

High Chlamydia and Gonorrhea Incidence and Reinfection Among Performers in the Adult Film Industry

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Background: Adult film industry (AFI) performers engage in unprotected oral, vaginal, and anal sex with multiple partners, increasing the likelihood of acquisition and transmission of human immunodeficiency virus and other sexually transmitted diseases. Current industry practice does not require condom use; instead it relies upon limited testing. We sought to estimate the annual cumulative incidence of chlamydia (CT) and gonorrhea (GC) and assess the rate of reinfection among AFI performers. **Methods:** We retrieved all CT and GC cases diagnosed among performers between 2004 and 2008 in Los Angeles, CA and reported to the health department surveillance registry. Using 2008 data, we estimated ranges for CT and GC annual cumulative incidences based on assumptions of the population size of performers. For cases reported between 2004 and 2007, we determined the CT and/or GC reinfection rate within 1 year.

Results: Lower bounds for the annual cumulative incidences of CT and GC among AFI performers were estimated to be 14.3% and 5.1%, respectively. The reinfection rate within 1 year was 26.1%. Female performers were 27% more likely to be reinfected as compared with male performers (prevalence ratio, 1.27; 95% confidence interval, 1.09–1.48).

Conclusion: CT and GC infections are common and recurrent among performers. Control strategies, including promotion of condom use, are needed to protect workers in this industry, as testing alone will not effectively prevent workplace acquisition and transmission. Additional legislation that places more responsibility on the production companies is needed to ensure the safety and health of performers.

Since the legalization of adult (X-rated) film production in the State of California in 1988 with the California Supreme Court's ruling in *People v. Freeman*,¹ the adult film industry (AFI) has expanded tremendously and is estimated to have gross revenues nearly of \$13 billion annually.² It is estimated that 2000 to 3000 performers (of whom 2000 are in California) are employed by approximately 200 production companies in Los Angeles County (LAC), CA.^{3–5} The career of a performer is generally short-lived, with an average duration estimated at

just 18 months.⁶ Although many production centers have arisen throughout the world, for example, in Florida, Brazil, Hungary, Czech Republic, and Japan, the largest production center for the AFI remains in LAC.

Although adult film has gained acceptance with expanding audiences through its availability on the internet, cable TV, and in major hotel chains, industry standards for protecting adult film performers lag far behind established worker health and safety standards. Adult film performers routinely engage in anal and vaginal sex without condoms, including prolonged and repeated sexual acts with multiple sexual partners over short periods.³ These practices often lead to rectal and/or vaginal mucosal trauma with exposure to seminal and vaginal fluids, fecal material, and blood, a combination that is ideal for transmission of human immunodeficiency virus (HIV), other sexually transmitted diseases (STDs), and fecal pathogens. The director of a clinic, which provides the majority of STD testing for performers, stated that "an average popular male in the industry, through partner-to-partner transmission, reaches approximately 198 people in 3 days."⁷ Although the total population of performers at any one time may appear small, they have a very large sexual network and serve as a bridge population for STD transmission to and from the general population.⁶

The current industry standard for performers in the heterosexual segment of the AFI is voluntary STD and HIV testing every 30 days, as recommended by clinics serving AFI performers. This standard is implemented by requiring performers to provide a negative test result within the previous 30 days in order to work.⁸ Testing facilities that serve the majority of the heterosexual performer population typically provide a urine-based nucleic acid amplification test for chlamydia (CT) and gonorrhea (GC). Performers are not routinely screened orally or rectally, and performers pay for the testing costs.⁸

Between 1998 and 2008, 17 HIV cases were reported among performers.⁴ The need for improvements in AFI policies was illuminated by the latest HIV outbreak in April 2004, when 3 of 14 female performers exposed to HIV became infected from a single-infected male performer. The index case had 61 primary and secondary sexual contacts within 23 days, and the attack rate was 23%.^{5,8,9} The infected male performer had consistently followed the industry standard of voluntary, monthly HIV testing. In response to the outbreak, the California Occupational Safety and Health Administration (Cal/OSHA) issued citations to 2 production companies for not complying with the Bloodborne Pathogens Standard.^{8,10}

Despite the extremely high risks for STD acquisition and transmission among AFI performers, there exists little published data on STD morbidity within this population. The goals of this study are to assess (1) the annual cumulative incidences of CT and GC among performers and (2) the rate of reinfection with CT and GC.

