1.2a), and contact tracing activities (3a-f). Frequency of sexual history taking was evaluated across three scenarios relating to patient visits for differing patient types; a new patient (1.1a), an existing patient (1.1b) and a patient with a non STI related need (1.1c). Percentage of 15-24 year old patients tested annually for chlamydia was assessed over a 4 point ordinal scale. Contact tracing related actions taken following receipt of a positive test result (3.a-f) were collected as a four-point Likert scaled response.

Other variables were collected. Physician knowledge of the general sexual activity of 15-24 year old women (1.2b) condom use behaviours of 15-24 year old women (1.2c) and rate of asymptomatic infection (1.2c) was collected under a four-point ordinal scaled response. Factors which predispose or enable the physician to act (1.3a-h, & 2.2a-h), were collected as four-point Likert scaled and binary responses.

Research question 1- What was the frequency with which general / family practice physicians in Nova Scotia question their 15-24 year old female patients regarding sexual history? To answer this question, the question posed to physicians was, “How often do you take a sexual history from a 15-24 year old woman in each of the following situations?” Answers were collected for three scenarios; routine visit with new patient, routine or annual visit with existing patient, and acute care visit for non STI issue with either new or existing patient. The response was obtained from a five-point Likert scale for each response (Never, Sometimes, About Half the Time, Usually, Always). To determine how other variables were associated with sexual history taking techniques of regression analysis was employed. Only those variables which were significant at the p=0.05 level will be included in the final regression model. Odds rations are provided with 95% confidence intervals.

Research question 2- What was the frequency with which physicians in Nova Scotia test sexually active 15-24 year old women for *Chlamydia trachomatis*? To

answer this question, the question posed to physicians was, “What percentage of sexually active 15-24 year old female patients do you test annually for chlamydia? Responses were chosen from ordinal scaled categories (0%-24%, 25%-49%, 50%-74% and 75%-100%). A descriptive statistical table reports the scaled responses. To determine how other variables were associated with frequency of testing, techniques of regression analysis were competed. Only those variables which were significant at the p=0.05 level were included in the final regression model. Odds rations were provided with 95% confidence intervals.

Research question 3 - What factors act as facilitators or barriers to testing for *Chlamydia trachomatis* in 15-24 year old women for physicians in Nova Scotia? To answer this question, respondents were asked to rate their agreement/disagreement to a series of statements relating to performing a test on a patient, communicating with patients about STIs and knowledge about the epidemiology and clinical presentation of chlamydia infection in 15-24 year old women. Responses included both yes/no and Likert agreement scales (Never, Sometimes, Usually and Always). A descriptive statistical table reports the scaled responses. Regression analysis was competed for other variables. Only those variables which were significant at the p=0.05 level were included in the final regression model. Odds rations were provided with 95% confidence intervals.

Research question 4 –What contact tracing related actions do physicians in Nova Scotia most frequently take following confirmation of a positive test of chlamydia? To answer this question a scenario was presented to physicians; ”Assume that a 24 year old unmarried woman you have screened for chlamydia tests positive. After notifying the patient of her test result and prescribing treatment, how often do you complete the following contact tracing activities?” Six options were evaluated and measured via 4-point Likert scale for each response (Never, Sometimes, Usually, Always). A descriptive statistical table reports the scaled responses. Regression analysis was competed for other variables. Only those variables which were significant at the p=0.05 level were included in the final regression model. Odds rations were provided with 95% confidence intervals.

2.6 Validation of Survey

Although the questionnaire was written with the assistance of health care researchers experienced in survey design, it was pilot tested on a small sample of physicians engaged in active clinical practice. Feedback was sought on the length, format, order of questions, and comprehensiveness of the survey. This information was incorporated into the final version of the survey. Many of the questions included in the survey were modeled after similar research on physician testing and counseling for STIs, while others were unique to this survey. It has been stated that questionnaires relating to clinical scenarios can not, and do not, provide exact measures of actual clinical performance. However, this research technique is commonly applied to health research, as it is in other fields of study. Further, research evaluating the quality of physician responses obtained using clinical vignettes has been validated. (119)

2.7 Statistical Approach

SAS statistical software, version 9.1, was used to analyze all data collected (118). Relationships between dependant and independent variables were analyzed via a variety of common statistical techniques, including descriptive and inferential procedures. Single and multivariate regression techniques were employed. Spearman correlation coefficients were calculated. The probability of making a type 1 error was set at 0.05 for hypothesis testing.

Chapter 3 - Results

3.1 Respondent Characteristics

Two hundred and forty one completed surveys were collected of the 891 survey packets mailed. Of those original 891 mailed packets, 16 were returned as non-deliverable and 12 were returned with the respondent indicating that they did not serve the intended patient audience (15-24 year old females), providing a return rate of 27.9%. For statistical precision, a 5% margin of error and 95% confidence, a total of 266 returned surveys were required(109). However, 241 responses do provide a sufficient return rate for 95% confidence with 5.52% precision. There was no means of comparing responders and non-responders to the 2009 Sexual Health Care Physician Survey, as very minimal information was available regarding the population of physicians registered with the College of Physicians and Surgeons of Nova Scotia, other than the number of male or female physicians. There are 1236 physicians registered for general / family practice with the College of Physicians and Surgeons of Nova Scotia, of which 732 (59.2%) are male, and 504 (40.8%) are female(120).

Table #1 provides demographic information for all respondents to the 2009 Sexual Health Care Physician Survey. Of the 241 returned surveys 139 (58.4%) were from female physicians, with 3 (1.3%) respondents failing to identify their gender. Respondents ranged in age from 25 to 65 years, with age recorded as a categorical variable spanning 5 year intervals. Of all respondents, 98 (40.2%) were between 46 and 55 years of age, with 49 (20.1%) aged 51-55 years and 49 (20.1%) aged 46-50 years. The most frequently reported age group for female physicians was 46-50 years with 36 (26.1%). Among male physicians, the most frequently reported age group was 51-55 years, with 24 (24.2%) of all men. For all physicians, the most frequently reported year of graduation from medical school was 1986-1990, with 48 (20.1%) graduating during that period. Female physicians had graduated more recently from medical school. The most frequently reported year of graduation for women was1986-1990, with 32 (23.0%) graduating during that period. For male physicians, 1976-1980 and 1980-1985 were most frequently reported, with 18 (18.2%) graduating during each 5 year span.

Just over one half of all respondents (n=120, 50.2%) lived in cities or towns with 20,000 or more residents. For female physicians, 78 (55.2%) were from communities of greater than 20,000 residents, while 44 (44.4%) of male physicians served communities of the same size. Nearly all physicians (91.6%) reported working in an office based practice, with only 20 (8.4%) reporting other locations, such as urgent/walk in or emergency room settings. One hundred and thirty-five physicians (57%) indicated that 15-24 year old female patients composed 10%-30% of their practice population, the most frequently reported value for both genders. Female physicians reported serving a higher percentage of 15-24 year old female patients when compared to men. Among female physicians, 87 (62.6%) reported patient populations composed of 10%-30% 15-24 year old women, and 33 (23.7%) served populations consisting of more than 30%. Among male physicians, 48 (48.5%) served patient populations of 10%-30% of 15-24 year old women.

Table #2 provides a summary of all survey responses to the 2009 Sexual Health Care Physician Survey for all physicians and by gender.

Table 1 Descriptive Statistics of Participants in the 2009 Sexual Health Care Physicians Survey (N and % reported)

Characteristic		All Physicians N = 241£ N (%)	Women N = 139 58.4% N (%)	Men N = 99 41.6% N (%)
Age	25-30 yrs	4 (1.7)	3 (2.2)	1 (1.0)
	31-35 yrs	22 (9.2)	17 (12.3)	5 (5.1)
	36-40 yrs	32 (13.5)	23 (16.7)	9 (9.1)
	41-45 yrs	38 (16.0)	24 (17.4)	14 (14.1)
	46-50 yrs	49 (20.1)	36 (26.1)	13 (13.1)
	51-55 yrs	49 (20.1)	25 (18.1)	24 (24.2)
	56-60 yrs	26 (11.0)	8 (5.8)	17 (17.2)
	61-65 yrs	18 (7.6)	2 (1.5)	16 (16.2)
Year Graduated				
	1966-1970	5 (2.1)	0 (0)	5 (5.1)
	1971-1975	20 (8.4)	5 (3.6)	14 (14.1)
	1976-1980	30 (12.6)	12 (8.6)	18 (18.2)
	1981-1985	45 (18.9)	27 (19.4)	18 (18.2)
	1986-1990	48 (20.1)	32 (23.0)	16 (16.2)
	1991-1995	35 (14.6)	22 (15.8)	13 (13.1)
	1996-2000	30 (12.6)	19 (13.7)	11 (11.1)
	2001-2005	21 (8.8)	19 (13.7)	2 (2.0)
	2006 >	5 (2.1)	3 (2.2)	2 (2.0)
Community Size				
	<1,000	4 (1.7)	2 (1.5)	2 (2.0)
	1,000-5,000	32 (13.4)	16 (11.6)	16 (16.2)
	5,000-10,0000	49 (20.1)	24 (17.4)	24 (24.2)
	10,000- 20,000	34 (14.2)	20 (14.5)	13 (13.1)
	>20,000	120 (50.2)	76 (55.1)	44 (44.4)
Practice Setting				
	Office Based Clinic	219 (91.6)	125 (90.6)	92 (93.0)
	Urgent / Walk In	8 (3.4)	5 (3.6)	3 (3.0)
	Hospital	2 (0.8)	1 (0.7)	1 (1.0)
	Other	10 (4.2)	7 (5.1)	3 (3.0)
% 15-24 y/o Female Patients				
	< 10%	65 (27.1)	19 (13.7)	46 (46.5)
	10% - 30%	137 (57.1)	87 (62.6)	48 (48.5)
	>30%	38 (15.8)	33 (23.7)	5 (5.1)

£ 3 respondents failed to identify their gender

Table 2 Summary of Responses to the 2009 Sexual Health Care Physicians Survey, for All Physicians and by Gender (N and % are reported)

Survey Item	All Physicians 241¥	Female 139 (58.4%)	Male 99 (41.6%)
1.1A – Sexual History Existing Patient			
Never	7 (2.0)	2 (1.4)	4 (4.0)
Sometimes	35 (14.5)	7 (5.0)	28 (28.3)
Half of time	23 (9.5)	12 (8.6)	11 (11.1)
Usually	93 (38.6)	52 (37.4)	40 (40.4)
Always	83 (34.4)	66 (47.5)	16 (16.2)
1.1B – Sexual History New Patient			
Never	24 (10.0)	8 (5.8)	15 (15.3)
Sometimes	81 (33.8)	39 (28.1)	41 (41.8)
Half of time	23 (9.6)	13 (9.4)	10 (10.2)
Usually	74 (30.8)	51 (36.7)	23 (23.5)
Always	38 (15.8)	28 (20.1)	9 (9.2)
1.1C- Sexual History Non-STI Patient			
Never	73 (30.4)	38 (27.3)	33 (33.7)
Sometimes	125 (52.1)	79 (56.8)	46 (46.9)
Half of time	19 (7.9)	11 (7.9)	8 (8.2)
Usually	11 (4.6)	6 (4.3)	5 (5.1)
Always	12 (5.0)	5 (3.6)	6 (6.1)
1.2A - % 15-24 yo Tested Annually			
0-24%	46 (19.2)	7 (5.0)	38 (38.8)
25-49%	27 (11.3)	13 (9.4)	14 (14.3)
50-74%	51 (21.3)	33 (23.7)	17 (17.6)
75-100%	116 (48.3)	86 (61.9)	29 (29.6)
1.2B - % 15-24 yo Believed Sexually Active			
0-24%	1 (0.4)	0 (0)	1 (1.0)
25-49%	11 (4.6)	4 (2.9)	7 (7.1)
50-74%	113 (46.9)	68 (48.9)	44 (44.4)
75-100%	116 (48.1)	67 (48.2)	47 (47.5)
1.2C - %15-24 Believed Condom Use			
0-24%	52 (21.9)	24 (17.4)	27 (27.8)
25-49%	123 (51.7)	75 (54.4)	47 (48.5)
50-74%	53 (22.3)	33 (23.9)	19 (19.6)
75-100%	10 (4.2)	0 (4.4)	4 (4.1)
1.2D - %15-24 Believed Asymptomatic			
0-24%	14 (5.8)	7 (5.0)	7 (7.1)
25-49%	66 (27.4)	32 (23.0)	32 (32.3)
50-74%	101 (41.9)	55 (39.6)	45 (45.5)
75-100%	60 (24.9)	45 (32.3)	15 (15.2)
1.3A – Have Necessary Skills			
Yes	237 (98.8)	138 (99.3)	96 (98.0)
No	3 (1.6)	1 (0.7)	2 (2.0)
1.3B – Wants STI Cont Med Education			
Yes	215 (90.3)	122 (89.1)	91 (92.9)
No	23 (9.7)	15 (11.0)	7 (7.1)
1.3C – Believes Important Health Counselor			
Yes	207 (87.3)	125 (90.6)	80 (83.3)
No	30 (12.7)	13 (9.4)	16 (16.7)
1.3D – Displays or Provides STI Info			
Yes	123 (51.7)	77 (55.8)	44 (45.4)
No	115 (48.3)	61 (44.2)	53 (54.6)
1.3E -Believes Physician Important Source			
Yes	225 (94.1)	131 (94.9)	91 (92.8)
No	14 (5.9)	7 (5.1)	7 (7.1)

Table 2 Summary of Responses to the 2009 Sexual Health Care Physicians Survey, for All Physicians and by Gender (N and % are reported)

Survey Item	All Physicians 241¥	Female 139 (58.4%)	Male 99 (41.6%)
1.3F – Frequently Take Sexual History			
Yes	183 (77.5)	121 (88.3)	59 (61.5)
No	53 (22.5)	16 (11.7)	37 (38.5)
1.3G – Believes Screening Aids Prevention			
Yes	209 (87.5)	126 (91.3)	81 (82.7)
No	30 (12.6)	12 (8.7)	17 (17.4)
1.3H – Self Swab Acceptable			
Yes	44 (18.7)	25 (18.5)	19 (19.6)
No	191 (81.3)	110 (81.5)	78 (80.4)
2.0 – Would Test Asymptomatic Patient			
Yes	37 (16.2)	25 (19.5)	12 (12.0)
No	191 (83.8)	103 (80.5)	85 (87.6)
2.1A – No Patient STI Complaint			
Yes	139 (59.2)	82 (61.2)	55 (56.1)
No	96 (40.9)	52 (38.8)	43 (43.9)
2.1B – Patient would be Embarrassed			
Yes	39 (16.6)	17 (12.6)	22 (22.7)
No	196 (83.4)	118 (87.4)	75 (77.3)
2.1C – Doctor would be Embarrassed			
Yes	12 (5.1)	5 (3.7)	7 (7.2)
No	223 (94.9)	130 (96.3)	90 (92.8)
2.1D – Patient of Different Gender			
Yes	12 (5.1)	6 (4.4)	6 (6.1)
No	224 (94.9)	130 (95.6)	91 (93.8)
2.1E – Others Present During Examination			
Yes	103 (43.8)	52 (38.5)	50 (51.6)
No	132 (56.2)	83 (61.5)	47 (48.5)
2.1F – No Time To Complete Test			
Yes	109 (46.2)	63 (46.3)	46 (47.4)
No	127 (53.8)	73 (53.7)	51 (52.6)
2.1G – Insufficient Materials for Testing			
Yes	24 (10.2)	14 (10.3)	10 (10.3)
No	212 (89.8)	122 (89.7)	87 (87.7)
2.1H – Routine To Test Patient			
Yes	118 (50.9)	85 (64.4)	32 (33.0)
No	114 (49.1)	47 (35.6)	65 (67.0)
3.1A – Advises to Inform Partners			
Never	0 (0)	0 (0)	0 (0)
Sometimes	3 (1.3)	2 (1.5)	1 (1.0)
Usually	9 (3.8)	3 (2.2)	6 (6.1)
Always	227 (95)	133 (96.4)	92 (92.9)
3.1B – Provides EPT for Partner			
Never	54 (22.7)	34 (24.6)	20 (20.4)
Sometimes	103 (43.3)	65 (47.1)	38 (38.8)
Usually	48 (20.2)	25 (18.1)	23 (23.5)
Always	33 (13.9)	14 (10.1)	17 (17.4)
3.1C – Reports Cases to Public Health			
Never	54 (22.7)	37 (27.0)	17 (17.2)
Sometimes	41 (17.2)	23 (16.8)	18 (18.2)
Usually	23 (9.7)	11 (8.0)	12 (12.1)
Always	120 (50.4)	66 (48.2)	52 (52.5)

Table 2 Summary of Responses to the 2009 Sexual Health Care Physicians Survey, for All Physicians and by Gender (N and % are reported)

Survey Item	All Physicians 241¥	Female 139 (58.4%)	Male 99 (41.6%)
3.1D – Would Request PH Assist			
Never	47 (19.7)	26 (18.7)	22 (22.2)
Sometimes	91 (38.1)	5 9 (42.5)	31 (31.2)
Usually	43 (18)	25 (18)	18 (18.2)
Always	58 (24.3)	29 (20.9)	28 (28.3)
3.1E – Assumes Patient Informs Partners			
Never	192 (80.3)	117 (84.8)	74 (74.8)
Sometimes	24 (10)	13 (9.4)	10 (10.1)
Usually	21 (8.8)	8 (5.8)	13 (13.1)
Always	2 (0.8)	0 (0)	2 (2.0)
3.1F – Relies on Lab to Notify PH	61 (25.5)	33 (23.9)	27 (27.3)
Never	30 (12.6)	16 (11.6)	14 (14.1)
Sometimes	72 (30.1)	43 (31.2)	28 (28.3)
Usually	76 (31.8)	46 (33.3)	30 (30.3)
Always			

¥ 3 surveys were returned without gender identification

3.2 Reported Rates of Sexual History Taking

Physicians were asked, “How often do you or your staff take a sexual history from a 15-24 year old female patient in each of the following situations?” Three scenarios were presented relating to the nature of the patient and the context of the visit. The scenarios described a new patient (A), an existing patient (B), and a patient not presenting with a complaint associated with sexual health or an STI related issue (C). Table #2 reports both the overall number and percent for all survey question responses and the differences between male and female respondents. Table #3 presents the overall number and percent of the dichotomized responses across the three patient types, and associated odds ratios and 95% confidence intervals. The uni-variate and multivariate logistic regression parameter estimates reported were based on 5 point Likert scaled responses for the dependant variable (frequency of history taking). However, these response scales were dichotomized in order to facilitate logistic regression analysis, reporting and interpretation. The dichotomization points were formulated following a review of the data, and associated sexual health care research. Further justification for the dichotomization points are provided under each patient type.

