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Vancomycin-Resistant Enterococci in Virginia, 1995-96

Background

Vancomycin-resistant enterococci (VRE) are an important cause of nosocomial infections, and the incidence of these infections is increasing.[1] The risk factors for VRE infection include severe underlying disease, prior hospitalization, and prior exposure to multiple antibiotics, including vancomycin. Infections with VRE are significant for several reasons. Firstly, enterococci are normal inhabitants of the gastrointestinal and female genital tracts, and people may become colonized with VRE with no apparent symptoms. If a person colonized with VRE is hospitalized or resides in a nursing home or other in-patient facility, there is a risk of transmitting VRE to other patients or residents who may then develop a symptomatic infection. Secondly, these infections are often difficult to treat due to their resistance to multiple antibiotics. Enterococci are inherently resistant to many commonly used antibiotics, such as cephalosporins, aminoglycosides and penicillin and, in addition to vancomycin, they readily develop resistance to tetracyclines and macrolides.

Thirdly, these organisms are able to acquire the genes for resistance from other bacterial species and pass them to other bacterial types, such as staphylococci.

The development of vancomycin-resistant staphylococci has recently become a reality. In 1996 and 1997, infections caused by *Staphylococcus aureus* strains with reduced susceptibility to vancomycin were identified in hospitalized patients in Japan, Michigan, and New Jersey.[2,3] Also in 1996, the first bloodstream infection in the United States due to a strain of *S. epidermidis* with decreased susceptibility to vancomycin was reported from a hospital in northern Virginia.

Virginia Survey

In order to learn how frequently VRE had been isolated in Virginia, the Office of Epidemiology sent a survey to all hospital laboratories in the state in June 1996. Information was collected retrospectively for a 12-month period (May 1, 1995 to April 30, 1996). The return rate for this survey was 42% (47/112), with replies primarily from community hospitals.

Forty-three (91%) of the 47 responding laboratories reported that they routinely do sensitivity testing in-house on enterococcal isolates. Two laboratories reported sending isolates to a reference laboratory and the other two reported no sensitivity testing on enterococcal isolates.

Forty-five percent of those testing enterococci for antibiotic sensitivity screen all isolates for vancomycin resistance, 50% test isolates from normally sterile sites, such as blood and urine, and 5% test isolates from sterile sites or if they are the predominant organism in a mixed culture. The sensitivity method used most frequently was the minimum inhibitory concentration (35/42 respondents, 83%). Only 17% of laboratories reported sensitivity testing by the disk diffusion method. The majority of laboratories tested enterococcal isolates against a panel of antibiotics, not just vancomycin. The panel included such antibiotics as penicillin (93%), ampicillin (88%), gentamicin (55%) and erythromycin (43%). The gentamicin-streptomycin synergy screen was included in testing for 19% (8/42) of laboratories reporting testing. Eighteen laboratories reported that when screening enterococci from a urine culture, additional antibiotics were included, such as nitrofurantoin (13/18), ciprofloxacin (7/18), or norflaxacin (8/18).

Twenty-five (66%) of the 38 responding laboratories reported isolating VRE. Among these, VRE accounted for an average of 4% of all enterococcal isolates (range <1% to

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18%). The majority (18/25) of laboratories that had isolated VRE had done so from urine cultures, almost half (12/25) had isolated VRE from wounds and a fourth (6/25) had found VRE in blood.

In this study, resistant enterococci were reported primarily from the northern, eastern and southwestern areas of the state. The extent to which laboratories in other areas of the state had isolated VRE could not be determined due to lack of response to the survey.

Several studies are ongoing in Virginia to determine utilization patterns of vancomycin in hospitals, one of which is included in this issue of the *Bulletin*.

References

1. CDC. Recommendations for preventing the spread of vancomycin resistance. MMWR 1995;44 (No. RR-12):1-13.

2. CDC. Reduced susceptibility of *Staphylococcus aureus* to vancomycin, Japan, 1996. MMWR 1997; 46:624-6.

3. CDC. Update: *Staphylococcus aureus* with reduced susceptibility to vancomycin, United States, 1997. MMWR 1997;46:813-5.

Submitted by: Elizabeth Eustis Turf, Ph.D., Virginia Commonwealth University, Survey Research and Evaluation Laboratory

Vancomycin Utilization in Selected Virginia Hospitals, 1995

The Virginia Health Quality Center (VHQC) was created in 1984 as the Medicare Peer Review Organization in Virginia. Under its current Medicare contract, known as the Health Care Quality Improvement Program, the VHQC aims to improve medical care through cooperative projects with Virginia hospitals and physicians. These projects target specific conditions prevalent in the Medicare population and procedures used for their treatment.

