ISSN 0725 - 3141

Communicable Diseases Intelligence

Bulletin number 88/10
Issue date: 23 May 1988

Contents:

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VIRUSES, CHLAMYDIAS, COXIELLAS, RICKETTSIAS AND MYCOPLASMAS REPORTING SCHEME: A total of 1 252 reports were processed during this period.

Two cases of Q fever were reported in South Australia during this period - two males aged 45 and 55 years. No occupational exposure data was available for these cases.

An additional two cases of Q fever, one in a grazier and one in a meatworker, were reported to the CDI by Dr Lynch, Pathologist, of Rockhampton, Queensland.

Cytomegalovirus was isolated from postmortem lung tissue of a one month old infant with Sudden Infant Death Syndrome.

Coxsackievirus A24 has been isolated from the eye of a male patient from Victoria. This case is reported as probably the first isolation of coxsackievirus A24 from the eye in Australia. No Australian reports of this virus have been received by the CDI virus reporting scheme since its inception in 1979 nor have any Australian reports been identified on the Medlars data base. However, this virus was identified in approximately 60 Fijian samples examined by Fairfield Infectious Diseases Hospital in 1986.

Coxsackievirus A24 has been associated with epidemics of acute haemorrhagic conjunctivitis in Singapore in 1970 and 1974-75, as well as in other countries such as Brazil, India, Pakistan, the Caribbean and Indonesia.

The Bulletin is compiled and distributed by the Public Health Section, Communicable Diseases Branch, Department of Community Services and Health.

AIDS UPDATE - INTERNATIONAL

(Based on WER NO 10, 4 March 1988)

Global data - AIDS cases reported to the World Health Organization, by country, as of 29 February 1988.

Country/Area	Number of cases	Date of report
Africa		
Algeria	8	04.01.88
Angola	6	26.09.86
Benin	3	18.05.87
Botswana	16	27.01.88
Burkina Faso	26	30.06.87
Burundi	569	15.10.87
Cameroon	25	05.03.87
Cape Verde	4	30.04.87
Central African Republic	254	31.10.86
Chad	1	13.11.86
Comoros	—	13.11.86
Congo	1 250	09.12.87
Côte d'Ivoire	250	20.11.87
Djibouti	—	01.10.87
Egypt	5	31.01.88
Ethiopia	19	04.12.87
Gabon	13	06.07.87
Gambia	14	16.03.87
Ghana	145	25.05.87
Guinea	4	12.11.87
Guinea-Bissau	16	20.11.87
Kenya	964	10.11.87
Lesotho	2	27.11.87
Liberia	2	12.06.87
Madagascar	—	25.04.87
Malawi	13	13.11.86
Mali	29	14.01.88
Mauritania	—	13.11.86
Mauritius	1	18.12.87
Mozambique	5	01.02.88
Niger	9	14.10.87
Nigeria	5	22.05.87
Reunion	1	10.06.87
Rwanda	705	30.11.86
Sao Tomé and Principe	—	01.12.86
Senegal	66	14.12.87
Seychelles	—	13.11.86
Sierra Leone	—	03.11.87
South Africa	98	04.01.88
Sudan	12	23.08.87
Swaziland	7	01.07.87
Togo	2	10.12.87
Tunisia	11	06.12.87
Uganda	2 369	31.10.87
United Republic of Tanzania	1 608	17.10.87
Zaire	335	30.06.87
Zambia	536	09.12.87
Zimbabwe	380	28.08.87
Total	9 788	
Americas		
Anguilla	2	31.03.87
Antigua and Barbuda	3	30.06.87
Argentina	120	30.09.87
Bahamas	163	16.10.87
Barbados	52	30.09.87
Belize	4	30.09.87
Bermuda	75	30.09.87
Bolivia	6	31.12.87
Brazil	2 325	07.12.87
British Virgin Islands	—	31.03.87
Canada	1 488	25.01.88
Cayman Islands	2	31.03.87
Chile	56	30.09.87
Colombia	153	30.09.87
Costa Rica	39	30.09.87
Cuba	27	31.12.87
Dominica	5	30.09.87
Dominican Republic	352	16.10.87
Ecuador	52	30.09.87
El Salvador	16	03.10.87
French Guiana	93	16.10.87
Guadeloupe	61	31.12.87
Grenada	7	16.10.87
Guatemala	30	30.09.87
Guyana	5	30.09.87
Haiti	912	30.09.87
Honduras	71	31.12.87
Jamaica	30	30.09.87
Martinique	27	30.06.87
Mexico	713	16.10.87
Montserrat	—	30.09.87
Nicaragua	19	18.09.87
Panama	27	31.12.87
Paraguay	14	30.06.87
Peru	44	30.09.87
Saint Christopher and Nevis	1	30.09.87
Saint Lucia	6	30.09.87
Saint Vincent and the Grenadines	7	30.09.87
Suriname	6	30.09.87
Trinidad and Tobago	206	30.11.87
Turks and Caicos Islands	4	30.06.87
United States of America	53 069	08.02.88
Uruguay	16	31.12.87
Venezuela	101	30.09.87
Total	60 409	
Asia		
Bangladesh	—	14.04.87
Bhutan	—	14.04.87
Brunei Darussalam	—	08.09.87
Burma	—	14.04.87
China	2	08.09.87
China (Province of Taiwan)	1	26.01.86
Cyprus	3	01.06.87
Democratic People's Republic of Korea	—	09.05.87
Eastern Mediterranean Region	36	10.09.87
Hong Kong	9	02.02.88
India	9	09.05.87
Indonesia	1	21.04.87
Israel	47	31.12.87
Japan	59	14.12.87
Jordan	3	24.12.87
Lebanon	3	03.06.87
Malaysia	2	31.12.87
Maldives	—	30.06.87
Mongolia	—	31.12.87
Nepal	—	09.05.87
Philippines	10	30.10.87
Qatar	9	09.05.87
Republic of Korea	1	08.09.87
Singapore	3	31.12.87
Sri Lanka	2	27.01.88
Thailand	12	12.10.87
Turkey	21	30.06.87
Viet Nam	—	08.09.87
Total	233	
Europe		
Albania	—	31.08.87
Austria	139	31.12.87
Belgium	297	31.12.87
Bulgaria	3	06.10.87
Czechoslovakia	8	31.12.87
Denmark	228	31.12.87
Finland	24	31.12.87
France	3 073	31.12.87
German Democratic Republic	4	30.09.87
Germany, Federal Republic of	1 760	29.01.88
Greece	88	31.12.87
Hungary	8	31.12.87
Iceland	4	30.09.87
Ireland	33	31.12.87
Italy	1 411	31.12.87
Luxembourg	9	31.12.87
Malta	7	30.09.87
Netherlands	420	31.12.87
Norway	70	31.12.87
Poland	3	30.06.87
Portugal	90	31.12.87
Romania	3	31.12.87
Spain	718	31.12.87
Sweden	165	21.01.88
Switzerland	355	31.12.87
USSR	4	05.08.87
United Kingdom	1 227	31.12.87
Yugoslavia	26	31.12.87
Total	10 177	
Oceania		
Australia	758	11.02.88
Cook Islands	—	08.09.87
Fiji	—	08.09.87
French Polynesia	1	08.09.87
Kiribati	—	26.10.87
Mariana Islands	—	05.08.87
New Caledonia and Dependencies	—	08.09.87
New Zealand	66	05.02.88
Papua New Guinea	—	08.09.87
Samoa	—	08.09.87
Solomon Islands	—	08.09.87
Tonga	1	06.10.87
Tuvalu	—	08.09.87
Vanuatu	—	08.09.87
Total	826	
World total	81 433	

AIDS SURVEILLANCE - AUSTRALIA

To 10 May 1988, 846 cases of AIDS fulfilling the criteria of case definition have been reported to the National Health and Medical Research Unit in AIDS Epidemiology and Clinical Research. The distribution of those patients by State or Territory of notification (Table 1), by age group (Table 2), by risk category (Table 3) and by clinical presentation (Table 4) are shown below. As previously stated the clinical classification of infection with HIV produced by CDC in Atlanta was adopted in Australia on 1 January 1988. All reporting of clinical manifestations of HIV will now be presented using that classification.

