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Update: Barrier Protection Against HIV Infection and Other Sexually Transmitted Diseases

Although refraining from intercourse with infected partners remains the most effective strategy for preventing human immunodeficiency virus (HIV) infection and other sexually transmitted diseases (STDs), the Public Health Service also has recommended condom use as part of its strategy. Since CDC summarized the effectiveness of condom use in preventing HIV infection and other STDs in 1988 (*1*), additional information has become available, and the Food and Drug Administration has approved a polyurethane "female condom." This report updates laboratory and epidemiologic information regarding the effectiveness of condoms in preventing HIV infection and other STDs and the role of spermicides used adjunctively with condoms.*

Two reviews summarizing the use of latex condoms among serodiscordant heterosexual couples (i.e., in which one partner is HIV positive and the other HIV negative) indicated that using latex condoms substantially reduces the risk for HIV transmission (*2,3*). In addition, two subsequent studies of serodiscordant couples confirmed this finding and emphasized the importance of consistent (i.e., use of a condom with each act of intercourse) and correct condom use (*4,5*). In one study of serodiscordant couples, none of 123 partners who used condoms consistently seroconverted; in comparison, 12 (10%) of 122 seronegative partners who used condoms inconsistently became infected (*4*). In another study of serodiscordant couples (with seronegative female partners of HIV-infected men), three (2%) of 171 consistent condom users seroconverted, compared with eight (15%) of 55 inconsistent condom users. When person-years at risk were considered, the rate for HIV transmission among couples reporting consistent condom use was 1.1 per 100 person-years of observation, compared with 9.7 among inconsistent users (*5*).

Condom use reduces the risk for gonorrhea, herpes simplex virus (HSV) infection, genital ulcers, and pelvic inflammatory disease (*2*). In addition, intact latex condoms provide a continuous mechanical barrier to HIV, HSV, hepatitis B virus (HBV), *Chlamydia trachomatis*, and *Neisseria gonorrhoeae* (*2*). A recent laboratory study (*6*) indicated that latex condoms are an effective mechanical barrier to fluid containing HIV-sized particles.

Three prospective studies in developed countries indicated that condoms are unlikely to break or slip during proper use. Reported breakage rates in the studies were 2% or less for vaginal or anal intercourse (*2*). One study reported complete slippage

*Single copies of this report will be available free until August 6, 1994, from the CDC National AIDS Clearinghouse, P.O. Box 6003, Rockville, MD 20849-6003; telephone (800) 458-5231.

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off the penis during intercourse for one (0.4%) of 237 condoms and complete slippage off the penis during withdrawal for one (0.4%) of 237 condoms (*7*).

Laboratory studies indicate that the female condom (Reality™ †)—a lubricated polyurethane sheath with a ring on each end that is inserted into the vagina—is an effective mechanical barrier to viruses, including HIV. No clinical studies have been completed to define protection from HIV infection or other STDs. However, an evaluation of the female condom's effectiveness in pregnancy prevention was conducted during a 6-month period for 147 women in the United States. The estimated 12-month failure rate for pregnancy prevention among the 147 women was 26%. Of the 86 women who used this condom consistently and correctly, the estimated 12-month failure rate was 11%.

Laboratory studies indicate that nonoxynol-9, a nonionic surfactant used as a spermicide, inactivates HIV and other sexually transmitted pathogens. In a cohort study among women, vaginal use of nonoxynol-9 without condoms reduced risk for gonorrhea by 89%; in another cohort study among women, vaginal use of nonoxynol-9 without condoms reduced risk for gonorrhea by 24% and chlamydial infection by 22% (*2*). No reports indicate that nonoxynol-9 used alone without condoms is effective for preventing sexual transmission of HIV. Furthermore, one randomized controlled trial among prostitutes in Kenya found no protection against HIV infection with use of a vaginal sponge containing a high dose of nonoxynol-9 (*2*). No studies have shown that nonoxynol-9 used with a condom increases the protection provided by condom use alone against HIV infection.

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Editorial Note: This report indicates that latex condoms are highly effective for preventing HIV infection and other STDs when used consistently and correctly. Condom availability is essential in assuring consistent use. Men and women relying on condoms for prevention of HIV infection or other STDs should carry condoms or have them readily available.

Correct use of a latex condom requires 1) using a new condom with each act of intercourse; 2) carefully handling the condom to avoid damaging it with fingernails, teeth, or other sharp objects; 3) putting on the condom after the penis is erect and before any genital contact with the partner; 4) ensuring no air is trapped in the tip of the condom; 5) ensuring adequate lubrication during intercourse, possibly requiring use of exogenous lubricants; 6) using only water-based lubricants (e.g., K-Y jelly™ or glycerine) with latex condoms (oil-based lubricants [e.g., petroleum jelly, shortening, mineral oil, massage oils, body lotions, or cooking oil] that can weaken latex should never be used); and 7) holding the condom firmly against the base of the penis during withdrawal and withdrawing while the penis is still erect to prevent slippage.

Condoms should be stored in a cool, dry place out of direct sunlight and should not be used after the expiration date. Condoms in damaged packages or condoms that show obvious signs of deterioration (e.g., brittleness, stickiness, or discoloration) should not be used regardless of their expiration date.

† Use of trade names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

Barrier Protection — Continued

Natural-membrane condoms may not offer the same level of protection against sexually transmitted viruses as latex condoms. Unlike latex, natural-membrane condoms have naturally occurring pores that are small enough to prevent passage of sperm but large enough to allow passage of viruses in laboratory studies (*2*).

The effectiveness of spermicides in preventing HIV transmission is unknown. Spermicides used in the vagina may offer some protection against cervical gonorrhea and chlamydia. No data exist to indicate that condoms lubricated with spermicides are more effective than other lubricated condoms in protecting against the transmission of HIV infection and other STDs. Therefore, latex condoms with or without spermicides are recommended.

