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**Gonococcal Isolate Surveillance Project (GISP)
Annual Report - 2002**

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The 2002 STD Surveillance Report may be found at <http://www.cdc.gov/std/stats/>.

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GONOCOCCAL ISOLATE SURVEILLANCE PROJECT (GISP) ANNUAL REPORT - 2002

Introduction

With 351,852 gonorrhea cases reported in 2002, gonorrhea is the second most frequently reported communicable disease in the United States. Gonorrhea rates in the United States declined 73.8% during 1975-1997. After a small increase in the rate in 1998, the gonorrhea rate decreased slightly and the 2002 rate was 125.0 cases per 100,000 persons (**Figure 1**).¹ Gonorrhea rates remain high in the southeastern states, among minorities, and among adolescents of all racial and ethnic groups (**Figures 2, 3, and 4**).¹⁻³ 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.⁴ In addition, data suggest that gonorrhea facilitates HIV transmission.^{5, 6}

The treatment and control of gonorrhea has been complicated by the ability of *Neisseria 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. The current CDC-recommended primary therapies for gonorrhea are two broad-spectrum cephalosporins (ceftriaxone and cefixime), and three fluoroquinolones (ciprofloxacin, ofloxacin, and levofloxacin).⁷ However, since the 1990s, fluoroquinolone-resistant *N. gonorrhoeae* (QRNG) have been reported from many parts of the world, including the United States.⁸⁻¹² The increased prevalence of QRNG in Asia (where prevalence in several countries exceeds 40%¹³), the Pacific Islands, Hawaii, and California, prompted CDC to recommend that fluoroquinolones not be used to treat patients with gonorrhea acquired in these areas with high QRNG prevalence.^{7, 11, 12}

GISP Overview

The Gonococcal Isolate Surveillance Project (GISP) was established in 1986 to monitor trends in antimicrobial susceptibilities of strains of *N. gonorrhoeae* in the United States in order to establish a rational basis for the selection of gonococcal therapies.¹⁴ 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, *N. gonorrhoeae* isolates are collected from the first 25 men with urethral gonorrhea attending STD clinics each month in 27 cities in the United States. At regional laboratories, the susceptibilities of these isolates to penicillin, tetracycline, spectinomycin, ciprofloxacin, ceftriaxone, cefixime, and azithromycin are determined by agar dilution. Minimum inhibitory concentrations (MICs) are measured, and values are interpreted according to criteria recommended by the National Committee for Clinical Laboratory Standards (NCCLS).¹⁵⁻¹⁷ Clinical and demographic data are abstracted from medical records.

Important GISP findings have included:

- the ongoing high prevalence of resistance to penicillin and tetracycline;
- the emergence and increasing prevalence of resistance to the fluoroquinolones;⁸⁻¹²
- the appearance, with low level prevalence, of decreased susceptibility to the macrolides;¹¹
- the absence of resistance to the broad-spectrum cephalosporins;
- the emergence of multi-drug resistant isolates (resistant to penicillin, tetracycline, and ciprofloxacin) with decreased susceptibility to cefixime;¹⁸ and
- the increasing proportion of gonorrhea cases identified in men who have sex with men.^{19, 20}

GISP findings contributed to the development of CDC's STD treatment recommendations in 1993, 1998, and 2002,^{7, 21, 22} and stimulated further investigation of the increase in gonorrhea among men who have sex with men (MSM).^{19, 20}

2002 GISP Sites

A total of 27 STD clinics contributed 5,367 gonococcal isolates to GISP in 2002 (**Figure 5**). Sixteen sites have participated continuously since 1988: Albuquerque, Anchorage, Atlanta, Baltimore, Birmingham, Cincinnati, Denver, Honolulu, Long Beach, New Orleans, Philadelphia, Phoenix, Portland, San Diego, San Francisco, and Seattle. Nine sites joined GISP after 1988: Cleveland and Orange County in 1991; Minneapolis in 1992; Chicago in 1996; Miami in 1998; Dallas in 2000, Tripler in 2001, and Greensboro and Las Vegas in 2002. Two sites have had intermittent participation in GISP: Fort Bragg 1987-1990 and 1997-2002, and St. Louis 1987-1993 and 1995-2002. The GISP Regional Laboratories are located in Atlanta, Birmingham, Cleveland, Denver, and Seattle.

DESCRIPTION OF GISP DATA

Aggregate data from all GISP sites are described and illustrated in the first part of this report. The clinic-specific data illustrate substantial geographic variation in patient characteristics and antimicrobial susceptibility of gonococcal strains; clinic-specific figures are provided in the second part of this report.

Demographic and Clinical Characteristics

Age The age distribution of GISP participants compared with nationally reported male gonorrhea patients in 2002 is shown in **Figure 6**. In 2002, GISP had proportionally fewer 20-24 year olds and fewer <20 year olds than were reported nationally for male gonorrhea cases; otherwise the two groups had similar age distributions. GISP participants in 2002 ranged in age from 12 to 77 years.