TABLE 1: AIDS patients by State or Territory of notification

STATE/ TERRITORY	CASES			DEATHS		
	Male	Female	Total	Male	Female	Total
NSW	545	23	568	297	17	314
VIC	156	3	159	59	2	61
QLD	52	4	56	34	3	37
WA	33	2	35	16	1	17
SA	18	1	19	5	1	6
NT	2	0	2	1	0	1
TAS	1	1	2	1	0	1
ACT	5	0	5	4	0	4
	812	34	846	417	24	441

TABLE 2: AIDS patients by age group

AGE (YEARS)	CASES			DEATHS		
	Male	Female	Total	Male	Female	Total
0 - 9	7	2	9	5	1	6
10 - 19	4	1	5	3	1	4
20 - 29	170	8	178	88	2	90
30 - 39	349	3	352	170	1	171
40 - 49	202	4	206	99	4	103
50 - 59	64	6	70	41	6	47
60 +	16	10	26	11	9	20
	812	34	846	417	24	441

TABLE 3: AIDS patients by risk category

RISK GROUP	CASES	DEATHS
Homo-/Bi-sexual	738	371
IV drug user	4	2
Homo-/Bi-sexual IV drug user	24	13
Blood transfusion recipient	49	40
Person with haemophilia	10	5
Heterosexual transmission	8	2
Under investigation	6	2
None of the above	7	6
	846	441

TABLE 4: AIDS patients by clinical presentation

INITIAL DISEASE REPORTED	CASES	DEATHS
GROUP IV:		
B: Neurologic disease	15	9
C: Secondary infectious diseases	618	319
D: Secondary cancers	171	84
E: Other conditions	0	0
BC: Neurologic disease + infectious diseases	7	7
BD: Neurologic disease + cancers	1	0
CD: Infectious diseases + cancers	34	22
	846	441

AGENT SUMMARY STATEMENT FOR HUMAN IMMUNODEFICIENCY VIRUSES (HIVS) INCLUDING HTLV-III, LAV, HIV-1, AND HIV-2*

(Based on MMWR [1988] 37, Suppl 4:1-18)

Introduction

In 1984, the Centers for Disease Control (CDC) and the National Institutes of Health (NIH), in consultation with experts from academic institutions, industry, and government, published the book Biosafety in Microbiological and Biomedical Laboratories ("Guidelines")[1].

These Guidelines are based on combinations of standard and special practices, equipment, and facilities recommended for use in working with infectious agents in various laboratory settings in the United States of America. The recommendations are advisory; they provide a general code for operating microbiological and biomedical laboratories.

One section of the Guidelines is devoted to standard and special microbiological practices, safety equipment, and facilities for biosafety levels (BSL) 1 through 4. Another section contains specific agent summary statements, each consisting of a brief description of laboratory-associated infections, the nature of laboratory hazards, and recommended precautions for working with the causative agent. The summary statement for human immunodeficiency virus (HIV) (called HTLV-III/LAV in the Guidelines) was revised in 1986[2] and is again updated by the following HIV agent summary.

BSL 2 and 3 laboratory descriptions reproduced from the Guidelines[1] are included as an addendum to the agent summary because they are recommended for laboratory personnel working with HIV, depending on the concentration or quantity of virus or the type of laboratory procedures used.

The HIV agent summary statement does not specifically address safety measures for collecting and handling clinical specimens. Nonetheless, it has been recommended that precautions consistently be used for **ALL** blood and body-fluid specimens from **ALL** patients. This approach, referred to as "universal blood and body-fluid precautions" or "universal precautions", eliminates the need to identify all patients infected with HIV (or other blood borne pathogens)[3]. This subject is also covered in other publications[3-8].

CDC recommends that laboratory directors and supervisors review the recommended precautions with laboratory personnel, provide appropriate training in practices and operation of facilities, and ensure that all personnel demonstrate proficiency **BEFORE** being allowed to work with HIV.

HIV AGENT SUMMARY STATEMENT

AGENT: HIVS INCLUDING HTLV-III, LAV, HIV-1, AND HIV-2

In the period 1984-1986, several health-care workers (HCWs) who had no recognized risk behaviour for acquired immunodeficiency syndrome (AIDS) were reported to have HIV infection[10-15]. Only one of these HCWs was identified as a laboratory worker. These and other reports assessed the risk of work-related HIV infection for all HCWs as being very low[3,6,10-12,14-18].

In 1985, anecdotal reports were received indicating that workers in two different HIV-reagent-production laboratories had been exposed to droplets and splashed liquid from a vessel containing concentrated virus. One of several workers had been cut by glass from a broken carboy that contained HIV-infected cells and medium. None of the persons exposed in these episodes had developed antibody to HIV or had clinical signs of infection 18 and 20 months, respectively, after the reported exposure.

In 1987, CDC received reports that three HCWs had HIV infection; none of the infections were associated with needlesticks or cuts. Two of these HCWs were clinical laboratory workers[11]. One was a phlebotomist whose face and mouth were splattered with a patient's blood when the rubber stopper was suddenly expelled from a blood-collection tube. The second was a medical technologist who inadvertently spilled blood on her arms and forearms while using an apheresis apparatus to process blood from an HIV-seropositive patient.

In September 1987, a production-laboratory worker was reported to have HIV infection[18]. This person worked with large concentrations of HIV in a BSL 3 facility. HIV was isolated from the worker's blood; the isolate was genetically indistinguishable from the strain of virus being cultivated in the laboratory. No risk factors were identified, and the worker recalled no specific incident that might have led to infection. However, there were instances of leakage of virus-positive culture fluid from equipment and contamination of the work area and centrifuge rotors. The report concluded that the most plausible source of exposure was contact of the worker's gloved hand with virus-culture supernatant, followed by inapparent exposure to skin.

In October 1987, a second person who worked in another HIV production facility was reported to have HIV infection[18]. This laboratory was a well-equipped BSL 3 facility, and BSL 3 practices were being followed. This worker reported having sustained a puncture wound to a finger while cleaning equipment used to concentrate HIV.

Laboratory Hazards

HIV has been isolated from blood, semen, saliva, tears, urine, cerebrospinal fluid, amniotic fluid, breast milk, cervical

secretions, and tissue of infected persons and experimentally infected nonhuman primates. In the laboratory, virus should be presumed to be present in all HIV cultures, in all materials derived from HIV cultures, and in/on all equipment and devices coming into direct contact with any of these materials.

