APPENDIX A

WORK GROUP PARTICIPANTS

Elaine Abrams, M.D. Harlem Hospital Center Department of Pediatrics 506 Lenox Avenue New York, NY 10037

Rabbi Richard F. Address Regional Director Union of American Hebrew Congregations 117 South 17th Street, Room 2111 Philadelphia, PA 19103

Manuel M. Album, D.D.S. American Society of Dentistry for Children 211 East Chicago Avenue Chicago, IL 60611

Fern Allen, R.N. Cedars—Sinai Medical Center Department of Pediatrics 8700 Beverly Boulevard Los Angeles, CA 90048

James R. Allen, M.D. Assistant Director AIDS Program Centers for Disease Control Building 6, Room 288 Atlanta, GA 30333

Arthur J. Ammann, M.D.
Director, Collaborative Medical
Research
Genentech, Inc.
460 Pt. San Bruno Boulevard
South San Francisco, CA 94080

Janet Anderson, Ed.D.
Staff Psychologist
Hematology Division
The Children's Hospital of Philadelphia
Philadelphia Child Guidance Clinic
34th Street and Civic Center Boulevard
Philadelphia, PA 19104

Virginia Anderson, M.D. Department of Pathology Armed Forces Institute Washington, DC 20906 Philip Banister, M.B., M.P.H., F.R.C.P. (C) Health and Welfare Canada Health Service and Promotion Branch Ottawa, Ontario K1A 1B4 Canada

Stephen D. Barbour, M.D., Ph.D. Division of Infectious Diseases The Children's Hospital of Philadelphia Philadelphia, PA 19104

Reverend Carl Bean Chairman National Minority AIDS Council 5882 W. Pico Boulevard, #210 Los Angeles, CA 90019

Myron Belfer, M.D. Chairman, Department of Psychiatry Harvard Medical School at The Cambridge Hospital 1493 Cambridge Street Cambridge, MA 02139

Jeffrey L. Black, M.D. Chairman, Task Force on AIDS American School Health Association University of California at San Diego 225 Dickenson Street San Diego, CA 92103

Mary G. Boland, M.S.N., C.P.N.P. Director, AIDS Program Children's Hospital of New Jersey 15 South 9th Street Newark, NJ 07107

Shirley Bonnem Vice President Public Relations and Development The Children's Hospital of Philadelphia Philadelphia, PA 19104 G. Stephen Bowen, M.D.
Medical Epidemiologist
Acute Infectious Disease Epidemiology Div.
Department of Health
Box 90
Harrisburg, PA 17108

William Borkowsky, M.D.
Bellevue Hospital Center/New York
University Medical Center
Pediatric Department
First Avenue at East 27th Street
New York, NY 10016

Elaine Brainerd, R.N., M.A. Consultant, School Health Services State Department of Education P.O. Box 2219 Hartford, CT 06145

Larry K. Brown, M.D. Rhode Island Hospital 593 Eddy Street Providence, R102903

Philip Brunell, M.D. Department of Pediatrics Health Science Center University of Texas San Antonio, TX 78228

Georgia Buggs, R.N., M.P.H. Division of Maternal and Child Health Department of Health and Human Services Rockville, MD 20857

Toni Cabat, M.S.W. Project Coordinator, AIDS Component Albert Einstein College of Medicine 1300 Morris Park Avenue Forchheimer Building, #401 Bronx, NY 10461

James Chin, M.D., M.P.H. Special Programme on AIDS World Health Organization 1211 Geneva 27, Switzerland

Marlene Cimons
Los Angeles Times – Washington Bureau
1875 Eye Street NW, Suite 1100
Washington, DC 20006

Matt Clark Newsweek 444 Madison Ave. New York, NY 10022 Karen A. Clifford, J.D. Assistant Counsel Health Insurance Association of America 1025 Connecticut Ave., NW Washington, DC 20036

Reverend Lynne Coggi AIDS Consultant National Mission National Episcopal Church 815 Second Avenue New York, NY 10017

Alan R. Cohen, M.D. Senior Physician Division of Hematology The Children's Hospital of Philadelphia Philadelphia, PA 19104

Edward M. Connor, M.D.
Associate Director
Div. of Immunology and Infectious Disease
Children's Hospital of New Jersey
15 South Ninth Street
Newark, NJ 07107

Jolene Connor, R.N. Associate Director, AIDS Program Harlem Hospital 506 Lennox Avenue, Room 2146 New York, NY 10037

Louis Z. Cooper, M.D. Director and Professor of Pediatrics St. Luke's-Roosevelt Hospital Center Amsterdam Avenue and 114th Street New York, NY 10019

Catherine Cowell, Ph.D.
Director, Bureau of Nutrition
City of New York, Department of Health
93 Worth Street, Room 714
New York, NY 10013

Mollie Coye State Commissioner of Health New Jersey State Department of Health Trenton, NJ 08625-0360

Leonard Davis Vice President Blue Cross of Greater Philadelphia 1333 Chestnut Street Philadelphia, PA 19106 William DeJong, Ph.D. Senior Research Associate Education Development Center, Inc. 55 Chapel Street Newton, MA 02160

Jane K. DeMaio Division of General Academic Education New Jersey State Department of Education 225 W. State Street Trenton, NJ 08625

Harold G. Devine, Jr., M.Ed., C.A.G.S. Assistant Superintendent of Schools Swansea Public Schools One Gardners Neck Road Swansea, MA 02777

Eunice Diaz, M.S., M.P.H.
Director, Health Promotion and Community
Affairs
White Memorial Medical Center
1720 Brooklyn Ave.
Los Angeles, CA 90033

Steven Douglas, M.D. Director, Div. of Immunology and Allergy The Children's Hospital of Philadelphia Philadelphia, PA 19104

Walter R. Dowdle, Ph.D. Acting Deputy Director (AIDS) Centers for Disease Control 1600 Clifton Road, N.E. Building 1, Room 2122 Atlanta, GA 30333

Lisa Egbuonu, M.D., M.P.H. University of Pennsylvania 2-L Nursing Education Building Mail Code 6094 Philadelphia, PA 19104

Leon G. Epstein, M.D.
Assistant Professor of Neurosciences and
Pediatrics
University of Medicine and Dentistry of
New Jersey
185 South Orange Avenue
Newark, NJ 07103-2757

Patricia Evans, R.N. Visiting Home Nurse 1326 Burnett Avenue Union, NJ 07083 Judith Feinberg, M.D.
Treatment Branch/AIDS Program
National Institute of Allergy and Infectious
Diseases
National Institutes of Health
Bethesda, MD 20892

Senih Fikrig, M.D. Professor of Immunology Downstate Medical Center 450 Clarkson Avenue Brooklyn, NY 11203

Loretta P. Finnegan, M.D. Director of Family Center Jefferson Medical College 111 South 11th Street. Suite 6105 Philadelphia, PA 19107

Gerald W. Fischer, M.D.
Professor of Pediatrics
Uniformed Services University of the Health
Sciences
4301 Jones Bridge Road
Bethesda, MD 20814-4799