Race/Ethnicity The race/ethnicity distribution of GISP participants compared with nationally reported male gonorrhea patients in 2002 is shown in **Figure 7**. White, Hispanic, and Asian males were slightly over represented in GISP while Black males were slightly under represented compared with the race/ethnicity distribution of nationally reported male gonorrhea patients in 2002.

Sexual Orientation Overall, the proportion of GISP isolates coming from MSM increased from 4.0% in 1988 to 20.6% in 2002. The proportion of GISP participants who were MSM has increased every year since 1993 (**Figure 8**). The interval increase between 2001 and 2002, from 17.2% to 20.6%, was the largest single year increase in the history of GISP. The number of clinics having >5% of GISP isolates from MSM rose from 7 clinics in 1990 to 14 clinics in 2000 to 16 clinics in 2001 and now to 17 clinics in 2002. These 17 clinics reported 96.2% (1028/1069) of the MSM in GISP in 2002. For the 17 clinics, the median percentage of patients who were MSM in 2002 was 20.0% (range, 6.6% to 74.6%) (**Figure 9**). A 1996 study of 8 of these clinics showed that in 5 of the 8 (Honolulu, Portland, San Diego,

San Francisco, and Seattle) the proportional increases corresponded to absolute increases in numbers of MSM with gonorrhea.¹⁹

Reason for Clinic Attendance Most (96.1%) GISP participants in 2002 presented to the clinic as volunteers; others were gonorrhea contacts or presented for test-of-cure cultures (**Figure 10**). There has been little change in this distribution over time. Dysuria and/or urethral discharge were present in 96.8% of GISP participants in 2002 and 3.2% had no symptoms; these proportions have been stable over time.

History of Gonorrhea The percentage of GISP participants who reported a history of gonorrhea (ever) was 48.1% in 2002. The percentage of GISP participants with a documented previous episode of gonorrhea in the last 12 months peaked at 23.6% in 2000 and was 18.6% in 2002 (**Figure 11**).

Antimicrobial Treatment The antimicrobial agents given to GISP participants for gonorrhea therapy are shown in **Figure 12**. The proportion of GISP patients treated with cephalosporins decreased from a peak of 84.7% in 1990 to 63.7% in 2002, while the proportion treated with fluoroquinolones (ciprofloxacin or ofloxacin or levofloxacin) increased from none in 1988 to a high of 38.9% in 2001 and was 33.4% in 2002. The antimicrobial agents given to GISP participants for treatment of *Chlamydia trachomatis* infection are shown in **Figure 13**. The proportion of GISP patients treated with doxycycline or tetracycline decreased from a high of 99.4% in 1990 to 58.2% in 2002, while the proportion treated with azithromycin increased from 0.2% in 1992 (the first year of GISP that azithromycin was identified as being used for *C. trachomatis* therapy) to 39.2% in 2002.

Supplemental Patient Data As of June 2002, six new GISP data elements were implemented to collect additional patient information. For patients for whom data were available during June-December 2002, the following information was identified. The proportion of GISP participants who were HIV-positive was 9.0% (162/1791). During the 60 days prior to diagnosis of gonorrhea, GISP patients reported the following behaviors:

- 5.4% (106/1975) took antibiotics;
- 4.4% (47/1066) traveled or had a sex partner who traveled outside the U.S. or to Hawaii;
- 2.9% (52/1781) used injection recreational drugs;
- 24.8% (336/1356) used non-injection recreational drugs;
- 4.4% (75/1692) exchanged money or drugs for sex or vice versa.

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):¹⁵⁻¹⁷

Penicillin, MIC ≥ 2.0 $\mu\text{g/ml}$

Tetracycline, MIC ≥ 2.0 $\mu\text{g/ml}$

Spectinomycin, MIC ≥ 128.0 $\mu\text{g/ml}$

Ciprofloxacin, MIC 0.125 - 0.5 $\mu\text{g/ml}$ (intermediate resistance)

Ciprofloxacin, MIC ≥ 1.0 $\mu\text{g/ml}$ (resistance)

Ceftriaxone, MIC ≥ 0.5 $\mu\text{g/ml}$ (decreased susceptibility)