The VHQC has more than 20 such projects under way, which are based on statistical analyses of the Medicare claims database and other data sources. Results of the analyses are shared with participants, often in face-to-face "feedback sessions," for the purpose of stimulating hospital quality improvement efforts. To date, more than 95% of all general, acute care hospitals in Virginia have participated in at least one project with the VHQC. By properly documenting their participation in a project, hospitals can meet the standards for quality improvement of the Joint Commission on Accreditation of Healthcare Organizations. This article presents baseline data from a vancomycin utilization project in six Virginia hospitals.

Introduction

Between 1989 and 1993, the percentage of nosocomial enterococcal infections caused by vancomycin-resistant enterococci (VRE) increased from 0.3% to 7.9%, according to the Centers for Disease Control and Prevention (CDC). The majority of this increase was seen in patients in intensive care units (ICUs) although an increase was seen also in non-ICU patients.[1] In addition, several hospital-based outbreaks have been due to VRE.

In response to the dramatic increase of vancomycin resistance in enterococci and the association between vancomycin exposure and resistance, the CDC Hospital Infection Control Practices Advisory Committee met with representatives of several related associations and developed recommendations for the prevention and control of VRE, including guidelines for the use of vancomycin. These recommendations were published in September 1995[1] and were reprinted in the November 1995 issue of the *Virginia Epidemiology Bulletin*. The goal of these guidelines was to encourage hospitals to work together with different programs and departments in their facility to develop a "comprehensive, institution-specific, strategic plan to detect, prevent, and control infection and colonization with VRE."[1]

The immediate objective of the vancomycin utilization project is to decrease unsupported vancomycin use in the participating hospitals.

The long-term goal is to decrease the incidence of VRE infections in hospital settings.

The vancomycin utilization project is a Medicare study that was conceived in response to the growing national concern about vancomycin-resistant infections. The VHQC is participating in the vancomycin utilization project, along with other Medicare Peer Review Organizations in Connecticut, Washington, D.C., Delaware, Massachusetts, Maine, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Puerto Rico, Rhode Island, Vermont and West Virginia. In Virginia, six hospitals are involved.

The immediate objective of this project, the largest vancomycin-use project conducted anywhere to date, is to decrease unsupported vancomycin use in the participating hospitals. The long-term goal is to decrease the incidence of VRE infections in hospital settings.

Methodology

The baseline study was a hospital-based retrospective medical record review. Medicare beneficiaries hospitalized in participating facilities who had received vancomycin between January 1 and July 31, 1995, were identified from hospital pharmacy records. Corresponding medical records were reviewed to assess the reason for vancomycin use. A record abstraction instrument was designed, pilot tested, and subsequently modified before project data collection began. Quality indicators were based on CDC guidelines regarding situations in which vancomycin use is appropriate and acceptable (see Box, page 3) and situations in which its use should be discouraged.

Data abstraction was done on-site and the VHQC analyzed the data using SAS, a commercially available statistical software package. Results were disseminated to participating hospitals.

Results

A total of 7,133 medical records from the participating hospitals were included in the project, 596 of which were from Virginia hospitals.

Of the 596 Virginia medical records reviewed, vancomycin was administered for the following reasons:

- 61% for treatment of suspected or confirmed infection (other than colitis)
- 1% for treatment of colitis
- 34% for procedural and/or endocarditis prophylaxis
- 4% for situations that could not be categorized in the analysis

Vancomycin was administered in a situation supported by the CDC guidelines in 39% of the Virginia records that were reviewed:

- 29% for serious beta-lactam-resistant

Recommendations for the Use of Vancomycin:

1. Treatment of serious infections caused by beta-lactam-resistant gram-positive microorganisms.

2. Treatment of infections caused by gram-positive microorganisms in patients who have serious allergies to beta-lactam antimicrobials.

3. Treatment of antibiotic-associated colitis that fails to respond to metronidazole therapy or is severe and potentially life-threatening.

4. Prophylaxis, as recommended by the American Heart Association, for endocarditis following certain procedures in patients at high risk for endocarditis.