In the laboratory, the skin (especially when scratches, cuts, abrasions, dermatitis, or other lesions are present) and mucous membranes of the eye, nose, mouth, and possibly the respiratory tract should be considered as potential pathways for entry of virus. Needles, sharp instruments, broken glass, and other sharp objects must be carefully handled and properly discarded. Care must be taken to avoid spilling and splashing infected cell-culture liquid and other virus-containing materials.

Recommended Precautions

1. BSL 2 standards and special practices, containment equipment, and facilities, as described in the CDC-NIH publication Biosafety in Microbiological and Biomedical Laboratories (Guidelines), are recommended for activities involving all clinical specimens, body fluids, and tissues from humans or from infected or inoculated laboratory animals. These are the same standards and practices recommended for handling all clinical specimens. For example, and for emphasis:

   a. Use of syringes, needles, and other sharp instruments should be avoided if possible. Used needles and disposable cutting instruments should be discarded into a puncture-resistant container with a lid. Needles should not be re-sheathed, bent, broken, removed from disposable syringes, or otherwise manipulated by hand.

   b. Protective gloves should be worn by all personnel engaged in activities that may involve direct contact of skin with potentially infectious specimens, cultures, or tissues. Gloves should be carefully removed and changed when they are visibly contaiminated. Personnel who have dermatitis or other lesions on the hands and who may have indirect contact with potentially infectious material should also wear protective gloves. Hand washing with soap and water immediately after infectious materials are handled and after work is completed - **EVEN WHEN GLOVES HAVE BEEN WORN** as described above - should be a routine practice.

   c. Generation of aerosols, droplets, splashes, and spills should be avoided. A biological safety cabinet should be used for all procedures that might generate aerosols or droplets and for all infected cell-culture manipulations. The Guidelines (pp. 11-13) contain additional precautions for operating at BSL 2.

2. Activities such as producing research-laboratory-scale amounts of HIV, manipulating concentrated virus preparations, and conducting procedures that may produce aerosols or droplets should be performed in a BSL 2 facility with the additional practices and containment equipment recommended for BSL 3 [19] (Guidelines, pp. 14-17).

3. Activities involving industrial-scale, large-volume production or high concentration and manipulation of concentrated HIV should be conducted in a BSL 3 facility using BSL 3 practices and equipment[19].

4. BSL 2 practices, containment equipment, and facilities for animals are recommended for activities involving nonhuman primates and any animals experimentally infected or inoculated with HIV. Because laboratory animals may bite, throw faeces or urine, or expectorate at humans, animal-care personnel, investigators, technical staff, and other persons who enter the animal rooms should wear coats, protective gloves, coveralls or uniforms, and as appropriate face shields or surgical masks and eye shields to protect the skin and mucous membranes of the eyes, nose, and mouth.

5. All laboratory glassware, disposable material, and waste material suspected or known to contain HIV should be decontaminated, preferably in an autoclave, before it is washed, discarded, etc. An alternate method of disposing of solid wastes is incineration.

6. Laboratory workers should wear laboratory coats, gowns, or uniforms when working with HIV or with material known or suspected to contain HIV. There is no evidence that laboratory clothing poses a risk for HIV transmission; however, clothing that becomes contaminated with HIV preparations should be decontaminated before being laundered or discarded. Laboratory personnel must remove laboratory clothing before going to nonlaboratory areas.

7. Work surfaces should be decontaminated with an appropriate chemical germicide after procedures are completed, when surfaces are overtly contaminated, and at the end of each work day. Many[5,20,23] commercially available chemical disinfectants can be used for decontaminating laboratory work surfaces, for some laboratory instruments, for spot cleaning of contaminated laboratory clothing, and for spills of infectious materials. Prompt decontamination of spills should be standard practice.

8. Universal precautions are recommended for handling all human blood specimens for hematological, microbiological, chemical, and serological testing; these are the same precautions for prevention transmission of all bloodborne infections including hepatitis B[17,21,24,25]. It is not certain how effective 56°C-60°C heat is in destroying HIV in serum[22,23,26], but heating small volumes of serum for 30 minutes at 56°C before serological testing reduces residual infectivity to below detectable levels. Such teatment causes some false-positive results in HIV enzyme immunoassays[27-30] and may also affect some biochemical assays performed on serum[24,31,32].

9. Human serum from any source that is used as a control or reagent in a test procedure should be handled at BSL 2 (Guidelines, pp. 11-13). Addendum 2 to this report is a statement issued by CDC on the use of all human control and reagent serum specimens shipped to other laboratories. The Food and Drug Administration requires that manufacturers of human serum reagents use a similarly worded statement.

10. Medical surveillance programs should be in place in all laboratories that test specimens, do research, or produce reagents involving HIV. The nature and scope of a surveillance program will vary according to institutional policy and applicable local, state, and Federal regulations[9].

11. If a laboratory worker has a parenteral or mucous-membrane exposure to blood, body fluid, or viral-culture material, the source material should be identified and, if possible, tested for the presence of virus. If the source material is positive for HIV antibody, virus, or antigen, or is not available for examination, the worker should be counselled regarding the risk of infection and should be evaluated clinically and serologically for evidence of HIV infection. The worker should be advised to report on and to seek medical evaluation of any acute febrile illness that occurs within 12 weeks after the exposure[31]. Such an illness - particularly one characterized by fever, rash, or lymphadenopathy - may indicate recent HIV infection. If seronegative, the worker should be retested 6 weeks after the exposure and periodically thereafter (e.g., at 12 weeks and 6 months after exposure). During this follow-up period - especially during the first 6-12 weeks after exposure, when most infected persons are expected to show serological evidence of infection - exposed workers should be counselled to follow Public Health Service recommendations for preventing transmission of HIV[3,14,25,33]. It is recommended that all institutions establish written policies regarding the management of laboratory exposure to HIV; such policies should deal with confidentiality, counselling, and other related issues.

12. Other primary and opportunistic pathogenic agents may be present in the body fluids and tissues of persons infected with HIV. Laboratory workers should follow accepted biosafety practices to ensure maximum protection against inadvertent laboratory exposure to agents that may also be present in clinical specimens[34-36].

13. Unless otherwise dictated by institutional policy, the laboratory director (or designated laboratory supervisor) is responsible for carrying out the biosafety program in the laboratory. In this regard, the laboratory director or designated supervisor should establish the biosafety level for each compenent of the work to be done and should ensure that facilities and equipment are adequate and in good working order, that appropriate initial and periodic training is provided to the laboratory staff, and that recommended practices and procedures are strictly followed[9].

14. Attention is directed to a 'Joint Advisory Notice' of the Department of Labor and Health and Human Services[9] that describes the responsibility of employers to provide 'safe and healthful working conditons' to protect employees against occupational infection with HIV. The notice defines three exposure categories of generic job-related tasks and describes the protective measures required for employees involved in each exposure category. These measures are: administrative measures, training and

education programs for employees, engineering controls, work practices, medical and health-care practices, and record-keeping. The recommendations in this report are consistent with the "Joint Advisory Notice"; managers/directors of all biomedical laboratories are urged to read this notice.