The most effective way to prevent sexual transmission of HIV infection and other STDs is to avoid sexual intercourse with an infected partner. If a person chooses to have sexual intercourse with a partner whose infection status is unknown or who is infected with HIV or other STDs, men should use a new latex condom with each act of intercourse. When a male condom cannot be used, couples should consider using a female condom.

Data from the 1988 National Survey of Family Growth underscore the importance of consistent and correct use of contraceptive methods in pregnancy prevention (*8*). For example, the typical failure rate during the first year of use was 8% for oral contraceptives, 15% for male condoms, and 26% for periodic abstinence. In comparison, persons who always abstain will have a zero failure rate, women who always use oral contraceptives will have a near-zero (0.1%) failure rate, and consistent male condom users will have a 2% failure rate (*9*). For prevention of HIV infection and STDs, as with pregnancy prevention, consistent and correct use is crucial.

The determinants of proper condom use are complex and incompletely understood. Better understanding of both individual and societal factors will contribute to prevention efforts that support persons in reducing their risks for infection. Prevention messages must highlight the importance of consistent and correct condom use (*10*).

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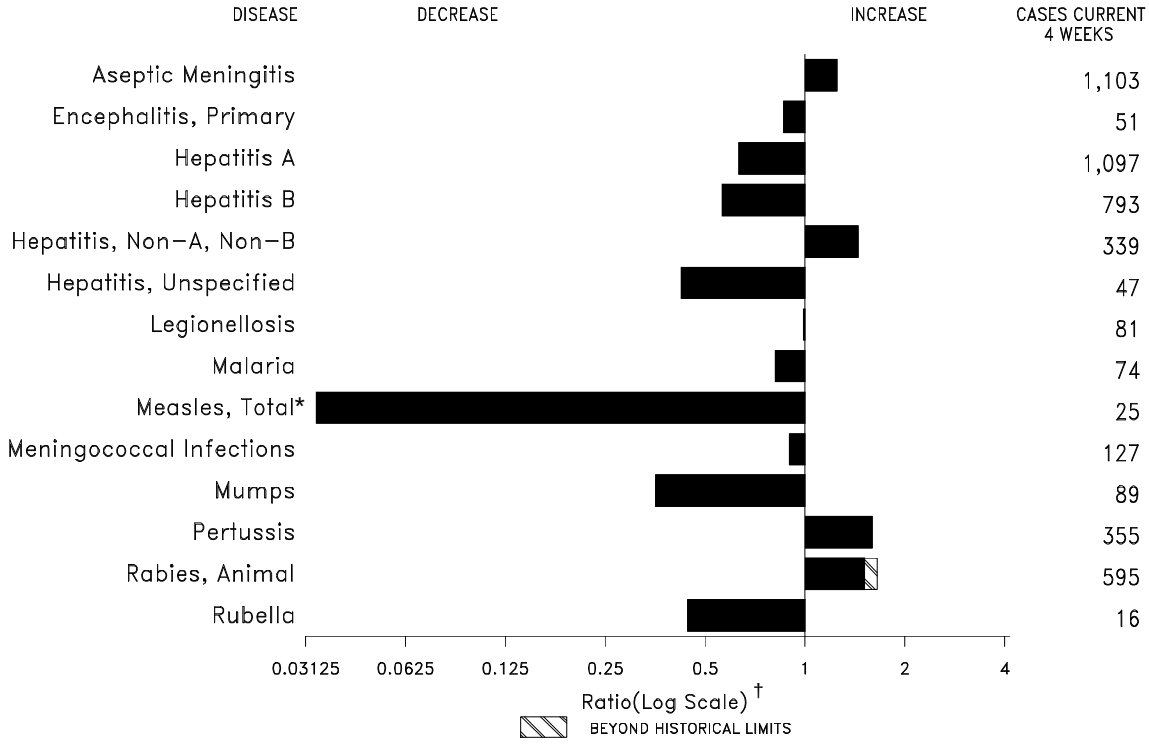
FIGURE I. Notifiable disease reports, comparison of 4-week totals ending July 31, 1993, with historical data — United States



*The large apparent decrease in reported cases of measles(total) reflects dramatic fluctuations in the historical baseline.

† Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where thehatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending July 31, 1993 (30th Week)

	Cum. 1993		Cum. 1993
AIDS*	67,732	Measles: imported	24
Anthrax	-	indigenous	172
Botulism: Foodborne	8	Plague	3
Infant	14	Poliomyelitis, Paralytic§	-
Other	2	Psittacosis	30
Brucellosis	52	Rabies, human	-
Cholera	15	Syphilis, primary & secondary	15,081
Congenital rubella syndrome	6	Syphilis, congenital, age < 1 year¶	677
Diphtheria	-	Tetanus	18
Encephalitis, post-infectious	96	Toxic shock syndrome	134
Gonorrhea	217,499	Trichinosis	8
Haemophilus influenzae (invasive disease)†	732	Tuberculosis	11,282
Hansen Disease	96	Tularemia	71
Leptospirosis	19	Typhoid fever	180
Lyme Disease	2,934	Typhus fever, tickborne (RMSF)	164

*Updated monthly; last update July 31, 1993.
†Of 672 cases of known age, 219 (33%) were reported among children less than 5 years of age.
§No cases of suspected poliomyelitis have been reported in 1993; 10 cases of suspected poliomyelitis were reported in 1992; 6 of the 9 suspected cases with onset in 1991 were confirmed; the confirmed cases were vaccine associated.
¶Reports through first quarter of 1993.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending July 31, 1993, and July 25, 1992 (30th Week)