New Patient Relationship (Usually-Always vs. About Half the Time-Never)
The most frequently reported overall level of history taking was “Sometimes”, with 81 (33.8%) of all physicians selecting this response category. However, responses to this question were somewhat bimodal, with 74 (30.8%) indicating that they do so “Usually”. For female physicians, “Usually” was the most frequently identified with 51 (36.7%) of all responses, compared to 23 (23.5%) for male physicians. In contrast to the 128 (53.3%) who took a sexual history “About Half the Time– Never”, 112 (46.5%) of all physicians indicated that they would “Always-Usually” do so with a new patient.

Existing Patient Relationship (Always vs. Usually - Never)
Overall, the most frequently reported practice was to “Usually” take a sexual history, where 93 (38.6%) physicians indicated they would do so. For female physicians, 66 (47.5%) indicated they would “Always” take a sexual history from an existing patient, compared to 16 (16.2%) of male physician who would “Always” do so. In contrast to 158

(65.6%) of all physicians who indicated they would “Usually - Never” take a sexual history from an existing patient, 83 (34.4%) indicated that they would “Always” do so.

Non STI Patient (Always-Sometimes vs. Never)
When the patient was described as presenting to the physician with a complaint not relating to an STI, the overall level of sexual history taking remained “Sometimes” with 125 (52.1%) of all physicians choosing this response. A total of 89 (56.7%) female physicians indicated they would “Sometimes” request a sexual history from non-STI patients, compared to 46 (46.9%) male physicians who would “Sometimes” do so. Compared to the 168 (69.7%) physicians who indicated they would “Always-Sometimes” request a sexual history from a non-STI patient, 73 (30.3%) indicated they would “Never” do so.

3.2.1 Uni-variate Analysis

The uni-variate logistic regression analyses presented in Table #3 suggest that many of the demographic characteristics of the physician, and their beliefs and attitudes toward reproductive and genitourinary health were associated with taking a sexual history from a 15-24 year old female patient. The uni-variate results are presented in a dichotomized format, as described in the following three paragraphs. In Table #3 the overall number and percent of responses are presented along with odds ratios and 95% confidence intervals.

Research on physician behaviours suggests that physicians are less inclined to initiate a discussion about testing for chlamydia with patients on their first visit to a new health care provider. (76) Therefore, it was expected that physicians would less frequently request a sexual history from a new patient, when compared to an existing patient. In the following sections where the patient was presented as a new patient, “Always-Usually” request a sexual history was used for comparison to “About Half the Time - Never”.

Where the patient and the physician had a previously established relationship, (existing patient) the category of “Always” was compared against the combined categories “Usually - Never”. It was expected that physicians would be more likely to take a sexual history from a patient with whom they already had an existing doctor patient relationship.

Further, the Canadian Public Health Association, the US Preventative Services Taskforce, the US Centers for Disease Control and Prevention, and many other health policy organizations strongly recommend routine annual screening for all sexually active females under the age of 25 years.(12,13,19)

For a patient presenting to the physician for a reason not related to an STI (non-STI), the categories of “Always - Sometimes” take a sexual history were used for comparison to “Never”. Again, it was expected that physicians would be much less likely to counsel non-STI patients regarding STIs, when compared to existing or new patients. (79)

Physician gender was significantly associated with history taking, where male physicians had a reduced odds of taking a sexual history from both new (OR 0.36, 95%CI 0.21-0.62) and existing (OR 0.21, 95%CI 0.11-0.40) 15-24 year old patients. However, for non-STI patients no significant gender based difference in history taking was observed. Only when there was a pre-established patient-physician relationship (existing patient) was physician age associated with history taking. Physicians aged 56 years or more had a 76% reduced odds of “Always” taking a sexual history, compared to physicians less than 45 years of age (referent category). For all other patient types the relationship between age and history taking was not significant. Physicians more recently graduated from medical school had an increased odds of taking a sexual history from existing and non-STI patients, but not with new patients Those having graduated after 1990 had a 81% increased odds of “Always” taking a sexual history from an existing patient, and a 24% increased odds of “Always-Sometimes” doing so with a non-STI patient. For new patients this difference in year of graduation was not significant.

The size of the community where the physician practiced showed no significant association with history taking for any patient type. However, physicians practicing in office / private clinics had a 60% reduced odds of “Always” taking a sexual history from their existing patients, compared to physicians working in hospitals, urgent care clinics or other unspecified locations. There were no significant associations between practice setting and history taking for either new or non-STI patients. The percent of 15-24 year old female patients in the physician’s overall patient population was associated with history taking for all three patient types. Those physicians who served patient populations composed of greater than 30% 15-24 year old women had an increased

odds of taking a sexual history, compared to physicians serving < 10% 15-24 year old women, (referent category) for all three patient types.

The survey also asked physicians for their agreement with a series of statements regarding their role in sexual health care and the sexual health related behaviours of their patients. Physicians who agreed that screening for chlamydia in asymptomatic patients contributes to their improved sexual health had a four fold increased odds of "Always" taking a sexual history from an existing patient. However, for a new or a non-STI patient, this association was not significant. Physicians who agreed that continuing medical education programs should target sexual health issues for 15-24 year old women had a 64% reduced odds of "Always" taking a sexual history from an existing patient, while those who provided or displayed STI testing information to their patients had a 98% and 94% increased odds of taking a sexual history from their existing and non-STI patients, respectively. Physician knowledge about the sexual activity of young adult women, their reliance on condoms to prevent infection with STIs or the asymptomatic nature of many infected patients was not associated with history taking for any patient type.

Table 3 Uni-variate Logistic Regression of Sexual History Taking and Physician Characteristics for Three Patient Types (ORs, 95% CIs, N & % reported)

Physician Characteristic	New Patient "Always-Usually"		Existing Patient "Always"		Non STI Patient "Always-Sometimes"	
	N(%)	OR (95%CI)	N(%)	OR (95%CI)	N(%)	OR (95%CI)
Gender						
Female	79 (56.8)	**1.0**	66 (47.5)	**1.0**	101 (72.7)	1.0
Male	32 (32.3)	**0.36 (0.21-0.62)**	16 (16.2)	**0.21 (0.11-0.40)**	66 (66.7)	0.75 (0.43-1.32)
Age						
< 45 years	46 (46.5)	1.0	39 (39.4)	1.0	71 (71.7)	1.0
45-55 years	53 (54.1)	1.36 (0.78 – 2.38)	38 (38.8)	0.97 (.55 – 1.73)	71 (72.5)	1.04 (0.56 – 1.93)
> 55 years	13 (29.6)	0.48 (0.22 – 1.03)	6 (13.6)	**0.24 (0.09 – 0.63)**	26 (59.1)	0.57 (0.27 – 1.20)
Year Graduated						
< 1990	85 (46.0)	1.0	44 (29.3)	**1.0**	102 (68)	**1.0**
> 1990	27 (48.2)	1.1 (0.68 – 2.0)	39 (42.9)	**1.81 (1.05 – 3.12)**	66 (72.5)	**1.24 (0.70 – 2.21)**
Community Size						
< 20,000	51 (42.2)	1.0	37 (30.6)	1.0	81 (66.9)	1.0
≥20,000	61 (50.8)	1.42 (0.85-2.36)	46 (38.3)	1.41 (0.83-2.41)	87 (72.5)	1.30 (0.75-2.26)
Practice Setting						
Other	14 (63.6)	1.0	12 (54.6)	**1.0**	18 (81.8)	1.0
Private Clinic	99 (44.8)	0.46 (0.19-1.15)	71 (32.4)	**0.40 (0.17-0.97)**	150 (68.5)	0.48 (0.16-1.48)
% 15-24 yo Female Patients						
< 10 %	26 (40.0)	1.0	11 (16.9)	**1.0**	39 (60.0)	**1.0**
10 -30%	60 (43.8)	1.17 (0.64 – 2.13)	47 (34.3)	**2.56 (1.23 – 5.36)**	96 (70.1)	1.56 (0.84 - 2.89)
>30%	26 (68.4)	**3.25 (1.40 – 7.57)**	25 (65.8)	**9.44 (3.72 – 24.0)**	33 (86.8)	**4.40 (1.52 –12.74)**
% 15-24 yo Believed Sexually Active						
< 75%	56 (44.8)	1.0	42 (33.6)	1.0	82 (65.6)	1.0
75%-100%	56 (48.3)	1.15 (0.69-1.91)	41 (35.3)	1.08 (0.64-1.84)	86 (74.1)	1.50 (0.86-2.62)
%15-24 Believed Condom Use						
< 50%	79 (44.4)	1.0	59 (33.2)	1.0	121 (68)	1.0
> 50%	33 (52.4)	1.38 (0.78-2.45)	24 (38.1)	1.24 (0.68-2.25)	47 (74.6)	1.38 (0.72-2.65)

Table 3 Uni-variate Logistic Regression of Sexual History Taking and Physician Characteristics for Three Patient Types (ORs, 95% CIs, N & % reported)

%15-24 Believed Asymptomatic						
< 50%	33 (41.2)	1.0	24 (30)	1.0	56 (70)	1.0
> 50%	79 (49.1)	1.37 (0.80-2.36)	59 (36.7)	1.35 (0.76-2.40)	112 (69.6)	0.98 (0.55-1.76)
Wants STI Cont Med Education						
No	11 (47.8)	1.0	13 (56.5)	**1.0**	14 (60.9)	1.0
Yes	98 (45.6)	0.91 (0.38 – 2.16)	69 (32.1)	**0.36 (0.15-0.87)**	151 (70.2)	1.52 (0.63 – 3.68)
Believes Important Health Counselor						
No	10 (33.3)	1.0	10 (33.3)	1.0	17 (56.7)	1.0
Yes	98 (47.3)	1.80 (0.80-4.03)	73 (37.3)	1.09 (0.48-2.45)	148 (71.5)	1.92 (0.88-4.20)
Displays or Provides STI Info						
No	51 (44.4)	1.0	31 (27.0)	**1.0**	72 (62.6)	**1.0**
Yes	58 (47.2)	1.12 (0.67-1.87)	52 (42.3)	**1.98 (1.15-3.42)**	94 (76.4)	**1.94 (1.10-3.40)**
Believes Physician Important Source						
No	4 (28.6)	1.0	4 (28.6)	1.0	7 (50)	1.0
Yes	106 (47.1)	2.23 (0.68-7.31)	79 (35.1)	1.35 (0.41-4.45)	159 (70.7)	2.41 (0.81-7.14)
Believes Screening Aids Prevention						
No	11 (36.7)	1.0	4 (13.30	**1.0**	19 (63.3)	1.0
Yes	99 (47.4)	1.56 (0.71-3.43)	79 (37.8)	**3.95 (1.30-11.73)**	147 (70.3)	1.37 (0.62-3.05)

3.2.2 Multivariate Analysis

The multivariate logistic regression analysis presented in Table #4 shows that both the demographic characteristics of the physician and their beliefs and attitudes about the reproductive and genitourinary health of their 15-24 year old female patients were associated with rates of sexual history taking. For all three patient types, the multivariate models included gender, year of graduation, size of community where the physician practiced, the practice setting and patient population of 15-24 year old women. In addition to these demographic variables, individual characteristics, attitudes and beliefs were included in the multivariate model only if their uni-variate associations were significant at p=0.20, or lower. Therefore, the composition of the three multivariate models was not always similar. The multivariate results are presented in a dichotomized format, as described above.

New Patient (Always-Usually vs. Half the Time - Never)
When the physician and the patient did not have a preexisting relationship, physician gender was the only characteristic significantly associated with sexual history taking. Male physicians had a 61% reduced odds of “Always-Usually” taking a sexual history, compared to female physicians. No other characteristic, belief or attitude toward sexual health care was significantly associated with history taking.

Existing Patient Relationship (Always vs. Usually-Never)
Where there was an existing physician patient relationship, male physicians had a 68% reduced odds of “Always” taking a sexual history, when compared to female physicians. Physicians working in office based clinics had a 68% reduced odds when compared to those working in other locations (ERs, hospitals, & non-disclosed). Physicians who served patient populations of >30% of 15-24 year old women had a four fold increased odds of “Always” taking a sexual history, compared to those serving less than 10%. Physicians who agreed with the statement that continuing medical education should target sexual health issues for 15-24 year old women had a 65% reduced odds of “Always” taking a sexual history, compared to those who did not agree. Finally, those physicians who displayed or provided STI testing information to their patients had a two fold increased odds of taking a sexual history, when compared to those who did not.

Non-STI Patient (Always-Sometimes vs. Never)

When the patient did not present with an STI related issue, only two survey items were significantly associated with sexual history taking. Physicians who served patient populations of > 30% of 15-24 year old women had a 3.5 fold increased odds of "Always-Sometimes" taking a sexual history, compared to those serving less than 10% (referent category). Finally, those physicians who indicated that they display or distribute STI related information to their patients had a two fold increase in odds of taking a sexual history from non-STI patients, compared to those who did not agree to the statement.

