Gonococcal Isolate Surveillance Project

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Robert Kirkcaldy, Project Officer

Attachment 7

Sample Report - Gonococcal Isolate Surveillance Project (GISP)

Annual Report 2008

Sexually Transmitted Disease Surveillance 2005 Supplement

Gonococcal Isolate Surveillance Project (GISP) Annual Report 2005

Division of STD Prevention
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DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
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The report is also available by Internet via the CDC home page at: **http://www.cdc.gov/std/GISP2005/** To view the Clinic Profiles, please use the drop down boxes on **http://www.cdc.gov/std/GISP2005/**

Any comments and suggestions that would improve the usefulness of future publications are appreciated and should be sent to Epidemiology and Surveillance Branch, GISP Coordinator, Division of STD Prevention, National Center for HIV, STD, and TB Prevention, Centers for Disease Control and Prevention, 1600 Clifton Road, Mailstop E-02, Atlanta, GA 30333.

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Gonococcal Isolate Surveillance Project (GISP) Annual Report – 2005

Introduction

With 339,593 gonorrhea cases reported in 2005, gonorrhea is the second most frequently reported communicable disease in the United States. Gonorrhea rates in the United States declined 74.3% from 1975 through 1997 following the implementation of national gonorrhea control programs in the mid-1970's. After 1997 gonorrhea rates appeared to plateau, although a slight increase was observed in 2005. The current rate is 115.6 per 100,000 persons (**Figure 1**).[1] Overall, in 2005 gonorrhea rates continue to remain high in the South, among African-Americans, and among adolescents and young adults of all racial and ethnic groups (**Figures 2**, **3** and **4**).[1-4] The health impact of gonorrhea is largely related to its role as a major cause of pelvic inflammatory disease, which frequently leads to infertility or ectopic pregnancy.[5] In addition, data suggest that gonorrhea facilitates HIV transmission.[6,7]

The treatment and control of gonorrhea has been complicated by the ability of *Neisseria gonorrhoeae* (or *N. gonorrhoeae*) to develop resistance to antimicrobial agents. The appearance of penicillinase-producing *N. gonorrhoeae* (PPNG) and chromosomally mediated penicillin and tetracycline-resistant *N. gonorrhoeae* (CMRNG) in the 1970s eventually led to the abandonment of these drugs as therapies for gonorrhea. Currently, the primary CDC-recommended therapies for gonorrhea are two broad-spectrum cephalosporins (ceftriaxone and cefixime*), and three fluoroquinolones (ciprofloxacin, ofloxacin, and levofloxacin).[8] However, since the 1990s, fluoroquinolone-resistant *N. gonorrhoeae* (QRNG) has been reported and is increasing in many parts of the world, including the United States.[10-19] QRNG increases in men who have sex with men (MSM) and in some regions of the U.S., led CDC to recommend in 2004 that quinolones not be used for infections in MSM, in those with a history of recent foreign travel or partners' travel, for infections acquired in California or Hawaii, or for infections acquired in other areas with increased QRNG prevalence.[18]

*Since 2002, cefixime tablets remain unavailable in the U.S.[9]

GISP Overview

GISP was established in 1986 to monitor trends in antimicrobial susceptibilities of strains of *N. gonorrhoeae* in the United States to establish a rational basis for the selection of gonococcal therapies.[19] GISP is a collaborative project among selected sexually transmitted diseases (STD) clinics, five regional laboratories, and the Centers for Disease Control and Prevention (CDC).

In GISP during 2005, *N. gonorrhoeae* isolates were collected from the first 25 men with urethral gonorrhea attending STD clinics each month in 27 cities in the United States. Using agar dilution, regional laboratories determined the susceptibilities of these isolates to penicillin, tetracycline, spectinomycin, cefixime, ceftriaxone, ciprofloxacin, and azithromycin. Minimum inhibitory concentrations (MICs) were measured, and values interpreted according to criteria recommended by the National Committee for Clinical Laboratory Standards (NCCLS).[20-22] Clinical and demographic data were abstracted from medical records.

Important GISP findings have included:

- the continued high prevalence of resistance to both penicillin and tetracycline which has remained above 15%;
- the emergence and increasing prevalence of resistance to the fluoroquinolones;[11-16,18]
- the appearance, and increasing prevalence of decreased susceptibility to the macrolides;[23]
- the emergence of multi-drug resistant isolates (resistant to penicillin, tetracycline, and fluoroquinolone) with decreased susceptibility to cefixime;[24] and
- the increasing proportion of gonorrhea cases identified in men who have sex with men. [25,26]

GISP findings have directly contributed to CDC's STD Treatment Guidelines in 1993, 1998, 2002, 2004, and 2006.[8,10,18,27,28]

2005 GISP Sites and Regional Labs

Twenty-seven STD clinics contributed 6,199 gonococcal isolates to GISP in 2005 (**Figure 5**). Fifteen out of 27 sites (56%) have participated continuously since 1987: Albuquerque, Atlanta, Baltimore, Birmingham, Cincinnati, Denver, Honolulu, Long Beach, New Orleans, Philadelphia, Phoenix, Portland, San Diego, San Francisco, and Seattle. The other twelve GISP sites joined in the following years:

Chicago (1996), Cleveland (1991), Dallas (2000), Detroit (2003), Greensboro (2002), Los Angeles (2003), Las Vegas (2002), Miami (1998), Minneapolis (1992), Oklahoma City (2003), Orange County (1991), and Tripler (2001). The five GISP regional laboratories are located in Atlanta at Emory University, Birmingham at the University of Alabama, Cleveland at the Cleveland Clinic Foundation, Denver at the University of Colorado Health Sciences Center, and Seattle at the University of Washington.

Description of GISP Data

Aggregate data from all GISP sites are described and illustrated in the first part of this report. Clinic-specific figures are provided in the second part of this report, to illustrate geographic variations in patient characteristics and antimicrobial susceptibility.

Demographic and Clinical Characteristics

Age: The age distribution of GISP participants compared with nationally reported male gonorrhea patients in 2005 is shown in **Figure 6**. In 2005, GISP had proportionally fewer 20-24 year olds and persons less than 20 years old than were reported nationally and more persons in the older age groups. GISP participants ranged in age from 13 to 81 years, with a median age of 27 years.

Race/Ethnicity: The race/ethnicity distribution of GISP participants as compared with nationally reported male gonorrhea patients in 2005 is shown in **Figure 7**. White, Hispanic, and Asian males were slightly over represented in GISP while African-American males were slightly under represented compared with the race/ethnicity distribution of nationally reported male gonorrhea patients in 2005.

Sexual Orientation: The proportion of GISP participants who were MSM increased every year from 1993 until 2003, when there was a slight decrease. However in recent years this again increased, from 20.2% in 2004 to 21.9% in 2005 (**Figure 8**). The majority of GISP participants who were MSM were on the West Coast. However, several sites had notable increases in their proportion of MSM when compared with 2004 such as Albuquerque, Dallas, Denver, Chicago, Greensboro, New Orleans, Los Angeles, Long Beach, Oklahoma City, Portland, and San Diego (**Figure 9**).

Reason for Clinic Attendance: Most (94.6%) GISP participants in 2005 presented to the clinic on their own initiative (volunteers); others were referred as contacts of sexual partners diagnosed with gonorrhea or presented for tests-of-cure (**Figure 10**). There has been little change in this distribution over time.

Report of Symptoms: In 2005, 97.3% of GISP participants reported dysuria and/or urethral discharge;

2.7% had no symptoms. These proportions have been relatively stable over time.

History of Gonorrhea: The percentage of GISP participants reporting ever having had a previous episode of gonorrhea remained the same at 52.7% in 2005. The percentage of GISP participants with a documented previous episode of gonorrhea in the last 12 months peaked at 23.6% in 2000 then decreased to 16.1% in 2004, and now has increased slightly to 18.3% in 2005.

Supplemental Patient Data: The proportion of GISP participants who were HIV-positive during 2005 was 8.4% (326/3,904). Of 1,069 MSM reporting HIV testing information, 262 (24.5%) were HIV positive; 2.2% (62/2,807) of heterosexuals were HIV positive. During the 60 days prior to diagnosis of gonorrhea, GISP patients reported the following behaviors:

- 5.4% (256/4,716) took antibiotics;
- 11.8% (400/3,392) traveled outside the state where the sentinel site is located;
- 1.5% (57/3,727) used injection recreational drugs;
- 27.5% (935/3,396) used non-injection recreational drugs
- 3.8% (130/3,401) exchanged money or drugs for sex or vice versa.

