EPIDEMIOLOGY BULLETIN

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September, 1986 Volume 86, Number 9

Occupational Hearing Loss in Virginia

Introduction

Noise-induced hearing loss occurs when a worker is continuously exposed to loud noise or after brief exposure to a very loud impulse noise such as an explosion. This hearing loss may result in permanent nerve deafness as a result of damage to the nerve cells of the inner ear, or cochlea.*

The increased mechanization of industry during the past century has resulted in many workers (15 million U.S. workers) currently being exposed to hazardous levels of noise. The hazard associated with noise exposure is proportional to the duration and intensity of exposure.

The Occupational Safety and Health Administration (OSHA) estimates that 473,000 production workers (5%) in the U.S. have moderate to severe hearing impairments due to excessive noise exposure.[1] In 1984, the Industrial Commission of Virginia received 143 workers' compensation claims for hearing loss and made 56 awards costing $211,647.[2]

Epidemiology in Virginia

All workers' compensation claims for noise-induced hearing loss filed with the Industrial Commission of Virginia from 1980 through 1985 were analyzed. Annual incidence rates per 100,000 were calculated using industry and locality-specific employment estimates published by the U.S. Bureau of Census.[3]

There were 369,034 workmen's compensation claims filed and computerized from 1980 through 1985. Of these, 500 (0.14%) were for noise-induced hearing loss; awards were paid on 226 (45%). Two thirds of the claims were filed by operators of machinery or equipment; few claims were filed by workers in service and professional occupations (Figure 1).

Incidence rates by major industry class are shown in Table 1. Mining, construction, manufacturing, and transportation/communications/utilities accounted for the highest numbers of cases and the highest rates for noise-induced hearing loss. The highest rate (177.1/100,000) was in the mining industry, predominantly coal mining. When manufacturing indus-

**Explosions may also result in conductive hearing loss due to trauma to the middle ear.*

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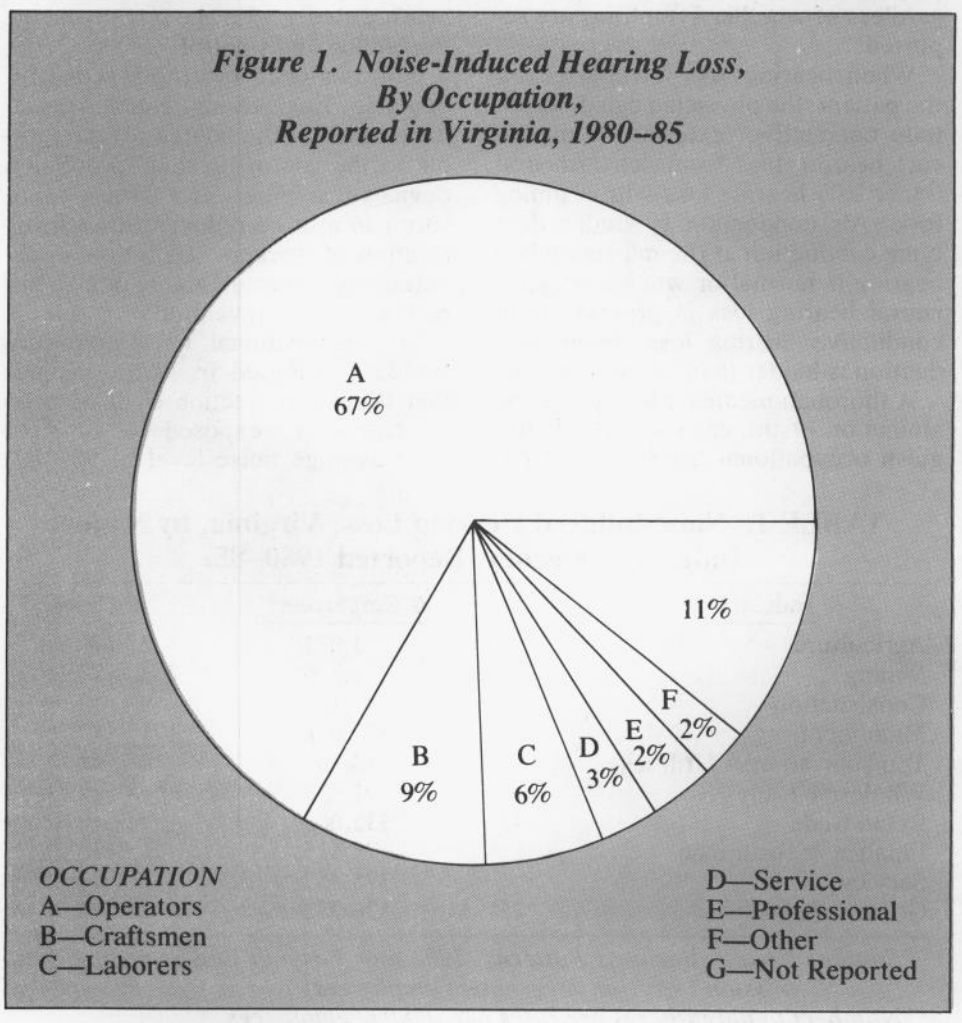
Figure 1. Noise-Induced Hearing Loss, By Occupation, Reported in Virginia, 1980--85



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tries were examined in greater detail, the vast majority of cases were from the furniture and fixture, paper and pulp, metal products, transportation equipment (predominantly shipbuilding), and rubber and plastics industries.