Table 4 Multivariate Logistic Regression of Sexual History Taking and Physician Characteristics for Three Patient Types (ORs, 95% CIs, & Pr Chi sq reported)

Physician Characteristic	Sexual History Taking					
	New Patient "Always-Usually"		Existing Patient "Always"		Non STI Patient "Always-Sometimes"	
	OR (95%CI)€	**Pr**	**OR (95%CI)€**	**Pr**	**OR (95%CI)€**	**Pr**
Gender						
Female	**1.0**		**1.0**		1.0	
Male	**0.39 (0.21–0.72)**	**0.0025**	**0.32 (0.16–0.64)**	**0.0013**	1.10 (0.58–2.12)	0.7655
Year Graduated						
< 1990	1.0		1.0		1.0	
> 1990	1.22 (0.69–2.14)	0.5639	1.33 (0.72–2.46)	0.2971	0.97 (0.52–1.81)	0.9144
Community Size						
< 20,000	1.0		1.0		1.0	
> 20,000	1.18 (0.70–2.06)	0.4833	0.99 (0.53–1.87)	0.9902	1.08 (0.59–1.97)	0.8161
Practice Setting						
Other	1.0		**1.0**		1.0	
Private Clinic	0.47 (0.17–1.32)	0.1529	**0.32 (0.11–0.96)**	**0.0419**	0.26(0.06–1.20)	0.0846
% 15-24 yo Female Patients						
< 10 %	1.0		**1.0**		**1.0**	
10 - 30%	0.83 (0.41–1.67)	0.6005	1.47 (0.64–3.37)	0.3622	1.45 (0.71–2.96)	0.3090
> 30%	1.92 (0.73–5.04)	0.1848	**4.21 (1.45–12.20)**	**0.0081**	**3.52 (1.07–11.53)**	**0.0382**
% 15-24 yo Believed Sexually Active						
< 75%	NA		NA		1.0	
75 -100%					1.65 (0.91–3.01)	0.1035
%15-24 Believed Condom Use						
< 50%						
> 50%	NA		NA		NA	
%15-24 Believed Asymptomatic						
< 50%	NA		NA		NA	
> 50%						

Table 4 Multivariate Logistic Regression of Sexual History Taking and Physician Characteristics for Three Patient Types (ORs, 95% CIs, & Pr Chi sq reported)

Wants STI Cont Med Education						
No			**1.0**			
Yes	NA		**0.35 (0.13–0.93)**	**0.0360**	NA	
Believes Important Health Counselor						
No	1.0		NA		1.0	
Yes	1.52 (0.64 – 3.65)	0.3442			1.16 (0.90–3.01)	0.7425
Displays or Provides STI Info						
No			**1.0**		**1.0**	
Yes	NA		**1.96 (1.06–3.61)**	**0.0319**	**2.04 (1.12–3.73)**	**0.0204**
Believes Physician Important Source						
No	NA		NA		1.0	
Yes					1.79 (0.55–5.79)	0.3316
Believes Screening Aids Prevention	NA		NA		NA	
No						
Yes						

€ adjusted only for factors which are represented by odds ratios and confidence intervals NA item not included in the multivariate model

3.3 Reported Rates of Annually Screening for Chlamydia

Physicians were asked, “What percentage of sexually active 15-24 year old female patients do you test annually for chlamydia?” The most frequent response was 75-100%, accounting for 116 (48.3%) of all returned surveys. Among female respondents, 86 (61.9%) indicated that they would test 75-100% of their female patients for chlamydia annually, compared to only 29 (29.6%) for male physicians. Table #2 reports both the overall number and percent for all survey question responses and the differences between male and female respondents.

Research suggests that physicians perform chlamydia tests on less than 75% of their 15-24 year old female patients annually(79, 82, 121). This survey found that 48% of the physicians surveyed would test 75-100% of their patients annually. Therefore, in order to facilitate data analysis, reporting and interpretation of results the response categories for rate of patients tested annually (0-25%, 25-50%, 50-75% and 75-100%) were dichotomized into 75-100% and 0-75%.

3.3.1 Uni-variate Analysis

Table #5 provides the uni-variate relationships between reported annual rate of chlamydia testing and physician characteristics, and includes overall number and percent for each dichotomized response, the associated odds ratios and 95% confidence intervals. There was a significant gender based difference for the rate of chlamydia testing done annually, where male physicians had a 74% reduced odds of testing 75-100% of their patients. Physicians having graduated after 1990 had more than a three fold increased odds of testing, compared to those graduating before 1990 (OR 3.25, 95%CI 1.88 – 5.61). There was also a significant difference in testing rates for physicians serving greater populations of 15-24 year old women patients. Physicians serving 10 - 30% and > 30% 15-24 year old women had 2.4 and 7.8 fold greater odds of testing 75-100% of their patients annually compared to physicians serving less than 10% (referent

category). However, the size of the community where the physician practices, and the practice setting had no significant effect on testing rates.

Other physician characteristics were associated with testing rates. Physicians who indicated that more than 50% of infected women were asymptomatic had 3 fold greater odds of testing 75-100% of their patients annually. This was also true for those who indicated that they frequently request a sexual history regardless of the patient's apparent risk (4.9 fold), compared to those who do not do so.

3.3.2 Multivariate Analysis

The multivariate model included the following demographic variables; gender, year of graduation, size of community where the physician practiced, the practice setting and patient population of 15-24 year old women. Subsequently, individual characteristics, attitudes and beliefs were included if their uni-variate associations were significant at p=0.2, or better. Variables with small cell sizes (n=<5) were excluded from the multivariate regressions, and effect modification was assessed by interaction terms.

Table #5 provides the results of the multivariate logistic regression for annual testing for chlamydia and physician characteristics, and includes Odds Ratios and associated 95% confidence intervals. Male physicians had a reduced odds of testing 75-100% of their patients when compared to female physicians (OR 0.4, 95%CI 0.22-0.86). However, physicians of both genders had an increased odds of testing 75-100% of their patients annually if they had graduated from medical school after 1990 (OR 3.06, 95% CI 1.61-5.97), or indicated that they frequently take a sexual history regardless of the patient's apparent risk (OR 2.70, 95%CI 1.17-6.27).

Table 5 Uni-variate and Multivariate Logistic Regression of Annual Testing for Chlamydia and Physician Characteristics (N, %, odds ratio, 95% CI & Pr Chi sq reported)

Characteristic	All Physicians N (%)	Uni-variate OR (95%CI)	P-Value	Multivariate OR (95%CI)	P-value
Gender					
Female	86 (61.8)	**1.0**		**1.0**	
Male	29 (29.3)	**0.26 (0.15 – 0.44**)	**0.0001**	**0.44 (0.22-0.86)**	**0.0155**
Age					
< 45 years	58 (58)	1.0			
45-55 years	49 (50)	0.71 (0.40 – 1.24)	0.2276		
> 55 years	9 (20.5)	**0.18 (0.08 – 0.42)**	**0.0001**	**¥**	
Year Graduated					
< 1990	56 (37.3)	**1.0**		**1.0**	
> 1990	60 (65.9)	**3.25 (1.88 – 5.61)**	**0.0001**	**3.06 (1.61-5.97)**	**0.0003**
Community Size					
< 20,000	51 (42.2)	1.0		1.0	
≥20,000	65 (54.2)	1.62 (0.98 – 2.70)	0.0625	1.29 (0.73–2.48)	0.4363
Practice Setting					
Other	13 (59.1)	1.0		1.0	
Private Clinic	103 (47.0)	0.62 (0.25 – 1.49)	0.2841	1.05 (0.34-3.19)	0.9358
% 15-24 yo Female Patients					
< 10 %	**19 (29.2)**	**1.0**		**1.0**	
10 - 30 %	**68 (49.6)**	**2.39 (1.27 – 4.48)**	**0.0001**	1.62 (0.74-3.39)	0.2352
> 30%	**29 (76.3)**	**7.80 (3.11 – 19.56)**	**0.0001**	**3.51 (1.20-10.29)**	**0.0219**
% 15-24 yo Believed Sexually Active					
< 75%	58 (46.4)	1.0			
75%-100%	58 (50)	1.56 (0.70 – 1.92)	0.5765	NA	
%15-24 Believed Condom Use					
< 50%	84 (47.2)	1.0			
> 50%	32 (50.8)	1.16 (0.65 – 2.05)	0.6228	NA	
%15-24 Believed Asymptomatic					

Table 5 Uni-variate and Multivariate Logistic Regression of Annual Testing for Chlamydia and Physician Characteristics (N, %, odds ratio, 95% CI & Pr Chi sq reported)

Characteristic	All Physicians N (%)	Uni-variate OR (95%CI)	P-Value	Multivariate OR (95%CI)	P-value
< 50%	**24 (30)**	**1.0**		**1.0**	
> 50%	**92 (57.1)**	**3.11 (1.76 – 5.51)**	**0.0001**	**3.28 (1.67-6.54)**	**0.0003**
Wants STI Cont Med Education					
No	10 (43.5)	1.0			
Yes	105 (48.8)	1.24 (0.52 – 2.95)	0.6255	NA	
Believes Important Health Counselor					
No	10 (33.3)			1.0	
Yes	106 (51.2)	70)	0.0716	1.27 (0.47 – 3.39)	0.6492
Displays or Provides STI Info					
No	55 (47.8)	1.0			
Yes	61 (49.6)	1.07 (0.65 – 1.79)	0.7852	NA	
Believes Physician Important Source					
No	4 (28.6)	1.0			
Yes	112 (49.8)	2.48 (0.76 – 8.13)	0.1348	NA	
Frequently Take Sexual History					
No	**11 (20.8)**	**1.0**		**1.0**	
Yes	**103 (56.3)**	**4.92 (2.38 – 10.15)**	**0.0001**	**2.70 (1.17-6.27)**	**0.0203**
Believes Screening Aids Prevention					
No	**4 (13.3)**	**1.0**			
Yes	**112 (53.6)**	**7.51 (2.53 – 22.26)**	**0.0003**	NA	

€ adjusted only for factors which are represented by odds ratios and confidence intervals
NA item not included in multivariate model due to non-significance or low cell count in a 2 x 2 table (n≤5)
¥ Age not included in multivariate model due to correlation with year of graduation

An interaction term for physician gender and percent infected women believed to be asymptomatic was significant (p= 0.0156), suggesting effect modification. Female physicians who believed > 50% of infected women are asymptomatic had greater than a 6 fold increased odds of testing 75-100% their patients annually for chlamydia, while their male colleagues who shared this belief were had a 60% increased odds of testing, when compared to female physicians who believed fewer than 50% are asymptomatic (referent category).

Physicians were asked to rate their agreement (yes/no) to a series of statements relating to taking a sexual history or performing a chlamydia test on a 15-24 year old female patient. In addition, a clinical scenario, consisting of a 24 year old female patient presenting for a non-STI related issue was presented and physicians were asked if they would test the patient for chlamydia (yes/no). A final series of questions then asked physicians if they would have taken certain factors into consideration when deciding whether or not to test the patient presented in the clinical scenario. Table #6 presents the number and percent of responses to these survey items for all physicians and differences between male and female physicians.

Almost all physicians (n= 237, 98.8%) indicated that they had obtained the skills necessary to perform a chlamydia test during their medical school training, and 215 (90.3%) agreed that continuing medical education activities should target sexual health care in 15-24 year old women. Two hundred and seven (87.3%) physicians indicated that their STI counseling activities were important as a means to improving the sexual health of their 15-24 year old female patients, and 123 (51.7%) provided informative pamphlets to their patients or displayed posters on the topic of sexual health and STI testing in their offices. Two hundred and twenty-five physicians (94.1%) indicated that they were important as a source of sexual health care information, and when asked if they "frequently" took a sexual history from their female patients regardless of their apparent risk, 183 (77.5%) indicated that they did. Two hundred and nine physicians (87.5%) agreed with the statement that screening asymptomatic patients for chlamydia would reduce the genitourinary complications associated with infection. Only 44 (18.7%) were confident that patient collected vaginal swabs would be an acceptable means of collecting a sample on which to perform a chlamydia test.

Few physicians indicated that they would test the asymptomatic, non-STI patient presented in the clinical scenario, with only 37 (16.2%) indicating they would do so. In making their decision to test the patient presented in the clinical scenario, 139 (59.2%) physicians would consider that the patient did not present with concerns related to STIs. Only 39 (16.6%) physicians would consider that the patient might be embarrassed when they recommend a chlamydia test, and only 12 (5.1%) would consider that they themselves might find it embarrassing to recommend a test. Similarly, only 12 (5.1%) would consider that the patient was of a different gender. If someone other than the patient were present during the examination, 103 (43.8%) of physicians would take it into consideration when deciding to recommend a test, and 109 (46.2%) would consider whether or not they had sufficient time during the appointment to complete the test. However, very few (n=24, 10.2%) would be concerned that they might not have sufficient materials to complete the test.

There were several significant differences between male and female responders with regard to both facilitators and barriers to counseling and testing 15-24 year old female patients for chlamydia. Female physicians more frequently took a sexual history regardless of the patient's apparent risk (p-value = 0.0001), and agreed that their counseling efforts contributed to improved patient sexual health (p-value = 0.0465). Male physicians were more likely to consider that the patient presented in the clinical scenario (asymptomatic & non-STI patient) would be embarrassed when recommending a chlamydia test (p-value = 0.0431), and that the patient's parent or partner might be present during the examination (p-value = 0.0491).

Table 6 Summary of Predisposing and Enabling Factors Which Influence Testing for Chlamydia (N, % and Pr Chi sq reported)

Survey Item	All Physicians 241¥	Female 139 (58.4%)	Male 99 (41.6%)	Chi Sq
1.2B - % 15-24 yo Believed Sexually Active				
0-24%	1 (0.4)	0 (0)	1 (1.0)	
25-49%	11 (4.6)	4 (2.9)	7 (7.1)	
50-74%	113 (46.9)	68 (48.9)	44 (44.4)	
75-100%	116 (48.1)	67 (48.2)	47 (47.5)	
1.2C - %15-24 Believed Condom Use				
0-24%	52 (21.9)	24 (17.4)	27 (27.8)	
25-49%	123 (51.7)	75 (54.4)	47 (48.5)	
50-74%	53 (22.3)	33 (23.9)	19 (19.6)	
75-100%	10 (4.2)	0 (4.4)	4 (4.1)	
1.2D - %15-24 Believed Asymptomatic				
0-24%	14 (5.8)	7 (5.0)	7 (7.1)	
25-49%	66 (27.4)	32 (23.0)	32 (32.3)	
50-74%	101 (41.9)	55 (39.6)	45 (45.5)	
75-100%	60 (24.9)	45 (32.3)	15 (15.2)	
1.3A – Have Necessary Skills				
Yes	237 (98.8)	138 (99.3)	96 (98.0)	
No	3 (1.6)	1 (0.7)	2 (2.0)	0.3712
1.3B – Wants STI Cont Med Education				
Yes	215 (90.3)	122 (89.1)	91 (92.9)	
No	23 (9.7)	15 (11.0)	7 (7.1)	0.3244
1.3C – Believes Important Health Counselor				
Yes	207 (87.3)	125 (90.6)	80 (83.3)	
No	30 (12.7)	13 (9.4)	16 (16.7)	0.0987
1.3D – Displays or Provides STI Info				
Yes	123 (51.7)	77 (55.8)	44 (45.4)	
No	115 (48.3)	61 (44.2)	53 (54.6)	0.1158
1.3E -Believes Physician Important Source				
Yes	225 (94.1)	131 (94.9)	91 (92.8)	
No	14 (5.9)	7 (5.1)	7 (7.1)	0.5079
1.3F – Frequently Take Sexual History				
Yes	183 (77.5)	121 (88.3)	59 (61.5)	
No	53 (22.5)	16 (11.7)	37 (38.5)	**0.0001**
1.3G – Believes Screening Aids Prevention				
Yes	209 (87.5)	126 (91.3)	81 (82.7)	
No	30 (12.6)	12 (8.7)	17 (17.4)	**0.0465**
1.3H – Self Swab Acceptable				
Yes	44 (18.7)	25 (18.5)	19 (19.6)	
No	191 (81.3)	110 (81.5)	78 (80.4)	0.8380
2.0 – Would Test Asymptomatic Patient				
Yes	37 (16.2)	25 (19.5)	12 (12.0)	
No	191 (83.8)	103 (80.5)	85 (87.6)	0.1522
2.1A – No Patient STI Complaint				
Yes	139 (59.2)	82 (61.2)	55 (56.1)	
No	96 (40.9)	52 (38.8)	43 (43.9)	0.4388
2.1B – Patient would be Embarrassed				
Yes	39 (16.6)	17 (12.6)	22 (22.7)	
No	196 (83.4)	118 (87.4)	75 (77.3)	**0.0431**
2.1C – Physician would be Embarrassed				
Yes	12 (5.1)	5 (3.7)	7 (7.2)	
No	223 (94.9)	130 (96.3)	90 (92.8)	0.2344

Table 6 Summary of Predisposing and Enabling Factors Which Influence Testing for Chlamydia (N, % and Pr Chi sq reported)

Survey Item	All Physicians 241¥	Female 139 (58.4%)	Male 99 (41.6%)	Chi Sq
2.1D – Patient of Different Gender				
Yes	12 (5.1)	6 (4.4)	6 (6.1)	
No	224 (94.9)	130 (95.6)	91 (93.8)	0.5468
2.1E – Others Present During Examination				
Yes	103 (43.8)	52 (38.5)	50 (51.6)	
No	132 (56.2)	83 (61.5)	47 (48.5)	**0.0491**
2.1F – No Time To Complete Test				
Yes	109 (46.2)	63 (46.3)	46 (47.4)	
No	127 (53.8)	73 (53.7)	51 (52.6)	0.8686
2.1G – Insufficient Materials for Testing				
Yes	24 (10.2)	14 (10.3)	10 (10.3)	
No	212 (89.8)	122 (89.7)	87 (87.7)	0.9970

Table #7 reports the uni-variate and multivariate odds ratios and associated 95% confidence intervals obtained from logistic regression for testing the patient presented in the clinical scenario for chlamydia and physician characteristics. After presenting a clinical scenario depicting a non-STI related patient visit, physicians were asked, "Would you test this patient for chlamydia?" Their responses were used as a dependant variable in logistic regression to examine factors which may have acted as barriers to performing a test on the patient. Table #2 has reported the overall number and percent for these survey questions. Of all physicians, 191 (83.8%) indicated that they would not complete a test for chlamydia on the patient as described in the scenario. Among male physicians, only 12 (12.4%) indicated that they would test this patient, compared to 25 (19.5%) female physicians who would do so.