Mary Flannery The Philadelphia Daily News 400 North Broad Street Philadelphia, PA 19101

Mary Fugate, R.N. American Red Cross Health Education 150 Amsterdam Avenue New York, NY 10023

Anna Garcia, M.S.W.
Department of Pediatrics
University of Miami School of Medicine
Jackson Memorial Hospital
Miami, FL 33124

Keith Geiger Vice President National Education Association 1201 16th Street, N.W. Washington, DC 20036

Sander G. Genser, M.D., M.P.H. National Institute of Drug Abuse Clinical Medicine Branch Rockville, MD 20857 Harold Ginzburg, M.D., J.D., M.P.H. Chief, Epidemiology Branch National Institute of Allergy and Infectious Diseases/AIDS Program National Institutes of Health Bethesda, MD 20892

Lenny Giteck Editor, *The Advocate* 6922 Hollywood Boulevard, 10th Floor Los Angeles, CA 90028

Karen Glanz, Ph.D., M.P.H. Associate Professor Department of Health Education Temple University (062-56) Philadelphia, PA 19122

Robert Gleeson, M.D. Northwestern Mutual Life 720 E. Wisconsin Avenue Milwaukee, WI 53202

D. Jay Gloeb, M.D. Department of Obstetrics University of Miami School of Medicine 3120 Indiana Street Miami, FL 33133

Jackie Goldberg Board of Education Los Angeles Unified School District P.O. Box 3307 Los Angeles, CA 90051

Max Gomez, Ph.D. Health and Science Editor KYW-TV Independence Mall East Philadelphia, PA 19106

Edward D. Gomperts, M.D. Director, Hemophilia Center Children's Hospital of Los Angeles 4650 Sunset Boulevard Los Angeles, CA 90027

Jesse Green, Ph.D. Director of Research New York University Medical Center New York, NY 10016

Phyllis Gurdin Leake and Watts Children's Home 463 Hawthorne Avenue Yonkers. NY 10705

Melvyn R. Haas, M.D. National Institute of Mental Health Parklawn Building, 7C10 Rockville, MD 20857 Mary Ellen Haines United Church Board for Homeland Ministries 132 West 31st Street New York, NY 10001

Lorranie Hale, Ph.D. Hale House Center 68 Edgecomb Avenue New York, NY 10030

Neal Halsey, M.D. Director, Division of Disease Control School of Hygiene and Public Health Johns Hopkins University 600 N. Wolfe St. Baltimore, MD 21205

H. Allan Handford, M.D. Hemophilia Center of Central Pennsylvania Director, Division of Child Psychiatry Penn State University College of Medicine Hershey, PA 17033

James C. Harris, M.D.
Associate Professor
Division of Child Psychiatry
Johns Hopkins University School of Medicine
Baltimore, MD 21205

Machelle Harris, M.D.

New York City Department of Health
Bureau of Maternity Services and Family
Planning
280 Broadway, Room 303

New York, NY 10007

Maurice Hartmen Acting Regional Administrator Health Care Financing Administration Box 7760 Philadelphia, PA 19101

Rashida Lorraine Hassan Blacks Educating Blacks About Sexual Health Issues 1319 Locust Street, Third Floor Philadelphia, PA 19107

Harry Haverkos, M.D. National Institute of Drug Abuse Clinical Medicine Branch Division of Clinical Research Rockville, MD 20857

Herbert Hazen
Director
School Health Services
School District of Philadelphia
Philadelphia, PA 19103

Margaret C. Heagarty, M.D. Director of Pediatrics Harlem Hospital Center New York, NY 10032

James Hegarty, M.D.
Columbia University School of Public Health
Sergievsky Center – Epidemiology
100 Haven
New York, NY 10032

Karen Hein, M.D. Albert Einstein College of Medicine/Montefiore Hospital Director, AIDS in Adolescence Program Bronx, NY 10461

Jay H. Herman, M.D. Penn-Jersey Regional Blood Services American Red Cross 23rd and Chestnut Streets Philadelphia, PA 19103

Margaret W. Hilgartner, M.D.
Director, Division of Pediatric
Hematology/Oncology
New York Hospital-Cornell Medical Center
525 E. 68th Street
New York, NY 10021

Susan Holman, R.N., M.S. SUNY Downstate Medical Center 450 Clarkson Avenue Brooklyn, NY 11203

John J. Hutchings, M.D. Division of Maternal and Child Health Department of Health and Human Services Rockville, MD 20857

Vince L. Hutchins, M.D. Division of Maternal and Child Health Department of Health and Human Services Rockville, MD 20857

Cecilia Hutto, M.D. Assistant Professor of Pediatrics Division of Infectious Diseases University of Miami P.O. Box 016960 Miami, FL 33101

Earthamae Isaac Legislative Assistant to Senator Arlen Spector Senate Office Building, Room 303 Washington, DC 20510 Joyce Jackson, M.A. Coordinator, AIDS Community Support Unit New Jersey State Department of Health Division of Narcotic and Drug Abuse 20 Evergreen Place East Orange, NJ 07018

Rudolph E. Jackson, M.D. Professor and Acting Chairman Department of Pediatrics Morehouse School of Medicine 720 Westview Drive, SW Atlanta, GA 30310

Annette Johnson, M.S., R.D. Education Coordinator AIDS Institute—NY State Dept. of Health 10 East 40th Street New York, NY 10016

Stephen Joseph, M.D. Commissioner of Health City of New York New York, NY 10013

Vijay Joshi, M.D. Department of Pathology Children's Hospital of New Jersey 15 South 9th Street Newark, NJ 07107

LaVohn E. Josten, Ph.D., R.N. Director of Nursing Minnesota State Department of Health Minneapolis, MN 55415

Emily Kahn Philadelphia Department of Health AIDS Program 500 S. Broad Street Philadelphia, PA 19146

Ram Kairam, M.D.
Assistant Professor of Clinical Pediatrics and
Clinical Neurology
St. Luke's/Roosevelt Hospital Center
Amsterdam Avenue and 11th Street
New York, NY 10025

Aditya Kaul, M.D. Associate Professor Department of Pediatrics New York Medical College 234 East 149th Street Bronx, NY 10451

Anne E. Keller, M.D. Director, Division of Rehabilitation Pennsylvania Department of Health Box 90 Harrisburg, PA 17108 Judith Keresztes, R.N.
Data Coordinator, AIDS Program
Children's Hospital of New Jersey
15 South Ninth Street
Newark, NJ 07103-2757

Barbara P. Kern, M.A. Director, Special Child Health Service New Jersey State Department of Health 120 S. Stockton Street, CN 364 Trenton, NJ 08625

C. Everett Koop, M.D., S.C. Surgeon General, Public Health Service Department of Health and Human Services Hubert H. Humphrey Building 200 Independence Avenue, S.E. Washington, DC 20201

Keith Krasinski, M.D.
Bellevue Hospital Center/New York
University Medical Center
Pediatric Department
First Avenue at East 27th Street
New York, NY 10016