5. Prophylaxis for major surgical procedures involving implantation of prosthetic materials or devices at institutions that have a high rate of infections caused by methicillin-resistant staphylococci. A single dose of vancomycin administered immediately before surgery is sufficient unless the procedure lasts >6 hours, in which case the dose should be repeated. Prophylaxis should be discontinued after a maximum of two doses.

Reprinted from Recommendations for Preventing the Spread of Vancomycin Resistance, MMWR 44(RR-12), 1995.

gram-positive infection
- 1% for beta-lactam-susceptible gram positive infection in patients with serious beta-lactam allergy
- 9% for surgical prophylaxis (limited to two days) involving implantation of prosthetic materials in patients with serious beta-lactam allergy or at institutions with a high rate of infections caused by methicillin-resistant *Staphylococcus aureus*
- 0.2% for endocarditis prophylaxis (limited to two days) in patients with serious beta-lactam allergy

However, in 57% of the Virginia records, vancomycin use was "unsupported," that is, used in situations where the CDC guidelines discourage its use. The two categories of uses with the highest percentage of unsupported use were for the empiric treatment of infection and the prolonged use for surgical prophylaxis.

The following situations stand out as potential areas for improvement:
- Treatment of confirmed or suspected beta-lactam-susceptible gram-positive infection in patients without serious beta-lactam allergy (12%)
- Treatment when cultures have no gram-positive growth or were not performed (18%)
- Surgical prophylaxis (excluding prosthetic implants) in patients without serious beta-lactam allergy (18%)
- Surgical prophylaxis exceeding two days (16%)

Discussion

After providing hospitals with these data in a series of regional feedback sessions, the VHQC encouraged each hospital to develop and implement a quality improvement plan designed to bring the hospital into closer compliance with the practice guidelines for the use of vancomycin. All six hospitals participating in the project submitted a plan.

Strategies that the hospitals incorporated in their plans included the following: computerized pharmacy and microbiology alerts containing CDC recommendations for treatment of certain infections; periodic physician educational updates; automatic antibiotic "stop dates" after three days to alert the practitioner to review culture results; antibiotic ordering forms that require justification for vancomycin; chart reminders; and hospital policies for antibiotic regimens for specific clinical circumstances.

The next step in this project is remeasurement. The VHQC will return to the participating hospitals to examine another set of medical records of Medicare beneficiaries. The VHQC will evaluate whether the hospitals, after the implementation of their quality improvement plans, are now in closer compliance with the clinical practice guidelines put forth by CDC. Remeasurement is scheduled for later this year, with feedback to hospitals planned for the spring of 1998.

Reference

1. Centers for Disease Control and Prevention Hospitals Infection Control Practices Advisory Committee. Recommendations for preventing the spread of vancomycin resistance. Infection Control Hospital Epidemiology, 1995;16:105-113.

Submitted by Virginia Health Quality Center, Richmond, Virginia.

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Results of the Public Health Response to *Pfiesteria* Workshop, Atlanta, Georgia, September 29-30, 1997

On September 29-30, 1997, CDC sponsored a workshop to coordinate a multistate response to public health issues about *Pfiesteria piscicida*. Workshop attendees included representatives from the health departments of eight states (Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia) and the District of Columbia, the U.S. Food and Drug Administration, the National Institutes of Health's National Institute of Environmental Health Sciences, CDC's National Institute for Occupational Safety and Health, and the U.S. Environmental Protection Agency.

P. piscicida and morphologically related organisms (MROs) are dinoflagellates that have been implicated in recent estuarine* fish kills on the U.S. eastern seaboard and have been reported to be associated with human illness. These dinoflagellates appear similar under light microscopy and require scanning elec-

**A coastal area at the mouth of a river where fresh river water mixes with salty sea water.*

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Penicillin-Resistant *Streptococcus pneumoniae*, Virginia, 1995-96

Background

The isolation of drug-resistant *Streptococcus pneumoniae* (DRSP) has increased since the late 1980s. A number of studies have been done to determine how commonly the organism is seen, what type of infections it causes, and to which antibiotics it is resistant. In 1994 and 1996, the Office of Epidemiology conducted surveys to evaluate the extent to which this organism has been isolated in Virginia.