Antimicrobial Treatments Given for Gonorrhea: The antimicrobial agents given to GISP participants for gonorrhea therapy are shown in **Figure 11**. The proportion of GISP patients treated with cephalosporins decreased from a peak of 84.7% in 1990 to 63.7% in 2005. However, 63.7% represented an increase from the proportion treated with cephalosporins in 2004, which was 57%. The manufacture and distribution of cefixime was halted in 2002.[9] With the discontinuation of cefixime, the use of "other cephalosporins" increased from 4.6% in 2003 to 18.1% in 2005. The proportion of GISP participants treated with fluoroquinolones (ciprofloxacin, ofloxacin or levofloxacin) increased from none in 1987 to a high of 42% in 2003 before declining slightly to 40% in 2004, and now to 33.7% in 2005.

Antimicrobial Treatments Given for Chlamydia: The antimicrobial agents given to GISP participants for empiric treatment of *Chlamydia trachomatis* infection are shown in **Figure 12**. The proportion of GISP patients treated with doxycycline or tetracycline decreased from a high of 100% in 1991 to 50.6% in 2005; whereas, the proportion treated with azithromycin 1 gram had been increasing from 0.2% in 1992 to 52.4% in 2004, and has decreased slightly to 45.8% in 2005.

Susceptibility to Antimicrobial Agents

Antimicrobial Resistance Criteria

Antimicrobial resistance in *N. gonorrhoeae* is defined by the criteria recommended by the National Committee on Clinical Laboratory Standards (NCCLS):[20-22]

Penicillin, MIC ≥ 2.0 µg/ml
Tetracycline, MIC ≥ 2.0 µg/ml
Spectinomycin, MIC ≥ 128.0 µg/ml
Ciprofloxacin, MIC 0.125 - 0.5 µg/ml (intermediate resistance)
Ciprofloxacin, MIC ≥ 1.0 µg/ml (resistance)
Ceftriaxone, MIC ≥ 0.5 µg/ml (decreased susceptibility)
Cefixime, MIC ≥ 0.5 µg/ml (decreased susceptibility)

NCCLS criteria for resistance to ceftriaxone, cefixime, erythromycin, and azithromycin and for susceptibility to erythromycin and azithromycin have not been established for *N. gonorrhoeae*.

Susceptibility to Penicillin and Tetracycline

Overall, 19.6% (1,217/6,199) of isolates collected in 2005 were resistant to penicillin, tetracycline, or both (**Figure 13**); this proportion peaked at 34% in 1992 and has been decreasing annually since 1998 until a slight increase occurred in 2005. For GISP analyses, six mutually exclusive categories of resistance are used for describing chromosomally and plasmid-mediated resistance to penicillin and tetracycline:[11]

Categories of Resistance

(1) penicillinase-producing *N. gonorrhoeae* (PPNG): β-lactamase-positive and tetracycline MIC < 16.0 µg/ml;

(2) plasmid-mediated tetracycline resistant *N. gonorrhoeae* (TRNG): β-lactamase-negative and tetracycline MIC ≥ 16.0 µg/ml;

(3) PPNG-TRNG: β-lactamase-positive and tetracycline MIC ≥ 16.0 µg/ml;

(4) chromosomally mediated penicillin-resistant *N. gonorrhoeae* (PenR): non-PPNG and penicillin MIC ≥ 2.0 µg/ml and tetracycline MIC < 2.0 µg/ml;

(5) chromosomally mediated tetracycline-resistant *N. gonorrhoeae* (TetR): non-PPNG and penicillin MIC < 2.0 µg/ml and tetracycline MIC 2.0-8.0 µg/ml; and

(6) chromosomally mediated resistance to both penicillin and tetracycline (CMRNG): non-PPNG and penicillin MIC ≥ 2.0 µg/ml and tetracycline MIC 2.0-8.0 µg/ml.

Figure 14 shows the plasmid-mediated resistance to penicillin and tetracycline among GISP isolates from 1988 to 2005. The percentage of PPNG declined annually from a peak of 11.0% in 1991 to 0.5% in 2005. The prevalence of TRNG peaked in 1997 at 7.3% and had been decreasing for several years until 2005 when it increased to 4.5%. Additionally, the prevalence of PPNG-TRNG has continued to be low and in 2005, was 0.7%.

Figure 15 shows the chromosomally mediated resistance to penicillin and tetracycline among GISP isolates from 1988 to 2005. The percentage of PenR isolates increased annually from 0.5% in 1988 to 5.7% in 1999, and has subsequently decreased every year thereafter, until 2005 when there was an increase to 1.9%. TetR prevalence for 2005 was 5.9%. The prevalence of CMRNG increased from 3.0% in 1989 to a peak of 8.7% in 1997, declined to 3.8% in 2003, and now increased from 4.3% in 2004 to 6.1% in 2005.

Susceptibility to Spectinomycin

All isolates were susceptible to spectinomycin in 2005. There have been five spectinomycin-resistant isolates in GISP; their locations and years were: St. Louis-1988, Honolulu-1989, San Francisco-1989, Long Beach-1990, and West Palm Beach-1994.

Susceptibility to Ceftriaxone

Susceptibility testing for ceftriaxone began in 1988. There has not been an overall increase in MICs since that time. **Figure 16** demonstrates MIC values for 3 years: the first year of testing, the current year, and a mid-point year (1996). There have been four isolates with decreased susceptibility to ceftriaxone in GISP; all four had MICs of 0.5 μg/ml. Their locations and years were: San Diego-1987, Cincinnati-1992 and 1993, and Philadelphia-1997. No isolates with decreased susceptibility to ceftriaxone were seen in 2005.

Susceptibility to Cefixime

Susceptibility testing for cefixime began in 1992. There has been a decrease in the percentage of isolates with higher MIC values since 1992, as demonstrated in **Figure 17**. In 2004, there were 2 isolates with decreased susceptibility to cefixime reported to GISP; both were from Los Angeles and demonstrated resistance to penicillin, tetracycline and ciprofloxacin. There were no isolates with decreased susceptibility to cefixime in 2002, 2003, and 2005.

Prior to 2001 there had been 45 isolates with decreased susceptibility to cefixime in GISP; their MICs ranged from 0.5-2.0 μg/ml.

Susceptibility to Ciprofloxacin

The correlation of ciprofloxacin MICs of 0.125-0.5 μg/ml with treatment failure is not well established. However, one study of infections with resistant strains treated with ciprofloxacin 500 mg orally showed a treatment failure rate of 45% for strains with MICs of ≥ 4.0 μg/ml.[29] Gonococcal isolates with intermediate resistance (MICs 0.125-0.5 μg/ml) and resistance (≥ 1.0 μg/ml) to ciprofloxacin also demonstrate intermediate resistance and resistance to other fluoroquinolones. Criteria recommended for interpreting ofloxacin MICs are: intermediate resistance, MICs 0.5-1.0 μg/ml; resistance, MICs ≥ 2.0 μg/ml.[21,22]

Susceptibility testing for ciprofloxacin began in 1990. A total of 10.5% (648/6,199) of isolates exhibited intermediate resistance or resistance to ciprofloxacin in 2005. This is an increase when compared to 2004 in which 7.6% (482/6,322) of isolates showed intermediate resistance or resistance to ciprofloxacin (**Figure 18**). **Figure 19** demonstrates all MIC values for ciprofloxacin for 3 years: the first year of testing, the current year, and a mid-point year (1997). There was a shift toward higher MIC values from 1997 to 2005.

Intermediate resistance: In 2005, 1.1% (67/6,199) of all GISP isolates exhibited intermediate resistance to ciprofloxacin, which is a slight increase from 0.8% (53/6,322) in 2004. The sixty-seven isolates of N. gonorrhoeae exhibiting intermediate resistance to ciprofloxacin in 2005 were found in Albuquerque (5), Birmingham (1), Chicago (11), Cincinnati (1), Cleveland (23), Dallas (4) Greensboro (2), Honolulu (1), Las Vegas (2), Miami (2), Orange County (2), Phoenix (1), San Diego (2), Seattle (1), and San Francisco (9).

