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Incident Syphilis Infections Declined in a Well Characterized Cohort of HIV Positive Persons

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Abstract

Background: Since 2000, syphilis rates have increased in the US; racial minorities are disproportionately represented. We used results of serially collected Non-Treponemal tests (NTrt) to examine incident syphilis infections in the US Military HIV Natural History Study (NHS), a cohort of HIV-infected Department of Defense beneficiaries

Methods: We included all NHS subjects with visits since 2004. Syphilis was diagnosed with a positive NTrt confirmed by treponemal testing. Descriptive statistics included temporal trends between 2004 and 2015 and sexual risk behavior data from a computer-assisted self-interview (administered since 2014). Time-updated Poisson regression was used to examine incidence rate ratios, while logistic regression was used to examine sexual risk behavior.

Results: 2719 participants contributed 14,504 person years (PY) of follow-up. Since 2004, 423 incident infections (99.3% male, 57.2% African- American (AA), 27%- Caucasian) were recorded. Syphilis incidence was highest during calendar year 2004-2007 [3.2/100 PY (2.7, 3.7)], and lowest between 2012 and 2015 [2.4/100 PY (2.0, 2.9); p=0.03]. Rates in 2008-2011 were similar to that observed in 2004-2007[3.1/100 PY (2.6, 3.6); p=.74]. While the overall rates were highest among African-American (AA) [3.9/100 PY (3.4, 4.4)], rates declined only in this ethnic group over time, table. Of 1,328 individuals completing the questionnaire, 53 men were subsequently diagnosed with syphilis. In a univariate model, ethnicity, drug use, higher numbers of male sex partners, participating in oral or anal intercourse, and use of social media to seek partners were associated with syphilis. In a selected multivariate model AA ethnicity [compared to Caucasian, OR 2.4 (1.2-4.8)] and participation in anal intercourse [OR 3.0 (1.5-6.2) remained independently associated with infection. Compared to those without syphilis, subjects with syphilis perceived themselves as being at medium or high risk for infection (45% vs.17%, p=<.0001).

Conclusion: Compared with civilian settings, NHS syphilis rates have declined, especially among AA, though this group remains disproportionately affected. Nonetheless, in spite of high self-perception of risk, subjects with syphilis still had high prevalence of high risk sexual behaviors. Given the observed association with social media use and subsequent infection, using social media to target high risk groups for prevention messages is a strategy worth pursuing in this setting.

Introduction

- After declines throughout the nineties, syphilis rates increased in the United States (US). [1]
- Syphilis rates have increased every year since the early 2000's. [2]
- During 2014-2015 overall syphilis rates increased 19.0%, and increases in both men and women were observed. [2]
- The resurgence in syphilis have been attributed primarily to increases observed in HIV-infected Men who have sex with Men (MSM). [3]
- In a comprehensive review of syphilis cases spanning 25 years (1986-2009) overall syphilis incidence in the US Military HIV Natural History Study (NHS) was 1.3/100 person years (PY) (95% CI 1.1,1.4), rates were lowest between 1994 and 1999 at 0.5/100 PY (95% CI 0.3, 0.6) and highest during the calendar years 2006-2009 at 2.5/100 PY (95% CI 2.0, 2.9). [4]
- In this study, we examined recent trends in the US Military NHS (2004 and 2015) to examine if the trends observed in the civilian sector are reflected in the NHS.

Methods and Materials

Retrospective cohort study

Study population: The US Military Natural History Study (NHS), a well-characterized cohort of nearly 6000 HIV-infected enrollees.
We included all NHS subjects who had visits since 2004 and Non-Treponemal (NTr) testing recorded in the database.
Since 2014, a computer-assisted risk behavior questionnaire has been deployed in the NHS. We used this data to examine behavioral risk factors associated with Syphilis

Definitions:
To be considered an incident case of syphilis we required a subject with no prior serologic diagnosis of syphilis to have a positive NTr test that was confirmed by treponemal testing