In uni-variate analysis, this difference in testing rates between male and female physicians was not significant. The same was true for physician year of graduation, and community size where the practice was located. However, when physicians who served patient populations of more than 30% 15-24 year old women were compared to those serving less than 10%, there was a significant association with testing the patient in question. Further, those physicians who considered the fact that the patient did not present for an STI related issue had a 67% reduced odds of testing the patient presented in the clinical scenario. When other barriers were taken into consideration (multivariate analysis), only one variable was found to be significantly associated with testing the patient presented in the clinical scenario. Physicians who considered the fact that the patient did not present with a genitourinary disorder had a 70% reduced odds of testing the patient.

Table #7 Uni-variate and Multivariate Logistic Regression for Testing an Asymptomatic, Non-STI Patient for Chlamydia and Physician Characteristics (N, %, ORs, 95%CIs and Pr Chi sq reported)

Characteristic	Would Test N (%)	Uni-variate OR (95%CI)	Chi sq	Multivariate OR (95%CI)	Chi sq
Gender					
Female	25 (19.5)	1.0		1.0	
Male	12 (12.4)	0.58 (0.28 – 1.22)	0.1522	0.58 (0.26 – 1.28)	0.1788
Age					
< 45 years	18 (19.2)	1.0			
45-55 years	13 (13.8)	0.68 (0.31 – 1.48)	0.3270		
> 55 years	6 (15.0)	0.74 (0.27 – 2.04)	0.5680	¥	
Year Graduated					
< 1990	20 (13.9)	1.0		1.0	
> 1991	17 (20.2)	1.57 (0.77 – 3.21)	0.2107	1.42 (0.67 – 3.02)	0.3667
Community Size					
< 20,000	17 (14.9)	1.0		1.0	
≥20,000	20 (17.5)	1.21 (0.60 – 2.46)	0.5508	1.05 (0.50 – 2.21)	0.9040
Practice Setting					
Other	3 (15.8)	1.0		1.0	
Private Clinic	34 (16.3)	1.04 (0.29 – 3.75)	0.9509	0.82 (0.21 – 3.12)	0.7675
% 15-24 yo Women Patients					
< 10 %	6 (10.2)	1.0			
10 - 30 %	21 (16.9)	1.67 (0.64 – 4.38)	0.2941	1.0	
> 30%	10 (27.8)	**3.40 (1.11 – 10.37)**	**0.0269**	1.14 (0.51 – 2.55)	0.7560
% 15-24 yo Believed Sexually Active					
< 75%	16 (13.5)	1.0			
75%-100%	21 (19.3)	1.59 (0.76 – 3.12)	0.2348	NA	
%15-24 Believed Condom Use					
< 50%	27 (16.2)	1.0			
> 50%	10 (16.4)	1.02 (0.46 – 2.25)	0.9674	NA	
%15-24 Believed Asymptomatic					
< 50%	12 (15.4)	1.0			
> 50%	25 (16.7)	1.10 (0.52 – 2.33)	0.8037	NA	
No Patient STI Complaint					
No	23 (25.0)	**1.0**		**1.0**	
Yes	13 (9.8)	**0.33 (0.16 - 0.68)**	**0.0020**	**0.30 (0.12 – 0.63)**	**0.0024**
Patient would be Embarrassed					
No	28 (15.0)	1.0			
Yes	8 (21.6)	1.57 (0.65 – 3.80)	0.3155	NA	
Physician would be Embarrassed					
No	33 (15.4)	1.0			
Yes	3 (30)	2.35 (0.58 – 9.56)	0.2209	NA	

Table #7 Uni-variate and Multivariate Logistic Regression for Testing an Asymptomatic, Non-STI Patient for Chlamydia and Physician Characteristics (N, %, ORs, 95%CIs and Pr Chi sq reported)

Characteristic	Would Test N (%)	Uni-variate OR (95%CI)	Chi sq	Multivariate OR (95%CI)	Chi sq
Patient of Different Gender					
No	34 (15.8)	1.0			
Yes	3 (30)	2.28 (0.56 – 9.26)	0.2378	NA	
Others Present During Examination					
No	22 (17.7)	1.0			
Yes	15 (15.0)	0.82 (0.40 – 1.68)	0.5836	NA	
No Time To Complete Test					
No	22 (18.3)	1.0			
Yes	15 (14.3)	0.74 (0.36 – 1.52)	0.4149	NA	
Insufficient Materials to Complete Test	32 (15.7)	1.0			
No	5 (23.8)	1.68 (0.58 – 4.91)	0.3400	NA	
Yes					
Routine To Test Patient					
No	2 (1.8)	**1.0**			
Yes	35 (31.8)	**25.9 (6.05 – 110.94)**	**0.0001**	NA	

NA item was not included in multivariate model due to non-significance or low cell count in a 2 x 2 table (n≤5)
¥ Age not included in multivariate model due to correlation with year of graduation

3.4 Contact Tracing Activities

Physicians were asked to rate their agreement to a series of statements regarding what actions they would take following laboratory confirmation of chlamydia infection in a 15-24 year old female patient. Their responses were collected as scaled items (Never, Sometimes, Usually, and Always) but were dichotomized to facilitate analysis, reporting and interpretation of results. Table #8 reports the dichotomized contact tracing actions physicians might take following laboratory confirmation of chlamydia infection in a patient and differences between male and female respondents.

Of all responding physicians, 227 (95.0%) would “Always” advise the patient to inform all recent partner(s) of exposure, with only 12 (5.1%) electing to do otherwise. When asked if they would provide treatment for the patient’s partner(s) without performing a chlamydia test on them (Expedited Partner Therapy), “Sometimes” was the most frequently identified response with 103 (43.3%) of all responses. Just over one half of all physicians (n=120, 50.4%) indicated they would “Always” report the case to public health authorities. However, 54 (22.9%) physicians indicated that they would “Never” report the case to public health, and 76 (31.8%) would “Always” rely on the lab to notify public health. Of all physicians, 192 (80.6%) indicated they would “Never” assume the patient would inform her recent partners about her diagnosis without asking them to do so. Finally, 91 (38.1%) physicians would “Sometimes” seek assistance from public health authorities in order to complete contact tracing related activities.

3.4.1 Uni-variate and Multivariate Analysis

Tables #9 (uni-variate) and #10 (multivariate) report the associations between contact tracing activities taken following receipt of a positive chlamydia test and physician demographic characteristics as calculated via logistic regression. As was completed for the previous questions, results have been based on dichotomized outcomes in order to facilitate data analysis, reporting and interpretation. The rational for these comparisons was based on a review of the distribution of results to the survey, current provincial legislation regarding notifiable diseases, observations from similar health research, and through discussions with public health officials.(79, 84, 91, 122)

Advise to inform all recent partner(s) (Always vs. Usually – Never)

Physicians were asked if they would advise the patient to inform all recent partners of exposure. However, as 95% of respondents indicated that they would "Always" do so there were too few alternate responses to permit logistic regression of associated variables. Thus, no results are presented for this survey item.

Expedited Partner Therapy (EPT) (Always-Sometimes vs. Never)

Physicians were asked if they would provide Expedited Partner Therapy (treatment for the patient's partner without first screening them for infection), and the combined response categories of "Always – Sometimes" were compared against "Never". This dichotomization was based on health care research which has shown that physicians will elect to provide EPT between 25% and 75% of the time. (79, 80, 91, 122)

Of all responding physicians, 184 (76.3%) would "Always-Sometimes" elect to provide EPT. Two physician characteristics were significantly associated with this form of partner treatment in multivariate analysis. Physicians who served 10-30% (OR 3.06, 95% CI 1.43-6.53) and > 30% (OR 3.05, 95% CI1.03-9.02) 15-24 year old female patients had an increased odds of providing EPT (Always-Sometimes), compared to those serving <10%. This was also true for physicians practicing in office based clinics (OR 3.46, 95% CI 1.32-9.07), when compared to those working in hospitals, emergency rooms and other non-disclosed locations. There were no significant differences between male and female physicians, and no other physician characteristics were significantly associated with "Always-Sometimes" providing partner therapy in multivariate analysis.

Report Case to Public Health (Always vs. Usually –Never)

Chlamydia is listed as a notifiable disease in Nova Scotia, and it is provincially legislated that physicians report lab-confirmed cases of chlamydia to the local public health authority(85). Therefore, the category of "Always" was compared against the composite category of "Usually – Never" report the case to public health authorities. Less than one half of responding physicians (n=120, 49.8%) indicated that they would "Always" report a positive case to public health authorities. There were no physician characteristics which were significantly associated with case reporting in multivariate analysis.

Request Public Health Assistance (Always-Usually vs. Sometimes-Never)

For seeking assistance from public health to complete contact tracing, the categories of "Always – Usually" were compared against "Sometimes – Never". Limited research was available regarding rates at which physicians seek assistance from public health to complete contact tracing. Therefore, discussions with a local public health official and what research was available were used to define the dichotomization point for this question. (79, 123)

One hundred and one (41.9%) of all respondents would "Always-Usually" request assistance from public health to carry out contract tracing activities. In multivariate analysis, physicians practicing in cities or town of > 20,000 residents had a 53% reduced odds of requesting assistance when performing contact tracing activities, compared to those living in smaller communities. Physicians serving populations of >30% 15-24 year old female patients had a 64% reduced odds of requesting assistance.

Assume Patient Informs (Always-Sometimes vs. Never)

Most physicians (n=194, 80.5%) indicated that they would "Never" assume that the patient would inform her recent partner(s) about infection, without instructing her to do so. For the combined category "Always-Sometimes", only 47 (19.5%) would assume the patient would inform their partner(s). The choice to dichotomize in this manner was based on a review of the distribution of the data, as there was no research on which to base this comparison. In multivariate analysis, male physicians had more than a two fold increased odds of assuming the patient would inform all recent partners (Or 2.11, 95%CI 1.03-4.31). No other physician characteristics were significantly associated with this outcome.

Rely on Lab to Inform PH (Always-Sometimes vs. Never)

As it is provincial law for physicians to notify public health about notifiable diseases, they should not rely on the laboratory to perform that task (84). Therefore, we dichotomized this response as "Always – Sometimes" vs. "Never" rely on the laboratory to notify public health of test results.

Physicians working from office based clinics had a 5 fold increased odds of relying on the diagnostic laboratory to inform public health about a positive case, compared to physicians working in other practice locations, such as hospitals, emergency rooms and other non-disclosed location. Also, those physicians who served patient populations of 10-30% 15-24 year old women had more than a two fold increased odds (OR 2.13, 95% CI 1.01-4.11) of relying on

the lab, compared to those serving < 10% (referent category). No other physician characteristics were significantly associated with this outcome.

Table 8 Summary of Physician Actions Taken Following Laboratory Confirmation of Chlamydia Infection, by Gender (N, % and Pr Chi sq reported)

Action	All Physicians 241¥ (%)	Female 139 (58.4%)	Male 99 (41.6%)	Chi sq
Advise Inform Partner(s)				
Never - Usually	14 (5.8)	6 (3.6)	7 (7.1)	
Always	227 (94.2)	133 (96.4)	92 (92.9)	0.3578
Expedited Partner Therapy				
Never	57 (23.7)	35 (25.2)	21 (21.2)	
Sometimes – Always	184 (76.3)	104 (74.8)	78 (78.8)	0.4779
Report to Public Health				
Never - Usually	121 (50.2)	73 (52.5)	47 (47.5)	
Always	120 (49.8)	66 (47.5)	52 (52.5)	0.4440
Public Health Assistance				
Never - Sometimes	140 (58.1)	85 (61.2)	53 (53.5)	
Usually- Always	101 (41.9)	54 (38.9)	46 (46.5)	0.2417
Assume Informs Partner(s)				
Never	194 (80.5)	118 (84.9)	74 (74.8)	
Sometimes – Always	47 (19.5)	21 (15.1)	25 (25.3)	0.0512
Lab Notifies Public Health				
Never	61 (25.3)	33 (23.7)	27 (27.3)	
Sometimes – Always	180 (74.7)	106 (76.3)	72 (72.7)	0.6250

Table 8 Uni-variate Logistic Regression for Contact Tracing Activities and Physician Demographic Characteristics
(N, %, ORs and 95% CIs reported)

Characteristic	N (%)	Expedited Partner Therapy	N (%)	Report To PH	N (%)
Gender					
Female	104(74.8)	1.0	66 (47.5)	1.0	54 (38.9)
Male	78 (78.8)	1.25 (0.68-2.31)	52 (52.5)	1.22 (0.73-2.05)	46 (46.5)
Age					
< 45 years	77 (77.8)	1.0	47 (47.5)	1.0	39 (39.4)
45-55 years	74 (75.5)	0.88 (0.46-1.71)	51 (52.0)	1.20 (0.69-2.10)	47 (48.0)
> 55 years	33 (75.0)	0.86 (0.37-1.97)	22 (50.0)	1.11 (0.54-2.25)	15 (34.1)
Year Graduated					
< 1990	114 (75.2)	1.0	78 (52.0)	1.0	64 (42.7)
> 1991	70 (76.9)	1.05 (0.57-1.95)	42 (46.2)	0.63 (0.32-1.22)	37 (40.7)
Community Size					
< 20,000	91 (75.2)	1.0	68 (56.2)	1.0	63 (52.1)
≥20,000	93 (77.5)	1.14(0.63-2.06)	52 (43.3)	0.59 (0.30-1.14)	38 (31.7)
Practice Setting					
Other	12 (54.6)	1.0	13 (59.1)	1.0	10 (45.5)
Private Clinic	172 (78.5)	3.05 (1.24-7.49)	107 (48.9)	0.78 (0.25-2.45)	91 (41.6)
% 15-24 yo Women Patients					
< 10 %	43 (66.2)	1.0	35 (53.9)	1.0	36 (55.4)
10 - 30 %	111 (81.0)	1.92 (0.75-4.88)	68 (49.6)	0.85 (0.47-1.52)	55 (40.2)
> 30%	30 (79.0)	**2.18 (1.12-4.26)**	17 (44.7)	0.69 (0.31-1.55)	10 (26.3)

Table 8 Uni-variate Logistic Regression for Contact Tracing Activities and Physician Demographic Characteristics (N, %, ORs and 95% CIs reported)

Characteristic	Seek PH Assist	N (%)	Assume Patient Informs	N (%)	Rely on Lab To Inform
Gender					
Female	1.0	21 (15.1)	1.0	105 (75.5)	1.0
Male	1.37 (0.81-2.05)	25 (25.3)	1.90 (0.99-3.63)	72 (72.7)	0.45 (0.20-1.01)
Age					
< 45 years	1.0	20 (20.2)	1.0	76 (76.8)	1.0
45-55 years	1.42 (0.81-2.50)	18 (18.4)	0.89 (0.99-3.63)	69 (70.4)	0.71 (0.38-1.36)
> 55 years	0.80 (0.38-1.67)	9 (20.5)	1.02 (0.42-2.45)	33 (75.0)	0.91 (0.37-2.08)
Year Graduated					
< 1990	1.0	30 (20.0)	1.0	108 (72.0)	1.0
> 1991	0.92 (0.54-1.56)	17 (18.7)	0.92 (0.47-1.78)	70 (76.9)	1.30 (0.71-2.23)
Community Size					
< 20,000	**1.0**	29 (24.0)	1.0	85 (70.3)	1.0
≥20,000	**0.43 (0.25-0.72)**	18 (15.0)	0.56 (0.29-1.08)	93 (77.5)	1.46 (0.82-2.41)
Practice Setting					
Other	1.0	3 (13.6)	1.0	10 (45.5)	**1.0**
Private Clinic	0.85 (0.35-2.06)	44 (20.1)	1.59 (0.45-5.62)	168 (76.7)	**3.95 (1.61-9.68)**
% 15-24 yo Women Patients					
< 10 %	**1.0**	11 (16.9)	1.0	42 (64.6)	**1.0**
10 - 30 %	**0.54 (0.30-0.98)**	31 (22.6)	1.44 (0.67-3.08)	109 (79.6)	**2.13 (1.01-4.11)**
> 30%	**0.29 (0.12-0.69)**	5 (13.2)	0.74 (0.24-2.33)	27 (71.1)	1.34 (0.57-3.20)