Diagnosis

Early occupational hearing loss may easily go undetected by both the worker and his physician because there are no obvious signs or symptoms. Impairment usually begins near the 4000 Hz (3000 to 6000 Hz) frequency, which is above the human speech frequency range (500–2000 Hz). As the hearing loss progresses, the speech frequencies become affected and the worker may complain of tinnitus or a blocked sensation in one or both ears. He may miss high frequency sounds such as the letters "t" or "d" at the end of a word ("six" is confused with "sit"). In order to detect noise-induced hearing loss at an early stage, it is recommended that a physician order an audiogram for any patient with a history of workplace exposure to excessive noise, regardless of whether symptoms are reported.

When hearing loss is reported by the patient, the physician can differentiate conductive (external or middle ear) hearing loss from sensorineural (inner ear) hearing loss with a tuning fork. Air conduction is louder than bone conduction at the mastoid when hearing is normal or when a sensorineural hearing loss is present. With conductive hearing loss, bone conduction is louder than air conduction.

A thorough medical history and examination of the ear can help distinguish occupational hearing loss from other causes of sensorineural hearing loss such as congenital, metabolic, infectious, drug-related, vascular, neoplastic, and traumatic disorders. The most common nonoccupational cause of hearing loss is the natural decline in hearing ability with age (presbycusis).

Prevention and Control

Noise-induced hearing loss is preventable. Engineering remedies to reduce noise at the source are preferable to the use of personal protection devices (ear plugs, etc). Noise exposure can also be reduced through the rotation of workers. Hearing conservation programs are an essential component of any prevention program.

The occupational noise exposure standard, adopted in 1970, specifies that hearing protection shall be used by employees exposed to an eight hour average noise level of 90 dBA (decibels on "A" scale) or more. A hearing conservation amendment became effective on June 15, 1984 which requires an employer at a workplace where average noise levels are greater than or equal to 85 dBA to establish a hearing conservation program including periodic audiograms for employees.[4]

Workplace noise exposure standards are enforced by the Virginia Department of Labor and Industry (804/786-0574) and the Virginia Department of Mines, Minerals and Energy (804/257-0330) in general industry and mining industry, respectively.

Submitted by Carl W. Armstrong, M. D. and C. Diane Woolard.

TABLE 1. Noise-induced Hearing Loss, Virginia, by Major Industry Category, Reported 1980–85.

Industry	# Employees*	# Cases	
Agriculture	3,077	2	(10.8)**
Mining	24,276	258	(177.1)
Construction	81,187	19	(3.9)
Manufacturing	372,024	171	(7.7)
Transportation & Utilities	98,367	14	(2.4)
Wholesale trade	91,338	1	(0.2)
Retail trade	335,060	5	(0.3)
Finance & Insurance	72,515	1	(0.2)
Services	375,455	10	(0.4)
Government	326,772	17	(0.9)

**Source: County Business Patterns, 1982 and Virginia Employment Commission 1985 (for government employees)*

***Numbers in parentheses are rates per 100,000 employees.*

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Classification System for HTLV-III/LAV Infections

Introduction

Persons infected with the etiologic retrovirus of acquired immunodeficiency syndrome (AIDS) (*1–4*)* may present with a variety of manifestations ranging from asymptomatic infection to severe immunodeficiency and life-threatening secondary infectious diseases or cancers. The rapid growth of knowledge about human T-lymphotropic virus type III/lymphadenopathy-associated virus (HTLV-III/LAV) has resulted in an increasing need for a system of classifying patients within this spectrum of clinical and laboratory findings attributable to HTLV-III/LAV infection (*5–7*).