Cefixime, MIC ≥ 0.5 $\mu\text{g/ml}$ (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, 18.0% (967/5367) of isolates collected in 2002 were resistant to penicillin, tetracycline, or both (**Figure 14**); this proportion peaked at 33.6% in 1992 and has been decreasing annually since 1998. For GISP analyses, six mutually exclusive categories of resistance are used for describing chromosomally and plasmid-mediated resistance to penicillin and tetracycline:⁸ (1) penicillinase-producing *N. gonorrhoeae* (PPNG): β -lactamase-positive and tetracycline MIC < 16.0 $\mu\text{g/ml}$; (2) plasmid-mediated tetracycline resistant *N. gonorrhoeae* (TRNG): β -lactamase-negative and tetracycline MIC ≥ 16.0 $\mu\text{g/ml}$; (3) PPNG-TRNG: β -lactamase-positive and tetracycline MIC ≥ 16.0 $\mu\text{g/ml}$; (4) chromosomally mediated penicillin-resistant *N. gonorrhoeae* (PenR): non-PPNG and penicillin MIC ≥ 2.0 $\mu\text{g/ml}$ and tetracycline MIC < 2.0 $\mu\text{g/ml}$; (5) chromosomally mediated tetracycline-resistant *N. gonorrhoeae* (TetR): non-PPNG and penicillin MIC < 2.0 $\mu\text{g/ml}$ and tetracycline MIC 2.0-8.0 $\mu\text{g/ml}$; and (6) chromosomally mediated resistance to both penicillin and tetracycline (CMRNG): non-PPNG and penicillin MIC ≥ 2.0 $\mu\text{g/ml}$ and tetracycline MIC 2.0-8.0 $\mu\text{g/ml}$. The percentage of PPNG declined annually from a peak of 11.0% in 1991 to 1.2% in 2002 (**Figure 15**). In contrast, the percentage of PenR isolates increased annually from 0.5% in 1988 to 5.7% in 1999 and subsequently decreased annually to 2.1% in 2002 (**Figure 16**). The prevalence of TRNG, which was 4.3% in 2002, has varied little since 1988 (**Figure 15**). TetR prevalence increased in 1995 to 11.5% and subsequently declined to 5.5% in 2002 (**Figure 16**). However, the prevalence of CMRNG increased from 3.0% in 1989 to a peak of 8.7% in 1997, and then declined to 4.2% in 2002. The prevalence of PPNG-TRNG isolates continues to be very low and was 0.8% in 2002.

Susceptibility to Spectinomycin

All isolates were susceptible to spectinomycin in 2002. 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

The distributions of MICs to ceftriaxone in 1988 and 2002 are shown in **Figure 17**. Over this time period, there has been a subtle shift towards higher ceftriaxone MICs. In 2002, all isolates were susceptible to ceftriaxone. There have been four isolates with decreased susceptibility to ceftriaxone in GISP; all four had MICs of 0.5 $\mu\text{g/ml}$. Their locations and years were: San Diego-1987, Cincinnati-1992 and 1993, and Philadelphia-1997.

Susceptibility to Cefixime

The distributions of MICs to cefixime in 1992 (the first year of cefixime susceptibility testing) and 2002 are shown in **Figure 18**. In 2002, all isolates were susceptible to

cefixime. There have been 45 isolates with decreased susceptibility to cefixime in GISP; their MICs have ranged from 0.5-2.0 $\mu\text{g}/\text{ml}$.

Susceptibility to Ciprofloxacin

The correlation of ciprofloxacin MICs of 0.125-0.5 $\mu\text{g}/\text{ml}$ with treatment failure when a fluoroquinolone is used to treat a gonococcal infection 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 $\geq 4.0 \mu\text{g}/\text{ml}$.²³ Gonococcal isolates with intermediate resistance and resistance to ciprofloxacin also have intermediate resistance and resistance to other fluoroquinolones. Criteria recommended for interpreting ofloxacin MICs are: intermediate resistance, MICs 0.5-1.0 $\mu\text{g}/\text{ml}$; resistance, MICs $\geq 2.0 \mu\text{g}/\text{ml}$.^{16, 17}

The distributions of MICs to ciprofloxacin in 1990 (the first year of ciprofloxacin susceptibility testing) and 2002 are shown in **Figure 19**. A total of 3.7% (196/5367) of isolates exhibited intermediate resistance or resistance to ciprofloxacin (MICs $\geq 0.125 \mu\text{g}/\text{ml}$) in 2002 compared with 2.6% (140/5472) of isolates tested in 2001 (**Figure 20**).

Intermediate resistance In 2002, 1.5% (80/5367) of all GISP isolates exhibited intermediate resistance to ciprofloxacin (MICs 0.125-0.5 $\mu\text{g}/\text{ml}$). Of these isolates, 35.0% (28/80) came from San Francisco where they accounted for 9.9% (28/283) of isolates; 16.3% (13/80) came from Cincinnati where they accounted for 5.0% (13/261) of isolates tested; 12.5% (10/80) came from Seattle where they accounted for 3.8% (10/267) of isolates tested; and 7.5% (6/80) came from Chicago where they accounted for 2.1% (6/283) of isolates tested in 2002. In 2002, isolates of *N. gonorrhoeae* exhibiting intermediate resistance to ciprofloxacin were also found in Anchorage (1), Atlanta (1), Baltimore (1), Cleveland (1), Fort Bragg (1), Honolulu (4), Long Beach (1), Miami (4), Orange County (1), Portland (3), San Diego (3), and St. Louis (2).