Reporting Area	AIDS*	Aseptic Menin-gitis	Encephalitis		Gonorrhea		Hepatitis (Viral), by type				Legionel-losis	Lyme Disease
			Primary	Post-in-fectious			A	B	NA,NB	Unspeci-fied		
	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	67,732	4,737	334	96	217,499	279,888	12,010	6,831	2,624	352	635	2,934
NEW ENGLAND	3,232	74	6	4	4,421	5,822	174	197	272	6	17	661
Maine	94	13	1	-	52	56	8	9	-	-	4	4
N.H.	67	16	-	2	43	73	13	53	246	1	2	30
Vt.	14	17	3	-	15	15	3	5	2	-	-	3
Mass.	1,818	12	1	2	1,378	2,132	49	78	17	5	7	25
R.I.	219	16	1	-	219	422	52	16	7	-	4	108
Conn.	1,020	-	-	-	2,714	3,124	49	36	-	-	-	491
MID. ATLANTIC	15,598	354	25	6	24,907	30,283	634	811	181	4	124	1,661
Upstate N.Y.	2,373	154	18	3	4,490	6,429	202	225	104	1	36	1,000
N.Y. City	8,289	104	1	-	6,768	10,148	177	121	1	-	3	3
N.J.	2,991	-	-	-	4,237	4,256	172	230	53	-	17	300
Pa.	1,945	96	6	3	9,412	9,450	83	235	23	3	68	358
E.N. CENTRAL	5,419	628	88	19	42,369	50,893	1,328	823	402	9	177	25
Ohio	938	216	30	3	12,070	15,632	176	131	31	-	91	17
Ind.	634	85	9	8	4,411	4,732	448	132	8	1	35	4
Ill.	1,939	119	18	2	12,862	16,323	321	140	32	2	8	2
Mich.	1,379	197	26	6	9,831	11,748	127	254	303	6	36	2
Wis.	529	11	5	-	3,195	2,458	256	166	28	-	7	-
W.N. CENTRAL	2,428	282	16	-	11,597	14,729	1,478	372	88	10	43	65
Minn.	511	51	7	-	1,471	1,719	267	40	3	4	1	23
Iowa	141	51	1	-	602	985	24	14	5	1	6	6
Mo.	1,374	69	-	-	6,706	7,963	934	267	62	5	11	7
N. Dak.	1	8	3	-	29	52	54	-	-	-	1	2
S. Dak.	22	7	3	-	164	98	12	-	-	-	-	-
Nebr.	135	6	-	-	476	956	128	11	8	-	21	4
Kans.	244	90	2	-	2,149	2,956	59	40	10	-	3	23
S. ATLANTIC	14,279	1,118	62	40	58,736	87,159	740	1,291	338	47	114	418
Del.	253	29	3	-	795	989	8	99	72	-	9	204
Md.	1,630	102	14	-	9,229	8,539	101	167	8	5	23	68
D.C.	896	23	-	-	2,990	3,829	5	29	-	-	13	2
Va.	1,049	114	22	4	6,869	10,314	91	89	22	20	3	32
W. Va.	46	10	10	-	341	514	8	22	16	-	1	3
N.C.	790	90	12	-	14,418	14,463	39	178	36	-	15	57
S.C.	933	13	-	-	6,032	6,331	9	25	-	1	11	4
Ga.	1,854	69	1	-	4,660	26,750	63	107	41	-	23	26
Fla.	6,828	668	-	36	13,402	15,430	416	575	143	21	16	22
E.S. CENTRAL	1,796	316	16	5	25,176	26,906	147	722	507	1	29	13
Ky.	213	110	9	4	2,668	2,739	71	49	9	-	11	3
Tenn.	731	79	5	-	7,586	8,826	30	607	488	-	13	8
Ala.	531	85	1	-	9,130	8,805	32	63	4	1	2	2
Miss.	321	42	1	1	5,792	6,536	14	3	6	-	3	-
W.S. CENTRAL	6,957	561	26	2	25,961	30,494	1,168	935	151	106	18	22
Ark.	267	26	1	-	4,860	4,602	28	35	2	1	2	1
La.	921	39	1	-	6,726	8,586	46	122	58	2	2	-
Okla.	590	1	6	-	2,063	3,127	73	155	50	6	10	10
Tex.	5,179	495	18	2	12,312	14,179	1,021	623	41	97	4	11
MOUNTAIN	2,948	273	16	4	6,113	7,053	2,379	335	178	57	49	9
Mont.	22	-	-	1	35	60	57	4	2	-	5	-
Idaho	52	7	-	-	101	64	105	27	-	1	1	-
Wyo.	31	5	-	-	57	31	11	16	53	-	5	6
Colo.	985	70	6	-	1,856	2,582	592	47	30	37	5	-
N. Mex.	240	50	3	2	538	522	214	134	58	2	3	-
Ariz.	992	99	5	-	2,260	2,406	833	53	10	7	9	-
Utah	197	9	1	-	198	161	506	25	19	10	7	2
Nev.	429	33	1	1	1,068	1,227	61	29	6	-	14	1
PACIFIC	15,075	1,131	79	16	18,219	26,549	3,962	1,345	507	112	64	60
Wash.	1,008	-	1	-	2,246	2,367	451	122	113	7	9	1
Oreg.	575	-	-	-	1,016	920	58	22	9	-	-	1
Calif.	13,233	1,062	74	16	14,332	22,575	2,927	1,178	374	102	50	57
Alaska	47	9	3	-	294	408	475	6	9	-	-	-
Hawaii	212	60	1	-	331	279	51	17	2	3	5	1
Guam	-	2	-	-	38	48	2	2	-	1	-	-
P.R.	1,950	31	-	-	296	109	52	214	34	2	-	-
V.I.	34	-	-	-	66	61	-	2	-	-	-	-
Amer. Samoa	-	-	-	-	30	24	13	-	-	-	-	-
C.N.M.I.	-	2	-	-	50	49	-	1	-	1	-	-

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of Northern Mariana Islands

*Updated monthly; last update July 31, 1993.