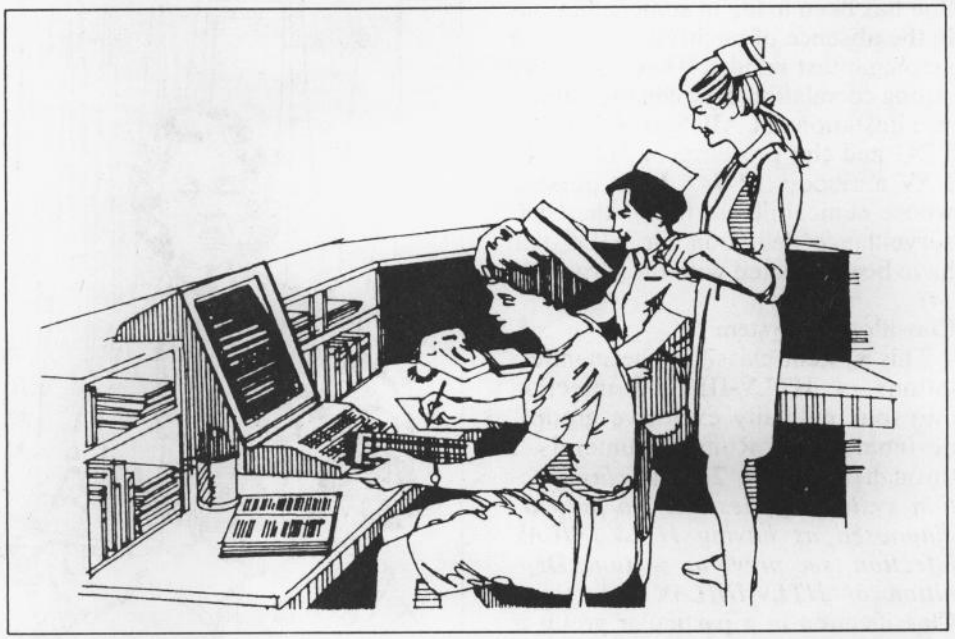
Various means are now used to describe and assess patients with manifestations of HTLV-III/LAV infection and to describe their signs, symptoms, and laboratory findings. The surveillance definition of AIDS has proven to be extremely valuable and quite reliable for some epidemiologic studies and clinical assessment of patients with the more severe manifestations of disease. However, more inclusive definitions and classifications HTLV-III/LAV infection are needed for optimum patient care, health planning, and public health control strategies, as well as for epidemiologic studies and special surveys. A broadly applicable, easily understood classification system should also facilitate and clarify communication about this disease.

In an attempt to formulate the most appropriate classification system, CDC has sought the advice of a panel of expert consultants† to assist in defining the manifestations of HTLV-III/LAV infection.

Goals and Objectives of the Classification System

The classification system presented in this report is primarily applicable to public health purposes, including disease reporting and surveillance, epidemiologic studies, prevention and control activities, and public health policy and planning.

Immediate applications of such a system include the classification of infected persons for reporting of cases to state and local public health agencies, and use in various disease coding and recording systems, such as the forthcoming 10th revision of the International Classification of Diseases.



Definition of HTLV-III/LAV Infection

The most specific diagnosis of HTLV-III/LAV infection is by direct identification of the virus in host tissues by virus isolation; however, the techniques for isolating HTLV-III/LAV currently lack sensitivity for detecting infection and are not readily available. For public health purposes, patients with repeatedly reactive screening tests for HTLV-III/LAV antibody (e.g., enzyme-linked immunosorbent assay) in whom antibody is also identified by the use of supplemental tests (e.g., Western blot, immunofluorescence assay) should be considered both infected and infective (*8–10*).

Although HTLV-III/LAV infection is identified by isolation of the virus or, indirectly, by the presence of anti-

**The AIDS virus has been variously termed human T-lymphotropic virus type III (HTLV-III), lymphadenopathy-associated virus (LAV), AIDS-associated retrovirus (ARV), or human immunodeficiency virus (HIV). The designation human immunodeficiency virus (HIV) has recently been proposed by a subcommittee of the International Committee for the Taxonomy of Viruses as the appropriate name for the retrovirus that has been implicated as the causative agent of AIDS (4).*

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TABLE 2. Summary of classification system for human T-lymphotropic virus type III/lymphadenopathy-associated virus

Group I.	Acute infection	
Group II.	Asymptomatic infection*	
Group III.	Persistent generalized lymphadenopathy*	
Group IV.	Other disease	
	Subgroup A.	Constitutional disease
	Subgroup B.	Neurologic disease
	Subgroup C.	Secondary infectious diseases
		Category C-1. Specified secondary infectious diseases listed in the CDC surveillance definition for AIDS†
		Category C-2. Other specified secondary infectious diseases
	Subgroup D.	Secondary cancers†
	Subgroup E.	Other conditions

**Patients in Groups II and III may be subclassified on the basis of a laboratory evaluation.*

†Includes those patients whose clinical presentation fulfills the definition of AIDS used by CDC for national reporting.