Table 9 Multivariate Logistic Regression for Contact Tracing Activities and Physician Demographic Characteristics (ORs, 95% CIs and Pr Chi sq reported)

Characteristic	Expedited Partner Therapy	Pr Chi sq	Report To PH	Pr Chi sq	Seek PH Assist	Pr Chi sq	Assume Patient Informs	Pr Chi sq	Rely on Lab To Inform	Pr Chi sq
Gender										
Female	1.0		1.0		1.0		**1.0**		1.0	
Male	1.85 (0.91-3.81)	0.0906	1.09 (0.63-1.94)	0.7550	0.99 (0.54-1.79)	0.9715	**2.11 (1.03-4.31)**	**0.0431**	1.07 (0.53-2.15)	0.8419
Year Graduated										
< 1990	1.0		1.0		1.0		1.0		1.0	
> 1991	1.11 (0.57-2.14)	0.7616	0.78 (0.45-1.34)	0.3632	0.95 (0.54-1.67)	0.8536	1.03 (0.51-2.08)	0.9279	1.35 (0.71-2.60)	0.3662
Community Size										
< 20,000	1.0		1.0		**1.0**		1.0		1.0	
≥20,000	1.03 (0.54-1.96)	0.9341	0.60 (0.35-1.03)	0.0634	**0.47 (0.23-0.82)**	**0.0071**	0.59 (0.30-1.16)	0.1226	1.46 (0.77-2.74)	0.2453
Practice Setting										
Other	**1.0**		1.0		1.0				**1.0**	
Private Clinic	**3.46 (1.32-9.07)**	**0.0117**	0.50 (0.20-1.30)	0.1536	0.62 (0.24-1.61)	0.3316	NA		**5.03 (1.90-13.29)**	**0.0011**
% 15-24 yo Women Patients										
< 10 %	**1.0**		1.0		**1.0**		1.0		**1.0**	
10 - 30 %	**3.06 (1.43-6.53)**	**0.0039**	0.80 (0.47-1.67)	0.6958	0.56 (0.30-1.07)	0.0792	1.98 (0.88-4.50)	0.1012	**2.50 (1.20-5.20)**	**0.0146**
> 30%	**3.05 (1.03-9.02)**	**0.0442**	0.87 (0.36-2.16)	0.7787	**0.36 (0.14-0.95)**	**0.0396**	1.43 (0.41-5.02)	0.5739	1.33 (0.49-3.64)	0.5785

NA item was not included in multivariate model due to non-significance or low cell count in a 2 x 2 table (n≤5)
Age not included in multivariate model due to correlation with year of graduation

Chapter 4 Discussion

This study was designed to investigate rates at which physicians in Nova Scotia take sexual histories from, and test 15-24 year old female patients for *Chlamydia trachomatis.* It was also intended to determine what actions were taken by physicians following laboratory confirmation of a positive test for chlamydia (contact tracing). It has provided an updated analysis on current chlamydia related activities of general and family practice physicians in Nova Scotia. Information gained from this research can be useful in the enhancement of public health policy relating to STIs, notifiable disease reporting, or continuing medical education activities. The most significant findings from this research were that physicians in Nova Scotia do not screen at risk patients in accordance with guidelines and recommendations promoted by public health authorities.(12, 14, 40, 74, 124) This research found that the frequency of self reported sexual history taking was below recommended levels, and varied depending on contextual factors of the visit, and the demographic characteristics of physicians. Testing rates were similarly below that recommended by public health and medical authorities. Further, in more than 50% of cases, physicians were not acting in compliance with provincial law regarding notifiable disease reporting. As a result, physicians may be failing to adequately assess, diagnose and treat infected women for chlamydia, and their actions may erode the capacity of public health to find and treat their infected partners. The consequences of which may leave 15-24 year old women at elevated risk for infection with an easily treated, preventable disease, which is associated with significant reproductive and genitourinary health problems.

4.1 Limitations

Due to methodological and practical constraints there are limitations to this study and the conclusions drawn from it. This survey has obtained responses from 241 physicians which is adequate, but less than ideal for a study of this nature. Response rates for physician surveys have historically been poor, introduce non-response bias, and jeopardize the representativeness of this type of research. Research on the effect of response bias in physician surveys has demonstrated that respondents and non-respondents do differ significantly in many characteristics.(115) Therefore, it is possible that this return rate has introduced some measure of bias into this research and will reduce the true representativeness of the results. However, non-response bias may not be as significant of a threat to the results of this research, as it may be to research in the general population. It has been suggested that

physicians are a relatively homogeneous group in the context of socioeconomic status, demographic characteristics, training, attitudes and behaviours when compared to the general population.(115, 116) So the true effect of a low response rate, or the extent to which non-response bias has influenced our results, may be limited, if not difficult to estimate.

When compared to physicians registered for family/general practice with the College of Physicians and Surgeons of Nova Scotia, the 241 respondents to the survey were over represented by female physicians. This sample was composed of 58% female physicians, compared to the 40.8% which make up the entire body of registered family/general practice physicians in Nova Scotia.(120) Therefore, if female physicians were more likely to respond to the survey, or had greater chlamydia related knowledge than males, these response biases would have influenced the observations away from the null value, providing a stronger association than may have actually been present. If responding female physicians had a greater interest in research on the topic of female reproductive and genitourinary health, this sampling error may have diluted the significance of responses from male physicians, reducing the representativeness of the results. The result may have been stronger observed relationships than might have occurred with more male representation. Thus, these results may be an overestimation of actual chlamydia related physician behaviour.

There was also the potential to introduce bias related to survey design, where measurement error may have resulted from flaws in the instrument, question wording, question order, timing, or question response options. It was also possible that some questions were answered in a manner believed to be socially desirable. Some participants did state that one or more question(s) were confusing, and there is always a potential for recall bias in surveys such as this. Thus, it is possible that one or more questions did not accurately measure what they were intended to, or may have lead the respondent in their response. If this was true, the survey did not accurately measure actual performance. Systemic bias relating to survey design can erode the precision or validity of the conclusions drawn, and erode the value and strength of observed relationships. However, the survey was prepared and modeled after similar research published in peer review academic literature, and was pilot tested on physicians prior to initiating the study. Information from the piloted surveys was used to rewrite the final survey in the attempt to reduce the potential for bias induced error. Ultimately, the extent to which this has happened is difficult to estimate.

4.2 Sexual History Taking

This research has observed that only 34.4% of physicians would always take a sexual history during a routine annual visit with a 15-24 year old female patient with whom a physician – patient relationship (existing patient) had already been established. When the context of the visit was changed to that of a new patient, or a patient not presenting with an STI related issue, rates of history taking were further reduced. This would suggest that the context of the visit and the nature of the physician – patient relationship were important in determining whether the patient was screened for chlamydia. If female patients do not initiate a discussion about their sexual health with their physicians, or are unaware that they may be infected with an STI, they are unlikely to be screened. Physicians must therefore take a lead role in these discussions with young adult women, assess the patient's risk, and proceed accordingly. Further, they should do this with every patient, existing or otherwise. This study has observed that this does not happen as frequently as is recommended. Therefore, it is likely that opportunities to screen for chlamydia are being missed in a population known to be at high risk for infection, and re-infection.

These observations are compatible with other research relating to STI screening in adolescent and young adult women, although reported rates of screening vary. A survey of primary care providers in Colorado found that 26.3% would always take a sexual history from a 13-19 year old female patient during an annual or new patient visit, and that 71.9% would do so regularly (always or often).(121) A similar study in California found that 73.3% of physicians would usually or always take a sexual history from a female patient aged 25 years or less at an annual visit, with rates dropping to 65.7% for new and 20.6% for acute care patients.(79)

This survey found male physicians to have a significantly reduced odds of history taking with new and existing patients, while other physician demographic characteristics, such as time since graduation, community size, or composition of the physician's patient population were not always significantly associated with history taking in the multivariate analysis. Support for a gender influence has been reported widely. (79, 82, 121) In this research, the gender influence may relate to the fact that the survey only asked about history taking from female patients, excluding males as annual screening is only recommended for females. It could be that the gender of the patient is as important as the gender of the physician when it comes to initiating a discussion about sexual activity. Alternatively, it is the difference in gender between the

physician and the patient which influences the physician's approach to assessing a patient's risk. The 2009 Sexual Health Care Physician Survey did not investigate this issue with respect to history taking, only testing the asymptomatic, non-STI patient presented in the clinical scenario. Regardless, contextual factors appeared to be as important in determining physician behaviour as did demographic characteristics.

Although various enabling and predisposing factors were significant in uni-variate analysis, when all independent variables were taken into consideration in a multivariate analysis, items such as; physician knowledge of the sexual behaviours of 15-24 year old women, and their knowledge about the asymptomatic nature of many infected patients did not significantly influence sexual history taking. This was also true for physicians' belief that they were important sources of adolescent sexual health information, or that their STI screening and counseling efforts lead to improved reproductive health for their 15-24 year old patients. Presenting STI testing information to patients was the sole action which did predispose physicians to taking sexual histories, although not for all patient types. It seems intuitive that those physicians who take the time to provide clients with this type of information might be more aware of STI issues in young adult women, and more likely to assess a patient for sexual health concerns. Alternatively, physicians may use this information as a means to begin a discussion about sexual health issues with a patient, or to simply raise awareness of the issue in the patient's mind. Physicians may rely on this type of indirect prompt to lead the patient into a sexual health discussion. Unfortunately, even if physicians do prompt their clients in this manner, the patient may remain inhibited to discuss their sexual activity or reproductive health problems.

Adolescents are often reluctant to talk to physicians about their drug and alcohol behaviours, physical abuse or sexual practices.(99) This reluctance may stem from shame, embarrassment or confusion and fear of reprisal or punishment, especially in a small rural community. Research on Australian youth suggests that adolescent women would prefer to not openly discuss their sexual history with their primary care physicians.(101) These women would even provide misleading information regarding their sexual history when asked by a primary care physician during a general health examination, preferring instead a blanket policy to screen all women based on age, not communicated sexual history. Other research suggests that women are reluctant to seek health care specifically for a genitourinary issue. Interviews with adult women found that only 6% sought medical advice specifically for an issue related to sexual health / sexual dysfunction; such as lack of interest, or failure to achieve orgasm. (125) In order to

deliver efficient and effective health care services, the physician must develop a system to assess a patient's likelihood for disease, risk factors, and risk behaviours, obtain the necessary health related information from the client and proceed with diagnostic testing or empirical therapy. This is as true for the 65 year old male smoker, as it is for a 19 year old sexually active female.

This survey found that physicians in office based clinics were at a reduced odds of taking a sexual history from an existing patient, when compared to physicians working in other locations. This finding is somewhat extraordinary. A total of 20 (8.4%) responding physicians identified their practice locations as being something other than an office based clinic; such as urgent care / walk-in clinic, hospital associated emergency clinic, or some other unidentified location. Intuitively, physicians working in hospitals or urgent care clinics would not be expected to have returning patients, or existing patients. Their patients would presumably be all new patients.

Several respondents to the survey took the time to write a short note on the survey when they felt a question was confusing, or difficult for them to answer properly. Although some questions did provide difficulty for respondents, no one responded that they did not see existing patients. There are however several possible explanations for this supposed anomaly. First, the 'other' work location was not specific and may have included STI clinics, community health centres, etc. Individual patients may frequent those locations for sexual health care on a regular basis, and may be seen repeatedly by the physicians working in those locations. Alternatively, some physicians may have identified their primary work location as non-office based, but may also see patients in other secondary work locations. For example, an emergency physician working one day a week from an office based clinic, or some location other than the emergency room. Possibly, the perceived shortage of general practice physicians in Nova Scotia has resulted in some individuals not having a regular doctor in an office based location. These individuals may obtain their routine health care through urgent care / walk-in clinics, and may be 'existing patients' for doctors regularly working in these locations. It is also possible that physicians now working in non-office based locations may have historically worked in an office based location and reported their behaviour from that perspective.

4.3 Performing a Test for Chlamydia

This research has found that less than half (48.3%) of responding physicians would test 75-100% of their 15-24 year old female patients annually for chlamydia. This is of concern given the widespread recommendation to screen all sexually active young adult women on an annual basis. The Canadian Public Health Association, the US Preventative Services Taskforce, the US Centers for Disease Control and Prevention, and many other health policy organizations around the globe all strongly recommend routine annual screening for all sexually active females under the age of 25 years. (12, 13, 19)

The testing rates reported here are compatible with other research on chlamydia screening, although rates do vary. A survey of primary care providers in Colorado found that 53.8% of physicians would always or often test a sexually active female adolescent for chlamydia, with 26.3% reporting always doing so.(121) Guerry *et al.* found that 47% of physicians would usually or always test a female patient under 25 years of age for chlamydia.(79) Similarly, 42% of respondents in a national survey of US providers reported annually screening sexually active adolescent female patients.(82)

Given all that is known about the epidemiology and risk factors for chlamydia infection, it is important to examine why screening rates remain below recommended levels. Although demographic characteristics of the physician (gender, year of graduation, % female patients) were associated with testing for chlamydia, physicians who provided or distributed information relating to STIs to their patients, were aware that a large percentage of infected patients were asymptomatic, took a sexual history regardless of the patient's apparent risk, or believed that their screening efforts lead to improved genitourinary health for their patients had an increased odds of testing their patients for chlamydia. These predisposing and enabling factors, the attitudes and beliefs held by physicians, can have an influence on their decisions to perform a chlamydia test. Further, they are important to identify as they are potentially modifiable through educational initiatives. This research has observed that predisposing factors and demographic characteristics do not always have individual effects, they can be interactive. (Female physicians who believed that >50% of infected women were asymptomatic had a 6 fold increased odds of testing compared to their female colleagues who believed otherwise.) This would suggest that an underlying and modifiable belief when combined with non-modifiable characteristics have synergistic effects on performance. Thus, an educational program focusing

on the epidemiology and risk factors for chlamydia might have greater success than simply trying to persuade or recommend that physicians test more frequently.

It has also been observed that factors which would intuitively predispose or enable the physician to act were not always significantly associated with chlamydia testing. Although half of all physicians believed that >75% of the 15-24 year old women in their communities were sexually active, and that 73.6% believed that less than half of those women would use condoms to prevent infection with STIs, this knowledge did not influence history taking or chlamydia testing. Also surprising was that even though 98% of physicians felt that their medical training had provided them with the skills necessary to perform a chlamydia test; 94.4% felt that they were an important source of adolescent sexual health counseling; 83.4% would not consider the patient's embarrassment when they were recommending a chlamydia test; and that 93.9% of the physicians themselves would not suffer embarrassment when recommending a test, only 16.2% would actually test an at risk patient as presented in the clinical scenario. This would suggest that some other factor was a more important determinant of whether at risk patients would be screened for infection. The fact that the asymptomatic, non-STI patient described in the clinical scenario did not present with complaints of a genitourinary disorder was the only statistically significant characteristic associated with testing. Physicians who indicated they would consider this factor had a 70% reduced odds of testing the patient, when all other factors were taken into consideration. This finding supports the observation made earlier that contextual factors relating to the patient and the nature of their visit are important determinants of physician behaviours.

This research was conducted on a sample of general or family practice physicians as these providers are the gate keepers to health care for women of this cohort. All 15-24 year old women must seek advice from a primary health care provider for any concerns relating to their reproductive health prior to accessing a gynecologist. It may be that a physician is not the ideal provider to be tasked with taking a sexual history and performing a chlamydia test from these women. There are other models of health care provision which could be applied in these situations, models which may more effectively and efficiently address sexual health issues for young adult women. Nurses and nurse practitioners may be more uniquely positioned to assess a young female patient's risk for infection, take a sexual history and recommend she be tested by the physician. Nurses have shown to perform better at these tasks than did physicians, are generally female and young adult women may be more comfortable discussing sexual health

issues with them.(79) Not only did nurses exhibit higher frequencies of sexual history taking and testing for STIs, they were more likely to provide risk reduction counseling, provide additional services within the clinic (free condoms, use urine based tests, single dose Azithromycin on site), and they were more likely to complete contact tracing related activities. In fact, they performed better on all contact tracing activities recorded in the survey, compared to physicians. Contact tracing related activities are important components of an overall strategy to control infectious diseases, such as STIs.