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending July 31, 1993, and July 25, 1992 (30th Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	1993	Cum. 1993	Cum. 1992
UNITED STATES	562	5	172	4	24	2,056	1,490	33	1,030	104	1,803	1,121	-	130	121
NEW ENGLAND	29	-	42	-	3	54	60	-	6	10	355	90	-	1	6
Maine	1	-	-	-	-	2	5	-	-	-	8	4	-	1	1
N.H.	6	-	-	-	-	13	12	-	-	5	213	28	-	-	-
Vt.	1	-	30	-	1	-	4	-	-	1	48	3	-	-	-
Mass.	4	-	3	-	1	14	19	-	-	1	44	36	-	-	-
R.I.	2	-	-	-	1	21	1	-	2	-	3	-	-	-	4
Conn.	15	-	9	-	-	4	19	-	4	3	39	19	-	-	1
MID. ATLANTIC	94	-	7	-	3	193	187	3	78	6	232	59	-	36	10
Upstate N.Y.	34	-	-	-	1	109	86	3	27	4	90	28	-	6	7
N.Y. City	24	-	2	-	-	48	19	-	-	-	7	9	-	15	-
N.J.	26	-	5	-	2	36	27	-	8	-	26	22	-	11	3
Pa.	10	-	-	-	-	-	55	-	43	2	109	-	-	4	-
E.N. CENTRAL	29	4	12	1	1	42	236	1	146	11	293	116	-	2	8
Ohio	7	-	5	-	-	6	73	-	57	11	142	29	-	1	-
Ind.	3	-	-	-	-	20	38	-	3	-	35	15	-	-	-
Ill.	14	-	3	-	-	9	65	-	34	-	28	20	-	-	7
Mich.	5	4	4	1§	1	4	41	1	49	-	20	5	-	-	1
Wis.	-	-	-	-	-	3	19	-	3	-	68	47	-	1	-
W.N. CENTRAL	17	-	1	-	2	11	96	-	31	13	138	96	-	1	7
Minn.	3	-	-	-	-	10	6	-	1	13	64	30	-	-	-
Iowa	1	-	-	-	-	1	16	-	7	-	1	3	-	-	2
Mo.	5	-	1	-	-	-	35	-	18	-	48	39	-	1	1
N. Dak.	2	-	-	-	-	-	3	-	4	-	3	10	-	-	-
S. Dak.	2	-	-	-	-	-	3	-	-	-	3	5	-	-	-
Nebr.	3	-	-	-	-	-	8	-	1	-	8	5	-	-	-
Kans.	1	-	-	-	2	-	25	-	-	-	11	4	-	-	4
S. ATLANTIC	170	-	17	-	3	117	293	21	335	27	213	70	-	8	12
Del.	2	-	-	-	-	1	11	-	4	1	6	1	-	2	-
Md.	16	-	-	-	2	16	32	1	57	7	72	14	-	2	4
D.C.	5	-	-	-	-	-	5	-	-	-	2	-	-	-	-
Va.	16	-	-	-	1	14	26	-	16	7	24	6	-	-	-
W. Va.	2	-	-	-	-	-	11	1	9	1	9	2	-	-	1
N.C.	88	-	-	-	-	24	55	19	195	6	35	14	-	-	-
S.C.	1	-	-	-	-	29	24	-	14	3	8	7	-	-	2
Ga.	9	-	-	-	-	-	63	-	14	-	12	8	-	-	-
Fla.	31	-	17	-	-	33	66	-	26	2	45	18	-	4	5
E.S. CENTRAL	18	-	1	-	-	457	91	1	36	10	83	18	-	-	1
Ky.	1	-	-	-	-	440	18	-	-	-	3	-	-	-	-
Tenn.	7	-	-	-	-	-	22	-	11	5	43	5	-	-	1
Ala.	6	-	1	-	-	-	32	1	20	5	35	12	-	-	-
Miss.	4	-	-	-	-	17	19	-	5	-	2	1	-	-	-
W.S. CENTRAL	13	1	2	3	3	1,067	131	4	151	7	56	149	-	16	6
Ark.	2	-	-	-	-	-	14	-	4	-	3	6	-	-	-
La.	-	-	1	-	-	-	25	-	12	-	6	2	-	1	-
Okla.	4	-	-	-	-	11	18	-	8	1	28	24	-	1	-
Tex.	7	1	1	3†	3	1,056	74	4	127	6	19	117	-	14	6
MOUNTAIN	20	-	2	-	-	15	126	-	36	15	153	195	-	5	5
Mont.	2	-	-	-	-	-	11	-	-	-	1	1	-	-	-
Idaho	1	-	-	-	-	-	9	-	5	10	39	23	-	1	1
Wyo.	-	-	-	-	-	1	2	-	2	-	1	-	-	-	-
Colo.	12	-	2	-	-	14	21	-	8	5	55	25	-	-	-
N. Mex.	5	-	-	-	-	-	4	N	N	-	24	42	-	-	-
Ariz.	-	-	-	-	-	-	61	-	6	-	17	79	-	1	2
Utah	-	-	-	-	-	-	11	-	3	-	16	24	-	2	1
Nev.	-	-	-	-	-	-	7	-	12	-	-	1	-	1	1
PACIFIC	172	-	88	-	9	100	270	3	211	5	280	328	-	61	66
Wash.	17	-	-	-	-	10	46	-	9	2	24	92	-	-	6
Oreg.	3	-	-	-	-	3	21	N	N	2	8	17	-	2	1
Calif.	147	-	77	-	4	50	182	3	181	1	237	198	-	35	39
Alaska	1	-	-	-	-	9	13	-	5	-	3	4	-	1	-
Hawaii	4	U	11	U	5	28	8	U	16	U	8	17	U	23	20
Guam	1	U	2	U	-	10	1	U	6	U	-	-	U	-	1
P.R.	-	-	224	-	-	293	6	-	2	-	2	9	-	-	-
V.I.	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Amer. Samoa	-	-	1	-	-	-	-	-	-	-	2	6	-	-	-
C.N.M.I.	-	-	-	-	1	-	-	1	12	-	-	1	-	-	-

