

# **National Surveillance of Dialysis-Associated Diseases in the United States, 2000**

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## SUMMARY

National Surveillance of Dialysis-Associated Diseases in the United States, 2000

- ! See summary of selected results (Table 1).
- ! This survey was performed yearly during 1982-1997 and in 1999-2000 by the Centers for Disease Control and Prevention (CDC) and the Health Care Financing Administration (HCFA).
- ! **Hepatitis B vaccine use.** During 1997-2000, the percent of patients vaccinated increased from 47% to 58% and the percent of staff vaccinated increased from 87% to 88%.
- ! **Influenza and pneumococcal pneumonia vaccines.** In 2000, an estimated 64% of patients had been vaccinated for influenza and 27% for pneumococcal pneumonia.
- ! **Hepatitis C virus.** In 2000, routine testing for antibody to hepatitis C virus (anti-HCV) was performed on staff at 40% of centers and on patients at 58% of centers. At centers testing, anti-HCV was found in 1.7% of staff and 8.4% of patients.
- ! **Vascular access.** During 1995-2000, the percentage of patients who received dialysis through central catheters increased from 13% to 24%; this trend is worrisome since infections and antimicrobial use are higher in patients receiving dialysis through catheters. However, during the same period, the percentage of patients receiving dialysis through fistulas increased from 22% to 28%.
- ! **Reasons for the use of catheters.** In 2000, 25% of catheters were used for new patients awaiting an implanted access, 28% for established patients with a failed access awaiting a new implanted access, 41% as an access of last resort, and 6% for other reasons, including patient preference.
- ! **Vancomycin-resistant enterococcus (VRE).** The percent of centers reporting one or more patients infected or colonized with VRE increased from 11.5% in 1995 to 32.7% in 2000.
- ! **The Dialysis Surveillance Network.** Because of the importance of vascular access-related infections, CDC developed a voluntary surveillance system that has been in operation since August 1999 (1,2). See Appendix III for more details.

**Table 1. Summary**

National Surveillance of Dialysis-Associated Diseases, 1995-2000, United States

Category	Unit of Measurement	Year		
		1995	1999	2000
Centers responding to survey	number of centers	2,647	3,483	3,683
Reuse dialyzers	% of centers	77	80	80
Total staff, all centers (end of year)	number of staff	43,465	52,368	55,585
Hepatitis B vaccination, staff	% of staff	82*	88*	88*
Test staff for anti-HCV	% of centers	16	36	40
Anti-HCV prevalence, staff	% of staff	2.0	1.9	1.7
Total patients, all centers (end of year)	number of patients	162,970	225,226	241,113
Vascular access	% of patients			
Arteriovenous graft				
Arteriovenous fistula				
Central catheter				
Hepatitis B vaccination, patients	% of patients	35*	55*	58*
Influenza vaccination, patients	estimated % of patients vaccinated	-	67	64
Pneumococcal pneumonia vaccination, patients		--	29	27
Test patients for anti-HCV	% of centers	39	56	58
Anti-HCV prevalence, patients	% of patients	10.4	8.9	8.4
HIV infection	% of patients	1.4	1.4	1.5
AIDS	% of patients	0.7	0.5	0.4
Vancomycin-resistant enterococcus (VRE)	% of centers with $\geq 1$ patients	11.5	34.1	32.7
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)		40	67	71

Anti-HCV denotes antibody to hepatitis C virus; HIV denotes human immunodeficiency virus; AIDS denotes acquired immunodeficiency syndrome.

\* For 1999 and 2000, included patients treated, or staff members working, at the end of the year. For 1995, included staff and patients from throughout the year.

## **INTRODUCTION**

The Centers for Disease Control and Prevention (CDC) has been conducting surveillance of hemodialysis-associated hepatitis since the early 1970s (3), when CDC reported that the incidence of HBV infection among patients and staff during 1972-1974 had increased by more than 100%, to 6.2% and 5.2%, respectively. These early surveys had only a 50% to 65% response rate of centers listed by the National Dialysis Registry. In an effort to obtain a higher response rate, and thus more complete information, CDC initiated a cooperative program with the Health Care Financing Administration (HCFA) in 1976 that provided for a questionnaire from CDC to be included in HCFA's annual facility survey. As a result of this collaboration, the response rates to the CDC questionnaire now exceed 90%.

Since collaboration with HCFA was begun, the CDC survey has been performed for calendar years 1976, 1980, 1982 to 1997, and 1999-2000 (4-15). Other hemodialysis-associated diseases and practices not related to hepatitis have been included over the years, and the questionnaire is continually updated to collect data about hemodialysis practices and hemodialysis-associated diseases of current interest and importance. The objectives of this yearly survey are to (a) determine the frequency with which certain hemodialysis practices are used, including measures designed to prevent disease, (b) determine the frequency of hemodialysis-associated complications and diseases, and (c) use this information to suggest further measures to prevent complications and disease in hemodialysis patients and staff.

## **METHODS**

In conjunction with the annual facility survey performed by HCFA for calendar year 2000, CDC distributed a questionnaire (see Appendix I) by mail to all chronic hemodialysis centers licensed by HCFA. All responses were reviewed, and approximately 5% of centers that responded provided inaccurate or inconsistent responses and were contacted for clarification of responses. The survey covered:

- a. hemodialysis practices, reuse of disposable dialyzers, type of vascular access, procedures for cleaning and disinfection of dialysis equipment.
- b. use of hepatitis B, pneumococcal pneumonia, and influenza vaccines in patients.

- c. the results of testing patients for hepatitis B surface antigen (HBsAg), antibody to HBsAg (anti-HBs), and antibody to hepatitis C virus (anti-HCV).
- d. whether patients with vancomycin-resistant enterococcus (VRE) or methicillin-resistant *Staphylococcus aureus* (MRSA) were treated during 2000.
- e. the number of patients with human immunodeficiency virus (HIV) infection.
- f. in staff members, receipt of hepatitis B vaccine, and testing for anti-HCV.

Survey questions on hepatitis B vaccination and the prevalence of HIV infection/AIDS were changed for the 1997, 1999, and 2000 surveys, and referred only to patients treated or staff members who worked during a one-week period in December (in 2000, this was December 4-9) of the survey year; in previous years, the questions referred to patients and staff present in the unit at any time during the year.

In 2000, the incidence of hepatitis B virus (HBV) infection was defined as the number of patients who became positive for HBsAg during 2000 divided by the number of patients treated at the facility during December 4-9, 2000; in effect, the number of patients treated during the one-week period in December 2000 was used as an estimate of the average census at that dialysis center during 2000. In previous years, the denominator for this incidence rate was the total number of patients treated at the facility at any time during the year. A similar method of calculating incidence was used in 1999.

The prevalence rates of chronic HBV infection and immunity were defined as the percentage of all patients or staff present in the facility during December 4-9, 2000, who were positive for HBsAg or anti-HBs, respectively. All patients or staff (regardless of their susceptibility to HBV infection) were included in calculations of the incidence and prevalence of HBV infection.

Information on dialysis center location and ownership was obtained from the HCFA End Stage Renal Disease (ESRD) Facility Survey dataset. The results of the 2000 survey were compared to results from previous surveys. For administrative purposes, HCFA has designated 18 ESRD Networks, each composed of  $\geq 1$  U.S. states, districts or territories(16); to evaluate differences in practices and diseases among centers in different geographic regions, analyses were performed according to ESRD Network.

Proportions were compared with the chi square or Fisher's exact test; when adjustment for confounding variables was required, the Mantel-Haenszel test or logistic regression was used. Risk factors for HCV incidence and prevalence were evaluated using Poisson regression controlling for ESRD network with indicator variables and for individual dialysis center by using Generalized Estimating Equations and clustering on dialysis center. All p-values were two-tailed; a p-value of  $<0.05$  was considered statistically significant.