Resistance One hundred-sixteen or 2.2% (116/5367) of GISP isolates were resistant to ciprofloxacin (MICs $\geq 1.0 \mu\text{g}/\text{ml}$) in 2002, which was three times the proportion identified in 2001 (0.7%; 38/5472). Ciprofloxacin-resistant isolates were identified in nearly half (13/27) of all Sentinel Sites in 2002 compared with nearly a quarter (6/26) of all Sentinel Sites in 2001. Of note, 75.0% (87/116) of these isolates were from the California GISP sites; the proportion of ciprofloxacin-resistant GISP isolates by California site was: San Diego – 16.5% (41/249), Orange County – 11.4% (20/175), Long Beach – 7.2% (7/97), and San Francisco – 6.7% (19/283). Honolulu experienced a decline in the proportion of ciprofloxacin-resistant isolates from 20.3% (16/79) in 2001 to 11.7% (11/94) of GISP isolates in 2002 (see Honolulu, Hawaii, **Figure K**). In Seattle, 3.0% (8/267) of isolates were ciprofloxacin-resistant compared to none in 2001. Ciprofloxacin-resistant isolates accounted for 1.7% (2/115) of GISP isolates in Portland and 1.0% (3/300) of isolates in Philadelphia compared to none previously in those cities. The remaining 5 ciprofloxacin-resistant 2002 GISP isolates came from Anchorage (1), Cincinnati (1), Miami (1), Minneapolis (1), and Phoenix (1).

Susceptibility to Azithromycin

The correlation of azithromycin MICs $\geq 0.5 \mu\text{g/ml}$ 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 $\mu\text{g/ml}$.²⁴⁻²⁷

The distributions of MICs to azithromycin in 1992 (the first year of azithromycin susceptibility testing) and in 2002 are shown in **Figure 21**. Over this time period, there has been a shift towards higher azithromycin MICs. In 1992, 0.9% (34/3928) of isolates had azithromycin MIC $\geq 0.5 \mu\text{g/ml}$ compared with 3.0% (163/5367) of such isolates in 2002. In 1992, there were no isolates with azithromycin MIC $\geq 1.0 \mu\text{g/ml}$. In 2002, there were 33 isolates with azithromycin MIC $\geq 1.0 \mu\text{g/ml}$ (range, 1.0-4.0 $\mu\text{g/ml}$); these isolates by location and number are: Atlanta (2); Baltimore (5); Birmingham (1); Cincinnati (2); Dallas (1); Denver (5); Honolulu (2); Minneapolis (3); Orange County (2); Philadelphia (3); Phoenix (2); St. Louis (2); San Diego (1); Seattle (1); and San Francisco (1).

NON-GISP SUSCEPTIBILITY REPORTING

The Association of Public Health Laboratories and STD project areas were informally surveyed in 2002-2003 to identify city or state health department laboratories that routinely performed antimicrobial susceptibility testing of *N. gonorrhoeae* in 2002. Information was not available for 7 of the 65 STD project areas. In 2002, no health department testing outside GISP occurred in 40 STD project areas (Alabama, Alaska, Arizona, Arkansas, Baltimore, Colorado, Connecticut, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Missouri, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Philadelphia, Rhode Island, San Francisco, South Carolina, South Dakota, Tennessee, Vermont, Virgin Islands, Washington, D.C., West Virginia, and Wyoming). Information on antimicrobial susceptibility test results for 2002 was available for 18 areas (**Table 1**).

Table 1. Non-GISP antimicrobial susceptibility testing of *N. gonorrhoeae* in 18 STD project areas in 2002.

STD Project Area	Total # Isolates Tested	Cip S	Cip I	Cip R	Spc S	Spc R	Cfx S	Cfx DS	Cro S	Cro DS	Azi S	Azi DS ^a
CA												
Orange Co.	179	155 ^b	2	22	179	0	179	0	179	0	172	7
San Diego	150	121 ^c	1	28 ^c	-	-	-	-	149	1	-	-
Chicago	159	159	0	0	159	0	159	0	159	0	159	0
FL	37	37 ^b	0	0	-	-	-	-	37	0	37	0
HI	251	228	1	22	251	0	250	1	251	0	251	0
Los Angeles	49	45 ^b	0	4	-	-	-	-	49	0	-	-
MA	486	476 ^b	0	10	-	-	-	-	486	0	-	-
MI	187	186 ^c	0	1 ^c	160	0	187	0	187	0	-	-
MN	51	49	0	2	51	0	51	0	51	0	-	-
MS	906	906	0	0	-	-	-	-	20	0	-	-
MT	11	11	0	0	11	0	11	0	11	0	11	0
NH	17	15	1	1	17	0	-	-	17	0	-	-
NJ	244	242 ^b	0	2	243	0	243	0	243	0	-	-
NYC	3196	3188 ^c	0	8 ^c	3189	0	-	-	3189	0	-	-
TX	58	58	0	0	-	-	-	-	58	0	-	-
UT	106	104 ^b	0	2	-	-	-	-	106	0	-	-
VA	8	8	0	0	8	0	-	-	8	0	-	-
WA												
Seattle	223	222	1	0	-	-	-	-	-	-	-	-
WI	198	195	2	1	198	0	-	-	195	3	198	0
Total	6516	6405	8	103	4466	0	1080	1	5395	4	828	7