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METHODS

In California, reporting of CT and GC cases to local health departments is required for both laboratories and all medical providers.¹¹ All infections diagnosed from centers or medical facilities that were known to provide AFI performer testing services and reported to the LAC Department of Public Health STD Program between January 2004 and December 2008 were identified for this analysis from the LAC STD surveillance registry (STD*Casewatch). The facilities included were 2 major performer testing centers and a medical clinic that commonly provides treatment, testing, and other health care needs to the performer community. Reported cases retrieved for the analysis were those with either (1) confidential morbidity reports (CMR) submitted by these facilities or (2) laboratory reports with these facilities listed as the requesting facility. Since the 2 major performer testing centers may also test non-performers, we excluded cases that were indicated as having an occupation different from performer on the CMR from all analyses; however, those missing occupation information were still included in the analyses. The medical clinic is open to the general population, but reliably indicates those who are performers as such on the CMR; therefore, only those cases designated as performers on the CMR from this clinic were retrieved. Cases that occurred within 20 days of diagnosis of the previous case were assumed to be biologic false-positives and excluded from the analyses. The 3 facilities will henceforth be collectively referred to as performer testing facilities.

We estimated the annual cumulative incidences of CT and GC among AFI performers by determining the proportion of performers who had one or more infections diagnosed and reported in 2008. The number of performers with reported infections (numerator) was retrieved from the surveillance registry; however, the total number of performers (denominator) is not readily available. We, therefore, estimated a range for incidence based on assumptions of the performer population size being between 2000 and 3000 performers, as previously mentioned. The annual cumulative incidences of the LAC general population aged 18 to 29 years and all ages were similarly calculated (proportion of those who had one or more infections reported in 2008) for comparison. LAC general population case reports were obtained from the LAC STD surveillance registry and compared to census data.

We also evaluated the frequency of repeat CT and/or GC infections among performers within 1 year. This is defined as the proportion of CT and GC cases reported between January 2004 and December 2007 that were matched to a subsequent CT and/or GC case report within 365 days of the diagnosis date. Repeat cases were matched based on first and last name and date of birth or medical record number. The proportion matched was also determined for 3-, 6-, and 9-month intervals (defined as <92 days, <183 days, and <274 days, respectively).

Analyses were performed using SAS 9.1 software (SAS Institute, Cary, NC). χ^2 statistical tests were used to compare differences in demographic characteristics between females and males. The *t* test and Wilcoxon signed rank test were used to compare the mean (log-transformed) and median, respectively, for continuous variables stratified by gender. A prevalence ratio and 95% confidence interval were used to compare the reinfection rate between females and males.

RESULTS

Between 2004 and 2008, a total of 3328 CT and/or GC cases were retrieved from the 3 performer testing facilities. Of these cases, 99 were excluded because they had non-performer

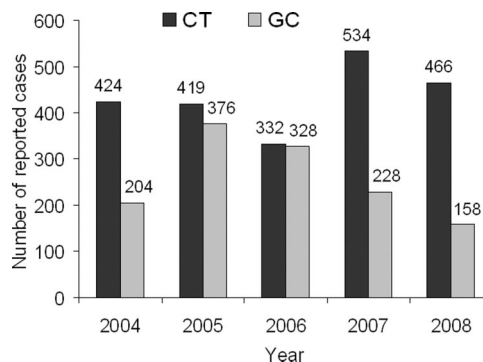


Figure 1. CT and GC cases reported among adult film performers in LAC (2004–2008).

occupations listed on the CMR, and 2 cases with a diagnosis date of less than 20 days from diagnosis date of the previous case report were excluded. A final total of 3227 cases were included in the analyses, 2633 (82%) of which were cases diagnosed between 2004 and 2007. Although those indicated as non-performers were excluded from the analyses, 44% of cases between 2004 and 2008 had no occupation information. Reporting of occupation, however, improved greatly over time, from only 22% of cases included in 2004 being indicated as performer to 94% in 2008. In addition, of the case reports with missing occupation information, 33% were indicated as performers in a previous or subsequent report.

Figure 1 shows the annual number of CT and GC cases among AFI performers reported to the LAC STD surveillance registry between 2004 and 2008. The number of CT cases generally increased, with a drop in 2006 and 2008, whereas the number of GC cases increased between 2004 and 2005 and steadily declined thereafter, decreasing nearly 60% between 2005 and 2008.