## **RESULTS AND DISCUSSION**

Questionnaires were returned by 3,683 (96%) of 3,793 centers. These 3,683 centers represented 241,113 patients and 55,585 staff members. During 1987-2000, the median number of patients per center increased from 40 to 57 and the median number of staff members per center increased from 12 to 13 (Table 2).



**Table 2. Numbers of Hemodialysis Centers, Patients, and Staff Members Surveyed, 1985-2000, United States**

Year	No. of Centers	Patients		Staff Members	
		Total Patients	Median per Center	Total Staff	Median per Center
1985	1,250	62,172	—*	20,346	—
1986	1,350	67,387	--	21,094	--
1987	1,486	74,249	40	22,334	12
1988	1,586	80,651	41	23,778	12
1989	1,726	90,596	42	26,112	12
1990	1,882	101,763	43	29,252	13
1991	2,046	116,651	46	33,079	13
1992	2,170	128,264	49	36,000	14
1993	2,304	135,798	49	37,992	14
1994	2,449	149,743	51	40,951	14
1995	2,647	162,970	51	43,465	14
1996	2,808	177,324	53	47,215	14
1997	3,077	195,935	54	50,321	14
1999	3,483	225,226	56	52,368	13
2000	3,683	241,113	57	55,585	13

The numbers of patients and staff members reflect the numbers present during a one-week period in December of the year.

\* Data not available.

During 1985-2000, the proportion of freestanding (i.e., located outside the hospital) centers increased from 56% to 82%, and the proportion of centers operating for profit increased from 46% to 78% (Table 3).

**Table 3. Location and Ownership of Hemodialysis Centers, 1985-1999, United States**

Year	Location		Ownership		
	Hospital	Freestanding	Profit	Nonprofit	Government
	<i>percent of hemodialysis centers</i>				
1985	44	56	46	44	11
1986	42	58	49	41	10
1987	39	61	51	40	9
1988	37	63	53	39	8
1989	35	65	55	38	7
1990	34	66	56	37	7
1991	35	65	56	35	9
1992	33	67	57	34	9
1993	31	69	62	32	6
1994	29	71	62	31	6
1995	27	73	63	30	7
1996	26	74	66	28	6
1997	23	77	70	25	5
1999	20	80	75	21	4
2000	18	82	78	18	4

## Dialyzer Reuse

During 1976-1997, the percentage of centers that reported reuse of disposable dialyzers increased from 18% to 82%, but decreased slightly to 80% in 1999 and remained at that level in 2000 (Table 4). Although dialyzer reuse has been implicated in numerous outbreaks, this practice is safe if performed according to recognized protocols (17,18).

**Table 4. Hemodialysis Centers Having Dialyzer Reuse Programs, 1976-2000, United States**

Year	No. of Centers	No. (%) Reusing Dialyzers
1976	750	135 (18)
1980	956	179 (19)
1982	1,015	435 (43)
1983	1,120	579 (52)
1984	1,201	693 (58)
1985	1,250	764 (61)
1986	1,350	855 (63)
1987	1,486	948 (64)
1988	1,586	1,058 (67)
1989	1,726	1,172 (68)
1990	1,882	1,310 (70)
1991	2,046	1,453 (71)
1992	2,170	1,569 (72)
1993	2,304	1,688 (73)
1994	2,449	1,835 (75)
1995	2,647	2,048 (77)
1996	2,808	2,261 (81)
1997	3,077	2,523 (82)
1999	3,478	2,788 (80)
2000	3,669	2,935 (80)

## Methods Used for Reprocessing Dialyzers

During 1983-2000, the proportion of centers using formaldehyde for reprocessing dialyzers decreased from 94% to 31%, while the proportion using a peracetic acid product increased from 5% to 59% (Table 5). In 2000, 4% of centers used heat to disinfect dialyzers between reuses.

**Table 5. Methods for Reprocessing Dialyzers in Hemodialysis Centers, 1983-2000, United States**

Year	Percent of Centers Using Method			
	Formaldehyde	Peracetic Acid	Glutaraldehyde	Heat
1983	94	5	<1	--
1984	86	12	3	--
1985	80	17	3	--
1986	69	28	3	--
1987	62	34	4	--
1988	54	40	6	--
1989	47	46	7	--
1990	43	49	8	--
1991	42	50	9	--
1992	40	52	8	<1
1993	40	51	8	1
1994	40	52	7	1
1995	38	54	7	1
1996	36	54	7	3
1997	34	56	7	3
1999	33	58	6	3
2000	31	59	5	4

## Vascular Access Types

During December 4-9, 2000, 48.0% of patients received dialysis through an arteriovenous graft, 28.0% through an arteriovenous fistula, and 24.0% through a temporary or permanent central catheter (Table 6). Since 1995, the percent of patients receiving dialysis through catheters increased from 12.7% to 24.0%.

In 2000, 25.4% of catheters were used for new patients awaiting an implanted access (i.e., a fistula or graft), 28.4% for established patients with a failed access awaiting a new implanted access, 40.6% as an access of last resort, and 5.7% for other reasons, including patient preference.

Among the 18 ESRD networks designated by HCFA (see Methods), use of fistulas (the most desirable access type) ranged from 20.6% to 39.8% (Table 7). The estimated risk of access-related bacteremia was calculated by using rates measured in the Dialysis Surveillance Network, a voluntary surveillance system for monitoring bacterial infections and related events in hemodialysis patients (Appendix III); the rates used for this calculation were 0.25 access-related bacteremias per 100 patient-months for fistulas, 0.53 for grafts, 4.84 for cuffed catheters, and 8.73 for noncuffed catheters (2). Networks 14 and 17 had the lowest estimated risk and Network 9 the highest; note that the estimated risk of vascular access infection is most closely related to the percentage of patients receiving dialysis through cuffed catheters.

**Table 6. Types of Vascular Access Used for Hemodialysis, 1995-2000, United States.**

Year	Number of Patients	Percent of Patients Receiving Dialysis Through				
		Fistula	Graft	All Catheters	Cuffed Catheters	Noncuffed Catheters
1995	153,320	22.2	65.1	12.7	—*	—
1996	176,609	22.1	62.9	14.9	—	—
1997	195,588	22.8	59.7	17.5	—	—
1999	225,226	26.0	51.9	22.2	19.0	3.2
2000	241,113	28.0	48.0	24.0	20.8	3.3

\* Data not collected

**Table 7. Vascular Access Types by End Stage Renal Disease (ESRD) Network, December 2000, United States**

ESRD Network	States, Districts, or Territories	No. of Patients	Percent of Patients Receiving Dialysis Through				Estimated Risk of Access-Related Bacteremia*
			Fistula	Graft	Noncuffed Catheter	Cuffed Catheter	
14	TX	20,337	20.6	61.7	2.7	14.9	1.8
17	AS, GU, HI, CA (northern)	12,185	27.9	53.8	4.5	13.7	1.8
16	AK, ID, MT, OR, WA	5,752	39.8	40.6	2.5	17.2	1.9
18	CA (southern)	16,597	28.5	52.6	3.7	15.2	1.9
8	AL, MS, TN	14,275	22.6	57.4	3.1	17	2.0
2	NY	17,063	35.8	42	3.3	19.1	2.1
15	AZ, CO, NM, NV, UT, WY	10,069	33.9	42.6	3.1	20.4	2.2
5	DC, MD, VA, WV	15,075	24.3	51.8	3.7	20.1	2.3
6	GA, NC, SC	22,821	23.8	51.9	3.5	20.3	2.3
13	AR, LA, OK	10,779	23.5	51	3.3	22.3	2.4
1	CT, MA, ME, NH, RI, VT	8,831	39.7	33.8	1.7	24.8	2.5
3	NJ, PR	10,809	31.9	39.9	5.7	22.5	2.5
10	IL	10,052	28.3	44.3	4.2	23.1	2.5
11	MI, MN, ND, SD, WI	14,983	27.7	45.7	3.4	23.3	2.5
7	FL	14,294	28.7	43.2	3.5	24.3	2.6
12	IA, KS, MO, NE	7,617	29.5	42.6	1.8	25.9	2.6
4	DE, PA	11,816	29.4	41.4	2.6	26.7	2.7
9	IN, KY, OH	16,879	25.8	43.3	2.6	28.2	2.9
	All	240,234	27.9	47.9	3.3	20.7	2.3

AS denotes American Samoa, GU denotes Guam.