Cip=ciprofloxacin; Spc=spectinomycin; Cfx=cefixime; Cro=ceftriaxone; Azi=azithromycin; S=susceptible; DS=decreased susceptibility; I=intermediate resistant; R=resistant. The testing methodology for all sites except Florida, Hawaii, Los Angeles, Montana, and Texas was by disk diffusion; Florida, Hawaii, Los Angeles, Montana, and Texas used the E-test method. Illinois and Michigan used both methods.

^aFor this table, AziDS is defined as an isolate with azithromycin disk inhibition zone size \leq 30mm or minimum inhibitory concentration (MIC) \geq 1.0.

^b Orange County, CA tested all isolates against levofloxacin, ofloxacin, and ciprofloxacin. Florida tested all isolates against levofloxacin, gatifloxacin, and ciprofloxacin. Los Angeles, CA tested all isolates against levofloxacin and ciprofloxacin. Massachusetts tested all isolates against norfloxacin, ofloxacin, and

ciprofloxacin. New Jersey tested all isolates against ofloxacin and ciprofloxacin. Utah tested all isolates against ofloxacin and ciprofloxacin.

° San Diego, Michigan, and New York City tested all isolates against ofloxacin, rather than against ciprofloxacin. The resistant isolates in San Diego and Michigan were resistant to ofloxacin. The 8 isolates in New York City that were resistant to ofloxacin were confirmed to be ciprofloxacin-resistant at the CDC.

Discussion

Susceptibility data from a total of 6516 non-GISP isolates were available. Non-GISP isolates from most STD project areas do not consist of a representative or systematic sample of the gonorrhea patient population but rather a convenience sample of patients who happen to undergo culture rather than non-culture testing. In addition, in contrast to GISP, multiple non-GISP isolates from various anatomic sites may be submitted from a single patient, so the 6516 non-GISP isolates are likely to represent fewer than 6516 patients with gonorrhea.

These data reveal that 103/6516 or 1.6% of non-GISP isolates were resistant to ciprofloxacin or ofloxacin, which is comparable to the 2.2% identified for GISP isolates in 2002. Fluoroquinolone-resistant isolates were identified in Orange County, California - 22/179 or 12.3%; San Diego, California - 28/150 or 18.7%; Hawaii - 22/251 or 8.8%; Los Angeles, California - 4/49 or 8.2%; Massachusetts - 10/486 or 2.1%; Michigan - 1/187 or 0.5%; Minnesota - 2/51 or 3.9%; New Hampshire - 1/17 or 5.9%; New Jersey - 2/244 or 0.8%; New York City - 8/3196 or 0.3%; Utah - 2/106 or 1.9%; and Wisconsin - 1/198 or 0.5%.

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ADDITIONAL RESOURCES

Recent publications using GISP data include a September 2003 article in *Clinical Infectious Diseases*,¹⁸ a May 2003 article in *International Journal of Antimicrobial Agents*,²⁸ and an *MMWR* article in November 2002.¹² Presentations of GISP data were made at the International Pathogenic *Neisseria* Conference in Oslo, Norway in September 2002,²⁹ at the International Society for Sexually Transmitted Diseases Research Congress in Ottawa, Canada in July 2003,^{30, 31} and at the Annual Meeting of the Infectious Diseases Society of America in San Diego, California in October 2003.³²

Additional information on GISP, as well as useful resources and links, may be found on the GISP website (<http://www.cdc.gov/std/gisp/>). Additional United States surveillance data on *N. gonorrhoeae* and other STDs may be found in the 2002 STD Surveillance Report¹ (<http://www.cdc.gov/std/stats/>).

Information on the U.S. Public Health Action Plan to Combat Antimicrobial Resistance may be found on the CDC webpage (<http://www.cdc.gov/drugresistance/actionplan/>).

The World Health Organization (WHO) webpage contains information on:

- 1) the WHO Global Strategy for Containment of Antimicrobial Resistance (<http://www.who.int/emc/amr.html>);
- 2) the WHO Surveillance Standards for Antimicrobial Resistance (<http://www.who.int/emc/pdfs/CDSsurveillance1.pdf>);
- 3) the UNAIDS/WHO Guidelines for Sexually Transmitted Infections Surveillance (<http://www.who.int/emc-documents/STId/docs/whocdscsredc993.pdf>); and
- 4) Antimicrobial Resistance in *Neisseria gonorrhoeae* (http://www.who.int/csr/drugresist/Antimicrobial_resistance_in_Neisseria_gonorrhoeae.pdf).