4.4 Contact Tracing Activities

This research found that most physicians would instruct a patient diagnosed with chlamydia to inform all recent partner(s) of their exposure, and would never assume that she would do so without their prompting her to. More importantly, even though it is required by provincial law, less than half of the physicians would report the infection to public health authorities, and 75% reported that they rely on the diagnostic laboratory to do this for them. This was observed even though approximately 80% of all physicians would request assistance from public health to complete contact tracing activities. Specific characteristics of the physician did appear to influence completion of some of these contact tracing activities, but none was consistent for all activities. This research clearly shows that physicians in Nova Scotia could greatly improve their contact tracing related activities. However, the reasons why they performed as they did was not apparent.

Reporting

It is possible that physicians may not universally have knowledge or completely understand their duties and responsibilities regarding reporting cases of notifiable diseases to health authorities, although it is stated in the Health Protection Act.(85) Even when the response category was broadened to “Always-Usually”, only 60.1% of responding physicians would report cases to public health. It is fortunate that diagnostic laboratories in Nova Scotia do report positive chlamydia test results to public health officials. However, this does not obviate the fact that reporting by the physician is the law in this province.

Research on disease reporting by physicians shows a wide range of compliance depending on the disease, and it is commonly observed that physicians do not report even though it may be

mandatory for them to do so.(126) Only 37% of chlamydia cases were reported in a national survey of American physicians. (80) Knowledge of reporting was an issue, as only 50% knew reporting was required by the physician, and a further 37.3% were unsure about what was required. As has been observed with this research, a high percentage (72%) of these providers assumed the laboratories were completing the notifications to public health. A survey of Canadian emergency room physicians found that approximately 88% knew that chlamydia reporting was required. However, half of those physicians indicated that they would report any notifiable disease less than 40% of the time. According to this study, the most common reasons for not reporting were related to the time required to do so, and not knowing which diseases were reportable. (127) In 1999, the Centers for Disease Control reported that 78%-98% of chlamydia cases were reported to public health by private physicians in the United States.(128) Many of these physicians worked in 3 large managed care organizations with system characteristics which may have contributed to the high reporting rates, such as centralized laboratory reporting systems, strong relationships with statewide STI programs, and other features. Other research suggests that depending on the STI, between 38.5% and 49.6% of physicians would always report patient names to public health.(91) Possibly, all reportable diseases are not considered equal by physicians, leading to differences in perceived need to report.

Another component of case reporting is timeliness, or the time taken from confirmation of the patient's infection to notification of public health authorities, or contacts. According to research completed in Nova Scotia, and specific to chlamydia, the mean time from laboratory receipt of a sample to the issue of a test report to the physician is 4.6 days, and 5.5 days from laboratory to public health. Although public health does initiate follow up within 3 days of laboratory reporting, the physician is given these 3 days to initiate case follow up. Although the time between physician receipt of laboratory confirmation and physician case notification was not specified, it is estimated to be approximately 2.5 days, as that is the period between public health contact with the physician and subsequently the case.(129) This research did not address the issue of timelines, or rates of physician follow up with infected patients.

Expedited Partner Therapy (EPT)

Following confirmation of infection with chlamydia, the physician should request the patient to identify all recent sexual contacts, notify those contacts of their exposure and recommend they consult their physician. This form of contact tracing is known as provider referral, and it places

the burden of responsibility on the physician, or their staff, to do this on behalf of the patient. Patient referral requires the patient to perform these notifications on their own. However, these methods have many drawbacks and have met with limited success. Provider referral occupies physician time, or the resources of their staff to complete. It may be that physicians feel they are not adequately compensated for this type of activity. It may also be that resource constraints prevent physicians from identifying, and locating exposed contacts. It has been estimated that patient referral may only lead to 40%-60% of sex partners being screened, leaving a large percentage untreated.(130)

Many physicians indicated that they do use this form of partner therapy, with only 22.7% reporting they would never do so. However, the survey did not ask why a provider would or would not elect to provide EPT. Expedited Partner Therapy does present the physician with moral, ethical and potentially legal consequences, and its use is not specifically legislated in Nova Scotia. Physicians may believe they should only provide medication for patients whom they have examined. It is also possible that physicians may consider the potential for adverse reactions on behalf of the partner to put them at risk for potential litigation. Regardless, males are equally likely to be infected with chlamydia and have been labelled a “forgotten reservoir of infection”.(18, 19) Infected women who are treated are likely to continue sexual activities with untreated male partners, becoming re-infected. Re-infection rates are high for STIs like chlamydia, and women are likely to become re-infected within a short period of time. A study of adolescent women attending school based health centres revealed an eight year cumulative incidence rate of re-infection within 1 year of 26.3% (95% CI 23.4–29.2%).(48) Adolescents who were younger at first infection showed a greater likelihood of becoming re-infected within one year. Other research suggests that women under 25 years of age are eight times more likely to become re-infected, when compared to their older colleagues.(131)

Physicians in this research who worked in office based practices and who served higher populations of 15-24 year old patients were at increased odds of providing EPT to patients. Research provides differing rates of physician acceptance for this type of partner management .(91, 122) According to a CDC review, up to 56% of providers had employed EPT, with up to 15% “usually” or “always” providing it. (132) Compared to the 34.2% of physicians in this research, 45% to 47% of California providers reported “usually” or “always” providing EPT as a management tool. (133)

Patients do see EPT as an acceptable means of partner management in other locations. EPT has been shown to be acceptable to patients in a randomized control trial of 14-25 year old women, where 89% compliance in partner medication delivery was reported. (134) Other research suggests that 73% to 76% of patients treated for chlamydia reported delivering EPT to their partner(s) when it was offered. (135, 136) When patients are asked which form of partner notification they prefer, 67% of women diagnosed with chlamydia infection in Great Britain would choose EPT over traditional partner referral. Men were equally enthusiastic about this form of partner notification.(137)

Studies examining the effectiveness of EPT in controlling STIs like chlamydia have shown mixed results. EPT has been shown to be equally effective (134) or 67% more effective at reducing re-infection rates when compared to standard forms of partner notification.(138) A systematic review of partner notification in cases of STIs has observed that the rate of re-infection was 27% less when EPT was employed as a partner notification strategy, when compared to standard patient referral. However, when EPT was compared to augmented forms of patient referral there was no significant difference in outcome.(139)

Contact Tracing

Approximately 75% of physicians in this study reported that they would rely on the lab to notify public health authorities of a notifiable disease case. This estimate is similar to that observed with physicians working in emergency settings, where 65.7% also report a reliance on laboratory completed notifications(140), and in a nationwide survey of US physicians which found that the mean response was for providers to “Usually” or “Half the Time” believe that the laboratory would contact the health department.(122) As previously indicated, laboratories in Nova Scotia do notify public health of positive cases, with 97.8% of reports being sent directly via fax from the laboratories to public health.(129) Therefore, it is reasonable to assume that public health and surveillance authorities in this province are made aware of most positive cases of chlamydia, if a test is submitted to the laboratory. However, that does not ensure that contact information for all index cases is brought to the attention of public health if physicians elect to presumptively treat an infected patient without performing a test. Limited research has addressed the rate at which physicians rely on the laboratory to notify public health of infections. Similarly, there is limited research on the rate at which physicians request the assistance of public health staff in completing contact tracing activities.

It has been reported that physicians in Nova Scotia rarely request assistance from public health to complete contact tracing activities.(129) However, approximately 80% of physicians in this survey indicated they would request assistance from public health staff in order to perform contact tracing related activities, with those working in larger communities (>20,000), or serving larger (>10%) populations of 15-24 year old female patients having a reduced odds of doing so. The survey used in this research was not designed to investigate factors which influence contact tracing activities, other than standard demographic characteristics, thus causal relationships can only be speculated. Research does however suggest that public health personnel may be more successful at completing contact tracing activities compared to physicians in practice. Disease Intervention Specialists (DIS) working with HIV patients were 3 times more effective at eliciting sex partner information and elicited 4 times as many partners per case, compared to community based physicians. DIS staff were able to notify 70.9% of HIV exposed partners, compared to 48.3% for community physicians. (141) This research was based on HIV infected persons in a large metropolitan area, where DIS staff were specifically trained to work with HIV patients to perform contact tracing activities. However, it does suggest that physician directed contact tracing may not be the best means of ensuring that exposed persons receive notification of their exposure.

4.5 The PRECEDE-PROCEED Model

Components of the PRECEDE-PROCEED model were employed in the creation of the 2009 Sexual Health Care Physician Survey, as it was a framework by which the predisposing and enabling factors which underlie testing rates could be investigated. However, this research was not conceptualized, or intended to be an analysis of the model's application in sexual health research. Therefore, it is difficult to state the usefulness of the model for performing an analysis of physician behavior.

When designing a survey it is important to not only investigate rates at which a behavior is completed, but to examine the factors which influence those behaviours. The PRECEDE-PROCEED model's predisposing and enabling factors did reveal certain important beliefs and attitudes about sexual health care which were associated with rates of sexual history taking and testing for chlamydia. Some of these factors were strongly associated with their respective behaviours, to the degree which was observed for demographic characteristics, if not more so. Therefore, it is important to acknowledge the importance of designing a survey instrument which takes into consideration those factors which underlie behavior outcomes. The PRECEED-

PROCEED model has provided such a framework, at least in this research.

Chapter 5 Conclusions

A significant component of providing health care is assessing a patient's risk for disease, or harm from behavioural and lifestyle factors. Taking a thorough patient history allows the physician to identify these risks and additional patient complaints that require medical attention. However, physician – patient discussions are a complex interaction of verbal and visual clues, and the physician must not only know which questions to pose, but how to pose them to obtain the greatest amount of patient information. Physicians are expected to do this with every patient, every time. Physicians are human beings, influenced by their own preconceptions and biases, factors which also greatly impact how patients are served.

This research has observed that physicians do not perform as well as they might on tasks related to providing reproductive and genitourinary health care to young adult women. In the case of *Chlamydia trachomatis* infection, physicians must continue to act even after the patient has left their office. Contact tracing activities are both essential to the control of communicable diseases, and are regulated by public legislation in many jurisdictions. Again, physicians do not always perform as well as they are expected to after diagnosing the patient's infection, or initiating therapy. We have seen how characteristics of the physician, both demographic and personal, may, or may not be associated with their completion of these chlamydia related activities. Demographic characteristics are not easily modified, but many of the personal characteristics investigated here are modifiable. Knowledge of the epidemiology and risk factors associated with chlamydia infection can be provided to physicians through well designed educational activities. Alternatively, models of sexual health care provision can be redesigned to enhance testing rates, improve patient communication and circumvent traditional barriers to patient service. Finally, it is clear that contact tracing performance needs to be ameliorated through an alternative model. The principles of effective public health can not be compromised. If physicians are unable, or unwilling to properly complete the necessary contact tracing related activities, then alternative models must be proposed and their effectiveness assessed.

5.1 Relevance of Research

As previously indicated, research suggests that chlamydia screening rates for 15-24 year old women fails to achieve guidelines established by health care policy organizations and public health agencies. There was no reason to believe that this would be untrue for physicians in

Nova Scotia. The factors which underlie these testing rates are complex and multi-factorial. Therefore, it is necessary to conduct research on the mechanisms which influence physician behaviours and beliefs. Green's model has facilitated such an undertaking, as it aided exploration of the underlying decision making variables which actual performance rates do not reveal. This research was therefore beneficial in providing insight into why physicians act as they do. Policies or programs for physicians and their patients have much to gain from this research, as it has the potential to improve the use of STI health resources and can assist health policy makers to develop more effective sexual health care delivery systems and techniques. This research can be used to guide physician training efforts and continuing education programs at all levels of medical education. Most importantly, it has the potential to be used to improve the physical and reproductive health of women in the province of Nova Scotia.

5.3 Knowledge Transfer

The findings of this project will contribute to a greater understanding of why chlamydia remains the most prevalent reportable infection in Nova Scotia. This research will provide opportunities to improve the use of chlamydia testing resources by informing physicians, public health officials and policy makers about the state of current practice with respect to management of chlamydia, thereby guiding policy development, health services planning for sexually transmitted infections and improve the health of infected individuals. Therefore, it is essential that all parties who could make use of this research to improve the health and wellbeing of Nova Scotians should have access to it.

Information gained from this project will be shared with the College of Physicians and Surgeons of Nova Scotia and the Dalhousie University Faculty of Medicine's Department of Continuing Medical Education. These agencies can in turn disseminate the findings to their respective audiences in the form of continuing education programs aimed at improving compliance with the established guidelines and increasing chlamydia screening rates. At the physician level, the information may assist physicians to develop alternative systems of communicating with patients, such that increasing numbers of patients will have access to appropriate screening and treatment for their infections. The Nova Scotia Department of Health Promotion and Protection and the Department of Health will also be informed of the findings from this project. These agencies may use the information to develop or enhance programs to promote awareness of

chlamydial infection in Nova Scotia and encourage those at risk to seek counseling from their physicians.

Appendices

Appendix 1.1

Data Summary Tables

Dependant Variables

Variable	Questionnaire Item	Variable Type
Routine New Patient	#1.1a	Ordinal 5 point
Routine or Annual	#1.1b	Ordinal 5 point
Acute Care Non STI	#1.1c	Ordinal 5 point
Frequency Annual Test Rate	#1.2a	Ordinal 4 point
Contact Tracing Activities	#3.1a-f	Ordinal 5 point

Independent Variables

Variable	Questionnaire Item	Variable Type
Perceived Sexual Activity Rate	#1.2b	Ordinal 4 point
Perceived Condom Use	#1.2c	Ordinal 4 point
Perceived Asymptomatic Rate	#1.2d	Ordinal 4 point
Beliefs, Attitudes and Knowledge	#1.3a-h	Binary
Would Test Patient	#2.1a	Binary
Barriers to Completing Test	#2.2a-h	Binary
Gender (Male/Female)	#4.1a	Dichotomous
Age (years)	#4.1b	Continuous
Year of Graduation	#4.1c	Continuous
Location of Practice (urban/rural)	#4.1D	Ordinal
Type of Practice Setting	#4.1F	Categorical 4 point

Appendix 1.2

2009 Sexual Health Care Physician Survey

Screening for Chlamydia trachomatis in Young Adult Women

2009 Sexual Health Care Physician Survey

Screening for Chlamydia trachomatis in Young Adult Women

To Participating Physicians

The purpose of this study is to collect your thoughts, experiences and opinions regarding screening 15 to 24 year old women for the sexually transmitted infection *Chlamydia trachomatis*. This research will help to identify factors which may impede or facilitate your counseling and providing testing for chlamydia in women of this age group. The information you provide will lead to improvements in the health and well-being of young adult women infected with chlamydia in Nova Scotia.

Completing the survey is voluntary. However, if you do participate, you are encouraged to answer all of the questions in the survey. This should take no more than 10 minutes of your time. The return of a completed questionnaire will be accepted as your having consented to participating in this study.

Please read all of the instructions carefully and answer honestly.

Do not sign your name to any component of the survey, as your participation will remain anonymous and only the researchers will see your responses. All surveys will be pooled for analysis and reporting. None of your answers will be linked to personally identifying information.

When you have completed all 4 sections of the survey, please seal it in the envelope provided and return it in the mail.
If for any reason you choose not to respond, please return the blank questionnaire in the enclosed stamped envelope.

If you have any questions or comments about this study, please contact me at 902-422-5790 or via e-mail at kp982409@dal.ca.

Thank you very much for helping me to complete this important study.

Sincerely,

Dr. Kip Grasse
Master's Candidate, Community Health and Epidemiology
Dalhousie University Faculty of Medicine, Community Health & Epidemiolog

Part 1: The following questions relate to taking a sexual history or performing a test for chlamydia in 15-24 year old female patients.
Please indicate your response to the situation by checking the appropriate box.

1.1 How often do you take a sexual history from a 15-24 year old woman in each of the following situations?

Situation	Never	Sometimes	About Half the Time	Usually	Always
a) Routine visit with new patient.	☐	☐	☐	☐	☐
b) Routine or annual visit with existing patient.	☐	☐	☐	☐	☐
c) Acute care visit for non STI issue with either new or existing patient.	☐	☐	☐	☐	☐

1.2 Please check the appropriate box after reading the following questions related to testing for chlamydia infection and the sexual activity of 15-24 year old women in the community where you practice.