Continued from page 3

body to the virus, a presumptive clinical diagnosis of HTLV-III/LAV infection has been made in some situations in the absence of positive virologic or serologic test results. There is a very strong correlation between the clinical manifestations of AIDS as defined by CDC and the presence of HTLV-III/LAV antibody (*11–14*). Most persons whose clinical illness fulfills the CDC surveillance definition for AIDS will have been infected with the virus (*12–14*).

Classification System

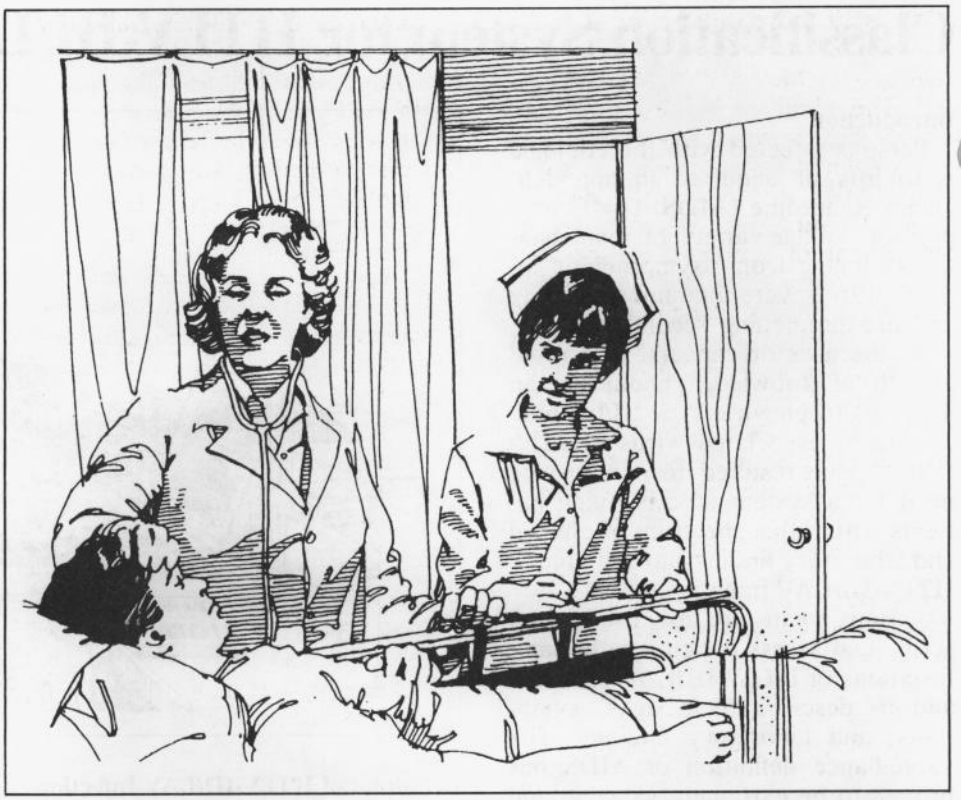
This system classifies the manifestations of HTLV-III/LAV infection into four mutually exclusive groups, designated by Roman numerals I through IV (Table 2). *The classification system applies only to patients diagnosed as having HTLV-III/LAV infection (see previous section, Definition of HTLV-III/LAV Infection).* Classification in a particular group is not explicitly intended to have prognostic significance, nor to designate severity of illness. However, classification in the four principal groups, I–IV, is hierarchical in that persons classified in a particular group should not be reclassified in a preceding group if clinical findings resolve, since clinical improvement may not accurately reflect changes in the severity of the underlying disease.

Group I includes patients with transient signs and symptoms that appear at the time of, or shortly after, initial infection with HTLV-III/LAV as identified by laboratory studies. All patients in Group I will be reclassified in another group following resolution of this acute syndrome.

Group II includes patients who have no signs or symptoms of HTLV-III/LAV infection. Patients in this category may be subclassified based on whether hematologic and/or immunologic laboratory studies have been done and whether results are abnormal in a manner consistent with the effects of HTLV-III/LAV infection.

Group III includes patients with persistent generalized lymphadenopathy, but without findings that would lead to classification in Group IV. Patients in this category may be subclassified based on the results of laboratory studies in the same manner as patients in Group II.

Group IV includes patients with clinical symptoms and signs of HTLV-III/LAV infection other than or in addition to lymphadenopathy. Patients



in this group are assigned to *one or more* subgroups based on clinical findings. These subgroups are: A. constitutional disease; B. neurologic disease; C. secondary infectious disease; D. secondary cancers; and E. other conditions resulting from HTLV-III/LAV infection. There is no *a priori* hierarchy of severity among subgroups A through E, and these subgroups are not mutually exclusive.

Definitions of the groups and subgroups are as follows:

Group I. Acute HTLV-III/LAV Infection. Defined as a mononucleosis-like syndrome, with or without aseptic meningitis, associated with seroconversion for HTLV-III/LAV antibody (*15–16*). Antibody seroconversion is required as evidence of initial infection; current viral isolation procedures are not adequately sensitive to be relied on for demonstrating the onset of infection.

