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Are Mass Screenings an Effective Diagnostic Tool for Chlamydia?

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University of North Dakota

in partial fulfillment of the requirement

for the degree of

Master of Science in Nursing

Grand Forks, North Dakota

PERMISSION

Title: Are mass screenings more effective means than the current standard of care in diagnosing chlamydia infections in young adults?"

Department Nursing

Degree Master of Science

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4/17/2014

Abstract

Chlamydia Trachomatis infection has historically been a focus of primary health of adolescents and young adults in the age group between 15-24 years of age. Satterwhite et al. (2013) report sexually transmitted infections (STI) are disproportionately larger amongst adolescent groups than adults. STI's are growing in a day and age where health promotion and disease prevention are at the forefronts of the minds of many providers. Chlamydia infections within the United States have increased nationally. Most recent statistics from the Centers for Disease Control and Prevention (CDC, 2013) indicate that in 2001 the chlamydia rates for women were 429.6/100,000 population and in 2011 were found to be increased to 648.9/100,000 population. The CDC has noted that America's youth are disproportionately affected by this infection citing that half of the STI's occur in young men and women (CDC, 2013). This is an estimated direct medical cost to the nation of 16 million dollars. This increase indicates a need for an in depth literature review to assist in identifying better ways to screen for this disease. The question that is examined throughout this literature review will explore the increased rates of chlamydia within the at risk cohort of 15-24 year-olds and whether mass screening of this population would be effective means of identifying chlamydia.

Background

The case report outlines a young woman's journey as she takes responsibility for this stage by seeking sexual healthcare. The opportunity for offering STI screening lies in what nurse practitioners are trained in doing – taking an accurate history, assessing risk factors and utilizing that information received to guide their medical decision making. The primary case outlines the red flags in the history and physical examination: multiple sexual contacts, inconsistent condom use and vague physical symptomology. She is included in the high risk cohort where STI screening is recommended in guidelines and by the Centers for Disease Control and Prevention (CDC, 2010) and as such was tested positive for chlamydia trachomatis.

Chlamydia trachomatis is an obligate, intracellular membrane-bound prokaryotic organism (Sagor & Golding, 2013). It infects the columnar epithelium of the cervix, urethra and rectum as well as non-genital sites (Mishori, McClaskey, & Winklerprins, 2012; Sagor & Golding, 2013). It is transmitted through vaginal, anal, or oral sex. It may be transmitted vertically from the mother to infant during vaginal birth (Sagor & Golding, 2013). It is reported via the CDC as the most reported STI in the United States. Symptomology of infected females is primarily asymptomatic for the majority of patients; however, some may present with mucopurulent vaginal discharge, dysuria, bartholinitis, abdominopelvic pain, and right upper quadrant pain. Infected male patients may present with dysuria, urethral discharge, scrotal pain, rectal pain or discharge, and or acute arthritis (Gottlieb et. al, 2010; Mishori, McClaskey, & Winklerprins; Sagor & Golding, 2013). Healthcare providers should be cognizant that though this disease presents largely asymptotically, it can present with vague symptomology at times especially with prolonged infections. Identifying risk factors and compiling that information

with even vague symptomology can assist in more accurate screening methods and timely treatment.

The case report identifies this infection in a 20 year-old female whom is seeking healthcare for contraception and has subsequently been screened with risk factor identification to be at risk for being susceptible to STI's. Her primary symptom was vague but with increased awareness, the health care provider honed in to question pertinent behavioral and physiological factors regarding her sexual history. Thus, it was decided between the patient and provider to screen her for this STI. This is the case of the opportunistic screening method and will be compared with mass screening within the literature to ascertain whether or not one type of screening is more efficacious in identifying those infected.

Case Report

The case identified as the incident case for this project was based on the college campus of the University of North Dakota student health services clinic. The young woman presented to the clinic with a chief complaint of inquiry for contraception. The case outlines how asymptomatic and ominous chlamydia can be without realizing one is infected. Following this paragraph outlines the clinical history of this young woman along with her review of systems, physical examination, assessment and plan:

Name: L.J.