The first survey requesting information about the isolation of penicillin-resistant pneumococci was distributed to all medical laboratories in the state in 1994. The results were reported in the September 1994 issue of the *Virginia Epidemiology Bulletin.* During the summer of 1996, a follow-up questionnaire was distributed in an attempt to determine any change in the incidence of penicillin-resistant pneumococci. Laboratories were asked to report information for the time frame May 1, 1995 to April 30, 1996. The return rate was 41% (46/112). Unfortunately, the hospitals with the greatest volume in the state were among those not completing the survey. The laboratories that did respond were geographically distributed throughout Virginia, allowing us to confirm an increase in isolation of penicillin-resistant pneumococci in all areas of the state, although the true incidence is probably higher than reported here.

Results

Of the laboratories that responded, 26 (57%) reported that they had also completed the 1994 survey. In the two years since that time, 52% of these laboratories had implemented new or additional *S. pneumoniae* testing procedures. During 1996, 68% reported sensitivity testing on pneumococci in-house; 16% screened for resistance in-house and sent positive isolates to a reference laboratory for confirmatory testing; and 11% sent all isolates to a reference laboratory. Only two (5%) respondents reported doing no sensitivity testing on *S. pneumoniae* isolates.

The majority (90%) of laboratories utilized a screening procedure to look for resistance to penicillin prior to a full sensitivity panel. Of those, 84% screened all isolates, 5% screened isolates from normally sterile sites and 11% screened a combination of respiratory and sterile site isolates. The most commonly reported testing method for full sensitivity testing was the E-Test (15 of 27 responding) followed by the Kirby-Bauer disk diffusion method (10/27). Other minimum inhibitory concentration testing methods were reported in 7% (2/27) of the facilities.

Percent of Hospitals Reporting Antibiotic Resistance

Organism	1994	1996
Penicillin-resistant *S. pneumoniae*	51%	83%
Multi-drug resistant *S. pneumoniae*	13%	54%

During the 1994 survey, 51% of laboratories that had the information available reported isolating penicillin-resistant pneumococci. In 1996, this proportion increased to 83% and the average number of resistant isolates per facility per year increased from seven (range 1-45) in 1994 to nine (range 1-36). Among the laboratories responding to the 1996 survey, the average yearly rate for isolation of penicillin-resistant pneumococci was 17 per 100 *S. pneumoniae* isolates. As seen previously, penicillin-resistant pneumococci have been isolated in all geographic regions of the state.

The most commonly reported sites for isolation of penicillin-resistant pneumococci were sputum (89% of laboratories) and blood (72%). Thirty-three percent of laboratories reported finding isolates in cultures of the ear, 28% from nasopharyngeal swabs, 28% in the eye and 24% in spinal fluid. This pattern was similar to that seen in 1994.

A question included in both surveys requested information on the isolation of pneumococcal isolates resistant to other antibiotics, such as the cephalosporins. Five of the 38 laboratories (13%) that answered the question in 1994 reported isolation of cephalosporin-resistant pneumococci. This figure increased to 54% (15/28) in 1996. As in 1994, the facilities reporting multi-drug-resistant pneumococci were located throughout the state.

Discussion

The findings highlight some important issues. Firstly, the number of laboratories reporting an increase in their pneumococcal sensitivity testing procedures since 1994 reflects the increase in requests for this testing, indicating that the medical community considers drug-resistant pneumococci a serious issue. Secondly, it is noteworthy that 17 of every 100 pneumococcal isolates were resistant to penicillin, especially considering that this figure is probably an underestimate of the true incidence rate. When treatment decisions are being made, it is no longer safe to assume that pneumococcal infections will respond to penicillin or even the cephalosporins.

The Office of Epidemiology wishes to thank all those laboratories who took the time to complete the questionnaire.

Submitted by Elizabeth Eustis Turf, Ph.D., Virginia Commonwealth University, Survey Research and Evaluation Laboratory

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tron microscopy for definitive identification. The attendees of the workshop agreed on a combined set of environmental conditions and clinical signs and symptoms that together may represent adverse consequences of exposure to these organisms. The environmental conditions are exposure to estuarine water characterized by any of the following: 1) fish with lesions consistent with *P. piscicida* or MRO toxicity (20% of a sample of at least 50 fish of one species having lesions); 2) a fish kill involving fish with lesions consistent with *P. piscicida* or MRO toxicity; or 3) a fish kill involving fish without lesions, if *P. piscicida* or MROs are present and there is no alternative reason for the fish kill. The clinical features in humans include any of the following signs and symptoms: 1) memory loss, 2) confusion, 3) acute skin burning (on direct contact with water), or 4) three or more of an additional set of conditions (headaches, skin rash, eye irritation, upper respiratory irritation, muscle cramps, and gastrointestinal complaints [i.e., nausea, vomiting, diarrhea, and/or abdominal cramps]).