\* Estimated vascular access-related bacteremias per 100 patient-months. See text for details of the calculation.

Rows are sorted by this estimate.

## **Use of Pneumococcal Vaccine**

In 2000, pneumococcal vaccine was offered to patients at 60.5% of centers, which included 18.8% of centers with <25% of patients vaccinated, 9.3% with 25-49% vaccinated, 10.1% with 50-74% vaccinated, 16.7% with  $\geq 75\%$  vaccinated, and 5.5% with percent vaccinated unknown.

The percent of patients vaccinated was estimated by assuming that 0% of patients were vaccinated at centers not offering the vaccine, 12.5% were vaccinated at centers with <25% vaccinated, 37.5% at centers with 25-49% vaccinated, 67.5% at centers with 50-74% vaccinated, and 87.5% at centers with  $\geq 75\%$  vaccinated. Overall, the estimated percent vaccinated was 27.2% (range 10.6%-40.4% among the ESRD Networks, Table 8).

**Table 8. Use of Pneumococcal Vaccine In Patients by End Stage Renal Disease (ESRD) Network, 2000, United States**

ESRD Network	States, Districts, or Territories	No. of Centers	Offer Vaccine to Patients (% of Centers)	Estimated Percentage of Patients Vaccinated
17	AS, GU, HI, CA (northern)	139	28.8	10.6
18	CA (southern)	188	42.6	14.8
3	NJ, PR	115	59.1	23.0
5	DC, MD, VA, WV	261	56.7	23.0
6	GA, NC, SC	349	52.7	23.4
7	FL	244	64.8	25.8
15	AZ, CO, NM, NV, UT, WY	170	47.1	25.9
10	IL	121	61.2	27.2
13	AR, LA, OK	231	56.7	28.1
4	DE, PA	208	63.9	28.3
8	AL, MS, TN	255	61.6	28.3
2	NY	198	63.6	28.5
1	CT, MA, ME, NH, RI, VT	128	67.2	29.1
14	TX	277	69.0	31.2
16	AK, ID, MT, OR, WA	98	60.2	31.2
11	MI, MN, ND, SD, WI	275	78.9	38.9
9	IN, KY, OH	248	70.2	39.1
12	IA, KS, MO, NE	165	69.1	40.4
	All	3670	60.5	27.2

AS denotes American Samoa, GU denotes Guam.

Rows are sorted by estimated percentage of patients vaccinated.



## Use of Influenza Vaccine

In 2000, influenza vaccine was offered to patients at 93.1% of centers, which included 5.9% of centers with <25% of patients vaccinated, 11.5% with 25-49% vaccinated, 23.5% with 50-74% vaccinated, 49.2% with  $\geq 75\%$  vaccinated, and 3.0% with percent vaccinated unknown (Table 9). The percent of patients vaccinated was estimated using methods similar to that outlined under “Use of Pneumococcal Vaccine.” Overall, the estimated percent vaccinated was 64.2% (range 47.3-73.6% among the ESRD networks, Table 9).

**Table 9. Use of Influenza Vaccine in Patients by End Stage Renal Disease (ESRD) Network, 2000, United States**

ESRD Network	States, Districts, or Territories	No. of Centers	Offer Vaccine to Patients (% of Centers)	Estimated Percentage of Patients Vaccinated
16	AK, ID, MT, OR, WA	98	68.4.	47.3
17	AS, GU, HI, CA (northern)	139	79.9	51.0
7	FL	244	87.7	53.3
10	IL	121	90.1	56.7
18	CA (southern)	188	89.9	57.7
3	NJ, PR	115	95.7	60.8
5	DC, MD, VA, WV	261	91.2	61.7
13	AR, LA, OK	230	92.2	63.7
2	NY	199	94.0	63.8
1	CT, MA, ME, NH, RI, VT	131	93.1	64.0
8	AL, MS, TN	254	97.6	67.1
14	TX	277	96.8	68.6
6	GA, NC, SC	350	94.6	68.7
15	AZ, CO, NM, NV, UT, WY	170	93.5	70.3
11	MI, MN, ND, SD, WI	275	96.4	70.9
9	IN, KY, OH	249	98.8	71.7
12	IA, KS, MO, NE	167	97.6	72.1
4	DE, PA	209	98.1	73.6
	All	3,677	93.1	64.2

AS denotes American Samoa, GU denotes Guam.

Rows are sorted by estimated percentage of patients vaccinated

## **Use of Hepatitis B Vaccine**

In 2000, policies for vaccination of chronic hemodialysis patients were as follows: 95.6% of centers offered vaccine to patients; in 1.3% of centers vaccine was offered at individual physician's offices; 2.0% of centers did not offer vaccine to patients; and 1.0% of centers reported other policies.

During 1983-2000, the proportion who had ever received at least three doses of hepatitis B vaccine increased from 5.4% to 57.7% among patients and from 26.1% to 88.4% among staff (Table 10). Note that the survey questions on vaccination of patients and staff were changed for the 1997-2000 surveys. During 1983-1996, the percent of patients vaccinated was calculated as the number of vaccinated patients treated at any time during the year divided by the total number of patients treated at any time during the year. In 1997-2000, the percent of patients vaccinated was calculated as the number of vaccinated patients who were present during a one-week period in December divided by the total number of patients present during the same one-week period in December. Similar methods were used to calculate the percents of staff vaccinated during the two time periods (1983-1996 vs 1997-2000). The vaccination data may be more accurate for 1997-2000 than for previous years, since determination of vaccine status in December of the year, at the time the survey is completed, should be more accurate than determining vaccine status for patients treated (or staff members who worked) at any time during the year, as was requested in previous surveys.

**Table 10. Use of Hepatitis B Vaccine in Hemodialysis Centers, 1983-2000, United States**

Year	No. (%) Ever Receiving $\geq 3$ Doses of Vaccine	
	Patients	Staff Members
1983	3,619 ( 5.4)	5,670 (26.1)
1984	4,495 ( 6.0)	7,181 (31.6)
1985	6,290 ( 7.8)	8,521 (35.5)
1986	8,815 (10.1)	9,877 (39.4)
1987	12,270 (12.8)	11,316 (41.9)
1988	17,019 (15.8)	12,949 (45.5)
1989	21,623 (17.6)	15,578 (48.0)
1990	24,260 (18.2)	19,311 (53.0)
1991	25,397 (16.9)	22,499 (56.1)
1992	37,459 (23.6)	30,069 (69.4)
1993	47,183 (28.8)	34,885 (76.1)
1994	61,492 (31.0)	40,008 (79.6)
1995	74,217 (35.0)	44,542 (82.4)
1996	79,133 (36.0)	48,817 (81.9)
1997*	87,749 (46.7)	43,341 (86.6)
1999*	116,920 (55.3)	45,735 (88.5)
2000*	132,709 (57.7)	47,978 (88.4)

\* Methods differed in 1983-1996 vs 1997-2000 (see text for details).

Among the ESRD networks, hepatitis B vaccination among patients in 2000 varied from 42.4% to 69.4% (Table 11). The largest absolute increase in vaccination during 1999-2000 occurred in ESRD network 3.