DOS: 1/24/14

DOB: 20 years old

Sex: Female

CC: Inquiry to contraceptive options

HPI: Twenty-year-old female here to inquire about contraception. She is sexually active with a male partner in a monogamous relationship of two months in duration. She reports having had a total of three partners in the past two years. At present, her method of contraception is occasional condom use. She has not used any hormonal birth control methods in the past. She denies having any history of sexually transmitted infections.

PMHx: Negative

General Health: L.J. reports that she enjoys general good health without chronic medical conditions present. She denies any illnesses at today's visit.

Childhood Illnesses: None

Adult Illnesses: None

Accidents/Injuries: None

Immunizations: She is currently in college at the University of North Dakota. It is assumed by this provider that she has had all required immunizations. To ensure accurate data, nursing staff will verify against information listed on the state data base of immunization history – Thor. *Post visit, it was thought to have been ideal time to speak with the patient regarding HPV vaccination; however, this was not done at this visit. Will note in her file to follow up with this topic at her next visit.*

Screening tests: CAGE alcohol screening initiated without any positive answers to illicit further discussion on substance abuse.

FAMILY HISTORY

Mother: Unknown

Father: Deep vein thrombosis secondary to traumatic motor vehicle accident. She is not aware of any clotting disorders in her father.

M.Grandmother: Unknown

M.Grandfather: Unknown

P.Grandmother: Unknown

P.Grandfather: Unknown

SOCIAL HISTORY:

L.J. is a twenty year-old female whom is attending the University of North Dakota in her junior year. She is studying nursing. She does not have a job outside of her studies at this time. She is originally from XX, North Dakota. She reports consuming about one cup of caffeinated beverages per week. She denies illicit drug use. Reports occasional alcohol consumption on the weekends. She denies smoking at this time.

MEDICATIONS:

Multivitamin one tablet daily

Xenadrine -- uses for weight maintainance.

ALLERGIES

Penicillin

ROS

GENERAL: Denies weight change, fatigue, weakness, fever, chills, night sweats.

SKIN: Denies skin, hair, nail changes. Denies itching, rashes, sores, lumps, or worrisome moles.

HEAD: Denies trauma, headaches, nausea, vomiting, or visual changes.

EYES: Denies blurriness, tearing, itching, or acute visual loss.

EARS: Denies hearing loss, tinnitus, vertigo, discharge or ear pain.

MOUTH,THROAT,NECK: Denies bleeding gums, hoarseness, sore throat, swollen neck.

CARDIAC: Denies hypertension, murmurs, angina, palpitations, dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, edema.

RESPIRATORY: Denies shortness of breath, wheezing, coughing, sputum, hemoptysis, pneumonia, asthma, bronchitis, emphysema, tuberculosis.

GI: Denies appetite changes, nausea, vomiting, indigestion, dysphagia, diarrhea, constipation, hemorrhoids, melena, abdominal pain, jaundice, or hepatitis.

GU: Denies frequency, hesitancy, urgency. Reports dysuria as "burning when pees" in past week on 2 occasions. Reports last menstrual period to be 12/19/13. Reports period regularity (5 days duration). Denies dysmenorrhea, itching, discharge, sores or dyspareunia. Denies miscarriages, abortions or past pregnancies. Reports having had a total of three partners in the past two years. Currently, she reports being in a monogamous relationship of two months duration. Reports "occasional condom use" during intercourse. Is in agreement to undergo sexually transmitted infection testing today. Requests discussion about birth control options and contraception prescription.

HEMATOLOGIC: Denies anemia, easy bruising, bleeding, petechiae, purpura, transfusions. Does reports positive family history of father having deep vein thrombosis secondary to a motor vehicle accident.

PSYCHIATRIC: Denies problems with mood, anxiety, depression, tension or memory.