Workshop attendees suggested using the above framework to identify potentially affected persons and recommended initiating the following public health activities: 1) uniform multistate surveillance for potential *P. piscicida*- and MRO-related illness; 2) multistate, CDC coordinated, epidemiologic studies to determine possible human health effects associated

Cases of Selected Notifiable Diseases Reported in Virginia*

Disease	Total Cases Reported, August 1997						Total Cases Reported Statewide, January through August		
	State	Regions					This Year	Last Year	5 Yr Avg
		NW	N	SW	C	E			
AIDS	42	2	19	3	4	14	719	800	813
Campylobacteriosis	103	32	17	20	17	17	406	504	461
Giardiasis	51	4	19	7	15	6	281	209	197
Gonorrhea	602	33	33	122	189	225	5215	6171	8043
Hepatitis A	32	10	13	3	4	2	150	110	104
Hepatitis B	9	2	1	2	1	3	85	96	97
Hepatitis NANB	2	0	0	0	1	1	20	10	17
HIV Infection	57	4	17	4	17	15	623	727	819
Influenza	0	0	0	0	0	0	437	373	653
Legionellosis	4	0	0	3	1	0	16	13	10
Lyme Disease	19	3	6	3	2	5	35	30	60
Measles	0	0	0	0	0	0	1	2	4
Meningitis, Aseptic	29	3	8	2	1	15	129	106	188
Meningitis, Bacterial†	6	1	2	1	0	2	57	53	70
Meningococcal Infections	3	1	0	2	0	0	38	41	43
Mumps	2	0	1	0	1	0	9	12	25
Pertussis	2	1	0	0	0	1	34	39	25
Rabies in Animals	65	18	18	16	6	7	414	391	278
Rocky Mountain Spotted Fever	3	0	1	1	0	1	10	27	15
Rubella	0	0	0	0	0	0	1	2	0
Salmonellosis	153	27	26	33	27	40	628	721	660
Shigellosis	57	1	25	23	2	6	344	415	344
Syphilis, Early‡	42	2	3	9	12	16	417	603	838
Tuberculosis	19	2	7	3	4	3	220	201	239

Localities Reporting Animal Rabies: Albemarle 1 sheep; Alexandria 2 raccoons; Alleghany 1 raccoon; Amelia 1 bat, 1 otter; Amherst 1 skunk; Appomattox 1 cat; Arlington 2 raccoons; Augusta 1 skunk; Bedford 1 cat; Chesapeake 1 fox; Chesterfield 1 raccoon; Cumberland 1 raccoon; Fairfax 1 cat, 2 foxes, 5 raccoons; Fauquier 1 raccoon; Franklin County 1 bat, 2 raccoons, 1 skunk; Giles 1 bat; Henrico 1 bat; Henry 1 raccoon; Lancaster 1 fox, 1 raccoon; Lee 1 bat; Loudoun 1 groundhog, 3 raccoons, 1 skunk; Louisa 1 raccoon; Lynchburg 1 skunk; Montgomery 1 fox; Nelson 2 skunks; Newport News 1 raccoon; Northampton 1 raccoon; Northumberland 1 raccoon; Page 1 skunk; Pittsylvania 1 raccoon; Prince George 1 raccoon; Pulaski 1 fox; Rappahannock 1 fox; Rockbridge 1 cow; Rockingham 2 skunks; Shenandoah 1 raccoon; Spotsylvania 2 bats, 1 skunk; Suffolk 1 raccoon; Tazewell 1 raccoon; Warren 1 raccoon, 1 skunk.

Occupational Illnesses: Arsenic Exposure 1; Asbestosis 18; Carpal Tunnel Syndrome 54; DeQuervain's Syndrome 1; Hearing Loss 10; Lead Poisoning 4; Mesothelioma 1; Pneumoconiosis 6.

*Data for 1997 are provisional. †Other than meningococcal. ‡Includes primary, secondary, and early latent.

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with *P. piscicida* and MRO exposure; and 3) identification of a biomarker of exposure to the toxins produced by these organisms. The public health implication of toxicity of these dinoflagellates is an example of an emerging environmental and potential occupational health issue that can best be addressed through collaboration among federal, state, and local health agencies.