ADDENDUM 1: LABORATORY BIOSAFETY LEVEL CRITERIA

BIOSAFETY LEVEL 2

Biosafety Level 2 is similar to Level 1 and is suitable for work involving agents that represent a moderate hazard for personnel and the environment. It differs in that:

a) laboratory personnel have specific training in handling pathogenic agents and are directed by competent scientists;

b) access to the laboratory is limited when work is being conducted; and

c) certain procedures in which infectious aerosols are created are conducted in biological safety cabinets or other physical containment equipment.

The following standard and special practices, safety equipment, and facilities apply to agents assigned to Biosafety Level 2:

A. Standard microbiological practices

1. Access to the laboratory is limited or restricted by the laboratory director when work with infectious agents is in progress.

2. Work surfaces are decontaminated at least once a day and after any spill of viable material.

3. All infectious liquid or solid waste is decontaminated before being disposed of.

4. Mechanical pipetting devices are used; mouth pipetting is prohibited.

5. Eating, drinking, smoking, and applying cosmetics are not permitted in the work area. Food must be stored in cabinets or refrigerators designed and used for this purpose only. Food storage cabinets or refrigerators should be located outside the work area.

6. Persons are to wash their hands when they leave the laboratory after handling infectious material or animals.

7. All procedures are performed carefully to minimise the creation of aerosols.

B. Special practices

1. Contaminated materials that are to be decontaminated away from the laboratory are placed in a durable, leakproof container that is closed before being removed from the laboratory.

2. The laboratory director limits access to the laboratory. In general, persons who are at increased risk of acquiring infection or for whom infection may be unusually hazardous are not allowed in the laboratory or animal rooms. The director has the final responsibility for assessing each circumstance and determining who may enter or work in the laboratory.

3. The laboratory director establishes policies or procedures whereby only persons who have been advised of the potential hazard and who meet any specific entry requirements (e.g., vaccination) enter the laboratory or animal rooms.

4. When an infectious agent being worked with in the laboratory requires special provisions for entry (e.g., vaccination), a hazard warning sign that incorporates the universal biohazard symbol is posted on the access door to the laboratory work area. The hazard warning sign identifies the infectious agent, lists the name and telephone number of the laboratory director or other repsonsible person(s), and indicates the special requirement(s) for entering the laboratory.

5. An insect and rodent control program is in effect.

6. Laboratory coats, gowns, smocks, or uniforms are worn while in the laboratory. Before leaving the laboratory for nonlaboratory areas (e.g., cafeteria, library, administrative offices), this protective clothing is removed and left in the laboratory or covered with a clean coat not used in the laboratory.

7. Animals not involved in the work being perfomed are not permitted in the laboratory.

8. Special care is taken to avoid having skin be contaminated with infectious material; gloves should be worn when handling infected animals and when skin contact with infectious material is unavoidable.

9. All waste from laboratories and animal rooms is appropriately decontaminated before disposal.

10. Hypodermic needles and syringes are used only for parenteral injection and aspiration of fluids from laboratory animals and diaphragm bottles. Only needle-locking syringes or disposable syringe-needle units (i.e., the needle is integral to the syringe) are used for the injection or aspiration of infectious fluid. Extreme caution should be used when handling needles and syringes to avoid autoinoculation and the generation or aerosols during use and disposal. A needle should not be bent, sheared, replaced in the sheath or guard, or removed from

the syringe following use. The needle and syringe should be promptly placed in a puncture-resistant container and decontaminated, preferably by autoclaving, before discard or reuse.

11. Spills and accidents that result in overt exposures to infectious material are immediately reported to the laboratory director. Medical evaluation, surveillance, and treatment are provided as appropriate, and written records are maintained.

12. When appropriate, considering the agent(s) handled, baseline serum samples for laboratory and other at-risk personnel are collected and stored. Additional serum specimens may be collected periodically, depending on the agents handled or on the function of the facility.

13. A biosafety manual is prepared or adopted. Personnel are advised of special hazards and are required to read instructions on practices and procedures and to follow them.

C. Containment equipment

Biological safety cabinets (Class I or II) or other appropriate personal-protection or physical-containment devices are used when:

1. Procedures with a high potential for creating infectious aerosols are conducted. These may include centrifuging, grinding, blending, vigorous shaking or mixing, sonic disruption, opening containers of infectious materials whose internal pressures may be different from ambient pressures, inoculating animals intranasally, and harvesting infected tissues from animals or eggs.

2. High concentrations or large volumes of infectious agents are used. Some types of materials may be centrifuged in the open laboratory if sealed heads or centrifuge safety cups are used and if the containers are opened only in a biological safety cabinet.

D. Laboratory facilities

1. The laboratory is designed so that it can be easily cleaned.

2. Bench tops are impervious to water and resistant to acids, alkalis, organic solvents, and moderate heat.

3. Laboratory furniture is sturdy and spaces between benches, cabinets, and equipment are accessible for cleaning.

4. Each laboratory contains a sink for hand washing.

5. If the laboratory has windows that open, they are fitted with fly screens.

6. An autoclave for decontaminating infectious laboratory wastes is available.

BIOSAFETY LEVEL 3

Biosafety Level 3 is applicable to clinical, diagnostic, teaching, research, or production facilities in which work is done with indigenous or exotic agents that may cause serious or potentially lethal disease as a result of exposure by inhalation. Laboratory personnel have specific training in handling pathogenic and/or potentially lethal agents and are supervised by competent scientists who are experienced in working with these agents. All procedures involving the manipulation of infectious material are conducted within biological safety cabinets or other physical containment devices or by personnel wearing appropriate person-protection clothing and devices. The laboratory has special engineering and design features. It is recognized, however, that many existing facilities may not have all the facility safeguards recommended for Biosafety Level 3 (e.g., access zone, sealed penetrations, and directional airflow). In these circumstances, acceptable safety may be achieved for routine or repetitive operations (e.g., diagnostic procedures involving the propagation of an agent for identification, typing, and susceptility testing) in laboratories in which facility features satisfy Biosafety Level 2 recommendations if the recommended 'Standard Microbiological Practices', 'Special Practices', and 'Containment Equipment' for Biosafety Level 3 are rigorously followed. The decision to implement this modificaton of Biosafety Level 3 recommendations should be made only by the laboratory director.

The following standard and special safety practices, equipment, and facilities apply to agents assigned to Biosafety Level 3.

A. Standard microbiological practices

1. Work surfaces are contaminated at least once a day and after any spill of viable material.

2. All infectious liquid or solid waste is decontaminated before being disposed of.

3. Mechanical pipetting devices are used; mouth pipetting is prohibited.

4. Eating, drinking, smoking, storing food, and applying cosmetics are not permitted in the work area.

5. Persons wash their hands after handling infectious materials and animals and every time they leave the laboratory.

6. All procedures are performed carefully to minimise the creation of aerosols.

B. Special practices

1. Laboratory doors are kept closed when experiments are in progress.

2. Contaminated materials that are to be decontaminated at a site away from the laboratory are placed in a durable, leakproof container that is closed before being removed from the laboratory.

3. The laboratory director controls access to the laboratory and limits access only to persons whose presence is required for program or support purposes. Persons who are at increased risk of acquiring infection or for whom infection may be unusually hazardous are not allowed in the laboratory or animal rooms. The director has the final responsibility for assessing each circumstance and determining who may enter or work in the laboratory.