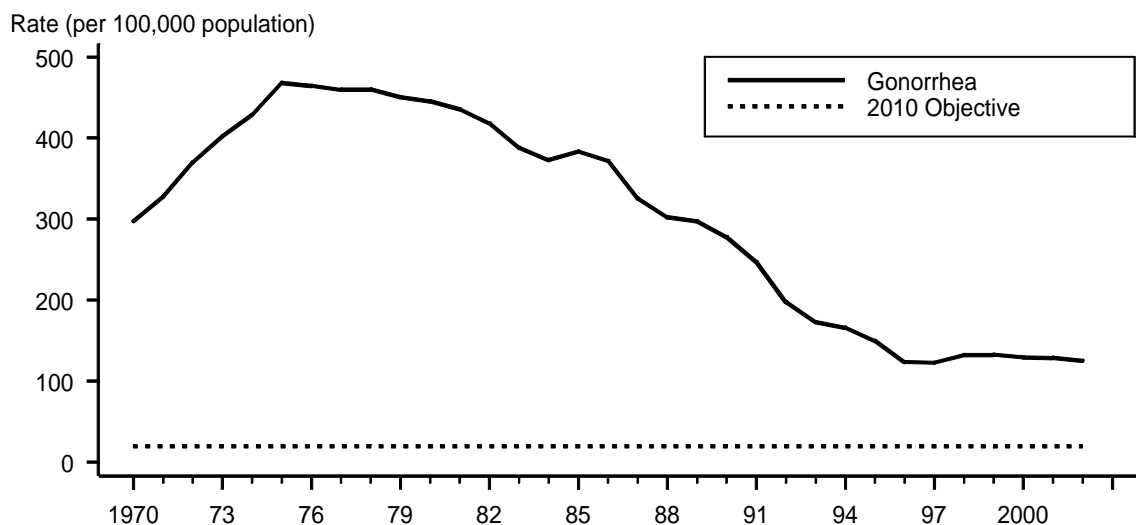
REFERENCES

1. CDC. Sexually Transmitted Disease Surveillance, 2002. Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service, September 2003.
2. CDC. Gonorrhea — United States, 1998 *MMWR* 2000;49:538-542.
3. Fox KK, Whittington WL, Levine WC, Moran JS, Zaidi AA, Nakashima AK. Gonorrhea in the United States, 1981-1996: Demographic and geographic trends. *Sex Transm Dis* 1998;386-93.
4. McCormack WM. Pelvic inflammatory disease. *N Engl J Med* 1994;330:115-119.
5. Laga M, Manoka A, Kivuvu M, Malele B, Tuliza M, Nzila N, Goeman J, Behets F, Batter V, Alary M. Non-ulcerative sexually transmitted diseases as risk factors for HIV-1 transmission in women: results from a cohort study. *AIDS* 1993;7:95-102.
6. Cohen MS, Hoffman IF, Royce RA, Kazembe P, Dyer JR, Daly CC, Zimba D, Vernazza PL, Maida M, Fiscus SA, Eron JJ. Reduction of concentration of HIV-1 in semen after treatment of urethritis: implications for prevention of sexual transmission of HIV-1. AIDSCAP Malawi Research Group. *Lancet* 1997;349:1868-73.
7. CDC. Sexually transmitted diseases treatment guidelines 2002. *MMWR* 2002;51 (no. RR-6).
8. Fox KK, Knapp JS, Holmes KK, Hook EW, Judson FN, Thompson SE, Washington JA, Whittington WL. Antimicrobial resistance in *Neisseria gonorrhoeae* in the United States 1988-1994: the emergence of resistance to the fluoroquinolones. *J Infect Dis* 1997;175:1396-1403.
9. CDC. Fluoroquinolone resistance in *Neisseria gonorrhoeae* - Colorado and Washington, 1995. *MMWR* 1995;44:761-4.
10. CDC. Fluoroquinolone-resistant *Neisseria gonorrhoeae* - San Diego, California, 1997. *MMWR* 1998;47:405-408.
11. CDC. Fluoroquinolone-resistance in *Neisseria gonorrhoeae*, Hawaii, 1999, and decreased susceptibility to azithromycin in *N. gonorrhoeae*, Missouri, 1999. *MMWR* 2000;49:833-837.
12. CDC. Increases in fluoroquinolone-resistant *Neisseria gonorrhoeae* – Hawaii and California, 2001. *MMWR* 2002;51:1041-1044.
13. WHO Western Pacific Gonococcal Antimicrobial Surveillance Programme. Surveillance of antibiotic resistance in *Neisseria gonorrhoea* in the WHO Western Pacific Region, 2001. *Communicable Disease Intelligence* 2002;26:541-545.
14. Schwarcz SK, Zenilman JM, Schnell D, Knapp JS, Hook EW, Thompson S, Judson FN, Holmes KK, The Gonococcal Isolate Surveillance Project. National surveillance of antimicrobial resistance in *Neisseria gonorrhoeae*. *JAMA* 1990;264:1413-1417.
15. National Committee for Clinical Laboratory Standards. 1993. Approved standard M7 - A3. Methods for dilution antimicrobial susceptibility tests for bacteria that grow aerobically. National Committee for Clinical Laboratory Standards, Villanova, PA.