The Virginia Department of Health established a toll-free hotline (888/238-6154) on September 18, 1997, to receive requests for information and reports of illness that might be related to *Pfiesteria.* Between September 18 and October 31, 1997, a total of 141 total calls were received. Of these calls, 99 were questions about the organism, 33 were reports or questions about illnesses unrelated to *Pfiesteria*, and nine were reports of illness related to possible *Pfiesteria* exposures. All nine persons with possible exposure were contacted and asked to participate in a preliminary medical evaluation. Five of the nine have already undergone the preliminary examination and while *Pfiesteria* has not been ruled out, neither has evidence been found to confirm that their symptoms are *Pfiesteria*-related. More testing is planned and arrangements are being made for the remaining four to be evaluated.

This article is adapted from the MMWR article with the same title (MMWR 1996:46;951).

Cases of Selected Notifiable Diseases Reported in Virginia*

Disease	Total Cases Reported, September 1997						Total Cases Reported Statewide, January through September		
	State	Regions					This Year	Last Year	5 Yr Avg
		NW	N	SW	C	E			
AIDS	96	10	46	4	9	27	814	904	917
Campylobacteriosis	62	13	10	9	17	13	469	608	540
Giardiasis	46	8	13	4	11	10	328	265	237
Gonorrhea	847	60	112	91	167	417	6158	7099	9130
Hepatitis A	21	1	8	4	2	6	171	135	122
Hepatitis B	10	1	2	0	3	4	95	111	109
Hepatitis NANB	3	0	0	1	1	1	23	12	21
HIV Infection	131	11	48	9	18	45	752	770	906
Influenza	0	0	0	0	0	0	437	374	657
Legionellosis	3	0	0	2	1	0	19	13	12
Lyme Disease	11	2	4	2	1	2	46	41	71
Measles	0	0	0	0	0	0	1	3	4
Meningitis, Aseptic	46	10	10	0	0	26	175	142	260
Meningitis, Bacterial†	12	3	5	2	1	1	68	57	75
Meningococcal Infections	3	0	0	1	0	2	42	47	47
Mumps	1	0	1	0	0	0	10	12	28
Pertussis	8	4	1	0	2	1	42	55	32
Rabies in Animals	91	23	37	9	13	9	505	448	324
Rocky Mountain Spotted Fever	5	2	0	1	1	1	15	46	22
Rubella	0	0	0	0	0	0	1	2	0
Salmonellosis	138	24	28	21	30	35	762	874	799
Shigellosis	23	0	8	8	1	6	363	506	397
Syphilis, Early‡	59	2	4	5	6	42	478	660	930
Tuberculosis	23	1	7	4	4	7	254	234	260

Localities Reporting Animal Rabies: Accomack 1 raccoon; Albemarle 1 raccoon; Alexandria 4 raccoons; Alleghany 1 skunk; Amelia 1 skunk; Amherst 1 skunk; Augusta 1 skunk; Buckingham 1 skunk; Chesapeake 1 raccoon; Chesterfield 2 raccoons; Fairfax 2 bats, 3 foxes, 16 raccoons, 4 skunks; Fauquier 3 raccoons; Floyd 1 raccoon; Frederick 1 fox; Gloucester 1 skunk; Goochland 1 raccoon; Hanover 1 raccoon, 2 skunks; Henrico 1 raccoon; Henry 1 skunk; Hopewell 1 raccoon; Lancaster 1 fox; Loudoun 1 fox, 2 raccoons, 2 skunks; Louisa 1 raccoon, 1 skunk; Nelson 1 raccoon, 2 skunks; Nottoway 1 skunk; Orange 1 fox; Patrick 1 raccoon; Prince George 1 raccoon; Prince William 1 bat, 1 raccoon, 1 skunk; Rappahannock 2 raccoons; Richmond City 1 raccoon; Roanoke County 1 raccoon; Spotsylvania 3 skunks; Stafford 1 fox, 3 raccoons; Suffolk 1 raccoon; Virginia Beach 1 cat, 1 raccoon; Warren 1 raccoon, 1 skunk; Williamsburg 1 skunk; Wythe 1 raccoon, 2 skunks; York 1 cat.

Occupational Illnesses: Asbestosis 34; Carpal Tunnel Syndrome 50; DeQuervain's Syndrome 1; Hearing Loss 13; Lead Poisoning 7; Pneumoconiosis 8.

*Data for 1997 are provisional. †Other than meningococcal. ‡Includes primary, secondary, and early latent.

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