The ranges for annual cumulative incidences of CT and GC among AFI performers (based on a performer population range of 2000–3000 performers using 2008 data) are shown in Figure 2. Between 14% and 21% of performers had one or more CT infections reported, and 5% to 8% had at least one GC infection reported in 2008. Compared with the incidence of the general population (based on 2008 data), the lower bound of the CT incidence among AFI performers was 8.5 times that of LAC residents aged 18 to 29 years (1.7%) and 34 times that of all

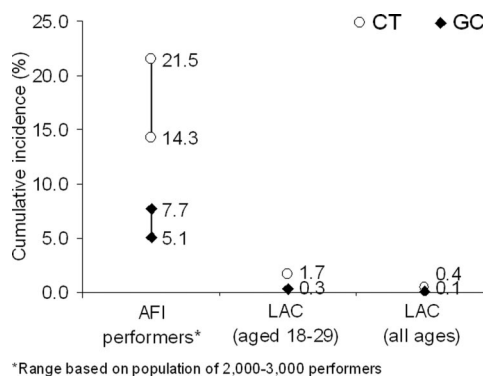


Figure 2. Estimated range of CT and GC annual cumulative incidences among adult film performers compared with the LAC general population (2008).

TABLE 1. Distribution of Reported Chlamydia (CT) and Gonorrhea (GC) Cases Among Adult Film Performers by Gender and Infection, Age, and Race in Los Angeles County (2004–2007)

	Females		Males		Both Genders	
	N	%	N	%	N	%
All cases*	1903	72.3%	728	27.6%	2633	100.0%
Infection						
CT	966	50.8%	529	72.7%	1497	56.9%
GC	763	40.1%	161	22.1%	924	35.1%
CT-GC	174	9.1%	38	5.2% [†]	212	8.1%
Age						
18–19	411	21.7%	26	3.6%	438	16.8%
20–24	961	50.7%	112	15.7%	1073	41.1%
25–29	304	16.0%	149	20.8%	454	17.4%
30–34	128	6.8%	135	18.9%	263	10.1%
35–39	54	2.8%	164	22.9%	218	8.3%
40+	38	2.0%	129	18.0% [†]	167	6.4%
Race						
White	805	64.9%	294	63.4%	1100	64.5%
Black	188	15.2%	119	25.6%	307	18.0%
Hispanic	157	12.7%	44	9.5%	201	11.8%
Other	90	7.3%	7	1.5% [†]	97	5.7%

*Includes 2 cases of unknown gender (0.0%), 20 cases of unknown age (0.8%), and 928 cases of unknown race (35.2%).

[†] χ^2 test for gender $P < 0.001$.

residents (0.4%). The lower bound of the GC incidence among AFI performers was 18 times that of LAC residents aged 18 to 29 years (0.3%) and 64 times that of all residents (0.1%).

From 2004 to 2007, 2633 CT and/or GC cases were reported among 1849 performers in LAC. The distribution of cases reported among performers by gender and infection, age, and race are displayed in Table 1. In all, 72% of cases ($n = 1903$) were reported among females; 57% of cases were CT only, 35% were GC only, and 8% were CT-GC coinfections. The distribution by STD, however, varied between males and females ($P < 0.001$); a much greater proportion of CT-only infections was reported among males (73% vs. 51%) and higher proportions of GC-only and CT-GC coinfections were found among females (40% vs. 22% and 9% vs. 5%, respectively). Of

the cases, 75% ($n = 1965$) were reported among performers aged 18 to 29 years, although a higher proportion of female cases were reported in younger age groups (aged 18–24 years) than male cases ($P < 0.001$). Of those cases with known race/ethnicity, 65% were white, 18% were black, and 12% were Hispanic performers; 35% of racial data, however, was missing. Nearly all cases with anatomical site information reported were urogenital (99.6%), although 25% of the data on specimen source were not reported (data not shown).

Between 2004 and 2007, the rate of reinfection within 1 year among performers was 26.1% (Table 2). The reinfection rates were 5.7% within 3 months, 15.7% within 6 months, and 22.0% within 9 months. The reinfection rates of female and male performers were 27.7% and 21.8%, respectively. Female

TABLE 2. Repeat Infection With Chlamydia and/or Gonorrhea Among Adult Film Performers by Gender (2004–2007)

	Females		Males		Both Genders	
	N	%	N	%	N	%
All cases	1903	72.3%	728	27.6%	2633	100.0%
Time to next infection						
<3 mo	122	6.4%*	29	4.0%*	151	5.7%*
<6 mo	327	17.2%	87	12.0%	414	15.7%
<9 mo	445	23.4%	133	18.3%	578	22.0%
<12 mo	528	27.7%	159	21.8%	687	26.1%
PR (95% CI) [†]	1.27 (1.09–1.48)					
Mean time (d)	167.1		178.5 [‡]		170	
Median time (d)	145.5		166 [§]		154	

*Percentage of all cases by gender.