Group II. Asymptomatic HTLV-III/LAV Infection. Defined as the absence of signs or symptoms of HTLV-III/LAV infection. To be classified in Group II, patients must have had no previous signs or symptoms that would have led to classification in Groups III or IV. Patients whose clinical findings caused them to be classified in Groups III or IV should not be reclassified in Group II if those clinical findings resolve.

Patients in this group may be subclassified on the basis of a laboratory evaluation. Laboratory studies commonly indicated for patients with HTLV-III/LAV infection include, but are not limited to, a complete blood count (including differential white blood cell count) and a platelet count. Immunologic tests, especially T-lymphocyte helper and suppressor cell counts, are also an important part of the overall evaluation. Patients whose test results are within normal limits, as well as those for whom a laboratory evaluation has not yet been completed, should be differentiated from patients whose test results are consistent with defects associated with HTLV-III/LAV infection (e.g., lymphopenia, thrombocytopenia, decreased number of helper [T_4] T-lymphocytes).

Group III. Persistent Generalized Lymphadenopathy (PGL). Defined as palpable lymphadenopathy (lymph node enlargement of 1 cm or greater) at two or more extra-inguinal sites persisting for more than 3 months in the absence of a concurrent illness or condition other than HTLV-III/LAV infection to explain the findings. Patients in this group may also be subclassified on the basis of a laboratory evaluation, as is done for asymptomatic patients in Group II (see above). Patients with PGL whose clinical findings caused them to be classified in Group IV should not be reclassified in

Group III if those other clinical findings resolve.

Group IV. Other HTLV-III/LAV Disease. The clinical manifestations of patients in this group may designated by assignment to one or more subgroups (A-E) listed below. Within Group IV, subgroup classification is independent of the presence or absence of lymphadenopathy. Each subgroup may include patients who are minimally symptomatic, as well as patients who are severely ill. Increased specificity for manifestations of HTLV-III/LAV infection, if needed for clinical purposes or research purposes or for disability determinations, may be achieved by creating additional divisions within each subgroup.

Subgroup A. Constitutional disease. Defined as one or more of the following: fever persisting more than 1 month, involuntary weight loss of greater than 10% of baseline, or diarrhea persisting more than 1 month; and the absence of a concurrent illness or condition other than HTLV-III/LAV infection to explain the findings.

Subgroup B. Neurologic disease. Defined as one or more of the following: dementia, myelopathy, or peripheral neuropathy; and the absence of a concurrent illness or condition other than HTLV-III/LAV infection to explain the findings.

Subgroup C. Secondary infectious diseases. Defined as the diagnosis of an infectious disease associated with HTLV-III/LAV infection and/or at least moderately indicative of a defect in cell-mediated immunity. Patients in this subgroup are divided further into two categories:

Category C-1. Includes patients with symptomatic or invasive disease due to one of 12 specified secondary infectious diseases listed in the surveillance definition of AIDS§: *Pneumocystis carinii* pneumonia, chronic cryptosporidiosis, toxoplasmosis, extraintestinal strongyloidiasis, isosporiasis, candidiasis (esophageal, bronchial, or pulmonary), cryptococcosis, histoplasmosis, mycobacterial infection with *Mycobacterium avium* complex or *M. kansasii,* cytomegalovirus infection, chronic mucocutaneous or disseminated herpes simplex virus infection, and progressive multifocal leukoencephalopathy.

Category C-2. Includes patients with symptomatic or invasive disease due to one of six other specified secondary infectious diseases: oral hairy leukoplakia, multidermatomal herpes zoster, recurrent *Salmonella* bactermia, nocardiosis, tuberculosis, or oral candidiasis (thrush).

Subgroup D. Secondary cancers. Defined as the diagnosis of one or more kinds of cancer known to be associated with HTLV-III/LAV infection as listed in the surveillance definition of AIDS and at least moderately indicative of a defect in cell-mediated immunity¶: Kaposi's sarcoma, non-Hodgkin's lymphoma (small, noncleaved lymphoma or immunoblastic sarcoma), or primary lymphoma of the brain.

Subgroup E. Other conditions in HTLV-III/LAV infection. Defined as the presence of other clinical findings or diseases, not classifiable above, that may be attributed to HTLV-III/LAV infection and/or may be indicative of a defect in cell-mediated immunity. Included are patients with chronic lymphoid interstitial pneumonitis. Also included are those patients whose signs or symptoms could be attributed either to HTLV-III/LAV infections or to another coexisting disease not classified elsewhere, and patients with other clinical illnesses, the course or management of which may be complicated or altered by HTLV-III/LAV infection. Examples include: patients with constitutional symptoms not meeting the criteria for subgroup IV-A; patients with infectious diseases not listed in subgroup IV-C; and patients with neoplasms not listed in subgroup IV-D.