**Table 11. Use of Hepatitis B Vaccine in Hemodialysis Patients by End Stage Renal Disease (ESRD) Network, 1999-2000, United States**

ESRD Network	States, Districts, or Territories	Percent Vaccinated		Absolute Change
		1999	2000	
10	IL	38.3	42.4	4.1
2	NY	42.7	46.3	3.6
3	NJ, PR	40.8	47.5	6.7
1	CT, MA, ME, NH, RI, VT	57.9	53.8	-4.1
18	CA (southern)	51.6	55.3	3.7
5	DC, MD, VA, WV	53.1	56.6	3.5
15	AZ, CO, NM, NV, UT, WY	57.9	56.7	-1.2
9	IN, KY, OH	56.9	57.6	0.7
6	GA, NC, SC	57.2	57.8	0.6
11	MI, MN, ND, SD, WI	57.0	58.2	1.2
17	AS, GU, HI, CA (northern)	54.7	59.7	5.0
4	DE, PA	57.6	60.6	3.0
7	FL	57.1	60.7	3.6
13	AR, LA, OK	58.6	61.0	2.4
8	AL, MS, TN	60.6	63.6	3.0
16	AK, ID, MT, OR, WA	62.2	63.6	1.4
12	IA, KS, MO, NE	66.5	66.4	-0.1
14	TX	64.8	69.4	4.6
	All	55.1	57.7	2.6

AS denotes American Samoa, GU denotes Guam.

### Prevalence of Antibody to Hepatitis B Surface Antigen (anti-HBs)

During 1980-2000, the prevalence of anti-HBs among patients increased from 11.3% to 37.6% (Table 12). The presence of anti-HBs indicates immunity to HBV infection, either from vaccination or as a result of recovery from natural infection (19).

**Table 12. Prevalence of Antibody to Hepatitis B Surface Antigen (Anti-HBs) in Hemodialysis Patients and Staff, 1980-2000, United States**

Year	Patients		Staff Members	
	Number Tested	Prevalence (%)	Number Tested	Prevalence (%)
1980	43,796	11.3	15,603	16.1
1982*	49,275	12.3	16,235	18.1
1983	54,343	18.3	18,714	39.2
1984	60,782	19.5	19,793	43.6
1985	62,172	17.7	20,346	45.9
1986	59,425	17.9	20,456	47.4
1987	67,387	18.3	21,761	49.6
1988	71,262	19.9	23,012	53.6
1989	81,672	19.1	25,355	54.0
1990	90,661	19.7	28,470	58.1
1991	101,888	21.2	31,872	62.7
1992	102,337	24.2	32,916	70.4
1993	114,528	28.7	35,589	78.1
1994	130,798	28.9	36,804	78.4
1995	144,607	30.8	38,627	79.2
1996	158,545	32.0	40,328	77.6
1997	163,937	33.3	38,638	78.1
1999	207,293	36.8	Not collected	Not collected
2000	224,553	37.6	Not collected	Not collected

\* Hepatitis B vaccine introduced

## **Incidence and Prevalence of HBV Infection**

In 2000, 75.0% of centers reported screening susceptible patients monthly for HBsAg, 0.6% bimonthly, 12.5% quarterly, 4.2% semiannually, and 7.7% other or none.

During 1976-2000, the incidence of HBV infection in patients decreased from 4.4% to 0.05%, with the largest decline occurring during 1976-1980 (Table 13). Note that in 1999-2000 the denominator for the HBsAg incidence rate was the number of patients treated during a one-week period in December of the year, while in prior years it was the number of patients treated throughout the year.

During 1976-2000, the prevalence of HBsAg-positivity among patients declined from 7.8% to 0.9% (Table 13).

In 2000, 2.9% of centers reported  $\geq 1$  patients with newly acquired (incident) HBV infection, 25.8% of centers reported  $\geq 1$  patients with chronic (prevalent) HBV infection, and 25.8% of centers reported  $\geq 1$  patients with either acute or chronic HBV infection.

This national surveillance project was initiated primarily because of the high incidence of HBV infection reported among hemodialysis patients and staff in the early 1970s (3). Hemodialysis patients may acquire HBV infection from community sources or from transmission in hemodialysis centers due to inadequate infection control precautions (20-22) or accidental breaks in technique (23). Factors contributing to the decline in HBV infection since the 1970s have been reviewed previously (11).

**Table 13. Incidence and Prevalence of Hepatitis B Virus Infection in Hemodialysis Patients, 1976-2000, United States**

Year	Incidence		Prevalence	
	Total Patients	Incidence (%)	Total Patients	Prevalence (%)
1976	33,875	3.0	22,876	7.8
1980	62,723	1.0	43,796	3.8
1982	66,326	0.5	49,275	2.7
1983	67,229	0.5	54,343	2.4
1984	76,327	0.3	60,782	2.3
1985	80,151	0.3	62,172	2.1
1986	87,505	0.3	67,387	1.9
1987	97,225	0.2	74,249	1.7
1988	107,804	0.2	80,651	1.5
1989	122,734	0.1	90,596	1.4
1990	140,608	0.2	101,763	1.2
1991	155,877	0.2	116,651	1.3
1992	170,028	0.1	128,264	1.2
1993	180,341	0.1	135,798	1.2
1994	206,884	0.1	149,743	1.1
1995	224,954	0.06	162,970	1.1
1996	229,527	0.08	177,324	1.1
1997	253,001	0.05	195,935	0.9
1999	225,226*	0.06	225,226	0.9
2000	241,113*	0.05	241,113	0.9

\* Denominator changed for 1999-2000 survey. See text.

## Hepatitis C

In 2000, 58% of centers tested patients for anti-HCV, and the prevalence of anti-HCV at these centers was 8.4%; 40% of centers tested staff for anti-HCV, and the prevalence of anti-HCV at these centers was 1.7% (Table 14).

Among centers that tested for anti-HCV, 11.7% reported having  $\geq 1$  patients who became anti-HCV positive in 2000 (i.e., tested positive for anti-HCV in 2000 and had previously tested negative). Anti-HCV incidence (i.e., the number of patients testing positive for anti-HCV who had tested negative in the past) was on the survey form for the first time in 2000; the incidence rate was 0.27% (346/130,190).

Anti-HCV prevalence among staff was similar at centers that reused (1.8%) and did not reuse (1.6%) dialyzers ( $p=0.5$ ).



**Table 14. Antibody to Hepatitis C Virus Testing and Prevalence among Hemodialysis Patients and Staff, 1992-2000, United States**

Group	Year	% of Centers Testing	Total Tested	No. (%) Positive
Patients	1992	22	27,086	2,202 (8.1)
	1993	29	37,654	3,654 (9.7)
	1994	34	50,438	5,306 (10.5)
	1995	39	61,400	6,362 (10.4)
	1996	44	75,601	7,652 (10.1)
	1997	48	91,098	8,434 (9.3)
	1999	56	120,871	10,726 (8.9)
	2000	58	135,599	11,419 (8.4)
	Staff	1992	10	2,889
1993		15	4,825	75 (1.6)
1994		16	5,679	106 (1.9)
1995		16	6,238	122 (2.0)
1996		20	8,472	113 (1.3)
1997		25	11,649	190 (1.6)
1999		36	16,804	327 (1.9)
2000		40	20,091	349 (1.7)

Among centers that reused dialyzers, 2,156 (74.4%) reused them on patients that were anti-HCV positive, 445 (15.4%) did not reuse them on anti-HCV positive patients, and 298 (10.3%) did not have any anti-HCV-positive patients.

Anti-HCV prevalence among patients was similar at centers that reused and did not reuse dialyzers (8.3 vs 8.9%; Table 15). Although among centers reusing dialyzers, the prevalence of anti-HCV was higher at centers that reused dialyzers on anti-HCV-positive patients (8.7%) vs those that did not (7.6%), the prevalence of anti-HCV among patients in centers that reused dialyzers on anti-HCV-positive patients (8.7%) was no different than the prevalence among patients in centers that did not reuse dialyzers on any patients (8.9%; Table 15).