Penelope G. Krener, M.D. Department of Pediatrics and Psychiatry University of California, Davis 2315 Stockton Boulevard Sacramento, CA 95817

Helen G. Kushnick General Management Corporation 9000 Sunset Blvd., Suite 400 Los Angeles, CA 90069

George Lamb, M.D. Boston City Hospital Administration Building, 4th Floor 818 Harrison Avenue Boston, MA 02118

Normand LaPointe, M.D., F.R.C.P. Hopital Sainte-Justine 3175 Cote Sainte-Catherine Montreal, Quebec H3T 1C5 Canada

William D. Lassek, M.D. Regional Health Administrator, Region III Department of Health and Human Services P.O. Box 13716 Philadelphia, PA 19101

Sandra Nusinoff Lehrman, M.D. Department of Virology Burroughs Wellcome Company 3030 Cornwallis Road Research Triangle Park, N.C. 27709 Carol Levine Co-Director, AIDS Project The Hastings Center 255 Elm Road Briarcliff Manor, NY 10510

Harold W. Lischner, M.D.
Chief, Section of Immunology and Rheumatology
St. Christopher's Hospital for Children
5th and Lehigh Streets
Philadelphia, PA 19133

Gwendolyn Long Assistant Regional Administrator Division of Youth and Family Services 1180 Raymond Boulevard, 18th Floor Newark, NJ 07102

Sarah Long, M.D. Chief, Section of Infectious Diseases St. Christopher's Hospital for Children 5th and Lehigh Avenue Philadelphia, PA 19133

Michael W. Lowenstein Commercial Insight 696 Meadowbrook Lane Moylan, PA 19063

Evelyn G. Lowery Southern Christian Leadership Conference P.O. Box 42257 Atlanta, GA 30311

Elaine Lugovoy, R.N., M.A. Associate Director of Nursing Pediatric Home Health Care Community Health Care of North Jersey, Inc. 451 Lincoln Avenue Orange, NJ 07050

German V. Maisonet, Jr., M.D. Medical Director Minority AIDS Project Coldwater Canyon Hospital 6421 Coldwater Canyon North Hollywood, CA 91606

Robert W. Marion, M.D. Assistant Professor of Pediatrics Albert Einstein College of Medicine Jacobi Hospital-Room 803 Pelham Parkway and Eastchester Road Bronx, NY 10461

Mary Mastrucci, M.D.
University of Miami School of Medicine
Division of Immunology and Infectious
Diseases
P.O. Box 016960
Miami, FL 33101

Robert M. May, F.R.S., Ph.D. Department of Biology Princeton University Princeton, NJ 08544

Donald J. McConnell, M.A., M.Div. Executive Director, CT Alcohol and Drug Abuse Commission 999 Asylum Avenue Hartford, CT 06105

Kenneth McIntosh, M.D. Children's Hospital Chief of Clinical Infectious Diseases 300 Longwood Ave. Boston, MA 02115

Loretta McLaughlin, C.P.A. Vice-President – Finance Delaware Valley Hospital Council 1315 Walnut Street Philadelphia, PA 19107

Janet L. Mitchell, M.D. Director of Ambulatory Perinatology Assistant Professor Harvard Medical School Beth Israel Hospital 330 Brookline Ave. Boston, MA 02215

Lawrence Miike, M.D., J.D. Senior Associate Office of Technology Assessment U.S. Congress Washington, DC 20510

Howard Minkoff, M.D. Downstate Medical Center Box 24 450 Clarkson Avenue Brooklyn, NY 11203

Anthony Minnefor, M.D.
Chief of Infectious Disease Division
St. Joseph's Hospital and Medical Center
703 Main Street
Paterson, NJ 07523

John Modlin, M.D. Associate Professor of Pediatrics Johns Hopkins University School of Medicine 600 N. Wolfe Street Baltimore, MD 21205

Paul A. Moore, M.S.W.
Assistant Director, AIDS Initiative
New York City Health and Hospital
Corporation
346 Broadway, Room 531
New York, NY 10013

Rachael Morecki, M.D.
Department of Pathology
The Albert Einstein College of Medicine
1300 Morris Park Avenue
Forchheimer Building #401
Bronx, NY 10461

Susan Morrison, M.D.
Pediatric Infectious Diseases
University of Medicine and Dentistry of New
Jersey
185 South Orange Avenue
Newark, NJ 07103-2757

Thomas M. Mundy, M.D. Assistant Professor of Pediatrics UCLA School of Medicine Cedars-Sinai Medical Center Box 48750 Los Angeles, CA 90048-0750

Solbritt Murphy, M.D.
Acting Director, Division of Family Health
Services
New York Department of Health
Albany, NY 12237

Andre Nahmias, M.D.
Department of Pediatrics
Emory University School of Medicine
69 Butler Street, SE
Atlanta, GA 30303

Linda Nelson, D.D.S. American Academy of Pediatric Dentistry 211 E. Chicago Avenue, Suite 1036 Chicago, IL 60611

Stephen W. Nicholas, M.D. Department of Pediatrics The Children's Hospital of Philadelphia Philadelphia, PA 19104

Brian Novick, M.D.
Division of Clinical Allergy and Immunology
Albert Einstein College of Medicine
1300 Morris Park Avenue
Bronx, NY 10461

Rita O'Donnell Pediatric AIDS Surveillance Coordinator New York City Department of Health 125 Worth Street New York, NY 10013

Annette Oestreicher Editor-in-Chief, *Medical World News* 7676 Woodway Street Suite 112 Houston, TX 77063 James Oleske, M.D.
Department of Pediatrics
College of Medicine and Dentistry of New
Jersey
100 Bergen Street
Medical Science Building, F532
Newark, NJ 07103

Gerald Oppenheimer, Ph.D. Associate Professor Department of Health and Nutrition Sciences Brooklyn College Brooklyn, NY 11215

Michael T. Osterholm, Ph.D., M.P.H. State Epidemiologist and Chief Minnesota Department of Health 717 S.E. Delaware Street Minneapolis, MN 55440

Margaret Oxtoby, M.D. Centers for Disease Control 1600 Clifton Road Atlanta, GA 30333

Savita Pahwa, M.D. Chief, Pediatric Immunology Division North Shore University Hospital 300 Community Drive Manhasset, New York 11030

Carmen Paris Health Education Philadelphia Dept. of Health AIDS Program 500 S. Broad Street Philadelphia. PA 19146

Wade P. Parks, M.D., Ph.D.
Director of Pediatrics
Division of Immunology & Infectious Disease
University of Miami School of Medicine
1550 N.W. 10th Avenue
Miami, FL 33136

Robert Parrott, M.D. Director Emeritus Children's Hospital National Medical Center 111 Michigan Avenue, NW Washington, DC 20010

Jude C. Payne
Research Analyst
National Leadership Commission on Health
Care
815 Connecticut Ave., NW
Washington, DC 20001

Cal Pierce Pediatric News 12230 Wilkins Ave. Rockville, MD 20852 Stanley A. Plotkin, M.D. Director, Division of Infectious Diseases The Children's Hospital of Philadelphia Philadelphia, PA 19104