Resistance: Five hundred eighty-one, or 9.4% of GISP isolates were resistant to ciprofloxacin (MICs ≥ 1.0 μg/ml) in 2005. Ciprofloxacin-resistant isolates were identified in 93% (25/27) of all sentinel sites in 2005 compared with 86% (24/28) in 2004 and 70% (21/30) in 2003. Of note, 43.9% (255/581) of the 2005 isolates were from the California GISP sites, compared with 56.1% (326/581) during 2004.

Resistance by Location/ Regions: The prevalence of ciprofloxacin resistant *N. gonorrhoeae* at each 2005 GISP site from the years 2002 to 2005 is shown in **Figure 20**.

In Hawaii, the prevalence of ciprofloxacin resistance remained high with a slight decrease in 2005; 17 (19.3%) of 88 isolates submitted from Honolulu demonstrated ciprofloxacin resistance. In California, increases in the number of isolates resistant to ciprofloxacin were identified in all the sites except in Long Beach which experienced a decrease from 25% in 2004 to 23.5% in 2005. San Francisco had

an increase in the prevalence of ciprofloxacin resistance to 31.3% in 2005 from 24.3% in 2004; Orange County to 27.5% from 20.5%; San Diego to 26.2% from 20.6%; and Los Angeles to 14.5% from 13.8%.

In other West Coast sites, increases in the proportion of isolates resistant to ciprofloxacin were observed in Portland (23.1% in 2005 from 11.5% in 2004); in Las Vegas (5.4% from 2.4%); in Denver (10.9% from 8.3%). In Seattle, the prevalence decreased somewhat (11.6% in 2005 from 16.2% in 2004). In Phoenix the prevalence remained about the same (7.1% in 2005 and 6.6% in 2004).

Substantial increases also occurred in the Northeastern, Midwest, and Southern GISP sites. In Philadelphia, ciprofloxacin-resistance increased to 14.3% in 2005 from 3.3% in 2004; in Atlanta resistance increased to 3.8% from 0.9%; in Chicago resistance increased to 4.7% from 2.3%; in Miami resistance increased to 9.1% from 6.8%; in Baltimore resistance increased to 3% from 1%; in Cleveland resistance increased to 2.8% from 0.4%; in Oklahoma City resistance increased to 2.3% from 1.3%; and in Cincinnati resistance increased to 1% from 0.3%. In New Orleans resistance increased to 6.3% in 2005 from 1.6% in 2004; however, this increase needs to be interpreted cautiously, because isolates were collected only from January to May 2005 as a result of Hurricane Katrina. In Greensboro, however, prevalence of ciprofloxacin-resistance decreased slightly to 0.6% in 2005 from 0.8% in 2004 and in Minneapolis, it decreased to 8.0% in 2005 from 9.3% in 2004. In Dallas, the prevalence remained about the same at 3.2% in 2005. Birmingham and Detroit had their first ciprofloxacin resistant isolates detected in GISP in 2005. Albuquerque and Tripler did not identify ciprofloxacin-resistant isolates during 2005.

Resistance by Sexual Behavior: Resistance to ciprofloxacin among MSM continued to increase from 15% in 2003 to 23.8% in 2004 to 29% in 2005. Ciprofloxacin resistance also increased among heterosexuals from 1.5% in 2003 to 2.9% in 2004 to 3.8% in 2005 (**Figure 21**). When excluding data from Hawaii and California, sites where CDC no longer recommends using fluoroquinolones for the treatment of gonorrhea, ciprofloxacin resistance among MSM continued to increase in 2005 to 24.3%, up from 18.8% in 2004; and among heterosexuals there was also an increase to 2.7% in 2005, up from 1.4% in 2004.

Susceptibility to Azithromycin

Susceptibility testing for azithromycin began in 1992. **Figure 22** demonstrates MIC values for 3 years: the first year of testing, the current year, and a mid-point year (1998). The correlation of azithromycin MICs $\geq$ 0.5 μg/ml with clinical treatment failure when the 2.0 gm

azithromycin dose is used to treat a gonococcal infection is not known. However, clinical treatment failures have been reported with the 1.0 gm azithromycin dose for strains with MICs of 0.125-0.5 μg/ml.[30-33]

In previous years and for 2005, the azithromycin MIC for decreased susceptibility was set at ≥ 1.0 μg/ml. However, there was a change in the media used for agar dilution testing among all the GISP regional laboratories throughout 2005. This media change resulted in an observational shift of the MIC curve, approximately one dilution higher. Therefore, caution is needed when interpreting the 2005 azithromycin MIC data.

In 2005, 2.9% (181/6,199) of isolates had azithromycin MIC ≥ 1.0 μg/ml (range, 1.0-4.0 μg/ml) and 0.6% (35/6,199) had azithromycin MIC ≥ 2.0 μg/ml (range, 2.0-16.0 μg/ml). The following thirty-five isolates with azithromycin MIC ≥ 2.0 μg/ml are listed by location and number of isolates detected in 2005: Albuquerque (2), Baltimore (2), Birmingham (3), Chicago (5), Cincinnati (2), Dallas (2), Honolulu (1), Las Vegas (3), Los Angeles (2), Minneapolis (3), Philadelphia (1), San Diego (4), San Francisco (3), and Seattle (2).

Susceptibility Reporting Outside of GISP

During 2005-2006, Association of Public Health Laboratories (APHL) and other public health laboratories were surveyed to identify state or city public health laboratories which routinely performed antimicrobial susceptibility testing of *N. gonorrhoeae*. Data from the survey revealed 24 laboratories which performed antimicrobial susceptibility testing and the results are presented in **Table 1**.

Table 1. Non-GISP antimicrobial susceptibility testing of *N. gonorrhoeae* during 2005

STD Project Area	Total # Isolates Tested	Cip S	Cip I	Cip R	Spc S	Spc R	Cfx S	Cfx DS	Cpd S	Cpd DS	Cro S	Cro DS	Azi S	Azi DS
AZ	53 (m)	53	0	0	-	-	-	-	-	-	53	0	-	-
	68 (f)	68	0	0	-	-	-	-	-	-	68	0	-	-
CA (San Diego)[b]	27	23	0	4	-	-	-	-	-	-	27	0	-	-
CO	1 (f)	1	0	0	-	-	-	-	-	-	1	0	-	-
FL	35	23	0	12	-	-	-	-	-	-	35	0	-	-
HI	309	269	0	40	309	0	-	-	309	0	309	0	307	2
IN	1123 (m)	1070	0	53	-	-	-	-	-	-	1123	0	-	-
	488 (f)	486	0	2	-	-	-	-	-	-	488	0	-	-
MA	233 (m)	157	0	76	233	0	233	0	233	0	233	0	201	32
	41 (f)	38	0	3	41	0	41	0	41	0	41	0	40	1
MD	69	69	0	0	69	0	69	0	-	-	69	0	-	-
MI	782	736	4	42	782	0	-	-	782	0	782	0	-	-
MN	88	84	0	4	88	0	88	0	-	-	88	0	88	0
MS	214	214	0	0	-	-	-	-	-	-	214	0	-	-
MT	4 (m)	3	0	1	4	0	4	0	-	-	4	0	3	1
	8 (f)	8	0	0	8	0	8	0	-	-	8	0	8	0
NH	7 (m)	5	0	2	7	0	-	-	-	-	7	0	-	-
	10 (f)	10	0	0	10	0	-	-	-	-	10	0	-	-
NJ[c]	79 (m)	77	0	2	79	0	79	0	-	-	79	0	-	-
	9 (f)	9	0	0	9	0	9	0	0	0	9	0	-	-
NYC	402 (m)	365	0	37	-	-	402	0	-	-	402	0	401	1
	77 (f)	75	0	2	-	-	77	0	-	-	77	0	77	0
NY (Erie County)	51 (m)	49	2	0	51	0	51	0	-	-	51	0	50	1
	106 (f)	106	0	0	106	0	106	0	-	-	106	0	106	0
NY State (Wadsworth)	149	142	0	7	149	0	-	-	-	-	149	0	149	0
OR[d]	132 (m)	94	0	38	-	-	52	0	-	-	52	0	52	0
	92 (f)	89	0	3	-	-	8	0	-	-	8	0	8	0
PR	3 (m)	3	0	0	3	0	0	-	-	-	-	-	-	-
TX	13	13	0	0	-	-	-	-	-	-	13	0	-	-
UT	96 (m)	88	0	8	-	-	-	-	-	-	96	0	-	-
	39 (f)	37	0	2	-	-	-	-	-	-	39	0	-	-
VA	2	1	0	1	2	0	-	-			2	0	-	-
WA (Seattle)[d]	280 (m)	228	0	52	-	-	60	0	-	-	60	0	59	0
	122 (f)	119	0	3	-	-	15	0	-	-	15	0	15	0
WI (Milwaukee)	758	736	15	7	758	0	-	-	-	-	758	0	747	11
TOTAL	**5970**	**5548**	**21**	**401**	**2708**	**0**	**1302**	**0**	**1365**	**0**	**5476**	**0**	**2311**	**49**

Key:

- m = male; f = female
- Cip=ciprofloxacin; Spc=spectinomycin; Cfx=cefixime; Cpd=cefpodoxime; Cro=ceftriaxone; Azi=azithromycin
- S=susceptible; DS=decreased susceptibility; I=intermediate resistant; R=resistant
- Cells containing only "-" indicate that the antimicrobial for that column was not tested

[1] For this table, AziDS is defined as an isolate with azithromycin disk inhibition zone size ≤ 30mm or minimum inhibitory concentration (MIC) ≥ 1.0 µg/ml.