Editorial Note: The classification system is meant to provide a means of grouping patients infected with HTLV-III/LAV according to the clinical expression of disease. It will require periodic revision as warranted by new information about HTLV-III/LAV infection. The definition of particular syndromes will evolve with increasing knowledge of the significance of certain clinical findings and laboratory tests. New diagnostic techniques, such as the detection of specific HTLV-III/LAV antigens or antibodies, may add specificity to the assessment of patients infected with HTLV-III/LAV.

The classification system defines a limited number of specified clinical presentations. Patients whose signs and symptoms do not meet the criteria for other groups and subgroups, but whose findings are attributable to HTLV-III/LAV infection, should be classified in subgroup IV-E. As the classification system is revised and

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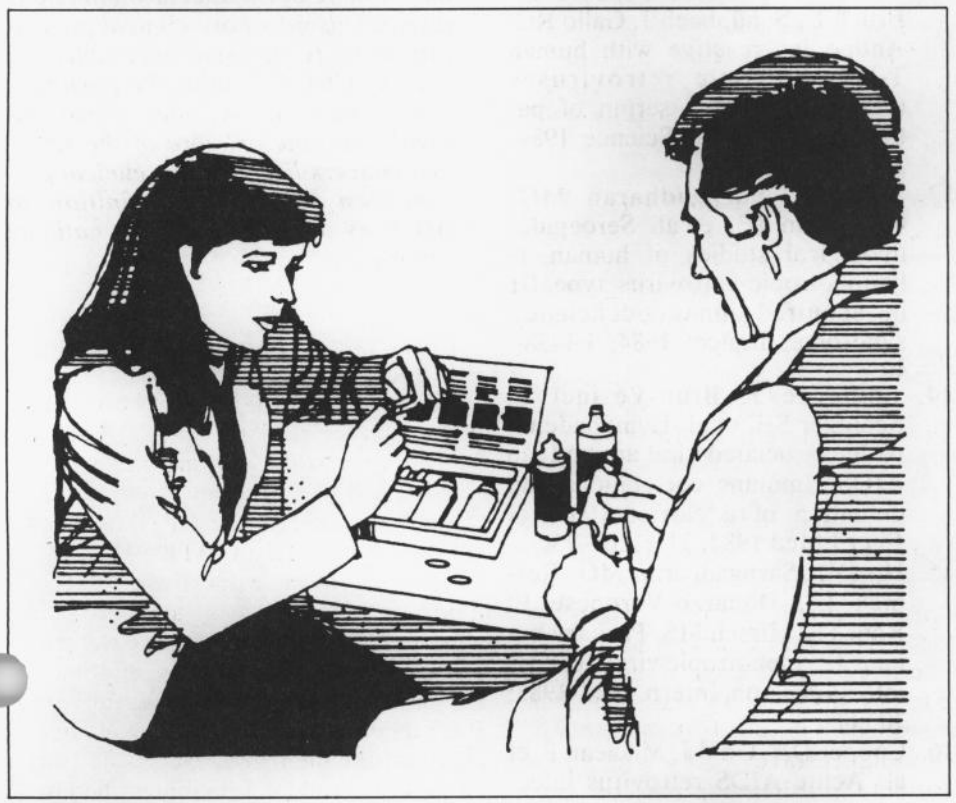

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updated, certain subsets of patients in subgroup IV-E may be identified as having related groups of clinical findings that should be separately classified as distinct syndromes. This could be accomplished either by creating additional subgroups within Group IV or by broadening the definitions of the existing subgroups.

Persons currently using other classification systems (*6–7*) or nomenclatures (e.g., AIDS-related complex, lymphadenopathy syndrome) can find equivalences with those systems and terminologies and the classification presented in this report. Because this classification system has only four principal groups based on chronology, presence or absence of signs and symptoms, and the type of clinical findings present, comparisons with other classifications based either on clinical findings or on laboratory assessment are easily accomplished.

This classification system does not imply any change in the definition of AIDS used by the Virginia Department of Health and CDC since 1981 for reporting. Patients whose clinical presentations fulfill the surveillance definition of AIDS are classified in Group IV. However, not every case in Group IV will meet the surveillance definition.

Persons wishing to comment on this material are encouraged to send comments in writing to the AIDS Program, Center for Infectious Diseases, CDC.

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Reprinted from MMWR 1986; 35: 334–9.

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§This subgroup includes patients with one or more of the specified infectious diseases listed whose clinical presentation fulfills the definition of AIDS as used by CDC for national reporting.