B. Frank Polk, M.D.
Professor of Epidemiology
School of Hygiene and Public Health
Johns Hopkins University
615 N. Wolfe Street
Baltimore, MD 21205

Angelea Portale, R.N.
Department of OB/GYN
Columbia Presbyterian Medical Center
622 W. 168th Street
New York, NY 10032

Anna Portigal Parent

Suki Ports
Director, Minority Task Force on AIDS
Council of Churches of the City of New York
92 St. Nicholas Avenue, 1B
New York City, NY 10026

Thomas C. Quinn, M.D., M.S.
National Institute of Allergy and Infectious
Diseases
Bethesda, MD 20892

Gerald V. Quinnan, Jr., M.D. Division of Virology Food and Drug Administration Bethesda, MD 20892

Gary Remafedi, M.D. M.P.H. Assistant Professor of Pediatrics Adolescent Health Program University of Minnesota Hospital and Clinic Box 721, UMHC Minneapolis, MN 55455

Gloria Rodriguez, M.S.W. Public Health Consultant New Jersey State Department of Health 20 Evergreen Place, 4th Floor East Orange, NJ 07018

Martha F. Rogers, M.D. Medical Epidemiologist AIDS Program Centers of Disease Control Atlanta, GA 30333

Nancy G. Rowett Director of Public Relations Rhode Island Hospital 593 Eddy Street Providence, RI 02902 Arye Rubinstein, M.D.
Professor of Pediatrics, Microbiology and
Immunology
Albert Einstein College of Medicine
Bronx, NY 10461

George W. Rutherford, M.D. Medical Director, AIDS Office San Francisco Department of Public Health 1111 Market Street San Francisco, CA 94103

Marie Saint Cyr-Delpe, M.S.W. Haitian Coalition on AIDS 50 Court Street, Suite 605 Brooklyn, NY 11201

Madlene Sawyer, M.D. Department of Obstetrics/Gynecology University of Miami School of Medicine Jackson Memorial Hospital – R136 P.O. Box 016960 Miami, FL 33101

Helen Schietinger, M.A., R.N. Director, AIDS Education and Training Program California Nurses Association 1855 Folsom Street, Suite 670 San Francisco, CA 94103

Neil Schram, M.D. Kaiser-Permanente 25825 S. Vermont Avenue Harbor City, CA 90710-3599

Richard H. Schwarz, M.D. Professor and Chairman Department of Obstetrics and Gynecology Downstate Medical Center Brooklyn, NY 11023

Harvey Schweitzer Attorney 8 Columbia Avenue Takoma Park, MD 20912

Gwendolyn B. Scott, M.D. Associate Professor of Pediatrics Div. of Infectious Disease & Immunology University of Miami School of Medicine Box 016960 Miami, FL 33101

John Scott, R.N.
Clinical Unit Coordinator
Pediatric AIDS Program
The Albert Einstein College of Medicine
1300 Morris Park Avenue
Forchheimer Building, #401
Bronx, NY 10461

Jeffrey Seibert, Ph.D. Chair, Pediatric AIDS Task Force American Psychological Association Associate Professor, University of Miami P.O. Box 016820 Miami, FL 33101

Peter Selwyn, M.D. Medical Director Drug Abuse Treatment Program Montefiore Medical Center 111 East 210th Street Bronx, NY 10467

John Sever, M.D. Chief, Infectious Disease Branch, NINCDS National Institutes of Health Bldg 36, Room 5D-06 Bethesda, MD 20892

Mary-Ann Shafer, M.D. Associate Director Division of Adolescent Medicine University of California at San Francisco San Francisco, CA 94143

Robert G. Sharrar, M.D., M.Sc. Director, Health Promotion/Disease Control Philadelphia Department of Public Health 500 South Broad Street Philadelphia, PA 19146

Karolynn Siegel, Ph.D. Director of Research Department of Social Work Memorial Sloan Kettering Cancer Center New York, NY 10021

Benjamin K. Silverman, M.D. Department of Emergency Medicine The Children's Hospital of Philadelphia 34th Street and Civic Center Boulevard Philadelphia, PA 19104

Peter Smith, M.D. Rhode Island Hospital 593 Eddy Street Providence, RI 02902

Shirley Smith, R.N., M.S. MCH Nursing Consultant Department of Health and Human Services JFK Federal Building Boston, MA 02902

George E. Sonsel, L.C.S.W. AIDS Project, Los Angeles 3670 Wilshire Boulevard, Suite 300 Los Angeles, CA 90010 Stephen Spector, M.D. Division of Infectious Diseases University of California San Diego Medical Center, H-814-H 225 Dickenson Street San Diego, CA 92103

Sari Staver American Medical News 535 North Dearborn Street Chicago, IL 60610

E. Richard Stiehm, M.D. University of California at Los Angeles Health Sciences Center Room 22-387 Los Angeles, CA 90024

Maria S. Suarez, M.D.
Assistant Clinical Professor
College of Physicians and Surgeons
Columbia University
Harlem Hospital/Pediatric Department
506 Lenox Avenue
New York, NY 10037

Mary Tasker, M.S.W. Pediatric Social Worker Children's Hospital of New Jersey 15 South Ninth Street Newark, NJ 07107

Katy Taylor
Deputy Director—AIDS Discrimination Unit
New York City Commission on Human
Rights
52 Duane Street, 7th Floor
New York, NY 10007

Tom Tebbens Vice President Lewis, Gilman, Kynett, Inc. 1700 Market St. Philadelphia, PA 19106

Pauline Thomas, M.D.
Director of AIDS Surveillance
New York City Department of Health
New York, NY 10013

James Troutman, M.D. Institute of Medicine 2101 Constitution Ave., NW Washington, DC 20418

Diane W. Wara, M.D. Professor of Pediatrics University of California Medical Center San Francisco, CA 94143 Dottie Ward-Wimmer, R.N., B.A. Immunology Clinical Specialist Children's Hospital National Medical Center 111 Michigan Avenue, NW Washington, DC 20010

C.J. Wellington, M.D. Regional Program Consultant, MCH Room 306, Federal Office Building 50 United Nations Plaza San Francisco, CA 94102

Catherine M. Wilfert, M.D. Duke University Department of Pediatrics Division of Infectious Diseases Box 2951 Durham, NC 27710

English Willis, M.D. General Pediatrics The Children's Hospital of Philadelphia Philadelphia, PA 19104

Anne Willoughby, M.D., M.P.H.
Special Assistant for Pediatrics
National Institute of Child Health and Human
Development
Landow 7C-05
Bethesda, MD 20892

Constance B. Wofsy, M.D. Co-Director, AIDS Activities 995 Potrero Avenue, Ward 84 San Francisco General Hospital San Francisco, CA 94110

Margaret Lynn Yonekura, M.D. Chief, Obstetrics Division of Maternal-Fetal Medicine Harbor UCLA Medical Center 1000 W. Carson Street Box #3 Torrence, CA 90509