[b] San Diego tested all isolates against ofloxacin, rather than against ciprofloxacin.

[c] For New Jersey data, due to complications with media preparation, susceptibility testing results were only available from January to June 2005.

[d] For Oregon and Washington data, cephalosporins and azithromycin susceptibility testing were performed only on a subset of isolates, generally those isolates found to be ciprofloxacin-resistant.

Observation

In 2005-2006, Association of Public Health Laboratories (APHL) and other public health laboratories were surveyed to determine the number of state and city public health laboratories that routinely performed antimicrobial susceptibility testing of *N. gonorrhoeae*. These isolates are not representative of the gonorrhea patient population but rather a convenience sample of patients who happen to undergo culture rather than non-culture testing.

Testing methodology used by the labs for susceptibility testing was either disk diffusion or E-test. The survey was distributed to 66 labs to which 60 responded, revealing that 24 of the 60 labs performed GC susceptibility testing and 36 did not. Data from 5,970 isolates were collected from these 24 labs. In addition, in contrast to GISP, multiple non-GISP isolates from various anatomic sites may be submitted from a single patient, so the 5,970 non-GISP isolates are likely to represent fewer than 5,970 patients. Furthermore, the laboratories did not always test for resistance to the same antibiotic panel used in GISP.

The survey revealed that 6.7% (401/5,970) of non-GISP isolates were resistant to ciprofloxacin or ofloxacin. Gender information was available for 3,524 (59.0%) of the 5,970 isolates. Of those, 70% (2,463/3,524) were male and 30% (1,061/3,524) female. QRNG was found among 10.9% (269/2,463) of males and 1.4% (15/1,061) of females. In addition, 2.1% (49/2,360) of isolates had decreased susceptibility to azithromycin. No resistance was reported to spectinomycin, cefixime, or ceftriaxone.

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and Scott J. Zimmerman; New York (Wadsworth) – Robin Atkinson, Andrea Carpenter, Nellie Dumas, and Lawrence Sturman; Oregon – Doug Harger and Wil Whittington; Puerto Rico – Carmen Matos Berrios, Rosa I. Cuevas, Dianne Martinez and Rosa Montanez; Washington (Seattle) – Wil Whittington; Texas – Tamara Baldwin and Elizabeth Delamater; Utah – Dan Andrews; Virginia – Karen Schnell; and Wisconsin (Milwaukee) – Patricia Jansen and Ajaib Singh.

We would also like to thank Anthony Tran of the Association of Public Health Laboratories for his assistance with the 2005 survey.

Additional Resources

Presentations of GISP and Non-GISP data were made at the 2006 National STD Prevention Conference in Jacksonville, Florida on May 9th & 10th, 2006; the 44th Annual Meeting of the Infectious Diseases Society of America (IDSA) in Toronto, Canada on October 13th, 2006; and at the 134th Annual Meeting and Exposition of the American Public Health Association in Boston, Massachusetts on November 8th, 2006.[34-37]

Additional information on GISP, as well as useful resources and links, may be found on the: CDC DSTDP Antimicrobial Resistant Gonorrhea website:
http://www.cdc.gov/std/Gonorrhea/arg/default.htm

Other United States surveillance data on *N. gonorrhoeae* and other STDs may be found on the CDC DSTDP Surveillance and Statistics website:
http://www.cdc.gov/nchstp/dstd/Stats_Trends/Stats_and_Trends.htm

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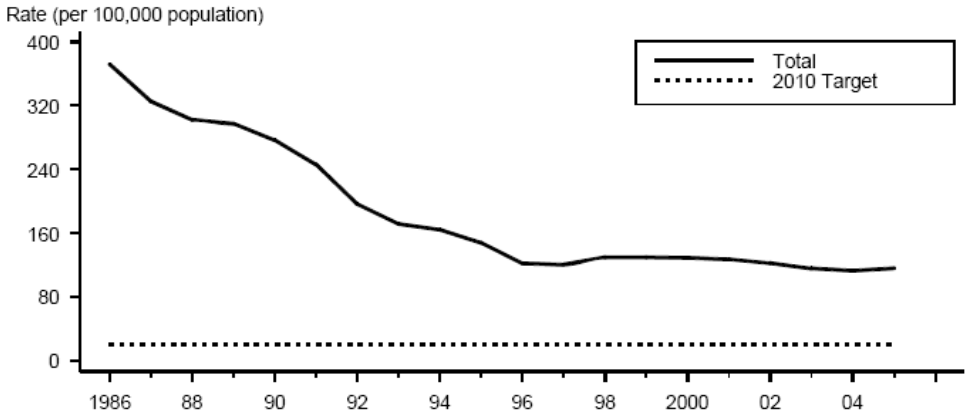
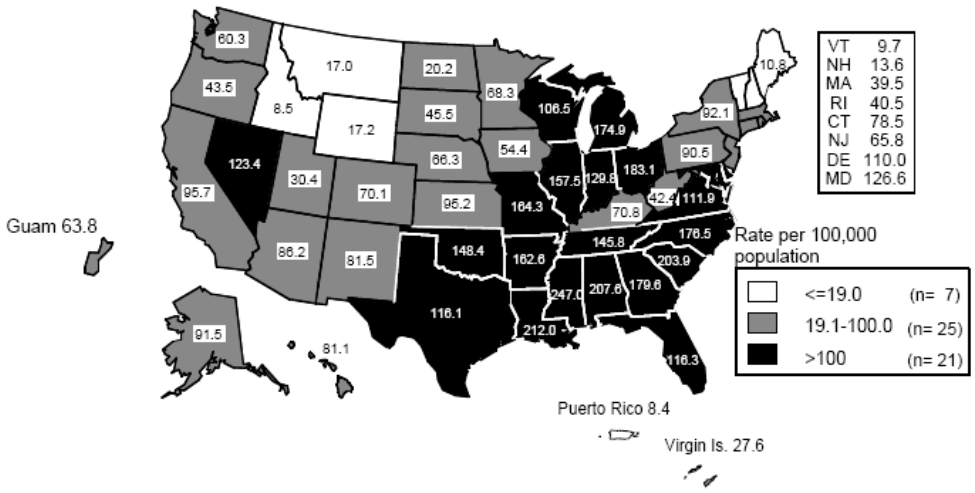
Figure 1. Gonorrhea — Reported rates: United States, 1986–2005 and the Healthy People 2010 target



Note: The Healthy People 2010 (HP2010) objective for gonorrhea is 19.0 cases per 100,000 population.

Figure 2. Gonorrhea — Rates by state: United States and outlying areas, 2005



Note: The total rate of gonorrhea for the United States and outlying areas (Guam, Puerto Rico and Virgin Islands) was 114.2 per 100,000 population. The Healthy People 2010 target is 19.0 cases per 100,000 population.