¶This subgroup includes those patients with one or more of the specified cancers listed whose clinical presentation fulfills the definition of AIDS as used by CDC for national reporting.

Sexually Transmitted Diseases Treatment Guidelines

Nongonococcal Urethritis (NGU)

Urethritis not associated with *N. gonorrhoeae* is usually caused by *C. trachomatis* or *Ureaplasma urealyticum*. NGU requires prompt antimicrobial treatment of the patient and evaluation and treatment of sex partners.

Recommended Regimens

Tetracycline HCl 500 mg by mouth 4 times daily for 7 days

OR

Doxycycline 100 mg by mouth twice daily for 7 days

Alternative Regimen (for patients in whom tetracyclines are contraindicated or not tolerated)

Erythromycin base or stearate 500 mg by mouth 4 times daily for 7 days OR *erythromycin ethylsuccinate* 800 mg by mouth 4 times daily for 7 days.

Management of Sex Partners

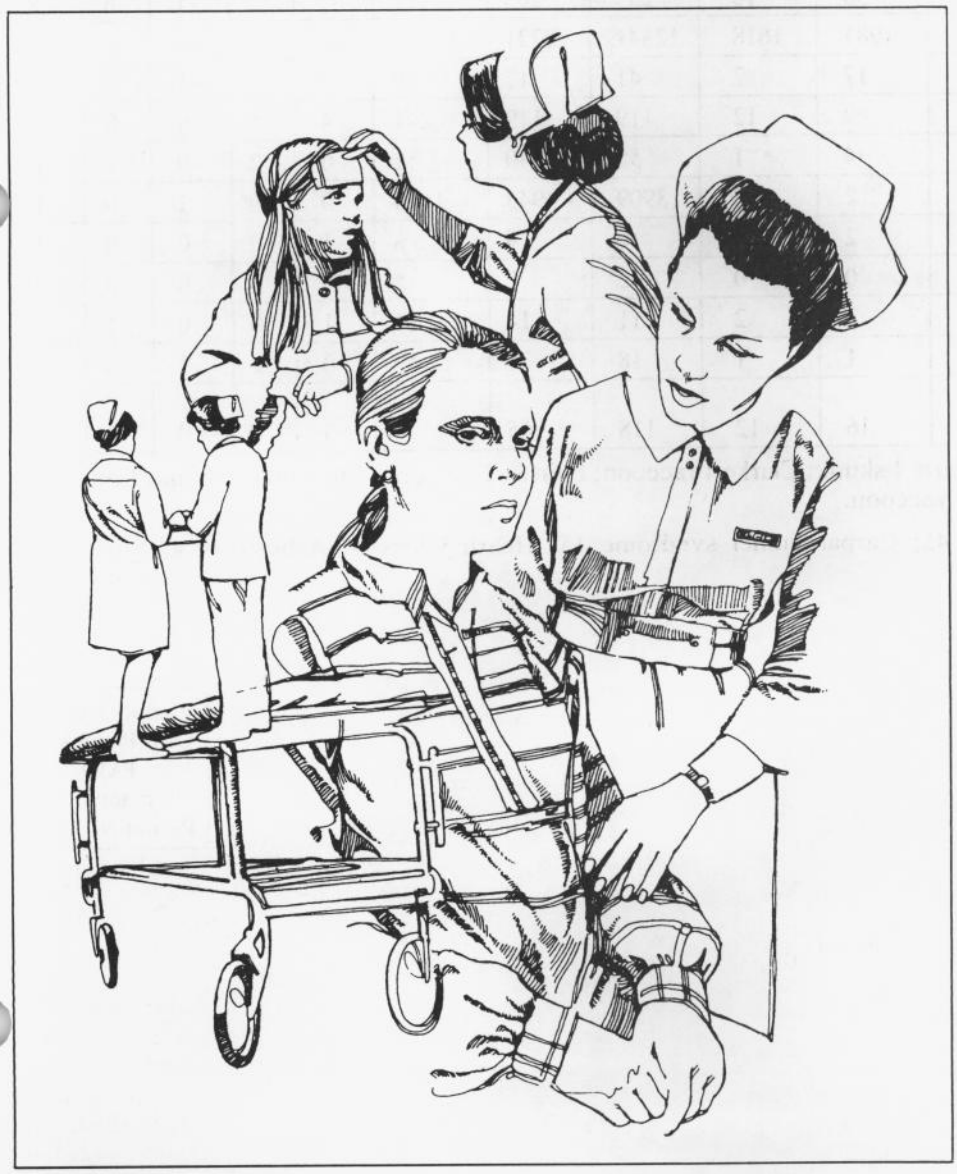
All persons who are sex partners of patients with NGU should be examined for STD and promptly treated with one of the above regimens.

Follow-Up

Patients should be advised to return if symptoms persist or recur.