Stephen Young,
Coordinator, AIDS Health Services
Division of Narcotics and Drug Abuse
New Jersey State Department of
Health/CN 362
Trenton, NJ 08625

Joel Ziff Arthur Andersen and Company 5 Penn Center Philadelphia, PA 19103

APPENDIX B

GROUP LEADERS

James Chin, M.D., M.P.H. World Health Organization

Louis Z. Cooper, M.D. St. Luke's-Roosevelt Hospital Center

Jesse Green, Ph.D. New York University Medical Center

Max Gomez, Ph.D. KYW-TV3, Philadelphia

Margaret C. Heagarty, M.D. Harlem Hospital Center

Stephen Joseph, M.D. Commissioner of Health, NYC

Gloria Rodriguez, M.S.W. NJ State Department of Health

Mary-Ann Shafer, M.D. University of California at San Francisco

Pauline Thomas, M.D.
Director of AIDS Surveillance,
NYCDH

Diane W. Wara, M.D. University of California at San Francisco

Catherine M Wilfert, M.D. Duke University

RECORDERS

Stephen Barbour, M.D.
Jonathan Bell, M.D.
Maryanne Bolton
Erna Goulding, M.A.*
Naynesh Kamani, M.D.
Anne E. Kazak, Ph.D.
Gary Marshall, M.D.
Anthony Mauro, M.S.W.
Stephen Nicholas, M.D.
Marianne C. Raphaely**

Recorders are staff members of The Children's Hospital of Philadelphia.

*Former Vice-President for Patient Care The Children's Hospital of Philadelphia

**Member, Executive Council of Volunteer Organizations The Children's Hospital of Philadelphia

APPENDIX C

GUIDELINES FOR MANAGEMENT OF HIV INFECTION

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APPENDIX D

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APPENDIX E

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225 Classification System for Human Immunodeficiency Virus (HIV) Infection in Children Under 13 Years of Age

MORBIDITY AND MORTALITY WEEKLY REPORT

Current Trends

Classification System for Human Immunodeficiency Virus (HIV) Infection in Children Under 13 Years of Age

INTRODUCTION

With the identification of the causative agent of the acquired immunodeficiency syndrome (AIDS), a broad spectrum of clinical manifestations has been attributed to infection with the human immunodeficiency virus (HIV). With the exception of the CDC surveillance definition for AIDS (1,2), no standard definitions for other manifestations of HIV infection have been developed for children. Classification systems published to date have been developed primarily to categorize clinical presentations in adult patients and may not be entirely applicable to infants and children (3-5).

Physicians from institutions caring for relatively large numbers of HIV-infected children report that only about half of their patients with symptomatic illness related to the infection fulfill the criteria of the CDC surveillance definition for AIDS (6,7).

To develop a classification system for HIV infection in children, CDC convened a panel of consultants* consisting of clinicians experienced in the diagnosis and management of children with HIV infection; public health physicians; representatives from the American Academy of Pediatrics, the Council of State and Territorial Epidemiologists, the Association for Maternal Child Health and Crippled Children's Programs, the National Institute on Drug Abuse/Alcohol, Drug Abuse and Mental Health Administration, the National Institute of Allergy and Infectious Diseases/National Institutes of Health, and the Division of Maternal and Child Health/Health Resources and Services Administration; and CDC.

GOALS AND OBJECTIVES OF THE CLASSIFICATION SYSTEM

The system was designed primarily for public health purposes, including epidemiologic studies, disease surveillance, prevention programs, and health-care planning and policy. The panel attempted to devise a simple scheme that could be subdivided as needed for different purposes.

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^{*}P Brunell, MD, R Daum, MD, American Academy of Pediatrics; J Chin, MD, State Epidemiologist, California Dept of Health Svcs; L Cooper, MD, St Luke's-Roosevelt Hospital Center, New York City; J Oleske, MD, MPH, L Epstein, MD, Univ of Medicine and Dentistry of New Jersey; N Luban, MD, Children's Hospital National Medical Center, Washington, DC; S Mailloux, MD, Assoc of Maternal Child Health and Crippled Children's Programs; S Pawha, MD, North Shore Univ Hospital, Cornell University Medical Center, Manhassett, NY; G Scott, MD, Univ of Miami School of Medicine; R Stiehm, MD, Univ of California, Los Angeles; P Thomas, MD, New York City Dept of Health; D Wara, MD, Univ of California, San Francisco; D Williams, MD, Los Angeles County Hospital; J Witte, MD, MPH, Florida Dept of Health and Rehabilitative Svcs.

HIV Infection - Continued

DEFINITION OF HIV INFECTION IN CHILDREN (Table 1)

Ideally, HIV infection in children is identified by the presence of the virus in blood or tissues, confirmed by culture or other laboratory detection methods. However, current tests—including culture—for detecting the virus or its antigens are not standardized and are not readily available. Detection of specific antibody to the virus is a sensitive and specific indicator of HIV infection in adults, since the majority of adults with antibody have had culture evidence of infection (8-10). Similar studies involving children have not been reported. Also, the presence of passively transferred maternal antibody in infants limits the interpretation of a positive antibody test result in this age group. Most of the consultants believed that passively transferred maternal HIV antibody could sometimes persist for up to 15 months. For this reason, two definitions for infection in children are needed: one for infants and children up to 15 months of age who have been exposed to their infected mothers perinatally, and another for older children with perinatal infection and for infants and children of all ages acquiring the virus through other means.

Infants and children under 15 months of age with perinatal infection — Infection in infants and children up to 15 months of age who were exposed to infected mothers in the perinatal period may be defined by one or more of the following: 1) the identification of the virus in blood or tissues, 2) the presence of HIV antibody as indicated by a repeatedly reactive screening test (e.g., enzyme immunoassay) plus a positive confirmatory test (e.g., Western blot, immunofluorescence assay) in an infant or child who has abnormal immunologic test results indicating both humoral and cellular immunodeficiency (increased immunoglobulin levels, depressed T4 [T-helper] absolute cell count, absolute lymphopenia, decreased T4/T8 ratio) and who meets the requirements of one or more of the subclasses listed under class P-2 (described below), or 3) the confirmation that a child's symptoms meet the previously published CDC case definition for pediatric AIDS (1,2).

The infection status of other perinatally exposed seropositive infants and children up to 15 months of age who lack one of the above immunologic or clinical criteria is indeterminate. These infants should be followed up for HIV-related illness, and they should be tested at regu-

TABLE 1. Summary of the definition of HIV infection in children

Infants and children under 15 months of age with perinatal infection

- 1) Virus in blood or tissues
 - or
- 2) HIV antibody

evidence of both cellular and humoral immune deficiency and

one or more categories in Class P-2

or

3) Symptoms meeting CDC case definition for AIDS

Older children with perinatal infection and children with HIV infection acquired through other modes of transmission

- 1) Virus in blood or tissues
 - 0
- 2) HIV antibody
- 3) Symptoms meeting CDC case definition for AIDS

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HIV Infection - Continued

lar intervals for persistence of antibody to HIV. Infants and children who become seronegative, are virus-culture negative (if blood or tissue samples are cultured), and continue to have no clinical or laboratory-confirmed abnormalities associated with HIV infection are unlikely to be infacted.