[†]Prevalence ratio for comparison between females and males and 95% confidence interval.

[‡] t test (of $\log[\text{time}]$) for gender $P = 0.09$.

[§]Wilcoxon test for gender $P = 0.11$.

performers were 27% more likely to have a repeat infection within 1 year than male performers (prevalence ratio = 1.27; 95% confidence interval = 1.09–1.48). The median time to repeat infection among females was 145.5 days compared with 166 days among males ($P = 0.11$). Additionally, an analysis of reinfection rates among cases identified by year revealed an increase from 26% in 2004 to 29% in 2005, 27% in 2006, and a decrease of 20% in 2007 (data not shown).

DISCUSSION

To our knowledge, these results are the first to document the high morbidity of CT and GC among AFI performers. We found both high annual cumulative incidences and high reinfection rates in this population. Reported cases among performers were retrieved from the LAC STD surveillance registry, which allowed us a unique opportunity to assess morbidity in this elusive population, especially for whom data are otherwise not readily available. While gender, age, and racial data for all AFI performers are unavailable, the observed distribution of cases most likely reflects the underlying distributions within the performer population.

Though we report that the CT and GC incidence among AFI performers are much greater than that of the general population, the limitations of these comparisons must be addressed. Although cases reported among AFI performers are likely to be predominantly incident cases due to the high frequency of testing, the reported cases of the general population are more likely to be prevalent cases. All AFI performers are screened for CT and GC so that they may work and may potentially be screened monthly if they are working regularly. Much of the general population, on the other hand, would be screened annually if at all,¹² potentially resulting in rates that are greatly underestimated. Although this underestimation cannot be established without knowledge of the proportion of the population that accesses healthcare and is screened, we still believe that a comparison with the surrounding population morbidity has value.

As previously mentioned, a recent decrease in the number of cases reported among performers occurred in 2008. This decrease is likely due to one or a combination of multiple possible factors: (1) a reduction in STD testing among performers due to lower demand in the AFI or decreased compliance with the “voluntary” testing standard; (2) increased use of self-medication or empirical treatment by providers; (3) a true decrease in STD reports likely due to expanded efforts of case investigations, interviews, and partner referrals for treatment; and (4) less frequent reporting from laboratories of performer testing facilities. The recent decrease in reinfection rates among performers in 2007 is likely due to the decline in the number of reported cases among performers.

The reinfection rate reported among AFI performers is high even when compared with those of other populations, including previous studies with active follow-up of cases. Hosenfeld et al.¹³ modeled CT reinfection among females within 12 months from studies with active follow-up and reported a peak reinfection rate of 19% at 10 months, a 47% lower rate than was found among female AFI performers for CT and/or GC. The modeled reinfection rate, however, may be biased in either direction since the proportion of infected patients retested ranged from 23% to 96% among studies reviewed, although Hosenfeld et al. also found that reinfection rates did not differ across the range of proportions retested.¹³

As high as the reported reinfection rates are among AFI performers, we believe these findings likely underestimate the

true rates in the performer population. First, infections among performers may be underreported due to either self-medication or presumptive empirical treatment without testing. Either situation would result in potential infections going undiagnosed and subsequently unreported. Second, to be conservative, we only included those cases from performer testing facilities and a non-performer occupation was not mentioned. We, therefore, potentially excluded cases among performers diagnosed elsewhere. Third, due to the high turnover in the AFI, many performers may not have remained in the industry for the entire 1-year follow-up. These performers would thus be included in the denominator but not have as much potential to be included in the numerator, resulting in an underestimation of reinfection rates. Fourth, the number of cases in the AFI is likely underestimated because CT and GC testing during the study period at performer testing centers was limited in scope, including only urine specimens and excluding rectal and oral-pharyngeal testing. A previous study on sexually transmitted infections among AFI performers from performer testing centers in the United Kingdom found that 60% of GC infections were detected only through pharyngeal and/or rectal testing.¹⁴ Unprotected oral and anal sex are common practices in the AFI; as such, rectal and oropharyngeal infections among performers may remain undiagnosed and untreated, supplying a disease reservoir for infection of performing partners as well as partners in their personal lives.