*For measles only, imported cases include both out-of-state and international importations.
N: Not notifiable U: Unavailable † International § Out-of-state

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending July 31, 1993, and July 25, 1992 (30th Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-Shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	15,081	19,653	134	11,282	12,372	71	180	164	4,566
NEW ENGLAND	236	376	8	246	183	-	12	2	596
Maine	3	2	2	7	14	-	-	-	-
N.H.	25	27	2	9	3	-	1	-	47
Vt.	1	1	1	3	3	-	-	-	19
Mass.	86	182	2	130	74	-	7	2	96
R.I.	9	20	1	34	13	-	-	-	-
Conn.	112	144	-	63	76	-	4	-	434
MID. ATLANTIC	1,446	2,809	24	2,696	3,034	1	43	14	1,872
Upstate N.Y.	118	209	13	281	388	1	8	1	1,377
N.Y. City	773	1,570	1	1,579	1,765	-	26	-	-
N.J.	189	382	-	435	519	-	6	9	319
Pa.	366	648	10	401	362	-	3	4	176
E.N. CENTRAL	2,298	2,854	37	1,158	1,227	3	20	7	43
Ohio	689	461	16	179	188	1	5	6	4
Ind.	195	145	1	123	99	1	1	-	3
Ill.	796	1,232	5	551	624	-	9	1	5
Mich.	374	557	15	251	269	1	4	-	4
Wis.	244	459	-	54	47	-	1	-	27
W.N. CENTRAL	961	787	9	251	293	25	2	7	207
Minn.	49	50	2	31	84	-	-	1	27
Iowa	32	31	5	36	24	-	-	1	36
Mo.	774	603	-	126	125	11	2	3	6
N. Dak.	-	1	-	4	4	-	-	-	45
S. Dak.	1	-	-	10	14	10	-	2	25
Nebr.	10	21	-	13	13	1	-	-	6
Kans.	95	81	2	31	29	3	-	-	62
S. ATLANTIC	4,055	5,451	16	1,975	2,263	2	25	79	1,175
Del.	78	130	1	26	25	-	1	2	94
Md.	234	400	-	225	161	-	5	8	342
D.C.	225	249	-	97	77	-	-	-	11
Va.	363	457	4	270	164	-	3	5	215
W. Va.	8	11	-	47	48	-	-	4	50
N.C.	1,128	1,383	3	279	290	1	-	36	51
S.C.	604	723	-	246	234	-	-	6	95
Ga.	684	1,090	2	437	498	-	1	13	275
Fla.	731	1,008	6	348	766	1	15	5	42
E.S. CENTRAL	2,212	2,557	6	761	859	3	3	20	58
Ky.	187	83	2	218	226	-	-	5	9
Tenn.	626	718	1	144	235	2	1	11	-
Ala.	492	966	2	275	231	1	2	2	49
Miss.	907	790	1	124	167	-	-	2	-
W.S. CENTRAL	3,172	3,446	2	1,298	1,227	29	2	31	342
Ark.	498	539	-	108	103	17	-	1	18
La.	1,426	1,482	-	-	107	-	1	1	4
Okla.	241	166	2	166	87	9	-	28	52
Tex.	1,007	1,259	-	1,024	930	3	1	1	268
MOUNTAIN	133	229	8	265	327	4	6	4	73
Mont.	1	7	-	15	-	-	-	-	15
Idaho	-	1	1	7	12	-	-	-	3
Wyo.	4	1	-	2	-	2	-	4	11
Colo.	36	34	2	8	30	-	5	-	2
N. Mex.	19	24	-	35	47	1	-	-	4
Ariz.	57	115	1	126	144	-	1	-	33
Utah	4	6	3	12	51	1	-	-	1
Nev.	12	41	1	60	43	-	-	-	4
PACIFIC	568	1,144	24	2,632	2,959	4	67	-	200
Wash.	34	57	4	149	173	1	4	-	-
Oreg.	50	26	-	68	77	2	-	-	-
Calif.	478	1,052	20	2,246	2,528	1	61	-	183
Alaska	4	4	-	29	40	-	-	-	17
Hawaii	2	5	-	140	141	-	2	-	-
Guam	1	2	-	28	34	-	-	-	-
P.R.	323	181	-	152	135	-	-	-	26
V.I.	31	37	-	2	3	-	-	-	-
Amer. Samoa	-	-	-	2	-	-	-	-	-
C.N.M.I.	3	4	-	19	38	-	-	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending July 31, 1993 (30th Week)