4. The laboratory director establishes policies and procedures whereby only persons who have been advised of the potential biohazard, who meet any specific entry requirements (e.g., vaccination), and who comply with all entry and exit procedures enter the laboratory or animal rooms.

5. When infectious materials or infected animals are present in the laboratory or containment module, a hazard warning sign (incorporating the universal biohazard symbol) is posted on all laboratory and animal-room access doors. The hazard warning sigh identifies the agent, lists the name and telephone number of the laboratory director or other responsible person(s), and indicates any special requirements for entering the laboratory, such as the need for vaccinations, respirators, or other personal-protection measures.

6. All activities involving infectious material are conducted in biological safety cabinets or other physical-containment devices within the containment module. No work is conducted in open vessels on the open bench.

7. The work surfaces of biological safety cabinets and other containment equipment are decontaminated when work with infectious materials is finished. Plastic-backed paper towelling used on nonperforated work surfaces within biological safety cabinets facilitates clean-up.

8. An insect and rodent control program is in effect.

9. Laboratory clothing that protects street clothing (e.g., solid-front or wrap-around gowns, scrub suits, coveralls) is worn in the laboratory. Laboratory clothing is not worn outside the laboratory, and it is decontaminated before being laundered.

10. Special care is taken to avoid skin contamination with infectious materials; gloves are worn when handling infected animals and when skin contact with infectious materials is unavoidable.

11. Molded surgical masks or respirators are worn in rooms containing infected animals.

12. Animals and plants not related to the work being conducted are not permitted in the laboratory.

13. All waste from laboratories and animal rooms is appropriately decontaminated before being disposed of.

14. Vacuum lines are protected with high-efficiency particulate air (HEPA) filters and liquid disinfectant traps.

15. Hypodermic needles and syringes are used only for parenteral injection and aspiration of fluids from laboratory animals and diaphragm bottles. Only needle-locking syringes or disposable syringe-needle units (i.e., the needle is integral to the syringe) are used for the injection or aspiration of infectious fluids. Extreme caution is used when handling needles and syringes to avoid autoinoculation and the generation of aerosols during use and disposal. A needle should not be bent, sheared, replaced in the sheath or guard, or removed from the syringe following use. The needle and syringe should be promptly placed in a puncture-resistant container and decontaminated, preferably by autoclaving, before being discarded or reused.

16. Spills and accidents that result in overt or potential exposures to infectious material are immediately reported to the laboratory director. Appropriate medical evaluation, surveillance, and treatment are provided, and written records are maintained.

17. Baseline serum samples for all laboratory and other at-risk personnel are collected and stored. Additional serum specimens may be collected periodically, depending on the agent handled or the function of the laboratory.

18. A biosafety manual is prepared or adopted. Personnel are advised of special hazards and are required to read instructions on practices and procedures and to follow them.

C. Containment equipment

Biological safety cabinets (Class I, II, or III) or other appropriate combinations of personal-protection or physical-containment devices (e.g., special protective clothing, masks, gloves, respirators, centrifuge safety cups, sealed centrifuge rotors, and containment caging for animals) are used for all activities with infectious materials that pose a threat of aerosol exposure. These include: manipulation of cultures and of clinical or environmental material that may be a source of infectious aerosols; the aerosol challenge of experimental animals; harvesting of tissues or fluids from infected animals and embryonated eggs; and necropsy of infected animals.

D. Laboratory facilities

1. The laboratory is separated from areas that are open to unrestricted traffic flow within the building. Passage through two sets of doors is the basic requirement for entry into the laboratory from access corridors or other contiguous areas. Physical separation of the high-containment laboratory from access corridors or other

laboratories or activities may also be provided by a double-doored clothes-change room (showers may be included), airlock, or other access facility that requires passing through two sets of doors before entering the laboratory.

2. The interior surfaces of walls, floors, and ceilings are water resistant so that they can be easily cleaned. Penetrations in these surfaces are sealed or capable of being sealed to facilitate decontaminating the area.

3. Bench tops are impervious to water and resistant to acids, alkalis, organic solvents, and moderate heat.

4. Laboratory furniture is sturdy, and spaces between benches, cabinets, and equipment are accessible for cleaning.

5. Each laboratory contains a sink for washing hands. The sink is foot, elbow or automatically operated and is located near the laboratory exit door.

6. Windows in the laboratory are closed and sealed.

7. Access doors to the laboratory or containment module are self-closing.

8. An autoclave for decontaminating laboratory wastes is available, preferably within the laboratory.

9. A ducted exhaust-air ventilation system is provided. This system creates directional airflow that draws air into the laboratory through the entry area. The exhaust air is not recirculated to any other area of the building, is discharged to the outside, and is dispersed away from occupied areas and air intakes. Personnel must verify that the direction of the airflow is proper (i.e., into the laboratory). The exhaust air from the laboratory room can be discharged to the outside without being filtered or otherwise treated.

10. The HEPA-filtered exhaust air from Class I or Class II biological safety cabinets is discharged directly to the outside or through the building exhaust system. Exhaust air from Class I or II biological safety cabinets may be recirculated within the laboratory if the cabinet is tested and certified at least every 12 months. If the HEPA-filtered exhaust air from Class I or II biological safety cabinets is to be discharged to the outside through the building exhaust system, it is connected to this system in a manner (e.g., thimble-unit connection) that avoids any interference with the air balance of the cabinets or building exhaust system.

ADDENDUM 2: CDC CAUTIONARY NOTICE FOR ALL HUMAN-SERUM-DERIVED REAGENTS USED AS CONTROLS

The following is a statement issued by CDC on the use of all human control and reagent serum specimens shipped to other laboratories. If additional statements describing the results of any heat treatment or serological procedure(s) already

performed on the human-serum reagent or control are used in conjunction with the above cautionary notice, these statements should be worded so as not to diminish the impact of the warning that emphasizes the need for universal precautions.

WARNING: Because no test method can offer complete assurance that laboratory specimens do not contain HIV, hepatitis B virus, or other infectious agents, this specimen should be handled at the BSL 2 as recommended for any potentially infectious human serum or blood specimen in the CDC-NIH manual, 'Biosafety in Microbialogical and Biomedical Laboratories', 1984, pages 11-13.