Statistics:
Descriptive statistics were used to describe the population and sexual risk behavior data
Incidence rates were calculated per 100 person years of follow up (PY), with exact Poisson 95% confidence intervals (CI).
Follow up time was calculated from the initial negative NTr test to the time of censoring, defined as the time of incident infection or last NTr test.
Poisson regression was used to test for trends in rates by calendar year.
Univariate and Multivariate logistic regression analysis were use to examine risk factors associated with syphilis

Results

	Cases	Person Years of Follow Up	Incidence (95% CI)	p-value
Overall	423	14504.57	2.92 (2.64,3.21)	
Year				
2004-2007	157	4929.60	3.18 (2.71, 3.73)	Ref
2008-2011	164	5340.64	3.07 (2.62, 3.58)	0.74
2012-2015	102	4234.33	2.41 (1.96, 2.92)	0.03

Table 1. Syphilis Incidence in the NHS

Results Continued

	Odds Ratio	p-value
Race		
Caucasian	Ref	
African- American	2.43 (1.23, 4.8)	0.01
Hispanic/Other	1.14 (0.42, 3.06)	0.80
Last sex act, Anal		
No	Ref	
Yes	3.01 (1.47, 6.15)	0.003
Self-Perceived STI risk		
1- none/low	Ref	
2- Medium/high	5.53 (2.91. 10.50)	<.0001
3- Don't/know	6.93 (2.52, 19.01)	0.0002
4- Prefer not to answer	10.62 (2.41, 46.81)	0.002

Table 2. Risk Factor Associated with Syphilis

	Cases	Person Years of follow up	Rates (95% CI)	p-value
Overall	423	14504.47	2.92 (2.64, 3.21)	
Race				
Caucasian	157	6205.72	1.84 (1.52, 2.21)	Ref
African-American	164	6186.34	3.91 (3.43, 4.44)	<0.0001
Hispanic/Other	102	2112.51	3.17 (2.46, 4.03)	0.0004
Caucasian				
2004-2007	38	2143.47	1.77 (1.25, 2.43)	Ref
2008-2011	51	2296.58	2.22 (1.65, 2.92)	0.29
2012-2015	25	1765.67	1.42 (0.92, 2.09)	0.38
African-American				
2004-2007	104	2184.45	4.76 (3.89, 5.77)	Ref
2008-2011	81	2208.26	3.67 (2.91, 4.56)	0.08
2012-2015	57	1765.67	3.18 (2.41, 4.12)	0.01
Hispanic/Other				
2004-2007	15	601.68	2.49 (1.40, 4.11)	Ref
2008-2011	32	835.79	3.83 (2.62, 5.40)	0.17
2012-2015	20	675.03	2.96 (1.81, 4.58)	0.61

Table 3. Syphilis Incidence as a Function of Calendar time and Ethnicity

Discussion

- After declining throughout the nineties, syphilis emerged as a significant problem in the US. Nationwide since 2000 syphilis rates have increased annually and a 19% increase was observed in 2014-2015.
- In this study we examined temporal trends of syphilis cases in the NHS over the last decade. Syphilis incidence in the NHS was highest during calendar year 2004-2007 [3.2/100 PY (2.7, 3.7)], and lowest between 2012 and 2015 [2.4/100 PY (2.0, 2.9); p=0.03.
- In contrast to the nationwide trends, declines in syphilis cases were observed in the NHS.[1] Further, nationally rates continue to increase among AA, statistically significant declines were observed among the AA enrolled in the NHS, .[4]
- Given the significantly low numbers of women enrolled in the NHS, we are unable to evaluate trends among women
- After the repeal of Don't Ask Don't Tell, a risk behavior questionnaire (RBQ) was introduced in the NHS
- In a selected model, we examined a preselect set of variables and its association with subsequent syphilis
- In this analysis, AA ethnicity and MSM behavior were associated with syphilis; further individuals with syphilis perceive their risk to be high but continue to engage in high risk behavior

Conclusions

- NHS syphilis rates have declined in recent years
- This declines appear to be driven by decreases especially among AA, though this group remains disproportionately affected.
- Despite the high self-perception of risk, subjects with syphilis still had high prevalence of high risk sexual behaviors.

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