Figure 3. Gonorrhea — Rates by race/ethnicity: United States, 1996–2005

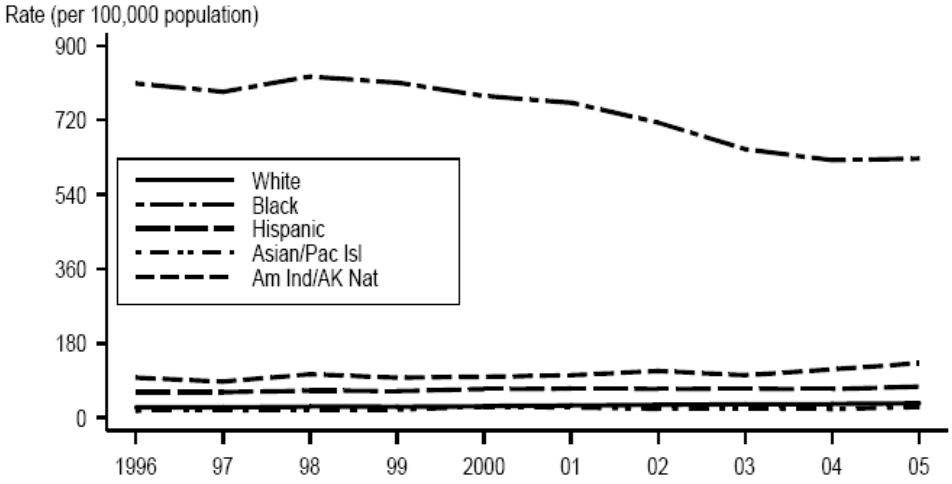


Figure 4. Gonorrhea — Age- and sex-specific rates: United States, 2005

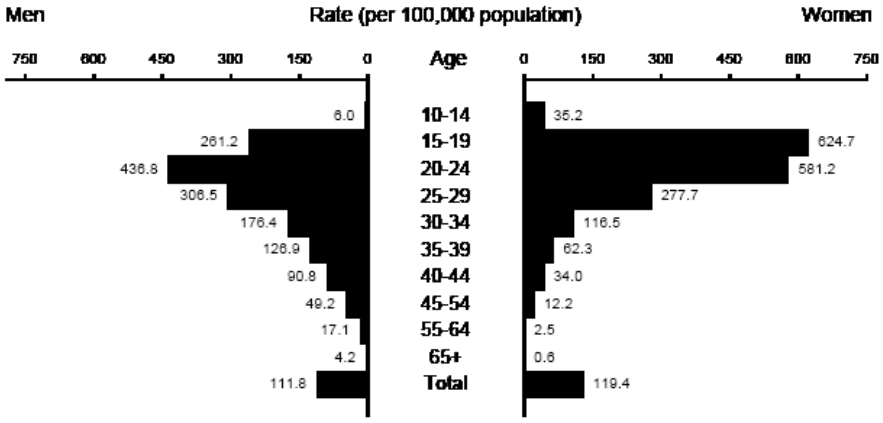


Figure 5. Location of participating GISP clinics and regional laboratories: United States, 2005

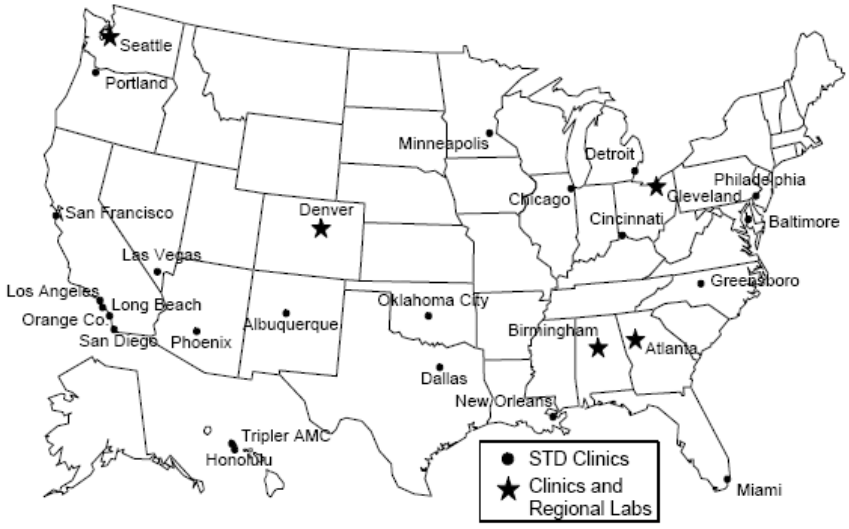
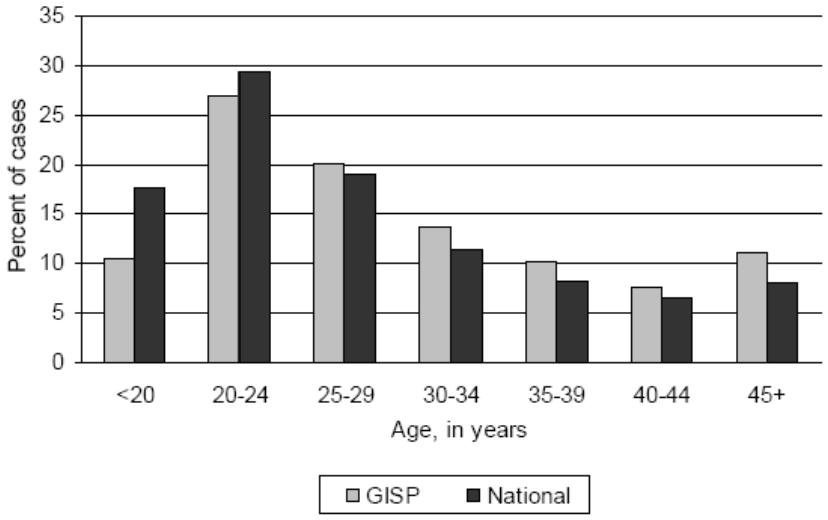
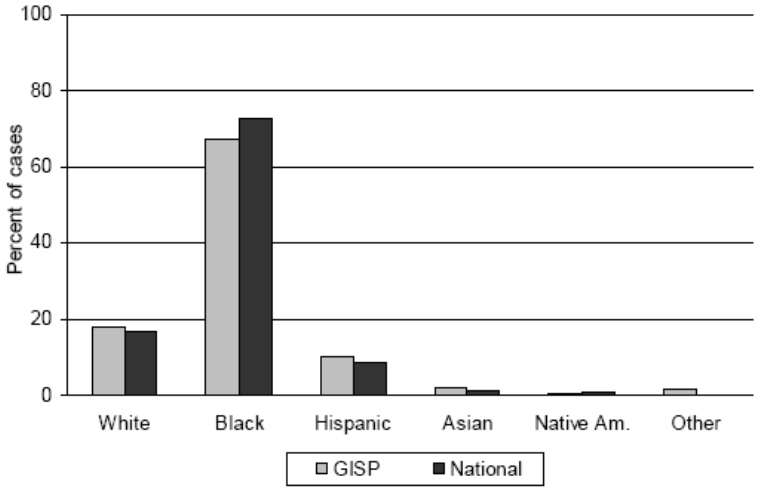


Figure 6. Age distribution of GISP participants and nationally reported gonorrhea cases in men, 2005



Note: The age < 20 category includes ages 10-19 for national cases, and ages 13-19 for GISP; 98.6% in GISP are ages 15-19 and for national cases, 97.7% are ages 15-19.

Figure 7. Race distribution of GISP participants and nationally reported cases of gonorrhea in men, 2005



Note: Asian includes Native Hawaiians and Pacific Islanders. Other includes participants who selected more than one race category. However, the "Other" category is not used in national gonorrhea reporting.