PHYSICAL EXAM

General: L.J. is a 20 year-old caucasian female whom is lean and appears to be physically conditioned. She is well groomed and facial expressions and body language are appropriate for the situation. She maintains eye contact and answers questions thoroughly for the exam.

Vitals: B/P: 122/74; P: 82 and regular; R: 18; Height: 67 inches; Weight: 110 lbs.; BMI: 17.23

Skin: Color of skin is consistent with ethnicity. No rashes, bruises. Hair texture is smooth, no alopecia noted. Nails are strong, without clubbing or pitting.

Head: Normocephalic, atraumatic.

Eyes: Symmetric. PERRL. EOMI. No conjunctival injection. Sclera white.

Ears: External ears are intact and symmetrical bilaterally. No tenderness, discharge or erythema noted.

Nose: Symmetrical. No tenderness or discharge.

Mouth/throat: Oral hygiene is adequate and clean.

Neck: No masses. Normal range of motion appreciated. No pain with movement. No thyroidmegally or masses.

Breasts: Deferred.

Heart: Regular rate, rhythm. No murmurs, gallops, rubs, clicks or precordial movements.

Lungs: Chest is symmetrical with respirations. No wheezes, crackles, rales or rhonchi.

Abdomen: Rounded abdomen. Soft and nontender. No hepatomegally or splenomegally.

GU: Deferred. Patient denied need for vaginal exam.

Musculoskeletal: No muscle atrophy, weakness or gait disturbance.

Vascular: 2+ bounding pulses noted radially.

Lymphatic: No anterior or posterior cervical, preauricular or tonsillar lymphadenopathy.

Neurologic: Cranial nerves grossly intact. No sensation loss, 5+ strength in upper and lower extremities. Patellar DTR 2+. Gait smooth and fluid.

INVESTIGATIVE STUDIES:

1. Urine screen for chlamydia and gonorrhea. Reason: high risk behavior, dysuria.
2. Urine analysis for possible urinary tract infection. Reason: dysuria.

ASSESSMENT/PLAN:

1. Dysuria (ICD-9 code: 788.1): Will have patient leave a urine sample for analysis to investigate possible urinary tract infection. Will send for culture to ensure adequate coverage if antibiotic therapy.
2. Contraceptive management (ICD-9 code: V 25): Discussion ensued regarding different modalities of contraception that would be appropriate for her. Consistency was discussed and the importance of deciding on a method of contraception that she would most likely be successful in using. Condoms, diaphragm, combined oral contraceptives, intrauterine devices and the vaginal ring contraception were discussed at length and their possible pros and cons reviewed. After this discussion, patient opted to try the vaginal contraceptive ring as she thought this may most accurately align with her lifestyle and the ease of use was appealing to her. Rx given for Nuva ring with instructions on use and informational pamphlet given.
3. High risk sexual behavior (ICD - 9 code: V69.2): Discussion had regarding high risk sexual behavior or having multiple sexual partners and decreased consistency in utilization of barrier methods to protect her from sexually transmitted infections. Encouraged patient to utilize consistency in using condoms as a means of protecting her sexual health and future reproductive capacity. Discussed at risk behavior and abstinence as an option in protecting herself from these infections. Patient verbalized understanding of the information. Web addresses given to her regarding sexually transmitted infections and encouraged her to practice safer sexual practices. Discussed the potential for exposure to sexually transmitted infections as her condom use has not been consistent

with each sexual encounter. She is in agreement to urine screen for gonorrhea and chlamydia. Treatment will be offered pending positive results.

AFTER VISIT SUMMARY

1. Urinary analysis was negative for UTI
2. Urine screen for chlamydia was positive for chlamydia trachomatis. Prescription given for azithromycin 1 gram po x one time dose. Educated patient that she does need to contact her partner and the state public health department will be contacting her for his name and number to ensure screening and treatment can be offered. Education provided verbally that this is a treatable infection and that safer sexual practices such as utilizing a barrier method (i.e. condom) with every sexual encounter will assist in preventing any future infections. Abstinence and maintaining a monogamous relationship were other preventative strategies that were discussed. Encouraged patient to call clinic if she should develop pelvic pain, dysuria, fever or malaise. CDC website given to patient for chlamydia information.