Question	0 -24%	25-49%	50-74%	75-100%
a) What percentage of sexually active 15-24 year old female patients do you test annually for chlamydia?	☐	☐	☐	☐
b) What percent of 15-24 year old women do you believe are sexually active in your community?	☐	☐	☐	☐
c) What percent of sexually active 15-24 year old women do you believe rely on condom use to prevent STIs?	☐	☐	☐	☐
d) What percentage of infected women do you believe are asymptomatic?	☐	☐	☐	☐

1.3 Please answer either yes or no to the following statements.

Statement	Yes	No
a) Your medical training has provided you with the necessary skills to complete a test for chlamydia.	☐	☐
b) Continuing medical education programs for physicians should target sexual health issues in 15 to 24 year old women.	☐	☐
c) Your STI counseling efforts lead to improved sexual health for your 15 to 24 year old female patients.	☐	☐
d) I display posters or distribute informative pamphlets on the topic of STI testing to my 15-24 year old patients.	☐	☐
e) I believe that physicians are an important source of adolescent sexual health counseling.	☐	☐
f) Regardless of their apparent risk, I frequently take a sexual history from my 15 to 24 year old patients.	☐	☐
g) I believe that screening asymptomatic women for infection with chlamydia can prevent significant genitourinary complications.	☐	☐
h) I feel that patient collected vaginal swabs are acceptable as a method of performing a test for chlamydia in female patients.	☐	☐

Part 2: For the following questions, please assume that an asymptomatic 24 year old woman in a long term relationship presents to you for a minor respiratory infection. It has been more than 1 year since you have seen this patient for an examination.

2.1a) Would you test this patient for chlamydia? (Please circle one) **YES** **NO**

2.2 Would you consider these factors when deciding to do a chlamydia test on this patient?

Barriers	Yes	No
a) If the patient did not present with complaints of a genitourinary disorder.	☐	☐
b) The possibility that the patient might be embarrassed when you recommend a chlamydia test.	☐	☐
c) The possibility that you might be too embarrassed to recommend a test.	☐	☐
d) If the patient is not the same gender as you.	☐	☐
e) If the patient's parent or partner were present during the examination.	☐	☐
f) Completing a test would require too much time during the appointment.	☐	☐
g) I might not have the right materials and equipment to perform the test.	☐	☐
h) I routinely test women of this background.	☐	☐

Part 3: In this section we would like to know what actions you might take given the following scenario. Assume that a 24 year old unmarried woman you have screened for chlamydia tests positive. After notifying the patient of her test result and prescribing treatment, how often do you complete the following contact tracing activities?

Please check the appropriate response about what you might do after diagnosing the patient's infection.

After diagnosing this patient I would	Never	Sometimes	Usually	Always
a) Advise her to inform all recent partner(s) of exposure.	☐	☐	☐	☐
b) Provide treatment for partner(s) without seeing them in order to complete a chlamydia test.	☐	☐	☐	☐
c) Report the case to public health authorities.	☐	☐	☐	☐
d) Seek assistance from public health authorities in completing contact tracing on behalf of patient.	☐	☐	☐	☐
e) Assume the patient would tell her recent partner(s) about her diagnosis without me asking her to.	☐	☐	☐	☐
f) I rely on the lab to notify public health of the test result.	☐	☐	☐	☐

Part 4: These final questions request demographic information. Please provide the appropriate answer where requested.

a) Please circle your gender ……..male …….female

b) Your current age in years is ……

c) In what year did you graduate from medical school?…….

d) How many persons live in the city, or town where you practice? (circle the best answer)

Up to 1,000 1,000 to 5,000 5,000 to 10,000 10,000 to 20,000 20,000 or more

e) Which type of practice setting best describes your work location? (check one box)

□ office based clinic □ urgent care/ walk-in clinic □ hospital associated emergency clinic □ other

We value your thoughts regarding this questionnaire. Please feel free to use this space to make any comments you wish regarding this survey.

References

1. Nova Scotia Department of Health Promotion and Protection. Surveillance Report 2006. Halifax, Nova Scotia; 2008.
2. Public Health Agency of Canada. Chlamydia Trachomatis in Canada: An Update. Ottawa, Ontario: Canadian Public Health Association; 1997.
3. Public Health Agency of Canada, Centre for Infectious Disease Prevention and Control. Incidence by Age Group, Chlamydia, Genital, Females, 2004, Nova Scotia, Number of Reported Cases. Public Health Agency of Canada; 2005.
4. Heyman DL. Control of Communicable Diseases Manual, 18th Edition. 18th Edition ed. Washington, DC: American Public Health Association; 2004.
5. Centers for Disease Control and Prevention. Chlamydia - CDC Fact Sheet. Sexually Transmitted Diseases 2008 December 20, 2007 [cited; Available from: http://www.cdc.gov/std/chlamydia/STDFact-Chlamydia.htm
6. Scholes D, Stergachis A, Heidrich FE, Andrilla H, Holmes KK, Stamm WE. Prevention of Pelvic Inflammatory Disease by Screening for Cervical Chlamydial Infection. New England Journal of Medicine. 1996;334(21):1362-6.
7. Steben M. The resurgence of Chlamydia trachomatis. Journal of Obstetrics and Gynaecology of Canada. 2004;26(6):552-29.
8. Mann J. What if it all means something? The consequences of high rates of chlamydia in Canada. Canadian Sexually Transmitted Infections Surveillance Report. Ottawa, Ontario: Public Health Agency of Canada; 2007. p. 2-6.
9. Chesson HW, Blandford JM, Gift TL, Tao G, Irwin KL. The estimated direct medical cost of sexually transmitted diseases among American youth, 2000. Perspectives on Sexual & Reproductive Health. 2004;36(1):11-9.
10. Bissell M, McKay A. Taking Action on Chlamydia Literature Review. Sex Information and Education Council of Canada; 2005. p. 33.
11. Silversides A. High cost of Chlamydia can be cut, researcher finds. Canadian Medical Association Journal. 1999;160(8):1119.
12. U.S. Preventative Service Task Force. Screening for chlamydia infection: recommendations and rationale. American Journal of Preventive Medicine. 2001;20(3):90-4.
13. Centers for Disease Control and Prevention. Recommendations for the prevention and management of Chlamydia trachomatis infections, 1993. Atlanta, Georgia: National Center for Prevention Services; 1993.
14. CMO Expert Advisory Group on *Chlamydia trachomatis*. *Chlamydia trachomatis:* summary and conclusions of CMO's Expert Advisory Group. In: Department of Health, editor.: London Department of Health; 1998.
15. Langille DB, Mann KV, Gailiunas PN. Primary care physicians' perceptions of adolescent pregnancy and STD prevention practices in a Nova Scotia county. American Journal of Preventative Medicine. 1997;13(4):324-30.
16. Langille DB. Teenage pregnancy: trends, contributing factors and the physician's role. Canadian Medical Association Journal. 2007;176(11):1601-2.
17. Greene L, Kreuter MW. Health Promotion Planning: An Educational and Ecological Approach. 3rd. ed. Mountain View, California: Mayfield; 1999.
18. Chen MY, Donovan B. Screening for genital Chlamydia trachomatis infection: are men the forgotten reservoir? Medical Journal of Australia 2003;179(3):124-5.

19. Public Health Agency Canada. Canadian Guidelines on Sexually Transmitted Infections, 2006 ed. 2007 [cited June, 2008]; Available from: http://www.phac-aspc.gc.ca/std-mts/sti_2006/sti_intro2006_e.html
20. Andersen B, Olesen F, Moller JK, Ostergaard L. Population-Based Strategies for Outreach Screening of Urogenital Chlamydia trachomatis Infections: A Randomized, Controlled Trial. The Journal of Infectious Diseases. 2002;185(2):252-8.
21. De Schryver A MA. Epidemiology of sexually transmitted diseases: the global picture. Bulletin of the World Health Organization. 1990;68(5):639-54.
22. Gerbase AC, Rowley JT, Heymann DH, Berkley SF, Piot P. Global prevalence and incidence estimates of selected curable STDs. Sexually Transmitted Infections. 1998;74 (Supp 1):12-6.
23. Paavonen J, Eggert-Kruse W. Chlamydia trachomatis: impact on human reproduction. Human Reproduction Update. 1999;5(5):433-47.
24. World Health Organization; Department of HIV/AIDS. Global Incidence and Prevalence of Selected Curable Sexually Transmitted Infections, Chlamydia. Global Prevalence and Incidence of Selected Curable Sexually Transmitted Infections 2001 June 4, 2008 [cited 2008 July 2009]; Available from: http://www.who.int/docstore/hiv/GRSTI/003.htm
25. Centers for Disease Control and Prevention, Division of STD Prevention. Chlamydia Prevalence Monitoring Project Annual Report 2006. Rev ed. Atlanta, Georgia; 2008.
26. Public Health Agency of Canada, Centre for Communicable Diseases and Infection Control. Reported cases and rates of genital chlamydia by age group and sex, 1991 to 2007. Public Health Agency of Canada; 2007.
27. Public Health Agency Canada. Incidence by Province/Territory, Chlamydia, Genital, Females, All Ages (Incl. Not Specified), 2004. Public Health Agency of Canada; 2004.
28. Public Health Agency of Canada. 2004 Canadian Sexually Transmitted Infection Surveillance Report. Ottawa, Ontario: Public Health Agency of Canada; 2007.
29. Public Health Agency Canada. Reported cases of notifiable STI from January 1 to December 31, 2006 and January 1 to December 31, 2007 and corresponding rates for January 1 to December 31, 2006 and 2007. Ottawa, Ontario: Public Health Agency of Canada; 2008.
30. Public Health Agency of Canada, Centre for Infectious Disease Prevention and Control. Notifiable Diseases On-Line, Chlamydia, Genital, Both Sexes Combined (Incl. Not Specified), All Ages (Incl. Not Specified), Canada, 1989-2004 Public Health Agency of Canada,; 2005.
31. Public Health Agency of Canada. Reported cases of notifiable STI from January 1 to September 30, 2006 and January 1 to September 30, 2007 and corresponding annual rates for 2006 and 2007. Public Health Agency of Canada; 2007.
32. The Public Health Agency of Canada. Chlamydia, Genital, Females, All Ages (Incl. Not Specified), Nova Scotia, 1989-2004. The Public Health Agency of Canada; 2008.
33. Tarr ME, Gilliam ML. Sexually transmitted infections in adolescent women. Clinical Obstetrics and Gynecology. 2008;51(2):306-18.
34. Chacko MR, Lovchik JC. Chlamydia trachomatis Infection in Sexually Active Adolescents: Prevalence and Risk Factors. Pediatrics. 1984;73(6):836.

35. Chacko MR, Wiemann CM, Smith PB. Chlamydia and gonorrhea screening in asymptomatic young women. Journal of Pediatric and Adolescent Gynecology. 2004;17(3):169-78.
36. Navarro C, Jolly A, Nsir R, Chen Y. Risk factors for genital chlamydial infection. Canadian Journal of Infectious Disease. 2002;13(3):195-207.
37. Langille DB, Shoveller J. Chlamydia trachomatis infection in rural Nova Scotia. Canadian Medical Association Journal. 1993;149(9):1267-72.
38. Forward K. Chief of Service for the Division of Microbiology at the Queen Elizabeth II Health Sciences Centre. Halifax, Nova Scotia; 2008. p. Personal communication.
39. ACOG Committee Opinion #301. ACOG Committee Opinion #301: Sexually Transmitted Diseases in Adolescents. Obstetrics & Gynecology. 2004;104(4):891.
40. American College of Obstetricians and Gynecologists Committee on Adolescent Health Care. ACOG Committee Opinion #301: Sexually Transmitted Diseases in Adolescents. Obstetrics & Gynecology. 2004;104(4):891.
41. Peipert JF. Genital chlamydial infections. New England Journal of Medicine. 2003;349(25):2524–30.
42. Cates WJ. The Epidemiology and Control of Sexually Transmitted Diseases in Adolescents. Adolescent Medicine. 1990;1(3):409-28.
43. Boyce W, Doherty-Poirier M, MacKinnon D, Fortin C. Sexual Health of Canadian Youth: Findings from the Canadian Youth, Sexual Health and HIV/AIDS Study. The Canadian Journal of Human Sexuality. 2006;15(2):59-68.
44. Rotermann M. Trends in teen sexual behavior and condom use. Health Reports. 2008;19(3):53-8.
45. Delaney M, Langille D, Richardson H, Beazley R. Factors Influencing Condom Use among Students Attending High School in Nova Scotia. The Canadian Journal of Human Sexuality. 1997;6.
46. Langille D, Beazley R, Shoveller J, Johnston G. Prevalence of high risk sexual behaviour in adolescents attending school in a county in Nova Scotia. Canadian Journal of Public Health. 1994;85(4):227-30.
47. Fortenberry JD, Brizendine EJ, Katz BP, Orr DP. Post-treatment sexual and prevention behaviours of adolescents with sexually transmitted infections. Sexually Transmitted Infections. 2002;78(5):365-8.
48. Gaydos CA, Wright C, Wood BJ, Waterfield G, Hobson S. Chlamydia trachomatis Reinfection Rates Among Female Adolescents Seeking Rescreening in School-Based Health Centers. Sexually Transmitted Diseases. 2008;35(1):233-7.
49. Thurman AR, Holden AE, Shain RN, Perdue S, Piper JM. Preventing Recurrent Sexually Transmitted Diseases in Minority Adolescents: A Randomized Controlled Trial. Obstetrics & Gynecology 2008;111(6):1417-25.
50. Fortenberry JD, Brizendine EJ, Katz BP, Wools KK, Blythe MJ, Orr DP. Subsequent Sexually Transmitted Infections Among Adolescent Women With Genital Infection Due to Chlamydia trachomatis, Neisseria gonorrhoeae, or Trichomonas vaginalis. Sexually Transmitted Diseases. 1999;26(2):26-32.
51. Lifson AR, HalcÓn LL, Hannan P, St. Louis ME, Hayman CR. Screening for sexually transmitted infections among economically disadvantaged youth in a national job training program. Journal of Adolescent Health. 2001;28(3):190-6.
52. Buffardi AL, Thomas KK, Holmes KK, Manhart LE. Moving Upstream: Ecosocial and Psychosocial Correlates of Sexually Transmitted Infections Among Young Adults in the United States. American Journal of Public Health. 2008;98(6):1128-36.

53. Peipert JF, Lapane KL, Allsworth JE, Redding CA, Blume JD, Stein MD. Bacterial vaginosis, race, and sexually transmitted infections: does race modify the association? Sexually Transmitted Diseases. 2008;35(4):363-7.
54. Sipkin DL, Grady LB, Gillam A. Risk Factors for Chlamydia Trachomatis Infection in a California Collegiate Population. Journal of American College Health. 2003;52(2):65-71.
55. Centers for Disease Control and Prevention. Trends in Reportable Sexually Transmitted Diseases in the United States, 2006. National Surveillance Data for Chlamydia, Gonorrhea, and Syphilis. Atlanta, Georgia: Centers for Disease Control and Prevention; 2007.
56. Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance 2006 Supplement, Chlamydia Prevalence Monitoring Project Annual Report 2006. Rev ed In: Department of Health and Human Services CfDCaP, editor.: Centers for Disease Control and Prevention.; 2008.
57. Richardson E, Sellors JW, Mackinnon S, Woodcox V, Howard M, Jang D, et al. Prevalence of Chlamydia trachomatis infections and specimen collection preference among women, using self-collected vaginal swabs in community settings. Sexually Transmitted Diseases. 2003;30(12):880-5.
58. Public Health Agency of Canada. Findings from Enhanced Surveillance of Canadian Street Youth 1999-2003. Ottawa, Ontario; 2006.
59. Manitoba Health, Communicable Disease Control Unit Public Health Division. The Descriptive Epidemiology of Sexually Transmitted Infections and Blood Borne Pathogens in Manitoba; 2002 - 2003. Winnipeg, Manitoba: Communicable Disease Control Unit; 2005.
60. Mangione-Smith R, O'Leary J, McGlynn EA. Health and cost-benefits of chlamydia screening in young women. Sexually Transmitted Diseases. 1999;26(6):309-16.
61. Mangione-Smith R, McGlynn EA, Hiatt L. Screening for Chlamydia in Adolescents and Young Women. Archives of Pediatric Adolescent Medicine. 2000;154(11):1108-13.
62. Hu D, Hook III EW, Goldie SI. Screening for Chlamydia trachomatis in women 15 to 29 years of age: a cost-effectiveness analysis. Annals of Internernal Medicine. 2004;141(7):501-13.
63. Welte R, Kretzschmar, M., van den Hoek, J.A., Postma, M.J. A population based dynamic approach for estimating the cost effectiveness of screening for Chlamydia trachomatis. Sexually Transmitted Infections. 2003;79(5):426.
64. Macleod J, Smith GD. Chlamydia screening can have high take-up rates if right methodology is used. British Medical Journal. 1999;319(7203):188.
65. Nova Scotia Department of Health. The Pap Test Rules Have Changed; Frequently Asked Questions. Halifax, Nova Scotia: Government of Nova Scotia; 2006.
66. Hayward RSA. Clinical practice guidelines on trial. Canadian Medical Association Journal. 1997;156(12):1725-8.
67. Hansen L, Barnett J, Wong T, Spencer D, Rekart M. STD and HIV counseling practices of British Columbia primary care physicians. AIDS Patient Care & STDs. 2005;19(1):40-8.
68. Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud P-AC, et al. Why Don't Physicians Follow Clinical Practice Guidelines?: A Framework for Improvement. Journal of the American Medical Association. 1999;282(15):1458-65.