Figure 8. Gonorrhea — Percentage of GISP cases that occurred among men who have sex with men (MSM), 1988–2005

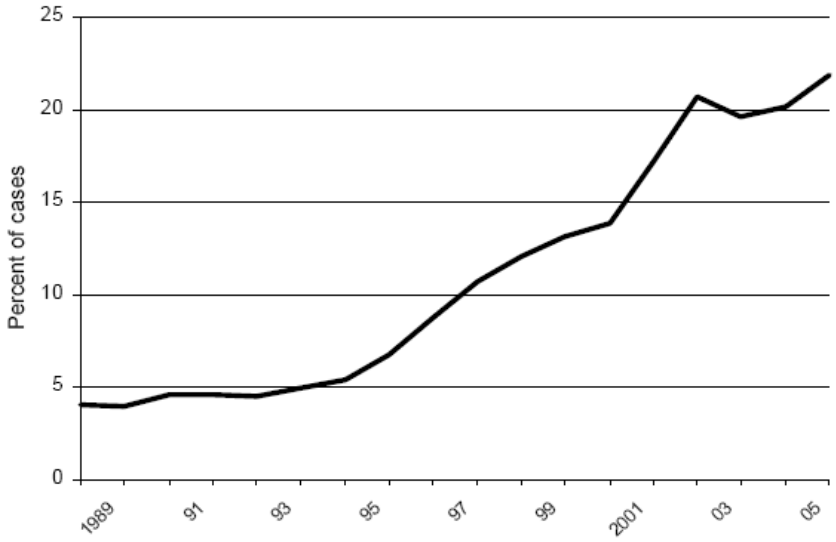
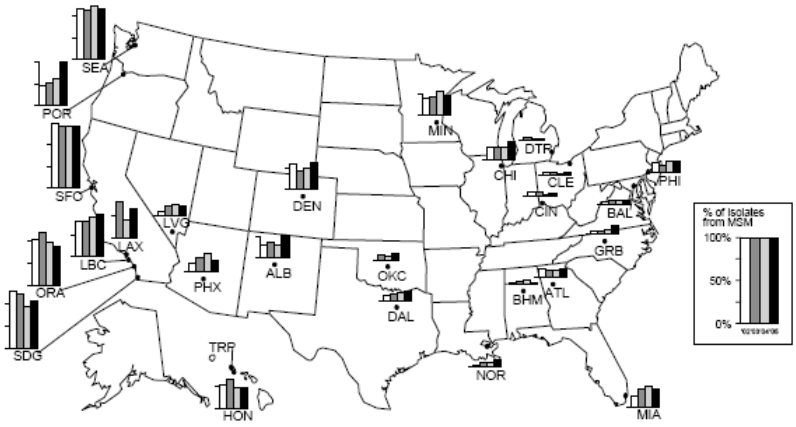
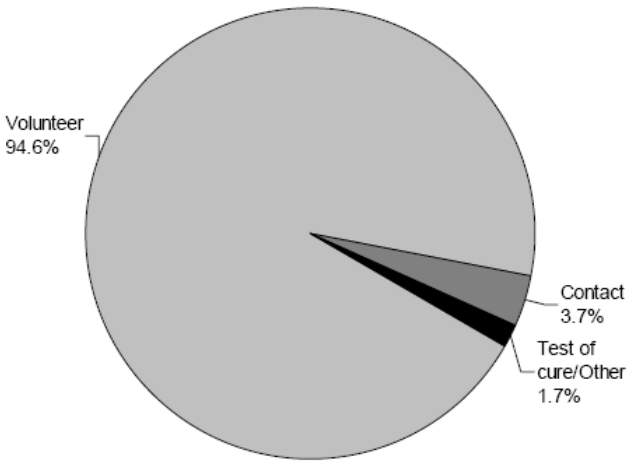


Figure 9. Percent of GISP *Neisseria gonorrhoeae* isolates obtained from MSM attending STD clinics, 2002–2005



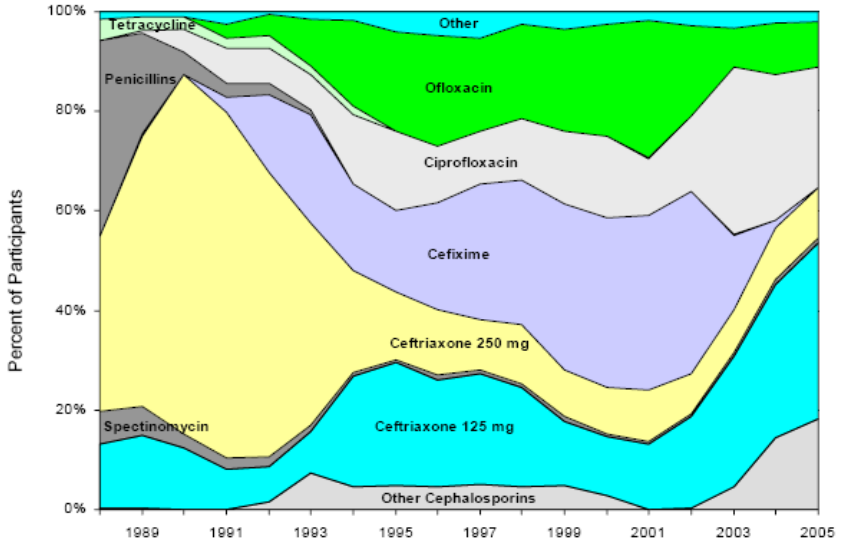
Note: Not all clinics participated in GISP for the last 4 years. Clinics include: ALB=Albuquerque, NM; ATL=Atlanta, GA; BAL=Baltimore, MD; BHM=Birmingham, AL; CHI=Chicago, IL; CIN=Cincinnati, OH; CLE=Cleveland, OH; DAL=Dallas, TX; DEN=Denver, CO; DTR=Detroit, MI; GRB=Greensboro, NC; HON=Honolulu, HI; LAX=Los Angeles, CA; LBC=Long Beach, CA; LVG=Las Vegas, NV; MIA=Miami, FL; MIN=Minneapolis, MN; NOR=New Orleans, LA; OKC=Oklahoma City, OK; ORA=Orange County, CA; PHI=Philadelphia, PA; PHX=Phoenix, AZ; POR=Portland, OR; SDG=San Diego, CA; SEA=Seattle, WA; SFO=San Francisco, CA; and TRP=Tripler Army Medical Center, HI (does not provide sexual risk behavior data).

Figure 10. Reason for clinic attendance among GISP participants, 2005



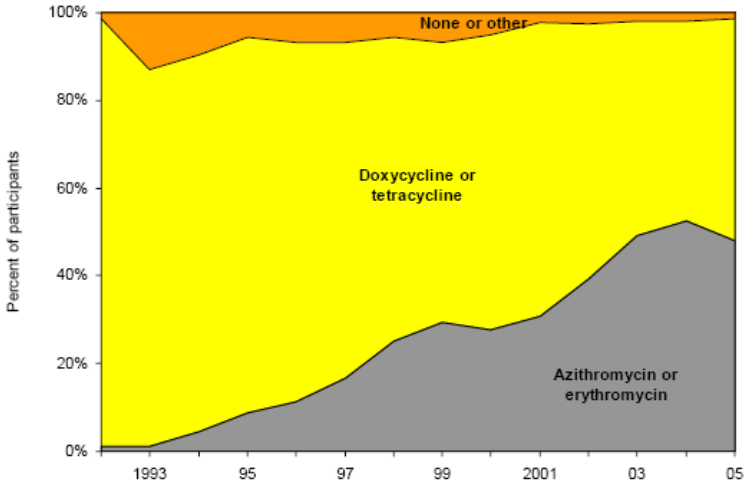
Note: Contact=has sexual partner with gonorrhea.

Figure 11. Drugs used to treat gonorrhea in GISP participants, 1988–2005



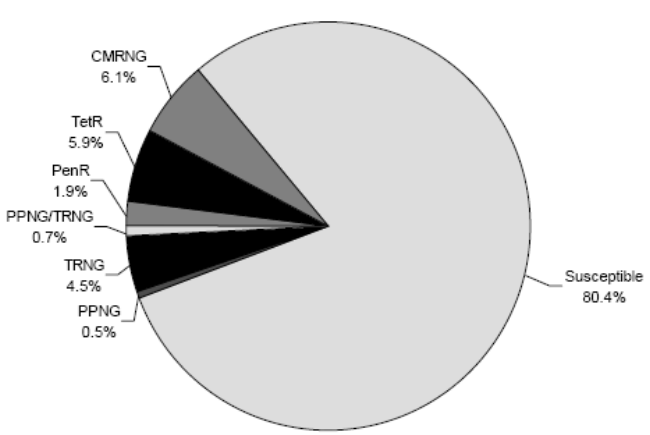
Note: For 2005, "Other" includes no therapy (1.4%), azithromycin 2 g (0.1%), levofloxacin (0.4%), and other less frequently used drugs.

Figure 12. Drugs used to treat *Chlamydia trachomatis* infection in GISP participants, 1992–2005



Note: For each year, "Other" accounted for only 0 - 0.9% of *C. trachomatis* treatment and erythromycin accounted for only 0.1 – 2.1% of *C. trachomatis* treatment.