16. National Committee for Clinical Laboratory Standards. 1998. Approved standard M100-38. Performance standards for antimicrobial susceptibility testing. National Committee for Clinical Laboratory Standards, Wayne, PA.
17. National Committee for Clinical Laboratory Standards. 2002. Approved standard M100-S12, 22. Performance standards for antimicrobial susceptibility testing. National Committee for Clinical Laboratory Standards, Wayne, PA.
18. Wang SA, Lee MVC, O'Connor N, Iverson CJ, Ohye RG, Whiticar PM, Hale JA, Knapp JS, Effler PV, Weinstock HS. Multi-drug resistant *Neisseria gonorrhoeae* with decreased susceptibility to cefixime – Hawaii, 2001. *Clin Infect Dis* 2003;37:849-852.
19. CDC. Gonorrhea among men who have sex with men--selected sexually transmitted diseases clinics, 1993-1996. *MMWR* 1997;46:889-892.
20. Fox KK, del Rio C, Holmes KK, Hook EW, Judson FN, Knapp JS, Procop GW, Wang SA, Whittington WL, and Levine WC. Gonorrhea in the HIV era: a reversal in trends among men who have sex with men. *Am J Public Health* 2001;91:959-64.
21. CDC. 1993 Sexually transmitted diseases treatment guidelines. *MMWR* 1993;42 (no. RR-14).CDC.
22. CDC. 1998 Guidelines for treatment of sexually transmitted diseases. *MMWR* 1998;47 (no.RR-1).
23. Ablasca MR, Pato-Mesola V, Klausner JD, Manalastas R, Tuazon CU, Dallabetta G, Whittington WL, Holmes KK. A randomized trial of ciprofloxacin versus cefixime for treatment of gonorrhea after rapid emergence of gonococcal ciprofloxacin resistance in The Philippines. *Clin Infect Dis* 2001; 32:1313-8.
24. Steingrimsson O, Olafsson JH, Thorarinsson H, Ryan RW, Johnson RB, Tilton RC. Azithromycin in the treatment of sexually transmitted disease. *J Antimicrob Chemother* 1990; 25 (Suppl A):109-114.
25. Waugh MA. Open study of the safety and efficacy of a single dose of azithromycin for the treatment of uncomplicated gonorrhea in men and women. *J Antimicrob Chemother* 1993;31 (Suppl E):193-198.
26. Young H, Moyes A, McMillan A. Azithromycin and erythromycin resistant *Neisseria gonorrhoeae* following treatment with azithromycin. *Int J STD AIDS* 1997;8:299-302.
27. Tapsall JW, Shultz TR, Limnios EA, Donovan B, Lum G, Mulhall BP. Failure of azithromycin therapy in gonorrhea and dis correlation with laboratory test parameters. *Sex Transm Dis* 1998;25:505-508.
28. Johnson SR, Sandul AL, Parekh M, Wang SA, Knapp JS, Trees DL. Mutations causing in vitro resistance to azithromycin in *Neisseria gonorrhoeae*. *Int J of Antimicrob Agents* 2003;2:414-419.
29. Wang SA, Harvey AB, Weinstock HS, and GISP Investigators. Antimicrobial susceptibilities of *Neisseria gonorrhoeae* in the United States [Abstract]. Thirteenth International Pathogenic *Neisseria* Conference, Oslo, Norway, September 1-6, 2002.