Persistent or Recurrent NGU

Recurrent NGU may be due to failure to treat the sex partners. Patients with persistent or recurrent objective signs of urethritis after adequate treatment of themselves and their partners warrant further evaluation for less common causes of urethritis.



Trichomoniasis

Recommended Regimen

Metronidazole 2.0 g by mouth in a single dose

Alternative Regimen

Metronidazole may be administered in dose of 250 mg by mouth 3 times daily for 7 days.

Asymptomatic Women

Asymptomatic women with trichomoniasis should be treated the same as symptomatic women.

Treatment Failures

Resistance of *Trichomonas vaginalis* to metronidazole has been observed, but is rare. Patients who fail treatment should be retreated with the same regimen. Persistent failures should be managed in consultation with an expert. Metronidazole 2 g by mouth daily for 3 days has been successful in patients infected with. *T. vaginalis* strains mildly resistant to metronidazole, but experience with this regimen is limited.

Treatment in Pregnancy

Metronidazole is contraindicated in the first trimester of pregnancy and should be avoided througout pregnancy. Clotrimazole 100 mg intravaginally at bedtime for 7 days may produce symptomatic improvement and some cures. Other local treatments may be used for symptomatic relief but have low cure rates. Lactating women may be treated with metronidazole 2.0 g by mouth in a single dose, but breastfeeding should be interrupted for at least 24 hours after therapy.

Management of Sex Partners

Male sex partners of women with trichomoniasis should be treated with 2.0 g metronidazole by mouth in a single dose and should be examined for coexistent STD.

Neonatal Trichomonal Infections

Infants with symptomatic trichomoniasis or with persistent urogenital trichomonal colonization beyond the fourth week of life can be treated with **metronidazole** 10–30 mg/kg daily for 5–8 days.

Trichomonal Infection of Older Children

Children with trichomonal infection should be treated with **metronidazole** 15 mg/kg by mouth daily divided into 3 doses for 7 to 10 days.

Reprinted from MMWR 1985; 34 (4S)

Cases of selected notifiable diseases, Virginia, for the period August 1 through August 31, 1986

Disease	State					Regions				
	This Month	Last Month	Total to Date 1986	Total to Date 1985	Mean 5 Year To Date	This Month N.W.	This Month N.	This Month S.W.	This Month C.	This Month E.
Measles	3	8	60	26	15	2	1	0	0	0
Mumps	7	2	34	41	48	0	2	0	1	4
Pertussis	10	4	30	3	19	6	3	0	1	0
Rubella	0	0	0	2	4	0	0	0	0	0
Meningitis—Aseptic	43	26	151	158	132	8	4	15	10	6
*Bacterial	15	20	171	172	160	2	2	2	4	5
Hepatitis A (Infectious)	8	6	77	116	109	0	1	5	1	1
B (Serum)	52	38	309	379	347	2	11	14	10	15
Non-A, Non-B	8	2	47	62	52	1	0	3	1	3
Salmonellosis	222	174	883	1083	956	29	40	46	65	42
Shigellosis	8	8	48	57	292	3	2	0	0	3
Campylobacter Infections	72	76	380	508	311	22	9	10	20	11
Tuberculosis	23	17	229	245	303	1	5	3	4	10
Syphilis (Primary & Secondary)	38	16	257	203	351	0	2	11	6	19
Gonorrhea	1981	1618	12341	12721	13392	—	—	—	—	—
Rocky Mountain Spotted Fever	17	7	41	17	49	7	3	1	2	4
Rabies in Animals	9	12	119	119	241	4	5	0	0	0
Meningococcal Infections	4	1	55	40	52	0	2	0	1	1
Influenza	2	2	3909	943	1624	0	0	1	0	1
Toxic Shock Syndrome	2	0	10	4	6	1	0	0	0	1
Reyes Syndrome	0	0	2	2	5	0	0	0	0	0
Legionellosis	3	2	11	14	14	1	0	0	1	1
Kawasaki's Disease	1	1	18	26	19	0	0	1	0	0
Other: Acquired Immunodeficiency Syndrome	16	12	118	55	—	3	9	0	2	2

Counties Reporting Animal Rabies: Albemarle 1 skunk; Clarke 1 raccoon; Fairfax 1 raccoon; Fluvanna 1 skunk; Loudoun 3 raccoons; Prince William 1 fox; Stafford 1 raccoon.

Occupational Illnesses: Pneumoconioses 45; Carpal tunnel syndrome 15; Hearing loss 6; Asbestosis 4; Silicosis 1; Poisoning-metal 1; Dermatitis 1.

*other than meningococcal

Published Monthly by the
VIRGINIA HEALTH DEPARTMENT
Division of Epidemiology
109 Governor Street
Richmond, Virginia 23219