REFERENCES

1. Richardson JH, Barkley WE, eds. Biosafety in microbiological and biomedical laboratories, 1984. Washington, DC: Public Health Service, 1984; DHHS publication no. (CDC) 84-8395.
2. MMWR (1986) 35: 540-2, 547-9
3. MMWR (1987) 36 (Suppl 2): 3S-18S.
4. Lennette EH, Balows A, Hausler WJ, Shadomy HJ, eds, Manual of clinical microbiology, 4th ed. Washington, DC: American Society for Microbiology, (1985) p73-98.
5. MMWR (1982) 32: 577-80.
6. MMWR (1985) 34: 681.
7. MMWR (1986) 35: 221-3.
8. MMWR (1985) 34: 682-6, 691-5.
9. U.S. Department of Health and Human Services, Public Health Service. Joint advisory notice: HBV/HIV. Federal Register (1987); 52 (October 30): 41818-24.
10. MMWR (1985) 34: 575-8.
11. MMWR (1987) 36: 285-9.
12. Lancet (1984) 2: 1376-7.
13. New Engl J Med (1986) 314: 1115.
14. New Engl J Med (1986) 314: 1127-32.
15. JAMA (1985) 254: 2089-93.
16. Ann Intern Med (1986) 104: 644-7.
17. J Infect Dis (1987) 156: 1-8.
18. Science (1988) 239: 68-71.
19. U.S. Department of Health and Human Services, Public Health Service. Biosafety guidelines for use of HTLV-III and related viruses. Federal Register 1984 (October 16); 49: 40556.
20. U.S. Environmental Protection Agency. EPA guide for infectious waste management. Washington, DC: U.S. Environmental Protection Agency, 1986; Publication no. EPA/530-5W-86-014.
21. Lennette EH, Balows A, Hausler WJ, Shadomy HJ, eds. Manual of clinical microbiology, 4th ed. Washington, DC: American Society for Microbiology: (1985) p129-37.
22. J Infect Dis (1985) 152: 400-3.
23. JAMA (1986) 255: 1887-91.
24. Miller BM, Groschel DHM, Richardson JH, et al., eds. Laboratory safety: principles and practice. Washington, DC: American Society for Microbiology, (1986) p49-58.
25. MMWR (1987) 36: 509-15.

26. J Infect Dis (1986) 153: 996.
27. Lancet (1985) 1: 1458.
28. Lancet (1985) 2: 672.
29. Lancet (1985) 2: 873-7.
30. J Clin Microbiol (1986) 23: 381-2.
31. Lancet (1985) 1: 1161.
32. Lancet (1985) 1: 1457-8.
33. MMWR (1986) 35: 152-5.
34. MMWR (1985) 34: 373-5.
35. MMWR (1986) 35: 448-52.
36. MMWR (1987) 36 (Suppl 1): 1S-15S.

UPDATE: ACQUIRED IMMUNE DEFICIENCY SYNDROME AND HUMAN IMMUNODEFICIENCY VIRUS INFECTION AMONG HEALTH-CARE WORKERS

(Based on MMWR (1988) 37: 229-239)

Acquired immune deficiency syndrome (AIDS) among health-care workers in the United States results primarily from human immunodeficiency virus (HIV) infections that occur outside of the health-care setting. However, a small number of health-care workers have been infected with HIV through occupational exposures, and one such worker has developed AIDS after documented seroconversion. This report summarises and updates both national surveillance data for AIDS among health-care workers and data from prospective studies on the risk of HIV transmission in the health-care setting.

Health-Care Workers with AIDS

The AIDS case report form used by the Centers for Disease Control (CDC) requests that state and local health departments collect information on employment since 1978 in a health-care or clinical laboratory setting. For surveillance purposes, any person who indicates such employment is classified as a health-care worker.

As of March 14, 1988, a total of 55,315 adults with AIDS had been reported to CDC. Occupational information was available for 47,532 of these person, 2,586 (5.4%) of whom were classified as health-care workers. A similar proportion (5.7%) of the U.S. labor force was employed in health services[1].

Forty-six states, the District of Columbia, and Puerto Rico have reported health-care workers with AIDS. Like other AIDS patients, health-care workers with AIDS had a median age of 35 years. Males accounted for 91.6% of health-care workers with AIDS and 92.4% of other patients with AIDS. The majority of health-care workers with AIDS (62.8%) and of other AIDS patients (60.5%) were white.

Ninety-five percent of the health-care workers with AIDS were classified into known transmission categories (Table 1). Health-care workers with AIDS were significantly less likely than others with AIDS to be intravenous drug users and more likely to be homosexual or bisexual men. They were also less likely to have a known risk factor reported ($p<0.001$).

Table 1. Comparison of health-care workers with AIDS and other AIDS patients reported to CDC, by transmission category - through March 14, 1988.

	Health-Care Workers with AIDS		Other AIDS Patients	
Transmission Category	No.	(%)	No.	(%)
Homosexual or Bisexual Male	1,916	(74.1)*	28,820	(64.1)
Heterosexual Intravenous Drug User	161	(6.2)*	8,263	(18.4)
Homosexual or Bisexual Male and Intravenous Drug User	187	(7.2)	3,267	(7.3)
Hemophilia/Coagulation Disorder	20	(0.8)	451	(1.0)
Heterosexual	119	(4.6)	1,772	(3.9)
Blood/Blood Component Recipient	47	(1.8)	1,105	(2.5)
Other(+)	1	(<1.0)	0	(0.0)
Undetermined(#)	135	(5.3)*	1,268	(2.8)
Total	2,586	(100.0)	44,946	(100.0)

* $p<0.001$, chi square analysis.

(+) Represents health-care worker who seroconverted to HIV and developed AIDS after documented needlestick exposure to blood.

(#) Includes patients who are under investigation, who died or refused interview, or for whom no risk was identified after follow-up.

To determine the possible cause of HIV infection, state and local health departments investigate those AIDS patients reported as having no identified risk. As of March 14, 1988, investigations had been completed for 121 of the 215 health-care workers initially reported with undetermined risk. Risk factors were identified for 80 (66.1%) of these. Of the 135 health-care workers who remain in the undertermined risk category, 41 (30.4%) could not be reclassified after follow-up; 20 (14.8%) had either died or refused to be interviewed; and 74 (54.8%) are still under investigation.

Overall, 5.3% of health-care workers with AIDS had an undetermined risk. When examined by year of report to CDC, the proportion of such health-care workers appears to have increased from 1.5% in 1982 to 6.2% in 1987. However, 71 of the 135 health-care workers for whom risk is still undetermined have been reported since March 1987, and 80.0% of these 71 cases are still under investigation. The proportion of other AIDS patients with an undetermined risk has also increased over time. However, previous experience suggests that other risk factors for HIV infection will be identified for many of these persons when investigations have been completed[2]. Ten percent of all reported AIDS patients with undetermined risk are health-care workers; this proportion has not changed over time.

A health-care worker reported to have developed AIDS after a well-documented occupational exposure to blood and HIV seroconversion is included among the 80 health-care workers who were reclassified after follow-up. The worker was accidentally self-injected with several milliliters of blood from a hospitalised patient with AIDS while filling a vacuum collection tube. Investigation revealed no other risk factors for this health-care worker.

Forty-one health-care workers could not be reclassified after investigation; 68.3% were men. In contrast, 23.0% of individuals employed in hospitals and health services in the United States are men[1]. These 41 health-care workers comprised eight physicians, four of whom were surgeons; one dentists; five nurses; eleven nursing assistants or orderlies; seven housekeeping or maintenance workers; four clinical laboratory technicians; one respiratory therapist; one paramedic; one mortician; and two others who had no contact with patients or clinical specimens. A comparison of the occupations of these 41 health-care workers with those of health-care workers for whom risk factors and job information were available showed that maintenance workers were the only occupational group significantly more likely to have an undetermined risk (7 [17.1%] of 41 health-care workers with undetermined risk, compared with 160 [7.1%] of 2,263 health-care workers with identified risk, p = 0.02).