Older children with perinatal infection and children with HIV infection acquired through other modes of transmission—HIV infection in these children is defined by one or more of the following: 1) the identification of virus in blood or tissues, 2) the presence of HIV antibody (positive screening test plus confirmatory test) regardless of whether immunologic abnormalities or signs or symptoms are present, or 3) the confirmation that the child's symptoms meet the previously published CDC case definition for pediatric AIDS (1,2).

These definitions apply to children under 13 years of age. Persons 13 years of age and older should be classified according to the adult classification system (3).

CLASSIFICATION SYSTEM (Table 2)

Children fulfilling the definition of HIV infection discussed above may be classified into one of two mutually exclusive classes based on the presence or absence of clinical signs and symptoms (Table 2). Class Pediatric-1 (P-1) is further subcategorized on the basis of the presence or absence of immunologic abnormalities, whereas Class P-2 is subdivided by specific disease patterns. Once a child has signs and symptoms and is therefore classified in P-2, he or she should not be reassigned to class P-1 if signs and symptoms resolve.

Perinatally exposed infants and children whose infection status is indeterminate are classified into class P-0.

Class P-0. Indeterminate infection. Includes perinatally exposed infants and children up to 15 months of age who cannot be classified as definitely infected according to the above definition but who have antibody to HIV, indicating exposure to a mother who is infected.

Class P-1. Asymptomatic infection. Includes patients who meet one of the above defini-

TABLE 2. Summary of the classification of HIV infection in children under 13 years of age

Class P-0. Indeterminate infection

Class P-1. Asymptomatic infection

Subclass A. Normal immune function
Subclass B. Abnormal immune function
Subclass C. Immune function not tested

Class P-2. Symptomatic infection

Subclass A. Nonspecific findings
Subclass B. Progressive neurologic disease

Subclass C. Lymphoid interstitial pneumonitis
Subclass D. Secondary infectious diseases

Category D-1. Specified secondary infectious diseases listed in the CDC surveillance definition for AIDS

Category D-2. Recurrent serious bacterial infections

Category D-3. Other specified secondary infectious diseases

Subclass E. Secondary cancers

Category E-1. Specified secondary cancers listed in the CDC surveillance definition for AIDS

Category E-2. Other cancers possibly secondary to HIV infection

Subclass F. Other diseases possibly due to HIV infection

HIV Infection - Continued

tions for HIV infection but who have had no previous signs or symptoms that would have led to classification in Class P-2.

These children may be subclassified on the basis of immunologic testing. This testing should include quantitative immunoglobulins, complete blood count with differential, and T-lymphocyte subset quantitation. Results of functional testing of lymphocytes (mitogens, such as pokeweed) may also be abnormal in HIV-infected children, but it is less specific in comparison with immunoglobulin levels and lymphocyte subset analysis, and it may be impractical.

Subclass A - Normal immune function. Includes children with no immune abnormalities associated with HIV infection.

Subclass B - Abnormal immune function. Includes children with one or more of the commonly observed immune abnormalities associated with HIV infection, such as hypergammaglobulinemia, T-helper (T4) lymphopenia, decreased T-helper/T-suppressor (T4/T8) ratio, and absolute lymphopenia. Other causes of these abnormalities must be excluded.

Subclass C - Not tested. Includes children for whom no or incomplete (see above) immunologic testing has been done.

Class P-2. Symptomatic infection. Includes patients meeting the above definitions for HIV infection and having signs and symptoms of infection. Other causes of these signs and symptoms should be excluded. Subclasses are defined based on the type of signs and symptoms that are present. Patients may be classified in more than one subclass.

Subclass A - Nonspecific findings. Includes children with two or more unexplained non-specific findings persisting for more than 2 months, including fever, failure-to-thrive or weight loss of more than 10% of baseline, hepatomegaly, splenomegaly, generalized lymphadenopathy (lymph nodes measuring at least 0.5 cm present in two or more sites, with bilateral lymph nodes counting as one site), parotitis, and diarrhea (three or more loose stools per day) that is either persistent or recurrent (defined as two or more episodes of diarrhea accompanied by dehydration within a 2-month period).

Subclass B - Progressive neurologic disease. Includes children with one or more of the following progressive findings: 1) loss of developmental milestones or intellectual ability, 2) impaired brain growth (acquired microcephaly and/or brain atrophy demonstrated on computerized tomographic scan or magnetic resonance imaging scan), or 3) progressive symmetrical motor deficits manifested by two or more of these findings: paresis, abnormal tone, pathologic reflexes, ataxia, or gait disturbance.

Subclass C - Lymphoid interstitial pneumonitis. Includes children with a histologically confirmed pneumonitis characterized by diffuse interstitial and peribronchiolar infiltration of lymphocytes and plasma cells and without identifiable pathogens, or, in the absence of a histologic diagnosis, a chronic pneumonitis—characterized by bilateral reticulonodular interstitial infiltrates with or without hilar lymphadenopathy—present on chest X-ray for a period of at least 2 months and unresponsive to appropriate antimicrobial therapy. Other causes of interstitial infiltrates should be excluded, such as tuberculosis, Pneumocystis carinii pneumonia, cytomegalovirus infection, or other viral or parasitic infections.

Subclass D - Secondary infectious diseases. Includes children with a diagnosis of an infectious disease that occurs as a result of immune deficiency caused by infection with HIV.

Category D-1. Includes patients with secondary infectious disease due to one of the specified infectious diseases listed in the CDC surveillance definition for AIDS: Pneumocystis carinii pneumonia; chronic cryptosporidiosis; disseminated toxoplasmosis with onset after 1 month of age; extra-intestinal strongyloidiasis; chronic isosporiasis; candidiasis (esophageal, bronchial, or pulmonary); extrapulmonary cryptococco-

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sis; disseminated histoplasmosis; noncutaneous, extrapulmonary, or disseminated mycobacterial infection (any species other than leprae); cytomegalovirus infection with onset after 1 month of age; chronic mucocutaneous or disseminated herpes simplex virus infection with onset after 1 month of age; extrapulmonary or disseminated coccidioidomycosis; nocardiosis; and progressive multifocal leukoencephalopathy.

Category D-2. Includes patients with unexplained, recurrent, serious bacterial infections (two or more within a 2-year period) including sepsis, meningitis, pneumonia, abscess of an internal organ, and bone/joint infections.

Category D-3. Includes patients with other infectious diseases, including oral candidiasis persisting for 2 months or more, two or more episodes of herpes stomatitis within a year, or multidermatomal or disseminated herpes zoster infection.

Subclass E - Secondary cancers. Includes children with any cancer described below in categories E-1 and E-2.

Category E-1. Includes patients with the diagnosis of one or more kinds of cancer known to be associated with HIV infection as listed in the surveillance definition of AIDS and indicative of a defect in cell-mediated immunity: Kaposi's sarcoma, B-cell non-Hodgkin's lymphoma, or primary lymphoma of the brain.