Figure 13. Penicillin and tetracycline resistance among GISP isolates, 2005



PPNG=penicillinase-producing *N. gonorrhoeae*

TRNG=plasmid-mediated tetracycline resistant *N. gonorrhoeae*

PPNG/TRNG=plasmid-mediated penicillin and tetracycline resistant *N. gonorrhoeae*

PenR=chromosomally mediated penicillin resistant *N. gonorrhoeae*

TetR=chromosomally mediated tetracycline resistant *N. gonorrhoeae*

CMRNG=chromosomally mediated penicillin and tetracycline resistant *N. gonorrhoeae*

Figure 14. Plasmid-mediated resistance to penicillin and tetracycline among GISP isolates, 1988–2005

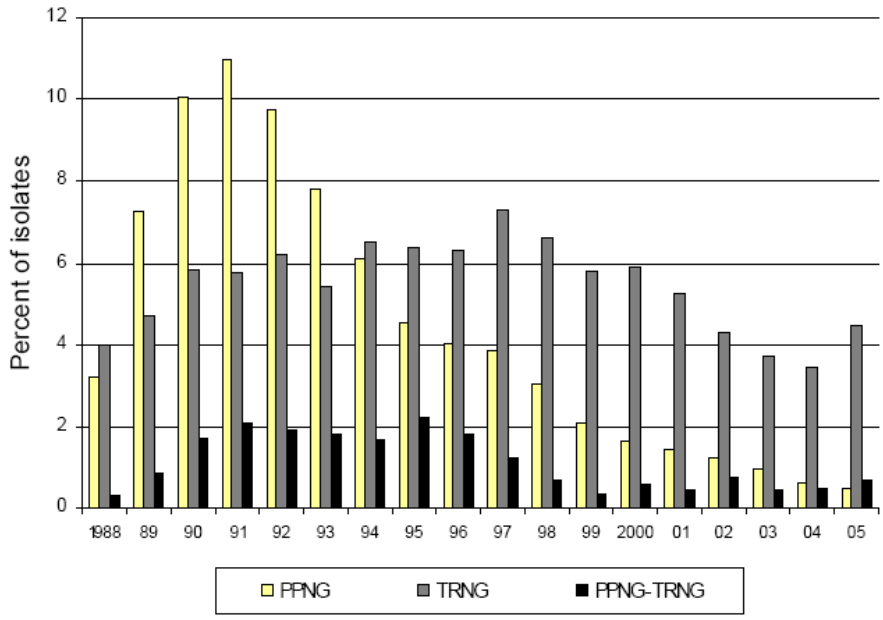


Figure 15. Chromosomally mediated resistance to penicillin and tetracycline among GISP isolates, 1988–2005

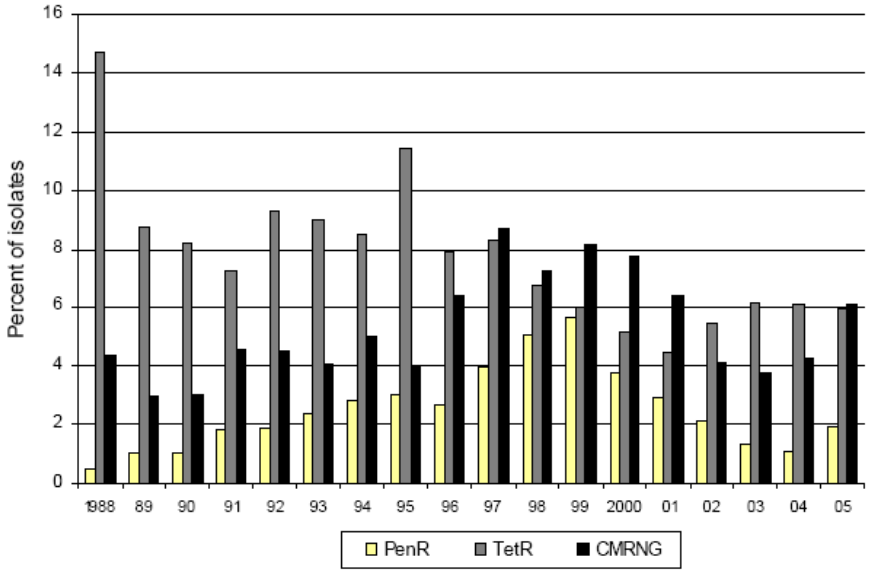
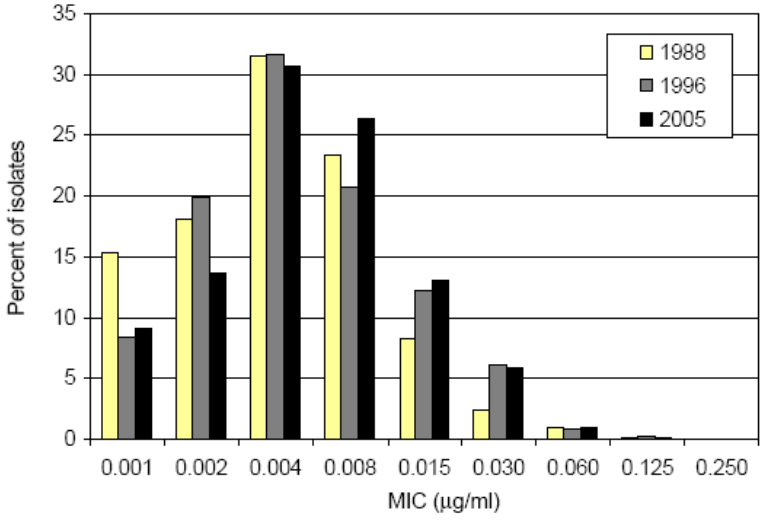
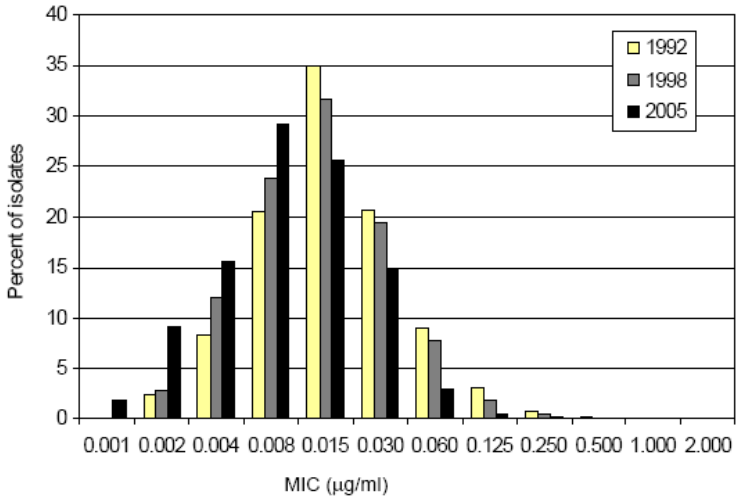


Figure 16. Distribution of MICs to ceftriaxone among GISP isolates, 1988, 1996, and 2005



Note: In 1988, there was one isolate with MIC 0.25 µg/ml. In 1996 and 2005, there were no isolates with MIC 0.25 µg/ml.

Figure 17. Distribution of MICs to cefixime among GISP isolates, 1992, 1998, and 2005



Note: In 1992, there were six isolates with MIC 0.5 µg/ml, three isolates with MIC 1.0 µg/ml, and two isolates with MIC 2.0 µg/ml. In 1998, there were two isolates with MIC 0.5 µg/ml and three isolates with MIC 1.0 µg/ml. In 2005, there were no isolates with MIC > 0.25 µg/ml.