E/M code: 99203

Literature Review

Chlamydia infections in women often go unnoticed as a large majority of cases are asymptomatic (CDC, 2010). Untreated, these infections can lead to pelvic inflammatory disease, infertility and chronic pelvic pain as well as increased risk of transmission (CDC, 2010). There are no current guidelines focused on men at this time except for risk factor identification. College campuses have unique opportunities to screen both males and females in this population for chlamydia trachomatis. Campus health professionals can assist young adults to be

responsible sexual beings by incorporating health promoting behaviors and messages throughout campus, offer mass screening, and disseminating education in timely and strategic intervals.

A search was conducted utilizing the databases of MEDLINE, CINAHL, PUBMED, PsychInfo, and COCHRANE REVIEW using the following search terms: population based screening, chlamydia, mass screening, chlamydia in North Dakota, chlamydia and young adults, college, and at risk behaviors. Medical Subject Headings (MeSH) was used in PubMed and CINAHL to obtain a more specific and narrow search. Filters were placed to search for English only articles and dates ranging in the last eight years for up to date information. Over 54 abstracts were reviewed with 22 deemed relevant to subject matter and subsequently were scrutinized more carefully. The findings are relevant to stake holders within the public health sector of North Dakota, healthcare providers, and young adults between ages of 15 years-old to 24 years-old.

Evidence Grading. The AACN grading tool (Armola et al., 2009) criteria was used to grade levels of evidence for utilizing the study in practice. These levels of evidence include:

Level A: Meta-analysis of multiple controlled studies or meta-synthesis of qualitative studies with results that consistently support a specific action;

Level B: Well-designed controlled studies; both randomized and non-randomized, with results that consistently support a specific action, intervention or treatment;

Level C: Qualitative studies, descriptive or correlational studies, integrative reviews, systematic review or randomized controlled studies with inconsistent results;

Level D: Peer reviewed professional organizational standards, with clinical studies to support recommendations. Theory based evidence from expert opinion or multiple case reports;

Level E: Theory based evidence from expert opinion or multiple case reports;

Level M: Manufacturer's recommendations only (Armola et al., 2009, p. 72).

There were several elements explored in the literature with focused attention in population-based screening practices for chlamydia trachomatis infections. There has been review of opportunistic screening practices as patient's present to their health provider, focused high risk population screening and incidental findings of infections. As it pertains to the case identified – which was an incidental finding - prudent health care providers must be aware of factors so that they may offer specific screening services to high risk cohorts and be a part of the health promotional milieu of infection prevention and education dissemination in a strategic manner.

Current Screening methods. Assessing for risk factors has been the first line in screening. Currently, the U.S. Preventative Services Task Force [USPSTF] (2011) recommends routine screening in all sexually active women 24 years of age and younger as they are in the high risk groups identified for chlamydia. All women 25 years of age and older whom are at increased risk due to engaging in sexual intercourse with multiple partners have a grade B recommendation to be screened. It is interesting to note that there are no guidelines for men in to ensure timely screening. As such the USPSTF (2010, p. 95) states, "Evidence appears to be insufficient to assess the balance of benefits and harms of routine screening for chlamydial infection within men unless they have high risk sexual behaviors". Mishori et al. (2012) report that test of cure is only recommended in pregnant women three to four weeks after completion of

treatment. It is also suggested that non-pregnant females and men be rescreened three months after treatment and if this is not feasible, then to rescreen yearly as the patient presents to clinic. Once positivity is identified through screening, it is recommended that all sexual partners within the last 60 days be notified. Sagor and Golding (2013) reported expedited partner therapy (EPT) to be a key component to STI control. EPT has been shown to be more effective than traditional partner referral in reducing recurrence rates. This practice encompasses providers to offer treatment to sexual partners of persons known to be infected with a STI without clinical assessment (Sagor & Golding, 2013). In addition to identifying screening practices, education protocol is necessary to promote prevention of reinfection. Education on prevention strategies to reduce reinfection include abstaining from intercourse until seven days after a single dose regimen, after completion of a multiple dose regimen, and after their partner has been treated (Mishori et al., 2012, p. 1129). This ensures successful treatment.