Category E-2. Includes patients with the diagnosis of other malignancies possibly associated with HIV infection.

Subclass F - Other diseases. Includes children with other conditions possibly due to HIV infection not listed in the above subclasses, such as hepatitis, cardiopathy, nephropathy, hematologic disorders (anemia, thrombocytopenia), and dermatologic diseases.

Reported by: AIDS Program, Center for Infectious Diseases, CDC.

Editorial Note: This classification system is based on present knowledge and understanding of pediatric HIV infection and may need to be revised as new information becomes available. New diagnostic tests, particularly antigen detection tests and HIV-specific IgM tests, may lead to a better definition of HIV infection in infants and children. Information from several natural history studies currently under way may necessitate changes in the subclasses based on clinical signs and symptoms.

A definitive diagnosis of HIV infection in perinatally exposed infants and children under 15 months of age can be difficult. The infection status of these HIV-seropositive infants and children who are asymptomatic without immune abnormalities cannot be determined unless virus culture or other antigen-detection tests are positive. Negative virus cultures do not necessarily mean the child is not infected, since the sensitivity of the culture may be low. Decreasing antibody titers have been helpful in diagnosing other perinatal infections, such as toxoplasmosis and cytomegalovirus. However, the pattern of HIV-antibody production in infants is not well defined. At present, close follow-up of these children (Class P-0) for signs and symptoms indicative of HIV infection and/or persistence of HIV antibody is recommended.

The parents of children with HIV infection should be evaluated for HIV infection, particularly the mother. The child is often the first person in such families to become symptomatic. When HIV infection in a child is suspected, a careful history should be taken to elicit possible risk factors for the parents and the child. Appropriate laboratory tests, including HIV serology, should be offered. If the mother is seropositive, other children should be evaluated regarding their risk of perinatally acquired infection. Intrafamilial transmission, other than perinatal or sexual, is extremely unlikely. Identification of other infected family members allows for appropriate medical care and prevention of transmission to sexual partners and future children (11,12).

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HIV Infection - Continued

The nonspecific term AIDS-related complex has been widely used to describe symptomatic HIV-infected children who do not meet the CDC case definition for AIDS. This classification system categorizes these children more specifically under Class P-2.

The development and publication of this classification system does not imply any immediate change in the definition of pediatric AIDS used by CDC for reporting purposes (1,2). Changes in this definition require approval by state and local health departments. However, changes in the definition for reporting cases have been proposed by CDC and are awaiting state and local approval.

Written comments are encouraged. They should be mailed to the AIDS Program, Center for Infectious Diseases, Centers for Disease Control, Atlanta, GA 30333.

- 1.CDC. Update: acquired immunodeficiency syndrome (AIDS)—United States MMWR 1984;32 688-91
- CDC. Revision of the case definition of acquired immunodeficiency syndrome for national reporting—United States. MMWR 1985;34:373-5.
- 3.CDC. Classification system for human T-lymphotropic virus type III/lymphadenopathy-associated virus infections. MMWR 1986;35:334-9.
- 4. Redfield RR, Wright DC, Tramont EC. The Walter Reed staging classification for HTLV-III/LAV infection. N Engl J Med 1986;314:131-2.

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Current Trends

Education and Foster Care of Children Infected with Human T-Lymphotropic Virus Type III/ Lymphadenopathy-Associated Virus

The information and recommendations contained in this document were developed and compiled by CDC in consultation with individuals appointed by their organizations to represent the Conference of State and Territorial Epidemiologists, the Association of State and Territorial Health Officers, the National Association of County Health Officers, the Division of Maternal and Child Health (Health Resources and Services Administration), the National Association for Elementary School Principals, the National Association of State School Nurse Consultants, the National Congress of Parents and Teachers, and the Children's Aid Society. The consultants also included the mother of a child with acquired immunodeficiency syndrome (AIDS), a legal advisor to a state education department, and several pediatricians who are experts in the field of pediatric AIDS. This document is made available to assist state and local health and education departments in developing guidelines for their particular situations and locations.

These recommendations apply to all children known to be infected with human T-lymphotropic virus type III/lymphadenopathy-associated virus (HTLV-III/LAV). This includes children with AIDS as defined for reporting purposes (Table 1); children who are diagnosed by their physicians as having an illness due to infection with HTLV-III/LAV but who do not meet the case definition; and children who are asymptomatic but have virologic or serologic evidence of infection with HTLV-III/LAV. These recommendations do not apply to siblings of infected children unless they are also infected.

BACKGROUND

The Scope of the Problem. As of August 20, 1985, 183 of the 12,599 reported cases of AIDS in the United States were among children under 18 years of age. This number is expected to double in the next year. Children with AIDS have been reported from 23 states, the District of Columbia, and Puerto Rico, with 75% residing in New York, California, Florida, and New Jersey.

The 183 AIDS patients reported to CDC represent only the most severe form of HTLV-III/LAV infection, i.e., those children who develop opportunistic infections or malignancies (Table 1). As in adults with HTLV-III/LAV infection, many infected children may have milder illness or may be asymptomatic.

Legal Issues. Among the legal issues to be considered in forming guidelines for the education and foster care of HTLV-III/LAV-infected children are the civil rights aspects of public

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TABLE 1. Provisional case definition for acquired immunodeficiency syndrome (AIDS) surveillance of children

For the limited purposes of epidemiologic surveillance, CDC defines a case of pediatric acquired immunodeficiency syndrome (AIDS) as a child who has had:

- A reliably diagnosed disease at least moderately indicative of underlying cellular immunodeficiency, and
- No known cause of underlying cellular immunodeficiency or any other reduced resistance reported to be associated with that disease.

The diseases accepted as sufficiently indicative of underlying cellular immunodeficiency are the same as those used in defining AIDS in adults. In the absence of these opportunistic diseases, a histologically confirmed diagnosis of chronic lymphoid interstitial pneumonitis will be considered indicative of AIDS unless test(s) for HTLV-III/LAV are negative. Congenital infections, e.g., toxoplasmosis or herpes simplex virus infection in the first month after birth or cytomegalovirus infection in the first 6 months after birth must be exluded.

Specific conditions that must be excluded in a child are:

- Primary immunodeficiency diseases—severe combined immunodeficiency, DiGeorge syndrome, Wiskott-Aldrich syndrome, ataxia-telangiectasia, graft versus host disease, neutropenia, neutrophil function abnormality, agammaglobulinemia, or hypogammaglobulinemia with raised IgM.
- Secondary immunodeficiency associated with immunosuppressive therapy, lymphoreticular malignancy, or starvation.

school attendance, the protections for handicapped children under 20 U.S.C. 1401 et seq. and 29 U.S.C. 794, the confidentiality of a student's school record under state laws and under 20 U.S.C. 1232g, and employee right-to-know statutes for public employees in some states.

Confidentiality Issues. The diagnosis of AIDS or associated illnesses evokes much fear from others in contact with the patient and may evoke suspicion of life styles that may not be acceptable to some persons. Parents of HTLV-III/LAV-infected children should be aware of the potential for social isolation should the child's condition become known to others in the care or educational setting. School, day-care, and social service personnel and others involved in educating and caring for these children should be sensitive to the need for confidentiality and the right to privacy in these cases.