Reporting Area	All Causes, By Age (Years)						P&I† Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	578	394	103	56	15	10	38
Boston, Mass.	181	110	40	22	4	5	21
Bridgeport, Conn.	33	28	2	2	1	-	2
Cambridge, Mass.	23	17	2	3	-	1	-
Fall River, Mass.	41	30	9	2	-	-	-
Hartford, Conn.	53	30	9	11	1	2	1
Lowell, Mass.	20	15	4	1	-	-	4
Lynn, Mass.	21	18	1	1	-	1	1
New Bedford, Mass.	16	10	2	4	-	-	-
New Haven, Conn.	36	22	9	3	2	-	1
Providence, R.I.	39	27	10	-	2	-	1
Somerville, Mass.	3	3	-	-	-	-	-
Springfield, Mass.	36	25	5	4	2	-	1
Waterbury, Conn.	28	19	6	2	1	-	2
Worcester, Mass.	48	40	4	1	2	1	4
MID. ATLANTIC	2,176	1,375	397	297	74	33	86
Albany, N.Y.	39	25	7	4	-	3	1
Allentown, Pa.	21	18	3	-	-	-	-
Buffalo, N.Y.	100	77	10	7	5	1	3
Camden, N.J.	31	18	4	6	2	1	2
Elizabeth, N.J.	20	16	3	1	-	-	2
Erie, Pa.§	38	30	5	3	-	-	2
Jersey City, N.J.	52	34	10	7	1	-	2
New York City, N.Y.	1,392	831	274	220	51	16	41
Newark, N.J.	38	14	11	8	3	2	4
Paterson, N.J.	21	12	2	2	1	4	-
Philadelphia, Pa.	U	U	U	U	U	U	U
Pittsburgh, Pa.§	85	58	14	8	2	3	8
Reading, Pa.	7	4	2	-	1	-	-
Rochester, N.Y.	126	89	18	14	4	1	12
Schenectady, N.Y.	20	14	6	-	-	-	-
Scranton, Pa.§	29	25	-	3	1	-	2
Syracuse, N.Y.	100	72	18	6	2	2	6
Trenton, N.J.	14	6	4	4	-	-	-
Utica, N.Y.	27	21	4	1	1	-	1
Yonkers, N.Y.	16	11	2	3	-	-	-
E.N. CENTRAL	1,993	1,258	390	182	95	68	86
Akron, Ohio	76	51	16	5	1	3	-
Canton, Ohio	29	22	4	-	2	1	4
Chicago, Ill.	240	106	43	48	37	6	12
Cincinnati, Ohio	125	97	19	4	2	3	9
Cleveland, Ohio	137	84	33	9	7	4	2
Columbus, Ohio	208	122	40	23	12	11	10
Dayton, Ohio	121	85	20	12	4	-	2
Detroit, Mich.	230	125	54	27	13	11	8
Evansville, Ind.	41	30	7	3	-	1	-
Fort Wayne, Ind.	62	41	12	8	-	1	1
Gary, Ind.	26	16	3	4	1	2	-
Grand Rapids, Mich.	44	26	11	3	4	-	8
Indianapolis, Ind.	207	127	50	14	6	10	9
Madison, Wis.	35	29	3	1	1	1	2
Milwaukee, Wis.	126	90	26	8	1	1	9
Peoria, Ill.	57	37	11	4	3	2	2
Rockford, Ill.	41	30	4	3	-	4	3
South Bend, Ind.	39	29	7	-	-	3	2
Toledo, Ohio	95	65	22	4	1	3	1
Youngstown, Ohio	54	46	5	2	-	1	2
W.N. CENTRAL	763	544	124	55	23	17	32
Des Moines, Iowa	94	72	15	5	2	-	6
Duluth, Minn.	23	18	5	-	-	-	1
Kansas City, Kans.	12	9	3	-	-	-	-
Kansas City, Mo.	97	72	13	9	2	1	5
Lincoln, Nebr.	36	29	4	2	1	-	1
Minneapolis, Minn.	160	111	28	13	4	4	5
Omaha, Nebr.	83	57	11	10	1	4	3
St. Louis, Mo.	130	86	21	8	9	6	7
St. Paul, Minn.	61	46	8	2	4	1	3
Wichita, Kans.	67	44	16	6	-	1	1
S. ATLANTIC	1,133	690	220	156	39	28	58
Atlanta, Ga.	U	U	U	U	U	U	U
Baltimore, Md.	246	151	47	41	5	2	25
Charlotte, N.C.	108	61	15	18	8	6	3
Jacksonville, Fla.	132	81	33	9	6	3	4
Miami, Fla.	110	70	23	15	1	1	-
Norfolk, Va.	46	24	11	9	2	-	1
Richmond, Va.	68	39	17	7	3	2	4
Savannah, Ga.	51	37	8	5	1	-	4
St. Petersburg, Fla.	47	35	6	2	1	3	5
Tampa, Fla.	142	101	20	17	2	2	11
Washington, D.C.	145	64	32	30	10	9	1
Wilmington, Del.	38	27	8	3	-	-	-
E.S. CENTRAL	740	480	139	55	37	28	47
Birmingham, Ala.	131	83	27	8	5	8	4
Chattanooga, Tenn.	80	53	20	5	2	-	3
Knoxville, Tenn.	61	40	12	6	2	-	5
Lexington, Ky.	81	54	13	4	2	8	10
Memphis, Tenn.	162	101	23	15	15	8	18
Mobile, Ala.	72	46	13	7	5	1	5
Montgomery, Ala.	33	24	7	2	-	-	-
Nashville, Tenn.	120	79	24	8	6	3	2
W.S. CENTRAL	1,438	914	255	170	58	41	82
Austin, Tex.	69	41	17	10	1	-	5
Baton Rouge, La.	20	16	1	2	-	1	-
Corpus Christi, Tex.	42	30	7	3	1	1	1
Dallas, Tex.	187	91	40	36	12	8	4
El Paso, Tex.	84	53	16	5	7	3	3
Ft. Worth, Tex.	81	58	8	10	2	3	4
Houston, Tex.	333	219	65	33	9	7	32
Little Rock, Ark.	83	53	13	12	5	-	5
New Orleans, La.	185	115	25	28	12	5	-
San Antonio, Tex.	195	136	33	16	6	4	15
Shreveport, La.	60	34	13	4	3	6	7
Tulsa, Okla.	99	68	17	11	-	3	6
MOUNTAIN	838	534	167	73	36	28	44
Albuquerque, N.M.	82	49	18	10	4	1	-
Colo. Springs, Colo.	45	24	9	5	2	5	1
Denver, Colo.	108	69	25	9	3	2	5
Las Vegas, Nev.	190	128	36	17	6	3	10
Ogden, Utah	33	22	4	3	3	1	2
Phoenix, Ariz.	169	92	39	15	12	11	6
Pueblo, Colo.	14	10	2	2	-	-	1
Salt Lake City, Utah	79	52	16	5	3	3	11
Tucson, Ariz.	118	88	18	7	3	2	8
PACIFIC	1,979	1,297	363	208	62	38	116
Berkeley, Calif.	20	14	4	2	-	-	4
Fresno, Calif.	26	11	8	3	1	3	1
Glendale, Calif.	31	28	2	1	-	-	2
Honolulu, Hawaii	65	41	14	5	2	3	10
Long Beach, Calif.	72	45	14	9	-	4	10
Los Angeles, Calif.	636	408	102	79	28	8	22
Pasadena, Calif.	24	18	2	1	1	2	2
Portland, Oreg.	137	97	21	12	3	4	4
Sacramento, Calif.	187	130	37	13	5	2	13
San Diego, Calif.	127	79	25	14	3	6	11
San Francisco, Calif.	162	85	41	32	4	-	2
San Jose, Calif.	208	149	33	20	4	2	15
Santa Cruz, Calif.	22	17	3	2	-	-	1
Seattle, Wash.	134	86	31	8	8	1	3
Spokane, Wash.	50	38	10	2	-	-	11
Tacoma, Wash.	78	51	16	5	3	3	5
TOTAL	11,638¶	7,486	2,158	1,252	439	291	589