Anti-HCV incidence among patients was similar at centers that reused vs did not reuse dialyzers (0.25% vs 0.27%; Table 15). Among centers that reused, the incidence was marginally higher at centers that reused on anti-HCV-positive patients (0.16% vs 0.27%).

Since reprocessed dialyzers are reused on the same patient, it is unclear why reuse would be associated with higher rates of HCV infection among patients. This association could be due to unmeasured confounding factors or related to environmental contamination resulting from improper handling (e.g., transport of used dialyzers to a reprocessing area without placing them in leakproof containers).

**Table 15. Incidence and Prevalence of Antibody to Hepatitis C Virus (anti-HCV) by Dialyzer Reuse Practice, 2000, United States**

	Anti-HCV Prevalence			Anti-HCV Incidence		
	Centers	No. (%)	P-value*	Centers	No. (%)	P-value*
Reuse dialyzers						
No	486	2143 (8.9)		455	57 (0.25)	
Yes	1617	9250 (8.3)	0.6	1543	288 (0.27)	0.5
Reuse dialyzers on anti-HCV positive patients						
No	280	1287 (7.6)		265	26 (0.16)	
Yes	1239	7806 (8.7)	0.004	1195	239 (0.27)	0.07

\*P-values determined by Poisson regression, controlling for ESRD network and dialysis unit.

Among the ESRD networks, anti-HCV prevalence ranged from to 4.7 to 11.9% (Table 16).

**Table 16. Prevalence of Antibody to Hepatitis C Virus (anti-HCV) Among Hemodialysis Patients by End Stage Renal Disease (ESRD) Network, 2000, United States**

ESRD Network	States, Districts, or Territories	Total Tested	Anti-HCV Positive (%)
14	TX	11,985	11.9
2	NY	11,269	11.5
5	DC, MD, VA, WV	9,286	10.5
3	NJ, PR	6,173	9.6
13	AR, LA, OK	6,870	9.4
11	MI, MN, ND, SD, WI	7,465	8.7
17	AS, GU, HI, CA (northern)	6,916	8.6
4	DE, PA	6,683	8.5
8	AL, MS, TN	8,624	7.8
18	CA (southern)	8,987	7.7
12	IA, KS, MO, NE	2,931	7.5
15	AZ, CO, NM, NV, UT, WY	5,323	7.1
7	FL	8,811	6.9
10	IL	4,716	6.8
6	GA, NC, SC	13,333	6.5
1	CT, MA, ME, NH, RI, VT	6,540	6.3
16	AK, ID, MT, OR, WA	2,710	6.2
9	IN, KY, OH	6,977	4.7
	All	135,599	8.4

AS denotes American Samoa, GU denotes Guam.

## Place of Preparation of Injectable Medications

In 2000, medications from multidose vials were drawn into syringes in preparation for patient administration on a medication cart or medication area within the treatment area (62.4% of centers), in a dedicated medication room or area separate from the treatment area (26.8%), at the dialysis station (6.6%), and in other areas (4.2%).

Compared with a dedicated medication room or area separate from the treatment area, the incidence of HBsAg was higher when medications were drawn up at the dialysis station (0.05% vs 0.13%, Table 17) and the incidence of anti-HCV was higher when medications were drawn up on a medication cart or medication area within the treatment area (0.20% vs 0.30%).

**Table 17. Place Where Injectable Medications Were Prepared and Association with Hepatitis B Virus and Hepatitis C Virus Infection, 2000, United States**

Place Where Medication Drawn Up Into Syringe	HBsAg Incidence, No. (%) of Patients	Anti-HCV Prevalence, No. (%) of Patients*	Anti-HCV Incidence, No. (%) of Patients*
Dedicated medication room or area separate from treatment area	31 (0.05)	2,707 (8.4)	63 (0.20)
Dialysis station	20 (0.13)†	815 (8.1)	18 (0.19)
Medication cart or medication area within the treatment area	67 (0.045)	7,400 (8.5)	255 (0.30)†

HBsAg denotes hepatitis B surface antigen, anti-HCV denotes antibody to hepatitis C virus.

\* Analysis limited to centers that test for anti-HCV.

† P<0.05 compared with dedicated medication room or area separate from treatment area.

## Antimicrobial Use Policies

In 2000, 93% of centers reported using  $\geq 1$  measures to encourage judicious antimicrobial use. Antimicrobial use policies included: the reason for the antimicrobial must be recorded in the patient's chart or on an order form, 63.3% of centers; a written policy on antimicrobial use, 35.9% of centers; automatic stop order (i.e., antimicrobials must be reordered at intervals), 31.1% of centers; formulary restriction (i.e., only selected antimicrobials are available), 27.9% of centers; and approval needed for certain antimicrobials, 21.7% of centers.

## Vancomycin-Resistant Enterococci (VRE) and Methicillin-Resistant *S. aureus* (MRSA)

In 2000, the number of patients with known VRE was as follows: no known patients with VRE, 67.3% of centers; 1-4 patients with VRE, 30.4% of centers; 5-9 patients with VRE, 1.9% of centers; and  $\geq 10$  patients with VRE, 0.4% of centers. At centers having  $\geq 1$  VRE-positive patients, VRE-positive patients were never treated in a separate room at 69.0% of centers, sometimes in a separate room at 11.0% of centers, and always in a separate room at 19.9% of centers. Rectal swab or stool cultures to check for VRE were done at 5.3% of centers.

The percentage of centers reporting  $\geq 1$  patients with VRE increased from 11.5% in 1995 to 34.1% in 1999, then decreased slightly to 32.7% in 2000 (Table 18). Among the ESRD networks, reporting of VRE varied from 18.0% (network 8) to 60.0% (network 1; Table 19).

The data reported here on treatment of VRE patients are limited in that the survey does not distinguish between clinical infection and colonization (i.e., positive culture for the organism without invasive infection). Centers that perform surveillance for VRE with stool or rectal cultures, or that treat patients from hospitals where such culturing is done, would be more likely to report VRE-colonized patients, introducing "surveillance bias."

During 1995-2000, the percent of centers reporting that they had treated one or more patients with MRSA increased from 40% to 71% (Table 18).

**Table 18. Reporting of One or More Patients with Vancomycin-Resistant Enterococci (VRE) or Methicillin-Resistant *Staphylococcus aureus*, by Year, 1995-2000, United States**

Year	Number of Centers Reporting VRE Patients / Total Centers (%)	Number of Centers Reporting MRSA Patients / Total Centers (%)
1995	303 / 2,634 (11.5)	1,056 / 2,620 (40)
1996	596 / 2,801 (21.3)	1,354 / 2,797 (48)
1997	918 / 3,077 (29.8)	1,720 / 3,077 (56)
1999	1,180 / 3,462 (34.1)	2,314 / 3,454 (67)
2000	1,195 / 3,659 (32.7)	2,562 / 3,623 (71)

**Table 19. Reporting of One or More Patients with Vancomycin-Resistant Enterococci (VRE), by ESRD Network, 2000, United States**

ESRD Network	States, Districts, or Territories	Percent of Centers Reporting VRE		Absolute Change
		1999	2000	
8	AL, MS, TN	17.7	18.0	0.3
16	AK, ID, MT, OR, WA	14.0	18.6	4.6
13	AR, LA, OK	20.3	20.4	0.1
7	FL	19.7	23.0	3.3
6	GA, NC, SC	26.1	25.0	-1.1
17	AS, GU, HI, CA (northern)	30.1	26.6	-3.5
18	CA (southern)	36.6	27.3	-9.3
15	AZ, CO, NM, NV, UT, WY	35.7	27.4	-8.3
14	TX	29.2	29.2	0
2	NY	40.4	36.6	-3.8
10	IL	49.1	37.2	-11.9
11	MI, MN, ND, SD, WI	36.5	38.2	1.7
5	DC, MD, VA, WV	42.9	38.5	-4.4
12	IA, KS, MO, NE	38.6	39.5	0.9
3	NJ, PR	45.0	40.0	-5
9	IN, KY, OH	45.7	46.6	0.9
4	DE, PA	47.3	47.8	0.5
1	CT, MA, ME, NH, RI, VT	62.1	60.0	-2.1
	All	34.1	32.7	-1.4

AS denotes American Samoa, GU denotes Guam.