Screening interventions. The literature has many different types of screening for chlamydia trachomatis. Focus was placed on the mass screening possibilities within the literature. The mass screening concepts which were found reasonable for the population identified were urine based screening programs; college campus mediated screening; mobile health screening; and social media. These methods were analyzed in the literature to gauge if they were acceptable amongst the young adults, effective in identifying those infected and cost prohibitive in implementing.

It has been noted in the literature that acceptable screening methods can only be successful if all aspects of the population at risk are identified. Hodgins et al. (2002) reported epidemics evolve through predictable phases which are shaped by dynamic interplay between the pathogen, behaviors, and subpopulation in which it emerges. They found success in a mass

screening program which was based in an oil community in Canada including a total of 14 communities that participated in first catch urine samples for chlamydia testing. This mode of testing offers ease of collection to participants as it is a noninvasive screening procedure to both men and women. Plunkett (2008) reported high success with college campus focused “pee in a pot” day chlamydia screening which noted majority of respondents were found to be male. A fact that was surprising to the health care providers as males were noted in the literature to be less likely access healthcare and there are no set guidelines for screening in this group. Marrazzo and Scholes (2008, p. S28) reports “the widespread availability of nucleic acid amplification testing (NAAT) of urine for chlamydia trachomatis infection has dramatically increased the capability screening asymptomatic men”. This would offer an excellent modality and ease that many may find acceptable. This identifies two interventions utilized simultaneously to provide opportunity for screening at a population based level. It appears this would be both beneficial and uptake would be acceptable to both sexes.

Defining who is at risk has been a difficult task within the realm of public health. To assist in identification of those at risk, social media via the internet was explored. Social media internet sites have been quickly replacing traditional forms of communication (Jones, Baldwin, & Lewis, 2012). Statistics indicated that the mean age of Facebook users are between the ages of 13-25 years of age indicating that this mode of intervention and education dissemination would target the at risk group identified (Jones et al., 2012). Huang, Gaydos, Barnes, Jet-Goheen and Blake (2011) found that adults and adolescents have been noted to utilize the internet to search for STIs. Jones et al. (2012) found this medium to be beneficial in their pilot study as they investigated whether this medium was useful in reducing chlamydia incidence by offering education via a Facebook site. This site developed by campus university system. Jones et al.

(2012) found a reduction in the incidence of chlamydia from 26% to 14% in a two year time span utilizing this educational approach. Thus it can be postulated that education of disease prevention and risk factor identification can be an effective intervention. In addition to education, action steps once being identified as being high risk through education can be included to provide a well-rounded disease prevention approach. Huang et al., 2011 explored this in as a means of audience capture as they compared chlamydial screening via self-collected vaginal swabs to traditional clinic based sample collection and found it to be a cost effective means of collection. Their study utilized the internet as an education medium and as reference site to order the self-administered chlamydial screening kit. They noted the internet to be a valuable tool for dissemination for information and screening tools. This type of testing offers confidentiality and anonymity that is felt to be appealing to both males and females.