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

†Pneumonia and influenza.

§Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

¶Total includes unknown ages.

U: Unavailable.

Barrier Protection — Continued

10. Roper WL, Peterson HB, Curran JW. Commentary: condoms and HIV/STD prevention—clarifying the message. Am J Public Health 1993;83:501–3.

Nosocomial Enterococci Resistant to Vancomycin — United States, 1989–1993

As part of continual surveillance for antibiotic resistance among pathogens associated with nosocomial infections, a recent analysis of data reported to CDC's National Nosocomial Infections Surveillance (NNIS) system demonstrated a 20-fold increase in the percentage of enterococci associated with nosocomial infections that are resistant to vancomycin from January 1, 1989, through March 31, 1993. Many of these strains are resistant to all available antimicrobial agents. This report summarizes that analysis.

The NNIS system began in 1970 when selected U.S. hospitals routinely reported nosocomial infection surveillance data for aggregation into a national data base; it is the only source of national data on the epidemiology of nosocomial infections in the United States. Isolates of *Enterococcus* sp. from nosocomial infections reported to the NNIS system from January 1, 1989, through March 31, 1993, were examined. Up to four pathogens could be reported for each episode of nosocomial infection. Multiple isolates of the same species from the same patient were not reported. Information on site of isolation (e.g., respiratory tract or urinary tract), place of acquisition of infection (intensive-care unit [ICU] or non-ICU), medical school affiliation of hospital (teaching or nonteaching), hospital size, and the hospital's susceptibility testing method was obtained for each infection and/or isolate.

Of 16,571 nosocomial *Enterococcus* isolates, 10,961 (66.2%) were tested for vancomycin susceptibility; 278 (2.5%) were resistant. The percentage of nosocomial enterococci resistant to vancomycin increased from 0.3% in 1989 to 7.9% in 1993 ($p<0.0001$, chi-square test). Among patients in ICUs with nosocomial infections, the percentage of enterococcal isolates resistant to vancomycin increased from 0.4% in 1989 to 13.6% in 1993 ($p<0.0001$) (Figure 1). Vancomycin resistance varied by site of infection: gastrointestinal (e.g., intraabdominal abscess), skin and soft tissue, and bloodstream sites had the highest percentage of resistant nosocomial enterococci (7.8%, 4.1%, and 3.8%, respectively).

Of the 10,961 nosocomial enterococcal isolates tested for vancomycin susceptibility and reported to the NNIS system, 1881 were from primary bloodstream infections; 323 (17.2%) patients died. Of the patients with primary bloodstream infection, mortality was significantly higher in those with vancomycin-resistant isolates compared with those with vancomycin-susceptible isolates (26 [36.6%] of 71 versus 297 [16.4%] of 1810; $p<0.0001$, chi-square test). Insufficient data on comorbidity were obtained to determine the relation of the bloodstream infection to death in these patients.

Vancomycin-resistant nosocomial enterococci have been reported from nine of 33 states with NNIS hospitals; the highest percentages were from NNIS hospitals in New York, Pennsylvania, and Maryland (8.9%, 5.6%, and 3.6%, respectively). Vancomycin resistance also varied by teaching affiliation of hospital: 14 (0.6%) of 2154 nosocomial enterococci at nonteaching hospitals were resistant versus 264 (3.0%) of 8807 at teaching hospitals ($p<0.0001$, chi-square test). The percentage of vancomycin resistance varied also by number of beds in the hospital: none of

Vancomycin-Resistant Enterococci— Continued

384 nosocomial enterococci at hospitals with fewer than 200 beds, 105 (1.8%) of 5780 nosocomial enterococci at hospitals with 200–500 beds, and 173 (3.6%) of 4797 at hospitals with more than 500 beds. Vancomycin resistance did not vary substantially by method of susceptibility testing.