Rows are sorted by percent reporting VRE in 2000.

## **Human Immunodeficiency Virus Infection**

During 1985-2000, the percentage of centers that reported providing dialysis for patients with HIV infection increased from 11% to 37% (Table 20). Since a minority of centers routinely test for HIV, these figures may be underestimates. Note that the survey questions on HIV infection and AIDS were changed for the 1999-2000 survey. In 1985-1997, the percent of patients with HIV infection was calculated as the number of patients with HIV infection who were treated at any time during the year divided by the total number of patients who were treated at any time during the year. In 1999-2000, the percent of patients with HIV infection was calculated as the number of patients with HIV infection who were present during a one-week period in December divided by the total number of patients who were present during the same one-week period in December. Similar methods were used to calculate the percent of patients with AIDS during 1985-1997 vs 1999-2000.

**Table 20. Chronic Hemodialysis Centers Reporting Patients with HIV Infection, 1985-2000, United States**

Year	No. (%) of Centers Treating Patients with HIV Infection	No. (%) of Patients with HIV Infection	No. (%) of Patients with Clinical AIDS
1985	134 (11)	244 (0.3)	-
1986	238 (18)	546 (0.6)	332 (0.4)
1987	351 (24)	924 (1.0)	462 (0.5)
1988	401 (25)	1,253 (1.2)	670 (0.6)
1989	456 (26)	1,248 (1.0)	663 (0.5)
1990	493 (26)	1,533 (1.1)	739 (0.5)
1991	601 (29)	1,914 (1.2)	967 (0.6)
1992	737 (34)	2,501 (1.5)	1,126 (0.7)
1993	792 (34)	2,780 (1.5)	1,350 (0.7)
1994	914 (37)	3,144 (1.5)	1,593 (0.8)
1995	1,022 (39)	3,090 (1.4)	1,606 (0.7)
1996	1,088 (39)	3,112 (1.4)	1,512 (0.7)
1997	1,214 (39)	3,298 (1.3)	1,501 (0.6)
1999*	1,241 (36)	3,223 (1.4)	1,077 (0.5)
2000	1,352 (37)	3,447 (1.5)	893 (0.4)

\* Methods changed in 1999 (see text).



In 2000, 1.5% (range among the networks, 0.3%-3.4%) of patients were reported to have HIV infection and 0.4% (range among the networks, 0%-1.0%) to have AIDS (Table 21).

**Table 21. Chronic Hemodialysis Centers Reporting Patients with HIV Infection/AIDS, by End Stage Renal Disease (ESRD) Network, 2000, United States**

ESRD Network	States, Districts, or Territories	Number of Centers	Number of Patients	Percent of Patients With	
				HIV Infection	AIDS
2	NY	193	16,778	3.3	1.0
5	DC, MD, VA, WV	259	15,040	3.4	0.7
3	NJ, PR	114	10,677	2.4	0.6
7	FL	241	14,179	2.3	0.6
6	GA, NC, SC	344	22,623	1.9	0.5
1	CT, MA, ME, NH, RI, VT	130	8,803	1.5	0.4
4	DE, PA	202	11,528	1.8	0.4
13	AR, LA, OK	229	10,688	1.2	0.4
8	AL, MS, TN	250	14,283	1.0	0.3
10	IL	118	9,869	1.3	0.3
11	MI, MN, ND, SD, WI	266	14,511	0.8	0.2
14	TX	268	19,796	0.9	0.2
17	AS, GU, HI, CA (northern)	117	10,200	0.8	0.2
18	CA (southern)	181	15,980	0.6	0.2
9	IN, KY, OH	245	16,657	0.5	0.1
12	IA, KS, MO, NE	163	7,523	0.6	0.1
16	AK, ID, MT, OR, WA	88	4,848	0.4	0.1
15	AZ, CO, NM, NV, UT, WY	166	9,858	0.3	0
	All	3574	233,841	1.5	0.4

AS denotes American Samoa, GU denotes Guam.

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## Appendix I

### National Surveillance of Dialysis-Associated Diseases 2000

#### Instruction Sheet

This questionnaire should be completed only for Chronic In-Center Hemodialysis patients who were dialyzed in your facility in 2000. Do NOT complete this questionnaire if your facility only performs transplants or acute dialysis or if you have only peritoneal or home dialysis patients. When the questionnaire is completed, keep a copy for your records and return the original to your ESRD Network office. For questions, please contact Elaine Miller at (404) 639-6422.

1. This question refers to your facility's policy for hepatitis b surface ANTIGEN (HBsAg) screening of patients who have never been infected with hepatitis B or are not immune to hepatitis B.
3. If your facility does not offer pneumococcal pneumonia vaccine status, respond "no" and omit question #3A. If your facility offers and tracks pneumococcal pneumonia vaccine status, report the total percent of patients who received the vaccine, NO MATTER WHERE THEY RECEIVED IT.
4. If your facility did not offer the influenza (flu) vaccine in 2000 respond "no" and omit question #4A. If your facility offers and tracks the influenza (flu) vaccine status, report the total percent of patients who received the vaccine, NO MATTER WHERE THEY RECEIVED IT.
5. How many of your chronic hemodialysis patients became newly INFECTED with the hepatitis B virus (seroconverted to hepatitis B surface ANTIGEN [HBsAg]) during 2000. This question is NOT referring to patients who seroconverted to hepatitis B surface ANTIBODY positive (anti-HBs) as a result of receiving the hepatitis B vaccination.
- 6a-c. These questions apply only to your chronic hemodialysis patients who were dialyzed Dec.4-9, 2000.
  - 6a asks how many of the patients had EVER received at least 3 doses of hepatitis B vaccine.
  - 6b asks if patients were tested for hepatitis B surface ANTIBODY during 2000.
  - 6b1 asks how many were hepatitis B surface ANTIBODY positive (regardless of whether they tested antibody positive due to vaccine or to resolved infection).
  - 6c asks how many patients were hepatitis B surface ANTIGEN positive. Being hepatitis B surface ANTIGEN positive means that the patient is acutely or chronically infected with the hepatitis B virus.
- 7a-b. These questions apply only to your chronic hemodialysis patients who were dialyzed Dec.4-9, 2000.
8. This question refers to the access actually being used to dialyze chronic hemodialysis patients the week of Dec.4-9, 2000.
9. "New hemodialysis patient" refers to someone who has been on hemodialysis less than 90 days. "Awaiting fistula/graft insertion" means that a referral has been made to a surgeon with a plan to schedule the patient for a fistula or graft insertion. "Awaiting maturity" means that the fistula or graft has been inserted but is not yet mature enough for use. "Established patient, fistula /graft failed, new fistula/graft planned" means that a referral has been made to a surgeon with a plan to schedule the patient for a fistula or graft insertion since the previous fistula/graft failed.
10. If the answer to #10 is no, omit 10a-d.
11. Check the answer that best fits your practice, even if the answer is not worded exactly as your practice.
- 12-14. These questions refer patients treated at any time during the year 2000.
16. If a screening test for HIV is positive, but the confirmatory test is negative, consider the patient HIV negative for this question.
  - 16a. For this question, include only those HIV positive patients who have AIDS. The 1993 AIDS definition for adolescents and adults includes patients with an AIDS-indicator condition and/or a CD4+ T-lymphocyte count <200/ ML or a CD4+ percentage <14.
17. Refers to only to staff who worked directly with hemodialysis patients or equipment. Do not include dietitians, social workers, or physicians.