69. Moses S, Lawrence E. Sexually transmitted diseases in Manitoba: evaluation of physician treatment practices, STD drug utilization, and compliance with screening and treatment guidelines. Sexually Transmitted Diseases. 2002;29(12):840-6.
70. Gorgos L FD, Marrazzo J. Chlamydia Positivity in American Indian/Alaska Native Women Screened in Family Planning Clinics, 1997-2004. Sexually Transmitted Infections. 2008;Epub ahead of print].
71. Rietmeijer CA, Van Bemmelen R, Judson FN, Douglas JMJ. Incidence and repeat infection rates of Chlamydia trachomatis among male and female patients in an STD clinic: implications for screening and rescreening. Sexually Transmitted Diseases. 2002;29(2):65-72.
72. Richey CM, Macaluso M, Hook EW. Determinants of reinfection with Chlamydia trachomatis. Sexually Transmitted Diseases. 1999;26(1):4-11.
73. Weyman K, Lanning A. Screening guidelines for *Chlamydia trachomatis* infection: Evaluating physician awareness, agreement and use. Canadian Family Physician. 1995;41:228-36.
74. Public Health Agency Canada. 1989 Canadian guidelines for screening for Chlamydia trachomatis infection. In: Canada PHA, editor. Canada Diseases Weekly Report Ottawa, Ontario; 1989. p. 1-13.
75. Langille DB. Adolescent Sexual Behaviors and Teenage Pregnancy. Atlantic Society of Obstetricians and Gynecologists Annual Meeting. Charlottetown, P.E.I.; 2004.
76. Langille DB, Naugler CT, Joffres MR. Chlamydia trachomatis genital infection: Nova Scotia physicians' approaches. Canadian Family Physician. 1997;43:1563-8.
77. Torkko KC, Gershman K, Crane LA, Hamman R, Baron A. Testing for Chlamydia and sexual history taking in adolescent females: results from a statewide survey of Colorado primary care providers. Pediatrics. 2000;106(3):32.
78. Cook RL, Wiesenfeld HC, Ashton MR, Krohn MA, Zamborsky T, Scholle SH. Barriers to screening sexually active adolescent women for chlamydia: a survey of primary care physicians. Journal of Adolescent Health. 2001;28(3):204-10.
79. Guerry SL, Bauer HM, Packel L, Samuel M, Chow J, Rhew M, et al. Chlamydia Screening and Management Practices of Primary Care Physicians and Nurse Practitioners in California. The Journal of General Internal Medicine. 2005;20(12):1102–7.
80. St. Lawrence JS, MontaÃ±o DE, Kasprzyk D, Phillips WR, Armstrong K, Leichliter JS. STD Screening, Testing, Case Reporting, and Clinical and Partner Notification Practices: A National Survey of US Physicians. American Journal of Public Health. 2002;92(11):1784-8.
81. Pourat N, Nihalani J, Neiman R, Rutherford G, Handon B, Brown ER, et al. Sexually Transmitted Disease Services in California's Medi-Cal Managed Care: Findings from a Baseline Survey of STD Care Delivery in 2002. Los Angeles, California: UCLA Center for Health Policy Research,; 2006 August 2006.
82. McClure JB, Scholes D, Grothaus L, Fishman P, Reid R, Lindenbaum J, et al. Chlamydia screening in at-risk adolescent females: An evaluation of screening practices and modifiable screening correlates. Journal of Adolescent Health. 2006;38(6):726-33.
83. Hoover K, Tao G. Missed Opportunities for Chlamydia Screening of Young Women in the United States. Obstetrics & Gynecology. 2008;111(5):1097-102.

84. Nova Scotia Department of Health Promotion and Protection. It's the Law: Reporting Notifiable Diseases and Conditions 2005 [cited 2009 January 30]; Available from: http://www.gov.ns.ca/hpp/ocmoh/health_act.htm
85. Nova Scotia Legislative Assembly. Health Protection Act, Reporting of Notifiable Diseases and Conditions Regulations. SNS 2004, c 4 Government of Nova Scotia; 2005.
86. Donovan B, Crooks L, Booker R, Edwards B. Australasian Contact Tracing Manual; A practical handbook for health care providers managing people with HIV, viral hepatitis, sexually transmitted infections and HIV-related tuberculosis. In: Ageing CDoHa, editor. 2nd edition ed: Australasian Society for HIV Medicine Inc.; 2002. p. 2.
87. Tomnay JE, Gebert RL, Fairley CK. A survey of partner notification practices among general practitioners and their use of an internet resource for partner notification for Chlamydia trachomatis. The Journal of Sexual Health. 2006;3(4):217-20.
88. Heal C, Muller R. General practitioners' knowledge and attitudes to contact tracing for genital Chlamydia trachomatis infection in North Queensland. Australian and New Zealand Journal of Public Health. 2008;32(4):364-6.
89. Shefras J, Edmondson S, McNulty C. Countywide survey of the current practice of chlamydia detection in primary care. Journal of Family Planning and Reproductive Health Care. 2002;28:145-8.
90. McCarthy M, Haddow LJ, Furner V, Mindel A. Contact tracing for sexually transmitted infections in New South Wales, Australia. Journal of Sexual Health. 2007;4(1):21-5.
91. Hogben M, St Lawrence JS, Montano DE, Kasprzyk D, Leichliter JS, Phillips WR. Physicians' opinions about partner notification methods: case reporting, patient referral, and provider referral. Sexually Transmitted Infections. 2004;80(1):30-4.
92. Sellors JW, Landis SJ, Pickard L, Dalby DM. Factors associated with appropriate physician management of sexually transmitted diseases in an urban Canadian center. Sexually Transmitted Diseases. 1997;24(7):393-7.
93. Wiesenfeld HC, Dennard-Hall K, Cook RL, Ashton MR, Zamborsky T, Krohn MA. Knowledge About Sexually Transmitted Diseases in Women Among Primary Care Physicians. Sexually Transmitted Diseases. 2005;32(11):649.
94. Millstein SG, Igra V, Gans J. Delivery of STD/HIV preventive services to adolescents by primary care physicians. Journal of Adolescent Health. 1996;19(4):249-57.
95. Montaño DE, Phillips WR, Kasprzyk D, Greek A. STD/HIV Prevention Practices Among Primary Care Clinicians: Risk Assessment, Prevention Counseling, and Testing. Sexually Transmitted Diseases. 2008;35(2):154-66.
96. Burd ID, Nevadunsky N, Bachmann G. Impact of physician gender on sexual history taking in a multispecialty practice. . The Journal of Sexual Medicine. 2006;3(2):194-200.
97. Kahn A, Plummer D, Hussain R, Minichello V. Does physician bias affect the quality of care they deliver? Evidence in the care of sexually transmitted infections. Sexually Transmitted Infections. 2008;84:150-1.
98. Verhoeven V, Bovijn K, Helder A, Peremans L, Hermann I, Van Royen P, et al. Discussing STIs: doctors are from Mars, patients from Venus. Family Practice. 2003;20(1):11-5.
99. Oscós-Sánchez MA, White D, Bajorek E, Dahlman M, Albright T, Treviño J, et al. SAFE TEENS: facilitators of and barriers to adolescent preventive care discussions. Family Medicine 2008;40(2):125-31.

100. McNulty C.A. F, E., Bowen, J., Shefras, J., F,enton K.A. Barriers to opportunistic chlamydia testing in primary care. British Journal of General Practice 2004;54(504):508-14.
101. Pavlin NL, Parker R, Fairley CK, Gunn JM, Hocking J. Take the sex out of STI screening! Views of young women on implementing chlamydia screening in General Practice. BMC Infectious Diseases. 2008;9(8):62.
102. Ransdell LB. Using the PRECEDE-PROCEED model to increase productivity in health education faculty. International Electronic Journal of Health Education. 2001 2001:276-82.
103. Zimmerman RK, Nowalk MP, Bardella IJ, Fine MJ, Janosky JE, Santibanez TA, et al. Physician and practice factors related to influenza vaccination among the elderly. American Journal of Preventive Medicine. 2004;26(1):1-10.
104. Green LW, Kreuter MW. Health Promotion Planning: An Educational and Environmental Approach. 2nd ed. Palo Alto, California: Mayfield Publishing Co.; 2001.
105. Deren S, Kang SY, Rapkin B, Robles RR, Andia JF, Colón HM. The utility of the PRECEDE model in predicting HIV risk behaviors among Puerto Rican injection drug users. AIDS and Behavior. 2003;7(4):405.
106. Mirand A, Beehler G, Kuo C, Mahoney M. Explaining the de-prioritization of primary prevention: Physicians' perceptions of their role in the delivery of primary care. BMC Public Health. 2003;3(1):15.
107. Han Y, Baumann LC, Cimprich B. Factors influencing registered nurses teaching breast self-examination to female clients. Cancer Nursing. 1996;19(3):197-203.
108. Dillman DA. Mail and Telephone Surveys: The Total Design Method. New York: Wiley & Sons; 1978.
109. Raosoft I. Sample Size Calculator. Dulles, Virginia: Raosoft, Inc.; 2004.
110. Canadian Institute for Health Information. 2004 National Physician Survey Response Rates and Comparability of Physician Demographic Distributions with those of the Physician Population. Analytical Bulletin. Ottawa, Ontario: The Canadian Institute for Health Information; 2005.
111. National Physician Survey. National Physician Survey; 2007.
112. Leece P, Bhandari M, Sprague S, Swiontkowski MF, Schemitsch EH, Tornetta P, et al. Internet Versus Mailed Questionnaires: A Randomized Comparison. Journal of Medical Internet Research. 2004;6(3):e29.
113. Langille DB, Asbridge M, Kisely S, Leblanc MB, Schaller E, Lynk A, et al. The Relationship of Sex and Risk Behaviors to Students' Use of School-Based Health Centres in cape Breton, Nova Scotia. Pediatric Child Health. 2008;13(7):605609.
114. Cull WL, O'Connor KG, Sharp S, SF. T. Response rates and response bias for 50 surveys of pediatricians. Health Services Research. 2005;40(1):213-6.
115. McFarlane E, Olmsted MG, Murphy J, Hill CA. Nonresponse bias in a mail survey of physicians. Evaluation and the Health Profession. 2007;30(2):170-85.
116. Kellerman SE, Herold J. Physician response to surveys: A review of the literature. American Journal of Preventive Medicine. 2001;20(1):61-7.
117. Thorne B. Manager of Communications and Information Technology. Halifax: College of Physicians and Surgeons of Nova Scotia; 2008.
118. SAS Institute. SAS for Windows, Version 6.12. 9.1 ed. Cary, North Carolina: The SAS Institute; 2007.
119. Peabody JW, Luck J, Glassman P, Jain S, al. e. Measuring the Quality of Physician Practice by Using Clinical Vignettes: A Prospective Validation Study. Annals of Internal Medicine. 2004;141(10):771-80.
120. College of Physicians and Surgeons of Nova Scotia. Physician Search. 2010.

121. Torkko KC, Gershman K, Crane LA, Hamman R, Baron A. Testing for Chlamydia and Sexual History Taking in Adolescent Females: Results From a Statewide Survey of Colorado Primary Care Providers. Pediatrics. 2000;106(3):e32-.
122. McCree DH, Liddon NC, Hogben M, St Lawrence JS. National survey of doctors actions following the diagnosis of a bacterial STD. Sexually Transmitted Infections. 2003;79(3):254-6.
123. Sarwal S. Personal Communication. Halifax, Nova Scotia; 2010.
124. American College of Obstetricians and Gynecologists; Committee on Adolescent Health Care. ACOG Committee Opinion #301: Sexually Transmitted Diseases in Adolescents. Obstetrics & Gynecology. 2004;104(4):891.
125. Shifren JL, Johannes CB, Monz BU, Russo PA, Bennett L, Rosen R. Help-Seeking Behavior of Women with Self-Reported Distressing Sexual Problems. Journal of Women's Health (15409996). 2009;18(4):461-8.
126. Thacker SB, Berkelman RL. PUBLIC HEALTH SURVEILLANCE IN THE UNITED STATES. Epidemiol Rev. 1988;10(1):164-90.
127. Friedman S.M. SL-A, Gardam M., Arenovich T. Suboptimal reporting of notifiable diseases in Canadian emergency departments: A survey of emergency physician knowledge, practices, and perceived barriers. Canada Communicable Disease Report. 2006;32(17).
128. CDC. Reporting of Laboratory-Confirmed Chlamydial Infection and Gonorrhea by Providers Affiliated with Three Large Managed Care Organizations --- United States, 1995--1999. Atlanta, GA: CDC; 2002 March 29, 2002.
129. Clay SV. Evaluation of Chlamydia Surveillance in Nova Scotia. PHAC, Canadian Field Epidemiology Program; 2009. p. 9.
130. Low N, Welch J.,Radcliffe K. Developing national outcome standards for the management of gonorrhoea and genital chlamydia in genitourinary medicine clinics. Sex Transm Infect 2004;80:223-9.
131. Burstein G, Zenilman J, Gaydos C, Diener-West M, Howell M, Brathwaite W, et al. Predictors of repeat Chlamydia trachomatis infections diagnosed by DNA amplification testing among inner city females. Sex Transm Infect. 2001;77(1):26-32.
132. CDC. Expedited partner therapy in the management of sexually transmitted diseases. Atlanta, GA; 2006.
133. Packel L GS, Bauer H, et al. . Patient-delivered partner therapy for chlamydial infections: attitudes and practices of California physicians and nurse practitioners. . Sex Transm Dis. 2006;33(7):458-63.
134. Schillinger J, Kissinger P, Calvet H, Whittington WL, Ransom RL, Sternberg MR, et al. Patient-delivered partner treatment with azithromycin to prevent repeated Chlamydia trachomatis infection among women: a randomized, controlled trial. Sex Transm Dis. 2003;30(1):49-56.
135. Golden MRMDMPH, Whittington WLHB, Handsfield HHMD, Malinski CBS, Clark ABS, Hughes JPP, et al. Partner Management for Gonococcal and Chlamydial Infection: Expansion of Public Health Services to the Private Sector and Expedited Sex Partner Treatment Through a Partnership With Commercial Pharmacies. Sexually Transmitted Diseases November. 2001;28(11):658-65.
136. Klausner J, Chaw J. Patient-delivered therapy for chlamydia: putting research into practice. Sex Transm Dis. 2003;30(6):509-11.
137. Melvin L, Cameron ST, Glasier A, Scott G, Johnstone A, Elton R. Preferred strategies of men and women for managing chlamydial infection. BJOG: An International Journal of Obstetrics & Gynaecology. 2009;116(3):357-65.

138. Kissinger P, Brown R, Reed K, Salifou J, Drake A, Farley TA, et al. Effectiveness of patient delivered partner medication for preventing recurrent Chlamydia trachomatis. Sex Transm Infect 1998;74(5):331-3.
139. Trelle S, A S, L N, JA C, N L. Improved effectiveness of partner notification for patients with sexually transmitted infections: systematic review. BMJ. 2007;334(7604):0-b-.
140. Friedman SM, Sommersall L-A, Gardam M, Arenovich T. Suboptimal reporting of notifiable diseases in Canadian emergency departments: A survey of emergency physician knowledge, practices, and perceived barriers. Canada Communicable Disease Report. 2006;32(17).
141. Malave M, Shah D, Sackoff JE, Rubin S, EM. B. Human immunodeficiency virus partner elicitation and notification in new york city: public health does it better. Sex Transm Dis. 2008;35(10):869-76.