Because infections are being reported by both the laboratories and facilities, we are confident that the cases included in this analysis wholly captured reports of infected performers diagnosed by performer testing facilities. The inclusion of non-performer in these analyses, however, is a possible limitation of the study. Although a large proportion of included cases did not have occupation reported (44%), we are confident that nearly all those included are among performers. First, reporting of occupation has improved greatly over time, attributed to the efforts of the LAC STD Program to improve completeness of reports from performer testing facilities. The 2 performer testing centers were established to test performers, especially in the earlier years when the majority of assumptions about occupation are made. Second, a large proportion of those with reported infections with no occupation information had a previous or subsequent infection in which a performer occupation was indicated, suggesting that they were likely performers but were not indicated as such on the CMR.

We focused on repeat infections with CT and GC in this analysis because they are generally indicators of (1) participation in higher sexual risk behaviors; (2) higher risk for HIV acquisition and transmission¹⁵; and (3) higher risk for the more serious sequelae of STDs, including pelvic inflammatory disease, infertility, pregnancy complications, and neonatal infection.^{16,17} The results suggest that female performers not only are more likely to have reinfections but also have them occurring sooner than their male counterparts, making female performers especially vulnerable to the potential reproductive consequences of repeat infections. We also focused on repeat infection in the AFI because the incidence of STDs in the industry is very difficult to estimate. Although the LAC Department of Public Health receives reports of diagnosed cases (numerator), we do not receive reports on the total number of individuals tested (denominator) from which the cases were diagnosed, making incidence difficult to estimate.

Currently, the heterosexual industry’s voluntary testing standards require a negative test result (typically through urine screening) within the past 30 days for a performer to work. Although the extent to which production companies comply

with this standard is not known, screening at this interval without the use of barrier protection would still be inadequate due to the much shorter incubation periods for most STDs. This would result in infected performers having unprotected sex with potentially numerous partners, making the risk of acquiring and transmitting STDs before their next screening extremely high. Furthermore, although screening provides an opportunity to diagnose and treat infected performers, it will not prevent infection, especially in this occupational group that has multiple sexual partners over a short period.

As noted previously, the industry relies upon urogenital screening for CT and GC. As such, rectal and oropharyngeal infections among performers may remain undiagnosed and untreated, supplying multiple sources of disease reservoirs for their partners in the workplace and in their personal lives. Furthermore, although HIV and syphilis are typically included in the screening panel, many other reportable and non-reportable STDs are not included, such as herpes; human papillomavirus; *Trichomonas*; hepatitis A, B, and C virus; and bacterial vaginosis.

In summary, this analysis provides evidence that the burden of CT and GC among AFI performers is unacceptably high and that testing alone is not sufficient for controlling the spread of STDs within this industry. Despite the determination by Cal/OSHA that the AFI must comply with the barrier protection requirements of the Bloodborne Pathogen Standard,^{10,18} condoms are still minimally used. The standard also requires that employers have an exposure control plan and that performers are made aware of the risks associated with participation in various sexual acts and how to fully benefit from preventive practices. The industry fears that use of condoms in films will result in a loss of revenue.^{19,20} However, Wicked Pictures, one of the longest running and largest production companies, is condom-only,²¹ and Brazil, the world's second largest AFI, has a condom usage rate of 80%,³ suggesting that use of condom in adult films does not necessarily mean a decrease in profits. Furthermore, flesh tone-colored condoms or digital removal of condoms post-production can also be done to minimize their appearance.³ In addition to the use of barriers, the following strategies can be adopted by the industry to increase performer protection: (1) mandatory labeling of adult films that state whether the film was produced pursuant to OSHA requirements; (2) prohibit distribution and sales of adult films produced in violation of OSHA requirements to hotels, cable television content providers, and others in commercial settings; and (3) more vigorous enforcement of OSHA occupational standards to reduce exposure to infectious diseases.

The AFI has thus far been generally a self-regulated industry. Self-regulation, however, has not sufficiently protected performers, and additional state and federal legislation that places more responsibility on production companies to ensure the safety of their vulnerable employees is needed. In this industry where a recent case of HIV in an adult film performer was deemed "not a major event,"²² workers need a means to protect themselves from STDs and HIV, which is simply not adequate through testing alone.

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