**-THANK YOU FOR YOUR PARTICIPATION; IT IS GREATLY APPRECIATED-**

National Surveillance of Dialysis-Associated Diseases, 2000

For the Time Period January 1, 2000-December 31, 2000



If you did not treat chronic non-transient in-center hemodialysis patients in 2000, do not fill out this form

OMB NO. 0920-0033 Exp. Date: 09/30/2002

(5-10) Provider Number Name of Facility

Present Address City State Zip Code

PATIENT DATA

1. How often does your facility routinely test seronegative (i.e., negative for hepatitis B surface antigen and hepatitis B surface antibody) patients for hepatitis B surface antigen (HBsAg)? (14-15)
0 No routine testing 1 Every month 2 Every 2 months
3 Every 3-6 months 4 Every 7-12 months 5 Other (specify)

2. Which of these best describes your center's practice for hepatitis B vaccination of patients: (choose one) (16-17)
1 Offer vaccine to patients 2 Vaccine is offered to patients at individual physician's office
3 Do not offer vaccine to patients 4 Other, specify

3. During 2000 did your facility offer the pneumococcal pneumonia vaccine to chronic in-center hemodialysis patients? (18) 1 Yes 2 No
3a. If Yes, what percent of the chronic hemodialysis patients assigned to your center as of December 4-9, 2000, have in the last five years received the pneumococcal pneumonia vaccine? (19)
1 less than 25% 2 25-49% 3 50-74% 4 75-100% 5 Unknown

4. During 2000 did your facility offer the influenza (flu) vaccine to chronic in-center hemodialysis patients? (20) 1 Yes 2 No
4a. If Yes, what percent of the chronic hemodialysis patients assigned to your center as of December 4-9, 2000, received the influenza (flu) vaccine during 2000? (21)
1 less than 25% 2 25-49% 3 50-74% 4 75-100% 5 Unknown

5. During 2000, how many of your CHRONIC, NON-TRANSIENT in-center hemodialysis PATIENTS converted from hepatitis B surface ANTIGEN (HBsAg) negative to positive (i.e. had newly acquired hepatitis B virus infection. Do not include patients who were antigen positive before they were first dialyzed in your center)? (22-24)

6. How many CHRONIC, NON-TRANSIENT in-center hemodialysis PATIENTS were assigned to your center as of December 4-9, 2000? (25-27)
6a. Of the patients counted in question 6, how many had ever in their lives received at least 3 doses of hepatitis B vaccine? (28-30)
6b. Of the patients counted in question 6, were all or almost all tested for hepatitis B surface ANTIBODY (anti-HBs) during 2000? (31) 1 Yes 2 No
6b1) If Yes, how many were positive? (32-34)
6c. Of the patients counted in question 6, how many were hepatitis B surface antigen (HBsAg) positive? (35-37)

7. Of the patients counted in question 6, were all or almost all tested for hepatitis C antibody during 2000? (38) 1 Yes 2 No
(Note-this is NOT hepatitis B core antibody)
7a. If Yes, how many were positive for hepatitis C antibody? (39-41)
7b. If Yes, how many tested positive for hepatitis C antibody in 2000 who had previously tested negative? (42-44) (i.e., how many seroconverted from hepatitis C negative to positive during 2000?)

8. During December 4-9, 2000, how many of your chronic hemodialysis PATIENTS received hemodialysis through: (Note: these numbers should add up to the number of patients in #6)
8a. AV graft (45-47)
8b. AV fistula (48-50)
8c. Cuffed catheter (51-53)
8d. Non-cuffed catheter (54-56)

9. Of the patients with catheters (questions 8c and 8d above), how many are in each of the following categories: (Total should be the same as the number of catheter patients reported in 8c and 8d above):
New hemodialysis patient, awaiting fistula/graft insertion or maturity (57-59)
Established patient, fistula/graft failed, new fistula/graft planned or not yet mature. (60-62)
Established patient, fistula/graft placement impossible—catheter is only available access (63-65)
Other, specify (66-68)

Public reporting burden of this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC, Project Clearance Officer, 1600 Clifton Road, MS D-24, Atlanta, GA 30333, ATTN.: PRA (0920-0033). Do not send the completed form to this address.

**DIALYSIS POLICIES AND PRACTICES**

10 In 2000, did your facility reuse dialyzers for some or all patients? ..... (80) 1  Yes 2  No

If Yes:

10a. What method is used to disinfect the majority of these dialyzers? (CHOOSE ONE) (81-82)

1  Formaldehyde (formalin)

2  Glutaraldehyde (Diacide)

3  Peracetic acid (e.g., Renalin, and others)

4  Heat

5  Amuchina

6  Other (SPECIFY) \_\_\_\_\_

10b. Is bleach also used to clean the inside of these dialyzers? ..... (83) 1  Yes 2  No

10c. Does your facility's policy allow dialyzer reuse on patients who are positive for hepatitis C antibody (anti-HCV)?

(84-85) 1  Yes 2  No 3  Do not have any known anti-HCV positive patients

(Note: CDC guidelines permit dialyzer reuse for hepatitis C antibody-positive patients.)

10d. Where are dialyzers reprocessed? (86) 1  Dialyzers are reprocessed at your facility 2  Dialyzers are transported to an off-site facility for reprocessing

3  Both at your facility and off-site

11. At your center, where are medications from multidose vials most commonly drawn into syringes to prepare for patient administration? (CHOOSE ONLY ONE) (87-88)

1  In a separate medication room or in a medication area separate from the treatment area

2  At the dialysis stations

3  On a medication cart within the treatment area

**DISEASES OR COMPLICATIONS**

12. During the year 2000, how many of your hemodialysis patients were known to have a positive culture for vancomycin-resistant enterococcus (VRE)?

(89) 0  None 1  1-4 2  5-9 3  ≥10

12a. If you treated VRE-positive patients, do you treat them in a room separate from VRE-negative patients?

(90) 0  Never 1  Sometimes 2  Always

13. During 2000 did you perform rectal swabs or stool cultures on some patients to check for VRE at your center?

(Do not include cultures done while a patient was hospitalized)

(91) 1  Yes 2  No

14. During the year 2000 did any of your hemodialysis patients have a positive culture for methicillin-resistant *Staphylococcus aureus* (MRSA)?

(92) 1  Yes 2  No

15. At your center, was there an attempt during the year 2000 to insure that antibiotics are used appropriately? (96) 1  Yes 2  No

If Yes, circle all measures that were used during 2000: (97-102)

1  A written policy on antibiotic use

2  Reason for antibiotic must be recorded in chart or on order form

3  Automatic stop order (antibiotic must be reordered at intervals)

4  Approval needed for use of certain antibiotics

5  Formulary restriction (only selected antibiotics are available)

6  Other, specify \_\_\_\_\_

16. Among the chronic hemodialysis patients assigned to your center as of December 4-9, 2000, how many were known positive for HIV antibody? *Include only chronic in-center hemodialysis patients* ..... (103-105) \_\_\_\_\_

16a. Of these HIV antibody positive patients, how many were known to have AIDS? ..... (106-108) \_\_\_\_\_

**STAFF MEMBERS**

17. How many full-time and part-time staff were employed in your facility the week of December 4-9, 2000? *Include only staff who had direct contact with hemodialysis patients or equipment* ..... (109-111) \_\_\_\_\_

17a. How many of these staff had ever in their lives received at least 3 doses of hepatitis B vaccine? ..... (112-114) \_\_\_\_\_

17b. Were all or almost all of these staff tested for hepatitis C antibody (anti-HCV) during 2000? ..... (115) 1  Yes 2  No

(Note-this is not hepatitis B core antibody)

17b1) If Yes, how many were positive for hepatitis C antibody? ..... (116-118) \_\_\_\_\_

Comments:

**NAME OF PERSON WHO COMPLETED THIS SURVEY**

Please PRINT: ..... (119-129) \_\_\_\_\_ (130-140) \_\_\_\_\_

LAST NAME (119-129)

FIRST NAME (130-140)

Phone: (\_\_\_\_) \_\_\_\_\_ (141-150)

Fax: (\_\_\_\_) \_\_\_\_\_ (151-160)

**Send Copy 1 of the completed form to your ESRD Network office. Keep Copy 2 for your own records. DO NOT SEND FORM TO CDC.**

Call Elaine Miller (404-639-6422) with questions. Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

## Appendix II – Infection Control Resources for Hemodialysis Units

Topic	Resource
Guidelines for Infection Control For Hemodialysis Centers	Recommendations for preventing transmission of infections among chronic hemodialysis patients <a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5005a1.htm">http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5005a1.htm</a>
Preventing Access Infections– Catheters	Guideline for prevention of intravascular device-related infections <a href="http://www.cdc.gov/ncidod/hip/IV/Iv.htm">http://www.cdc.gov/ncidod/hip/IV/Iv.htm</a>
Vancomycin Use	Centers for Disease Control and Prevention. Recommendations for preventing the spread of vancomycin resistance. Mor Mortal Wkly Rep. 1995;44 (No. RR-12):1-13. <a href="http://aepo-xdv-www.epo.cdc.gov/wonder/prevguid/m0039349/m0039349.asp">http://aepo-xdv-www.epo.cdc.gov/wonder/prevguid/m0039349/m0039349.asp</a>  Tokars JI. Vancomycin use and antimicrobial resistance in hemodialysis centers. Am J Kidney Dis. 1998; 32 (3):521-523. <a href="http://www.ajkd.org/cgi/reprint/32/3/521">http://www.ajkd.org/cgi/reprint/32/3/521</a>
Vaccination	Rangel M, Coronado V, Euler G, Strikas R. Vaccine recommendations for patients on chronic dialysis. Semin Dial. 2000;13:101-107.
K/DOQI Guidelines Choice of vascular access Preventing access infections	NKF-K/DOQI Clinical Practice Guidelines for Vascular Access: Update 2000. Am J Kidney Diseases 37 (No. 1, Suppl 1), 2001: S157-S159. <a href="http://www.ajkd.org/content/vol37/suppl_1/">http://www.ajkd.org/content/vol37/suppl_1/</a>
Other Guidelines and Infection Control Information	Division of Healthcare Quality Promotion <a href="http://www.cdc.gov/ncidod/hip/default.htm">http://www.cdc.gov/ncidod/hip/default.htm</a>
Monitoring of Vascular Access Infections	Dialysis Surveillance Network <a href="http://www.cdc.gov/ncidod/hip/Dialysis/dsn.htm">http://www.cdc.gov/ncidod/hip/Dialysis/dsn.htm</a>



## Appendix III

### DIALYSIS SURVEILLANCE NETWORK

The Dialysis Surveillance Network (DSN), a voluntary national surveillance system monitoring bacterial infections and related events in hemodialysis patients, was initiated by CDC in August 1999 (1,2). Both adult and pediatric dialysis centers treating outpatients are invited to participate.

Bacterial infections, especially those involving the vascular access site, cause considerable morbidity and mortality in hemodialysis patients. Due to frequent hospitalizations and receipt of antimicrobials, these patients are at high risk for infection or colonization with antimicrobial-resistant bacteria. However, there are few recent studies of bacterial infections in hemodialysis patients, and previously there were no standardized surveillance methods.

The purposes of the DSN are as follows:

1. To provide a method for individual hemodialysis centers to record and track rates of vascular access infections, other bacterial infections, and intravenous antimicrobial starts.
2. To provide rates for comparisons among various dialysis centers (benchmarking).
3. To use these data to motivate practice changes and to prevent infections, especially those caused by antimicrobial resistant organisms.

Participating centers may enter data on paper forms provided by CDC and receive a data analysis report every quarter. Alternatively, they may use our **Internet-based** system for data entry and analysis and generate and print reports whenever desired. While summary data are released, the data from individual centers are confidential and cannot be released to anyone other than the dialysis center reporting the data.

Unique features of the DSN include:

- ! User-friendly methods simplify reporting.
- ! Data collectors record the presence or absence of criteria for infections, not the infections themselves.
- ! A computer algorithm determines whether the infection case definitions are met.
- ! The data collector does not have to memorize case definitions.
- ! The frequency of blood culturing, a factor that may influence reported infection rates, is determined.
- ! Several different rates are reported to better characterize the situation at any given center.

Centers are encouraged to participate in this system as a quality monitoring and control measure. **For information about enrollment, call 404-498-1109 or go to <http://www.cdc.gov/ncidod/hip/Dialysis/dsn.htm>.**

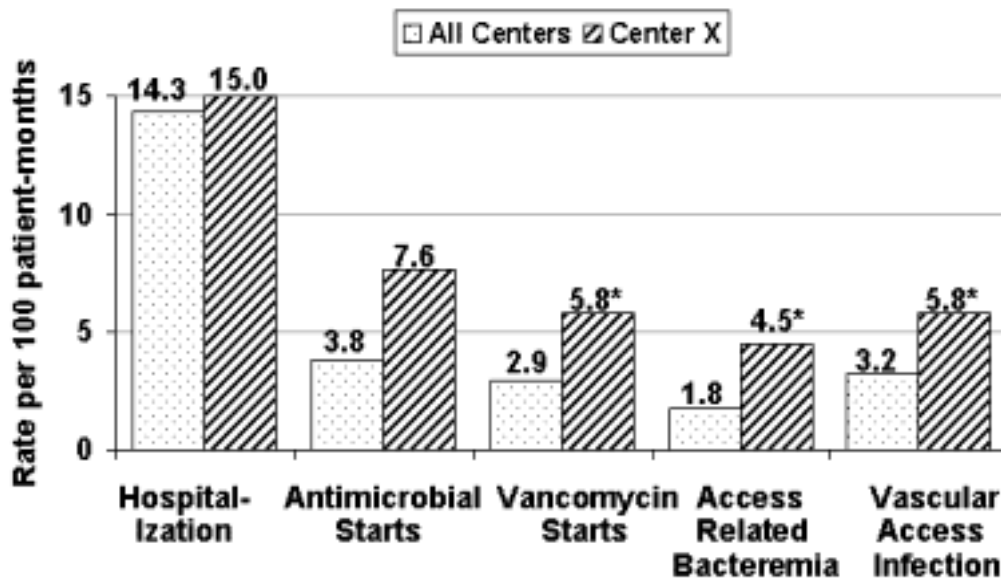
## SAMPLE DATA: DIALYSIS SURVEILLANCE NETWORK

The graph below shows some sample data from this surveillance system. The rates for “All Centers” are compared with the rate at a single center, designated “Center X.” Data are shown as the rate per 100-patient months, which is equivalent to the percent of patients having the stated event each month.

The five events in the graph include hospitalization, outpatient IV antimicrobial starts, vancomycin starts, access-related bacteremia (i.e., positive blood cultures thought to be related to the patient’s vascular access device), and vascular access infection (i.e., includes episodes both with and without a positive blood culture).

As indicated by the asterisk (\*), “Center X” has some rates that are significantly higher than other centers. This was determined after standardizing the data, i.e., accounting for any possible differences in the mix of vascular access types between Center X and other centers<sup>1</sup>. We hope that these comparisons will assist dialysis centers in their attempts to reduce infections, use antimicrobials wisely, and limit the spread of antimicrobial resistance.

### Rates for All Centers vs a Single Center (Center X)



\*P<0.05 standardized for vascular access types

<sup>1</sup>Infection rates vary widely depending on the type of vascular access. For example, the rate of access-related bacteremia was 0.25 per 100 patient-months for fistulas, 0.53 for grafts, 4.84 for noncuffed catheters, and 8.73 for cuffed catheters (2).