Mobile van services for healthcare are not a new concept and have been utilized for breast and prostate cancer, bone densitometry, and countless other health promotional screening activities. Mimiaga et al. (2008) explored this concept as it pertains to HIV/STI risk behavior in men who had sex with men in Massachusetts. This mode of testing would bring testing to sites where the reservoir chlamydia population reside or work. Mimiaga et al. (2008) brought these screening and preventative services to population of men who have sex with men to aid them in their preventative efforts towards incidence of HIV. They found the lack of access to care was a barrier that could be overcome by bringing services to this population where they were most likely found. Ninety-six percent were first time users of this type of service which offered services such as STI testing, hepatitis vaccinations, and substance abuse triage into treatment facilities (Mimiaga et al., 2008). Bringing the screening to the at-risk population encourages patients to utilize a service in which they do not have to seek out. It is more likely it will be

utilized if placed in the environment of the at-risk cohort. There are a high percentage of young adults whom do not enter college. This could be a viable option to access the specified age groups to ensure that a wide span of the at-risk population is included.

Education. Education is considered a component of health promotion. Pender, Murdaugh and Parsons (2011) report health education should focus on learning activities and experiences for individual groups. Health promotion for the intended cohort must incorporate the three components: health education, prevention, and health protection. In order for this to become realized many intricate parts of the health promotion plan must be realized, public health in this area must promote "...health fostering and ill prevention policies; strategies and activities to address social, economic, and physical environments; cultural factors; equity and diversity; education and learning; services, amenities, and products; and community based activities" (Pender et al.,2011, p. 28). The scope of this paper is not to define each of the mentioned factors, but to create awareness to the reader that health promotion holds much responsibility and work within its contextual meaning. The focus within this scope of health promotion is one of detection and prevention. Mishori et al. (2012) report preventative efforts to reduce incidence of chlamydia to include abstinence, mutually exclusive monogamous sexual relationships, avoidance of high risk sexual behaviors such as having unprotected sex or multiple sex partners, consistent and correct use of condoms, and education about the transmission of disease through unprotected vaginal, anal, or oral sex. It is truly believed that without educational efforts to the intended risk population, any health promotional efforts will not be realized without strategic implementation of the educational groundwork laid down prior to implementing the screening intervention.

Attitudes and behavior. Men and women have differing attitudes regarding STIs in the literature. Balfe, Brugha, O'Connell, Vaughan, and O'Donovan (2012) explored men's attitudes toward chlamydia screening and found their attitudes were influenced by their knowledge about the infection, their perceived vulnerability to infection, the degree of embarrassment and shame they associate with the screening, and the stigma they associate with screening. It was found in the literature that some men do not view chlamydia as a serious infection. Thus, how does one address a problem if it is not perceived as one? Identifying the gender-specific attitudes is paramount in designing a screening program that will be successful. It has been indicated that education and access are an important sections of effective screening interventions. Darroch & Cassell (2003) found that men failed to understand the nature of their infection, did not seek care promptly with vague symptomology, partner notification, and public health messages were not strong enough triggers to seek medical help. Thus, it is inferred that mass screening in this population would be effective means to assist in capturing those least likely to identify their risk or symptomology as triggers to seek medical treatment.

Women have differing views with STI's. They identified anxiety about future reproductive health, fear of stigmatism and internalized blame on themselves (Darroch, Myers, & Cassell, 2003). Literature reports that women need to feel comfortable while seeking screening for chlamydia. Walker et al. (2013) indicate that previous research reveals a variety of concerns that women have voiced, those included were: fear of breach of confidentiality, fear of stigmatization of having been tested for chlamydia, and apprehension of others knowing that they have been tested for a STI. This identifies different factors than those of their male counterparts. Population based screening in this gender needs to encompass criteria that promote a confidential and non-judgmental atmosphere to promote uptake within this group. As such,

internet based testing may be more appealing to this cohort as this promotes a sense of confidentiality and non-judgmental atmosphere to explore risk factors and testing needs.

Evidence to practice. Throughout this review, exploration was focused on mass screening as a means of identifying those infected with chlamydia. The concepts in this paper will now be shifted towards a different population to provide an example to the reader how the evidence can be utilized to affect a different high risk population – the oil fields of western North Dakota. Young adults ages 15-24 years-old have been identified as being the high risk group most likely to come into contact with chlamydia trachomatis. There is an increased influx to this state for jobs and many are younger adults seeking employment within this industry. To assist in seeing how one might define a population at risk, specific factors were identified within this state that promotes infection transmission.