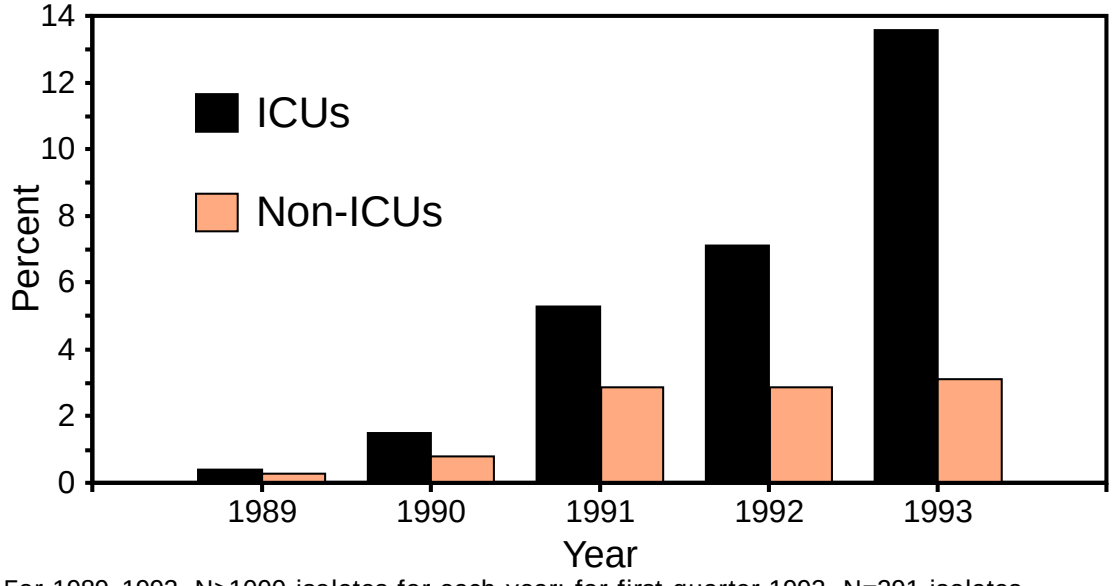
Since 1989, of 32 vancomycin-resistant nosocomial enterococci isolates from the NNIS system examined at CDC for confirmation of resistance, 20 demonstrated high-level vancomycin and teicoplanin resistance (the VanA phenotype) where the minimum inhibitory concentration (MIC) was >128 μg/mL for vancomycin and >8 μg/mL for teicoplanin; 12 isolates that were teicoplanin susceptible demonstrated moderate vancomycin resistance with a MIC 16–64 μg/mL (the VanB phenotype).

Reported by: National Nosocomial Infections Surveillance system participating hospitals. Hospital Infections Program, National Center for Infectious Diseases, CDC.

Editorial Note: Vancomycin resistance represents a serious challenge for physicians treating patients with bacterial infections, particularly because many hospital-acquired *E. faecium* strains also are resistant to ß-lactam and aminoglycoside antibiotics (*1*). Treatment options for patients with nosocomial infections associated with vancomycin-resistant enterococci are limited, often to unproven combinations of antimicrobials or experimental compounds (*2*). The data presented in this report suggest that vancomycin resistance among nosocomial enterococci is increasing dramatically, especially in ICUs, and that both the VanA and VanB phenotypes are present among these resistant nosocomial pathogens.

Because information on the myriad of risk factors that influence mortality (e.g., smoking status, age, and comorbidity) are not collected, NNIS data cannot be used to estimate the increased risk for death from a particular site of nosocomial infection.

FIGURE 1. Percentage of nosocomial enterococci reported as resistant to vancomycin isolated from infections in patients in intensive-care units (ICUs) and non-ICUs, by year* — National Nosocomial Infections Surveillance system, 1989–March 31, 1993†



*For 1989–1992, N>1000 isolates for each year; for first quarter 1993, N=291 isolates.
†p<0.0001, chi-square test for linear trend.

Vancomycin-Resistant Enterococci — Continued

The observed differences in mortality for patients with vancomycin-resistant compared with vancomycin-susceptible nosocomial enterococcal bloodstream infections may be explained in part by differences in these risk factors.

Enterococci may also serve as a reservoir for resistance genes for other gram-positive organisms, including *Staphylococcus aureus*. Laboratory evidence suggests that transfer of the *vanA* gene from enterococci to *S. aureus* can occur and generate a vancomycin-resistant *S. aureus* (*3*). However, clinical strains of *S. aureus* that are vancomycin resistant have not been reported to CDC. Vancomycin resistance in coagulase-negative staphylococci has been reported rarely (*4*); none has been reported through the NNIS system.

Detection of vancomycin resistance using in vitro susceptibility testing methods remains difficult (*5*). In particular, isolates with the VanB phenotype often are not detected with automated methods. The NNIS data may represent both underreporting of resistance and a bias in favor of detecting only the VanA phenotype. The National Committee for Clinical Laboratory Standards has approved changes in the disk diffusion testing methodology to increase the accuracy of this test (*6*) and is assessing a vancomycin resistance agar screen test using 6 μg/mL of vancomycin in brain-heart infusion agar. These changes should enhance the ability of microbiology laboratories to detect resistant enterococci.

Control measures for vancomycin-resistant enterococci include more consistent application of infection-control precautions and control of indiscriminate vancomycin use (*7,8*). Vancomycin use is a risk factor for colonization with vancomycin-resistant enterococci (*9*); however, the transmission of the resistant organism can be controlled and eradicated in a hospital by intensive infection-control efforts.

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