ASSESSMENT OF RISKS

Risk Factors for Acquiring HTLV-III/LAV Infection and Transmission. In adults and adolescents, HLTV-III/LAV is transmitted primarily through sexual contact (homosexual or heterosexual) and through parenteral exposure to infected blood or blood products. HTLV-III/LAV has been isolated from blood, semen, saliva, and tears but transmission has not been documented from saliva and tears. Adults at increased risk for acquiring HTLV-III/LAV include homosexual/bisexual men, intravenous drug abusers, persons transfused with contaminated blood or blood products, and sexual contacts of persons with HTLV-III/LAV infection or in groups at increased risk for infection.

The majority of infected children acquire the virus from their infected mothers in the perinatal period (1-4). In utero or intrapartum transmission are likely, and one child reported from Australia apparently acquired the virus postnatally, possibly from ingestion of breast milk (5). Children may also become infected through transfusion of blood or blood products that contain the virus. Seventy percent of the pediatric cases reported to CDC occurred among children whose parent had AIDS or was a member of a group at increased risk of acquiring HTLV-III/LAV infection; 20% of the cases occurred among children who had received blood or blood products; and for 10%, investigations are incomplete.

HTLV-III/LAV - Continued

Risk of Transmission in the School, Day-Care or Foster-Care Setting. None of the identified cases of HTLV-III/LAV infection in the United States are known to have been transmitted in the school, day-care, or foster-care setting or through other casual person-to-person contact. Other than the sexual partners of HTLV-III/LAV-infected patients and infants born to infected mothers, none of the family members of the over 12,000 AIDS patients reported to CDC have been reported to have AIDS. Six studies of family members of patients with HTLV-III/LAV infection have failed to demonstrate HTLV-III/LAV transmission to adults who were not sexual contacts of the infected patients or to older children who were not likely at risk from perinatal transmission (6-11).

Based on current evidence, casual person-to-person contact as would occur among schoolchildren appears to pose no risk. However, studies of the risk of transmission through contact between younger children and neurologically handicapped children who lack control of their body secretions are very limited. Based on experience with other communicable diseases, a theoretical potential for transmission would be greatest among these children. It should be emphasized that any theoretical transmission would most likely involve exposure of open skin lesions or mucous membranes to blood and possibly other body fluids of an infected person.

Risks to the Child with HTLV-III/LAV Infection. HTLV-III/LAV infection may result in immunodeficiency. Such children may have a greater risk of encountering infectious agents in a school or day-care setting than at home. Foster homes with multiple children may also increase the risk. In addition, younger children and neurologically handicapped children who may display behaviors such as mouthing of toys would be expected to be at greater risk for acquiring infections. Immunodepressed children are also at greater risk of suffering severe complications from such infections as chickenpox, cytomegalovirus, tuberculosis, herpes simplex, and measles. Assessment of the risk to the immunodepressed child is best made by the child's physician who is aware of the child's immune status. The risk of acquiring some infections, such as chickenpox, may be reduced by prompt use of specific immune globulin following a known exposure.

RECOMMENDATIONS

- 1. Decisions regarding the type of educational and care setting for HTLV-III/LAV-infected children should be based on the behavior, neurologic development, and physical condition of the child and the expected type of interaction with others in that setting. These decisions are best made using the team approach including the child's physician, public health personnel, the child's parent or guardian, and personnel associated with the proposed care or educational setting. In each case, risks and benefits to both the infected child and to others in the setting should be weighed.
- For most infected school-aged children, the benefits of an unrestricted setting would outweigh the risks of their acquiring potentially harmful infections in the setting and the apparent nonexistent risk of transmission of HTLV-III/LAV. These children should be allowed to attend school and after-school day-care and to be placed in a foster home in an unrestricted setting.
- 3. For the infected preschool-aged child and for some neurologically handicapped children who lack control of their body secretions or who display behavior, such as biting, and those children who have uncoverable, oozing lesions, a more restricted environment is advisable until more is known about transmission in these settings. Children infected with HTLV-III/LAV should be cared for and educated in settings that minimize exposure of other children to blood or body fluids.

HTLV-III/LAV - Continued

- 4. Care involving exposure to the infected child's body fluids and excrement, such as feeding and diaper changing, should be performed by persons who are aware of the child's HTLV-III/LAV infection and the modes of possible transmission. In any setting involving an HTLV-III/LAV-infected person, good handwashing after exposure to blood and body fluids and before caring for another child should be observed, and gloves should be worn if open lesions are present on the caretaker's hands. Any open lesions on the infected person should also be covered.
- 5. Because other infections in addition to HTLV-III/LAV can be present in blood or body fluids, all schools and day-care facilities, regardless of whether children with HTLV-III/LAV infection are attending, should adopt routine procedures for handling blood or body fluids. Soiled surfaces should be promptly cleaned with disinfectants, such as household bleach (diluted 1 part bleach to 10 parts water). Disposable towels or tissues should be used whenever possible, and mops should be rinsed in the disinfectant. Those who are cleaning should avoid exposure of open skin lesions or mucous membranes to the blood or body fluids.
- The hygienic practices of children with HTLV-III/LAV infection may improve as the child matures. Alternatively, the hygienic practices may deteriorate if the child's condition worsens. Evaluation to assess the need for a restricted environment should be performed regularly.
- 7. Physicians caring for children born to mothers with AIDS or at increased risk of acquiring HTLV-III/LAV infection should consider testing the children for evidence of HTLV-III/LAV infection for medical reasons. For example, vaccination of infected children with live virus vaccines, such as the measles-mumps-rubella vaccine (MMR), may be hazardous. These children also need to be followed closely for problems with growth and development and given prompt and aggressive therapy for infections and exposure to potentially lethal infections, such as varicella. In the event that an antiviral agent or other therapy for HTLV-III/LAV infection becomes available, these children should be considered for such therapy. Knowledge that a child is infected will allow parents and other caretakers to take precautions when exposed to the blood and body fluids of the child.
- 8. Adoption and foster-care agencies should consider adding HTLV-III/LAV screening to their routine medical evaluations of children at increased risk of infection before placement in the foster or adoptive home, since these parents must make decisions regarding the medical care of the child and must consider the possible social and psychological effects on their families.
- Mandatory screening as a condition for school entry is not warranted based on available data.
- 10. Persons involved in the care and education of HTLV-III/LAV-infected children should respect the child's right to privacy, including maintaining confidential records. The number of personnel who are aware of the child's condition should be kept at a minimum needed to assure proper care of the child and to detect situations where the potential for transmission may increase (e.g., bleeding injury).
- 11. All educational and public health departments, regardless of whether HTLV-III/ LAV-infected children are involved, are strongly encouraged to inform parents, children, and educators regarding HTLV-III/LAV and its transmission. Such education would greatly assist efforts to provide the best care and education for infected children while minimizing the risk of transmission to others.