North Dakota ranks 39th amongst 50 states for incidence of chlamydia with 303.3 per 100,000 persons being reported (CDC, 2010). In fact, the oil boom in western North Dakota may skew the statistics as Association of States and Territorial Health Officials [ASTHO] (2013) reports rates of chlamydia increasing between 100 and 750% since 2009. Furthermore, ASTHO (2013, p. 2) reports “western counties rates have risen from 300 cases per 100,000 people in 2008 to 720 cases per 100,000 in 2012.” This indicates a necessary intervention in these areas to assist with diagnosing and controlling this increasing problem. As noted previously, not all young adults go to college. Many are located in the workforce and in particularly, in the oil fields of North Dakota. The guidelines report that there is no evidence to routinely screen men with exception if they are identified in areas where high chlamydia rates indicate a problematic cohort. Western North Dakota has been identified as an area of concern. Men are particularly of concern as the majority of the oil workers are of the male gender and elicit particular attention as

to where to bring testing services to this high risk population. This is in alignment with the Centers for Disease Control and Prevention's (CDC, 2010) guidelines of supporting screening practices in young sexually active men with high prevalence of chlamydia. Goldenberg, Shoveller, Ostry and Koehoorn (2008) explored the oil boom phenomenon and identified four main ways that sociocultural and structural conditions created by the boom affect the sexual behaviors of the population. They found four main trends contributing to increasing sexually transmitted infections, they are as follows: "mobility of oil/gas workers; binge partying; high levels of disposable income; and gendered power dynamics" (p.220). These factors can help elucidate how preventative efforts can assist in controlling the problem by subjects that have been discussed throughout this literature review. Education, gender attitudes, and access to screening need to be addressed in order for effective mass screening programs to be realized. The urine based screening and mobile van services discussed would assist this population in their screenings to identifying those infected with chlamydia. Bringing the testing to the oil fields is ideal as it was identified that men don't identify chlamydia as a problematic disease. By identifying positively infected individuals, it can enable public health efforts to decrease the incidence rates of infection by ensuring timely treatment.

Conclusion

In conclusion, many factors must be taken in to consideration whilst surveying screening interventions to identify people infected with chlamydia trachomatis. Though the question regarding which screening method -opportunistic versus mass - was the impetus for this review, it was found that more people can be reached via population based screening. However, it should be noted that providers should take every opportunity to offer STI screening whether it be mass screening or opportunistic, to ensure adequate coverage as it pertains to sexual healthcare. The

college campus was scrutinized in how to best screen this audience. It was revealed through the literature that this age group can exist in all facets of life as some young adults opt to enter the workforce right out of high school versus going to college. The information contained in this literature review can be utilized to address different audiences as it was exemplified in the western North Dakota population. By actively looking at risk factors, behaviors, attitudes, and educational needs, health care providers and communities can effectively design mass screening programs. Focusing interventions with the above factors identified will help reduce the rates of chlamydia and ensure future sexual health in the young adult population.

Learning Points

Many factors need to be explored when researching mass screening control programs for chlamydia trachomatis infection. As you have seen in this review, it is difficult to design and implement a program without first looking at the population and defining the confounding factors that have led to the increase in disease activity. It is a multifaceted dynamic process that must be ongoing. Uptake of screening programs will only be successful if they are focused on specific populations' needs in mind. Three key messages I would like to leave the reader with are as follows:

- Screening programs need to be focused on the micro-population affected
- Education focused on specific gender-based attitudes needs to be evaluated when designing a mass screening program. Different genders have different needs and attitudes.
- The screening methods of urine based screening; social media education; mobile van services; and college campus-focused urine based screening can be utilized in this risk population but more importantly can be combined with current practices to give providers

the tools they need when designing and implementing effective STI screening programs across all high risk populations.

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