Seventeen of the 41 investigated health-care workers with undetermined risk (including two of the seven maintenance workers) reported needlestick and/or mucous-membrane exposures to the blood or body fluids of patients during the 10 years preceding their diagnosis of AIDS. However, none of the patients was known to be infected with HIV at the time of exposure, and none of the health-care workers was evaluated at the time of exposure to document seroconversion to HIV antibody. None of the remaining 24 health-care workers reported needlestick or other nonparenteral exposures to blood or body fluids.

Other Health-Care and Laboratory Workers with HIV Infection

As of December 31, 1987, 1,176 health-care workers had been enrolled and tested for HIV antibody in ongoing CDC surveillance of health-care workers exposed to blood or other body fluids from HIV-infected patients. Of the 1,070 workers tested 90 days or more after exposure, 870 (81.3%) had parenteral exposures to blood; 104 (9.7%) had exposures of mucous membrane or nonintact skin to blood; and 96 (9.0%) had exposures to other body fluids (Table 2).

Four (0.5%) of the 870 workers with parenteral exposures to blood were seropositive for HIV antibody (upper boundary of the 95% confidence interval [CI] = 1.1%). However, one of these four was not tested until 10 months after exposure[3,4]. In addition, this worker had an HIV-seropositive sexual partner, and heterosexual acquisition of infection could not be excluded. Of the 489 health-care workers who sustained parenteral exposures to blood and for whom both acute- and convalescent-phase serum samples had been obtained, three, or 0.6%, seroconverted to HIV within 6 months of exposure (upper boundary of the 95% CI = 1.6%)[4-6]. Investigation revealed no nonoccupational risk factors for these three workers.

Two other ongoing prospective studies assess the risk of nosocomial acquisition of HIV infection among health-care workers in the United States[7,8]. As of April 30, 1987, the National Institutes of Health had tested 103 health-care workers with documented needlestick injuries and 691 health-care workers with more than 2,000 cutaneous or mucous-membrane exposures to blood or other body fluids of HIV-infected patients; none had seroconverted[7]. As of March 15, 1988, a similar study at the University of California of 235 health-care workers with 644 documented needlestick injuries or mucous-membrane exposures had identified one seroconversion following a needlestick (9; University of California, San Francisco, unpublished data). Prospective studies in the United Kingdom and Canada show no evidence of HIV transmission among 220 health-care workers with parenteral, mucous-membrane, or cutaneous exposures[10,11].

Table 2. HIV infection among health-care workers, by type of exposure and body fluid - CDC Prospective Study, 15 August, 1983 - 31 December, 1987

Type of Exposure	Number of Health-Care Workers with Exposure to: Blood	Saliva	Urine	Other /Unknown	No. of Infections
Parenteral (needle-stick, or cut with sharp object)	870	7	3	21	4*
Contamination of mucous-membrane, open wound, or nonintact skin	104	42	12	11	0

* All four health-care workers had parenteral exposure to HIV-infected blood; risk is 4/870, or 0.5% (upper bound of 95% confidence interval = 1.1%).

In addition to the health-care workers enrolled in these longitudinal surveillance studies and the case reported here, six persons from the United States and four persons from other countries who denied other risk factors for HIV infection have reportedly seroconverted to HIV after parenteral, nonintact skin, or mucous-membrane exposures to HIV-infected blood or concentrated virus in a health-care or laboratory setting (Table 3)[12-20]. Six additional health-care workers with no other identified risk factors reportedly acquired HIV infection, but the date of seroconversion is unknown[3,15,21-23].

MMWR Editorial Note:

These data are consistent with previous observations that the occupational risk of acquiring HIV in health-care settings is low and is most often associated with percutaneous inoculation of blood from a patient with HIV infection. Prospective surveillance studies, which provide data on the magnitude of the risk of HIV infection, indicate that the risk of

Table 3. HIV-infected health-care workers with no reported nonoccupational risk factors and for whom case histories have been published in the scientific literature

Cases with Documented Seroconversion

Case	Occupational	Country	Type of Exposure	Source	Reference
1*	NS(+)	United States	Needlestick	AIDS patient	This report
2	NS	United States	Needlestick	AIDS patient	(4,6)
3	NS	United States	Needlestick	AIDS patient	(5)
4	NS	United States	2 Needlesticks	AIDS patient, HIV-infected patient	(5)
5	NS	United States	Needlestick	AIDS patient	(9)
6	Nurse	England	Needlestick	AIDS patient	(12)
7	Nurse	France	Needlestick	HIV-infected patient	(13)
8	Nurse	Martinique	Needlestick	AIDS patient	(14)
9	Research lab worker	United States	Cut with sharp object	Concentrated virus	(15,16)
10	Home health-care provider	United States	Cutaneous(#)	AIDS patient	(17)
11	NS	United States	Nonintact skin	AIDS patient	(18)
12	Phlebotomist	United States	Mucous-membrane	HIV-infected patient	(18)
13	Technologist	United States	Nonintact skin	HIV-infected patient	(18)
14	NS	United States	Needlestick	AIDS patient	(19)
15	Nurse	Italy	Mucous-membrane	HIV-infected patient	(20)

Cases without Documented Seroconversion

Case	Occupational	Country	Type of Exposure	Source	Reference
1	NS	United States	Puncture wound	AIDS patient	(3,4)
2	NS	United States	2 Needlesticks	2 AIDS patients	(3)
3	Research lab worker	United States	Nonintact skin	Concentrated virus	(15,16)
4	Home health-care provider	England	Nonintact skin	AIDS patient	(21)
5	Dentist	United States	Multiple needlesticks	Unknown	(22)
6*	Technician	Mexico	Multiple needle-sticks and mucous-membrane	Unknown	(23)
7	Lab worker	United States	Needlestick, puncture wound	Unknown	(3)

* Health-care worker diagnosed with AIDS.

(+) NS = not specified.

(#) Mother who provided nursing care for her child with HIV infection; extensive contact with the child's blood and body secretions and excretions occurred; the mother did not wear gloves and often did not wash her hands immediately after exposure.

seroconversion following needlestick exposures to blood from HIV-infected patients is less than 1.0%. The level of risk associated with the exposure of nonintact skin or mucous-membranes is likely far less than that associated with needlestick exposures. Individual published case reports must be interpreted with caution because they provide no data on the frequency of occupational exposures to HIV or the proportion of exposures resulting in seroconversion.

The reasons that a higher proportion of health-care workers with AIDS have no identified risk than do other persons with AIDS are unknown. They could include a tendency of health-care workers not to report behavioural risk factors for HIV infection, the occupational risk of HIV infection as a result of blood exposure, or both. The first hypothesis is suggested by the overrepresentation of men among these health-care workers, a finding that is similar to the overrepresentation of men among AIDS patients infected with HIV through sexual activity or intravenous drug use. The second hypothesis is suggested by the documentation of HIV transmission in the health-care setting. Similar hypothesis may be raised for the apparent excess of maintenance personnel among health-care workers with no identified risk for AIDS. Occupationally acquired HIV infection in such workers would be difficult to determine unless the source patient or clinical specimen was known to be HIV-positive, the occupational exposure had been well documented, and the HIV seroconversion of the health-care worker had been detected.