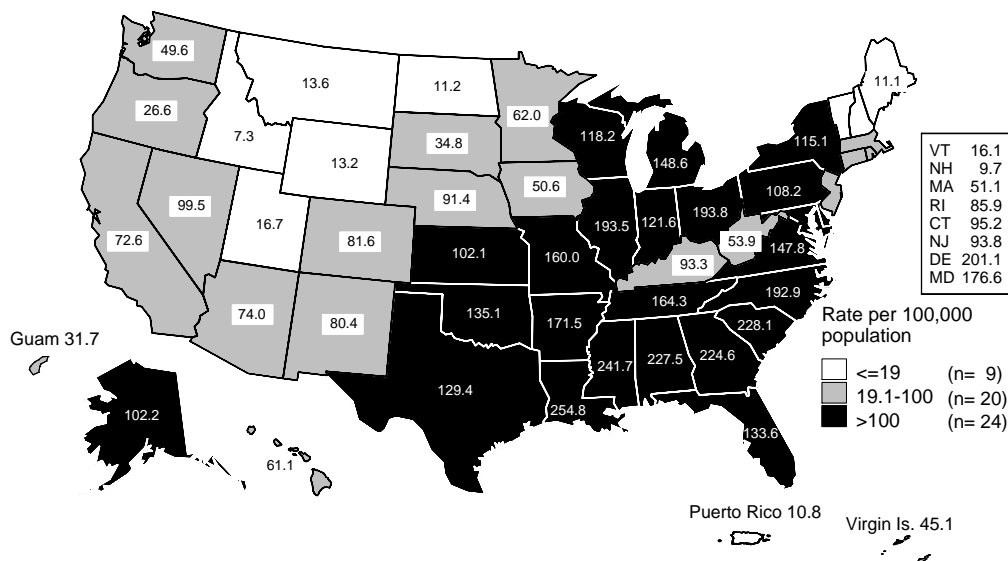
30. Bauer HM, Hannah P, Moore D, Wolfe J, Knapp J, Trees D, Wang S, Bolan G. Molecular epidemiology of quinolone-resistant *Neisseria gonorrhoeae* in California, 2000-2002. [Abstract 283] 15th Biennial Congress of the International Society for Sexually Transmitted Diseases Research, Ottawa, Canada, July 27-30, 2003.
31. Wang SA, Harvey AB, Conner SM, Weinstock HS. Gonococcal susceptibility and epidemiological trends: data from the Gonococcal Isolate Surveillance Project, United States, 2002. [Abstract 284] 15th Biennial Congress of the International Society for Sexually Transmitted Diseases Research, Ottawa, Canada, July 27-30, 2003.
32. Wang SA, Harvey AB, Conner SM, Weinstock HS, and the Gonococcal Isolate Surveillance Project Investigators. Trends in gonococcal susceptibility and epidemiology in the United States for 2002 identified through the Gonococcal Isolate Surveillance Project. [Abstract 924]. 41st Annual Meeting of the Infectious Diseases Society of America, San Diego, California, October 9-10, 2003.

Figure 1. Gonorrhea - Rates: United States, 1970-2002 and the Healthy People 2010 objective



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

Figure 2. Gonorrhea — Rates by state: United States and outlying areas, 2002



Note: The total rate of gonorrhea for the United States and outlying areas (Guam, Puerto Rico and Virgin Islands) was 123.4 per 100,000 population. The Healthy People 2010 objective is 19.0 cases per 100,000 population.

Figure 3. Gonorrhea — Rates by race and ethnicity: United States, 1981-2002 and the Healthy People 2010 objective

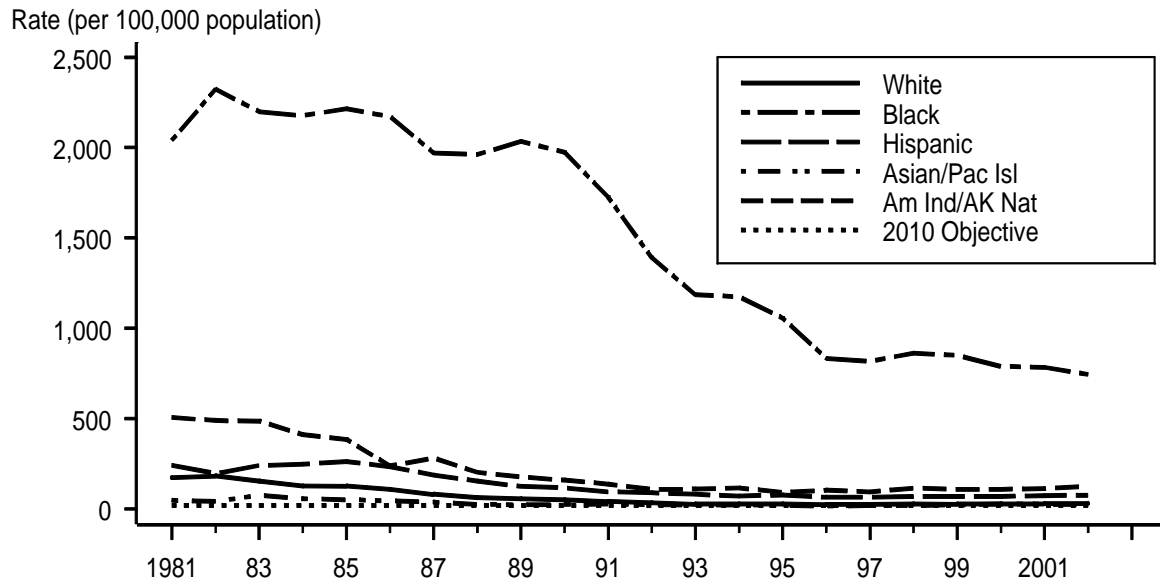


Figure 4. Gonorrhea — Age- and sex-specific rates: United States, 2002