Figure 18. Percentage of GISP isolates with intermediate resistance or resistance to ciprofloxacin, 1990–2005

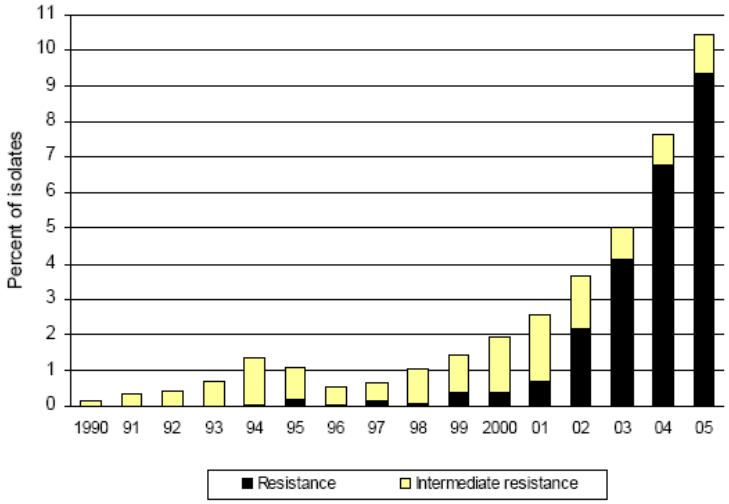
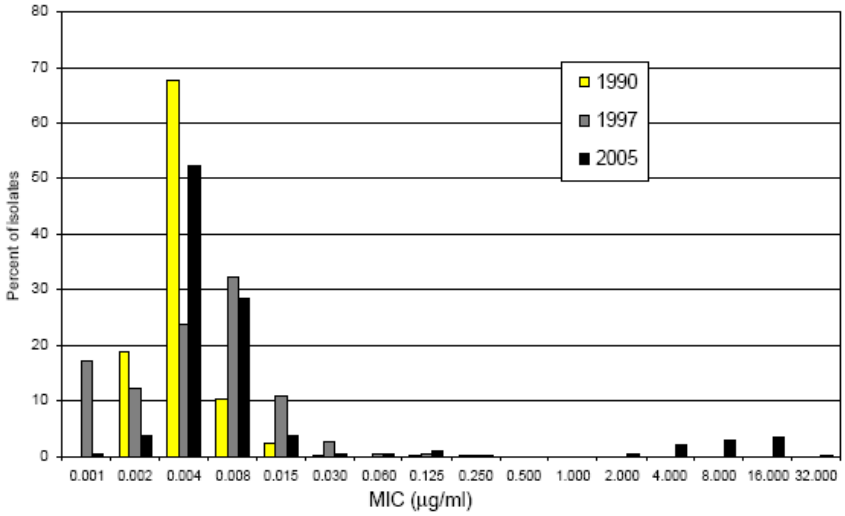
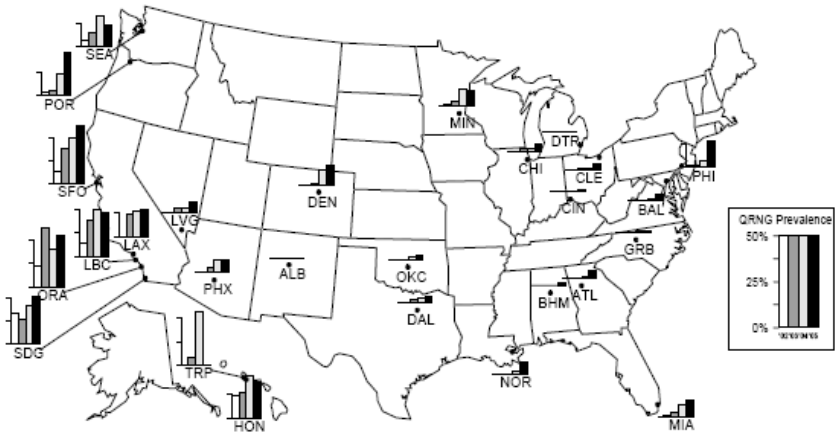


Figure 19. Distribution of MICs to ciprofloxacin among GISP isolates, 1990, 1997, and 2005



Note: In 1990, there were no isolates with MIC > 0.25 µg/ml. In 1997, there was one isolate with MIC 0.5 µg/ml, one isolate with MIC 1.0 µg/ml, two isolates with MIC 2.0 µg/ml, and two isolates with MIC 16.0 µg/ml. In 2005, there were six isolates with MIC 0.5 µg/ml, seven isolates with MIC 1.0 µg/ml, thirty-five isolates with MIC 2.0 µg/ml, one hundred twenty-eight isolates with MIC 4.0 µg/ml, one hundred seventy-one isolates with MIC 8.0 µg/ml, two hundred twenty-two isolates with MIC 16.0 µg/ml, and eighteen isolates with MIC 32.0 µg/ml.

Figure 20. Prevalence of ciprofloxacin resistant *Neisseria gonorrhoeae* by GISP site, 2002–2005



Note: Not all clinics participated in GISP for the last 4 years. Clinics include: ALB=Albuquerque, NM; ATL=Atlanta, GA; BAL=Baltimore, MD; BHM=Birmingham, AL; CHI=Chicago, IL; CIN=Cincinnati, OH; CLE=Cleveland, OH; DAL=Dallas, TX; DEN=Denver, CO; DTR=Detroit, MI; GRB=Greensboro, NC; HON=Honolulu, HI; LAX=Los Angeles, CA; LBC=Long Beach, CA; LVG=Las Vegas, NV; MIA=Miami, FL; MIN=Minneapolis, MN; NOR=New Orleans, LA; OKC=Oklahoma City, OK; ORA=Orange County, CA; PHI=Philadelphia, PA; PHX=Phoenix, AZ; POR=Portland, OR; SDG=San Diego, CA; SEA=Seattle, WA; SFO=San Francisco, CA; and TRP=Tripler Army Medical Center, HI.

Figure 21. Percentage of GISP isolates with resistance to ciprofloxacin by sexual behavior, 2001–2005

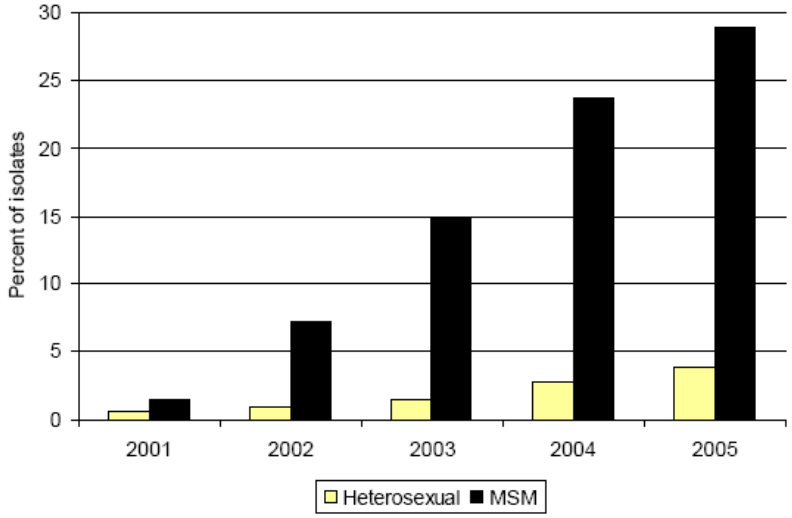
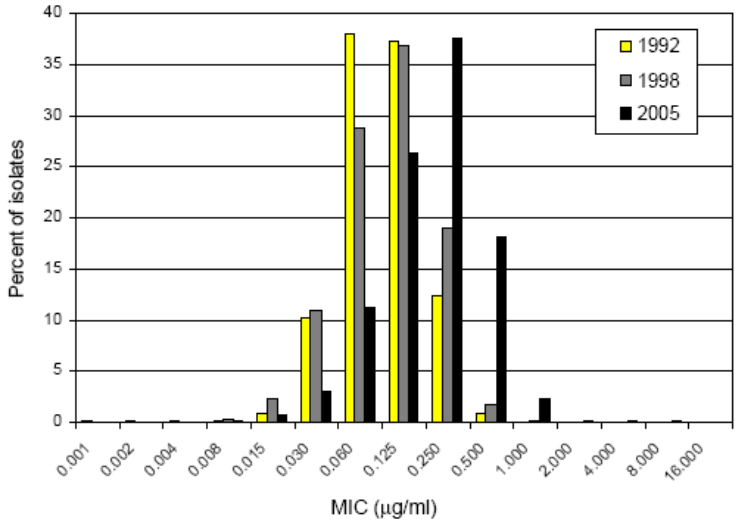


Figure 22. Distribution of MICs to azithromycin among GISP isolates, 1992, 1998, and 2005



Note: In 1992, there were no isolates with MIC > 0.5 µg/ml. In 1998, there were four isolates with MIC 1.0 µg/ml, two isolates with MIC 2.0 µg/ml, and one isolate with MIC 4.0 µg/ml. In 2005, there were one hundred forty-six isolates with MIC 1.0 µg/ml, eleven isolates with MIC 2.0 µg/ml, ten isolates with MIC 4.0 µg/ml, eleven isolates with MIC 8.0 µg/ml, and three isolates with MIC 16.0 µg/ml.