The increasing number of persons being treated for HIV-associated illnesses makes it likely that more health-care workers will encounter patients infected with HIV. The risk of transmission of HIV can be minimised if health-care workers use care while performing all invasive procedures, adhere rigorously to previously published recommendations, and use universal precautions when caring for all patients[5]. In addition, employers should instruct health-care workers on the need for routine use of universal precautions, provide equipment and clothing necessary to minimise the risk of infection, and monitor workers' adherence to these precautions[5,24].

REFERENCES

1. Bureau of Labor Statistics. Employment and earnings. Washington, DC: US Department of Labor, Bureau of Labor Statistics, 1988; 35: 13,93,194.
2. JAMA (1988); 259: 1338-42.
3. JAMA (1985); 254: 2089-93.
4. N Engl J Med (1986); 314: 1127-32.
5. MMWR (1987); 36 (Suppl 2S).
6. N Engl J Med (1986); 314: 1115.
7. Program and abstracts of the Twenty-Seventh Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington, DC: American Society for Microbiology, Abstract No. 76, 1987: p109.
8. J Infect Dis (1987); 156: 1-8.
9. J Infect Dis (1987); 156: 1-4.
10. Br Med J (1987); 294: 1595-7
11. Canada Dis Weekly Rep (1987); 13-37: 163-6.
12. Lancet (1984); 2: 1376-7.

13. N Engl J Med (1986); 315: 582.
14. Lancet (1986); 2: 814.
15. Science (1988); 239: 68-71.
16. MMWR (1988); 37 (suppl S-4).
17. MMWR (1986); 35: 76-9.
18. MMWR (1987); 36: 285-9.
19. Clin Res (1988); 36: 1A.
20. Eur J Epidemiol (1988); 4: 119-20.
21. PHLS Commun Dis Rep (1985); 42: 4.
22. N Engl J Med (1988); 318: 86-90.
23. Infect Control Hosp Epidemiol (1988); 9: 101-2.
24. US Department of Labor, US Department of Health and Human Services. Joint Advisory Notice: protection against occupational exposure to hepatitis B virus (HBV) and human immunodeficiency virus (HIV). Federal Register 1987; 52: 41818-24.

AUSTRALIA - COMMUNICABLE DISEASES INTELLIGENCE

TOTAL VIRAL ISOLATIONS BASED ON DATE OF REPORTING
PERIOD - FORTNIGHTLY
VIRAL IDENTIFICATIONS FROM CONTRIBUTING LABORATORIES

Period 3-5-88 to 16-5-88.

1. CODE 019 - FAIRFIELD(VIC)
2. CODE 065 - STATE LAB(WA)
3. CODE 110 - IMVS(SA)
4. CODE 111 - RCH(VIC)
5. CODE 112 - ICPMR(NSW) WVH(ACT)
6. CODE 113 - PRH PDN(NSW)
7. CODE 114 - RANC(NSW)
8. CODE 115 - STATE LAB(QLD)

		019	065	110	111	112	114	115	TOTAL
0100	ADENOVIRUS NOT TYPED	18	1	2	7	4	3	5	40
0101	ADENOVIRUS TYPE 1	0	0	2	1	1	0	0	4
0102	ADENOVIRUS TYPE 2	2	0	1	1	1	0	0	5
0103	ADENOVIRUS TYPE 3	2	0	0	1	5	0	0	8
0104	ADENOVIRUS TYPE 4	0	0	0	0	1	0	0	1
0105	ADENOVIRUS TYPE 5	0	0	0	4	0	0	0	4
0109	ADENOVIRUS TYPE 9	0	0	0	0	1	0	0	1
0114	ADENOVIRUS TYPE 14	0	0	0	0	1	0	0	1
0125	ADENOVIRUS TYPE 25	0	0	0	0	1	0	0	1
0135		1	0	0	0	0	0	0	1
0199	ADENOVIRUS TYPING PENDING	0	0	0	2	0	0	0	2
0201	INFLUENZA A VIRUS	0	0	2	0	0	0	0	2
0203	INFLUENZA B VIRUS	1	0	4	0	0	0	0	5
0301	PARAINFLUENZA VIRUS TYPE 1	4	3	0	14	1	0	5	27
0302	PARAINFLUENZA VIRUS TYPE 2	5	0	0	4	0	0	0	9
0303	PARAINFLUENZA VIRUS TYPE 3	0	0	11	4	1	2	6	24
0399	PARAINFLUENZA VIRUS TYPING PEN	0	0	0	0	0	0	13	13
0400	RESPIRATORY SYNCYTIAL VIRUS (R	1	3	7	9	0	8	14	42
0500	RHINOVIRUS (ALL TYPES)	6	1	0	4	1	0	2	14
0600	MYCOPLASMA PNEUMONIAE	11	0	15	5	0	2	0	33
0700	ORNITHOSIS-PSITTACOSIS	7	0	0	0	0	0	0	7
0805	COXSACKIEVIRUS A5	0	0	0	1	0	0	0	1
0809	COXSACKIEVIRUS A9	2	0	1	2	2	0	0	7
0824	COXSACKIEVIRUS A24 = ECHOVIRUS	1	0	0	0	0	0	0	1
0901	COXSACKIEVIRUS B1	0	0	0	1	0	0	0	1
0902	COXSACKIEVIRUS B2	0	0	0	0	10	1	0	11
0905	COXSACKIEVIRUS B5	1	0	0	0	3	1	0	5
1005	ECHOVIRUS TYPE 5	0	2	0	0	2	0	0	4
1006	ECHOVIRUS TYPE 6	0	0	0	0	0	1	0	1
1014	ECHOVIRUS TYPE 14	0	0	0	0	1	0	0	1
1015	ECHOVIRUS TYPE 15	0	0	0	1	0	0	0	1
1018	ECHOVIRUS TYPE 18	0	0	0	1	0	0	0	1
1019	ECHOVIRUS TYPE 19	0	0	1	0	0	0	0	1
1020	ECHOVIRUS TYPE 20	0	0	1	0	0	0	0	1
1022	ECHOVIRUS TYPE 22	0	0	1	1	0	0	0	2
1025	ECHOVIRUS TYPE 25	0	0	0	0	1	0	0	1
1101	POLIOVIRUS TYPE 1	1	0	0	0	1	0	0	2
1102	POLIOVIRUS TYPE 2	0	0	2	0	1	0	0	3
1103	POLIOVIRUS TYPE 3	0	0	0	0	2	0	0	2
1300	HERPES VIRUS GROUP - NOT TYPED	1	0	0	1	36	0	0	38
1301	HERPES SIMPLEX VIRUS - NOT TYP	6	2	0	0	0	0	0	8
1302	EPSTEIN-BARR VIRUS (EB VIRUS)	5	7	2	0	0	0	0	14
1303	VARICELLA-ZOSTER VIRUS	4	4	1	0	7	0	2	18
1306	HERPES SIMPLEX TYPE 1	40	22	16	0	44	1	19	142
1307	HERPES SIMPLEX TYPE 2	63	48	19	0	94	0	71	295
1399	HERPES VIRUS TYPING PENDING	0	0	0	5	0	0	0	5
1401	COXIELLA BURNETI	0	0	2	0	0	0	0	2
1502	PICORNIA VIRUS - NOT TYPED = E	0	0	0	0	0	0	21	21
1521	MEASLES VIRUS	1	0	1	1	0	0	0	3
1522	RUBELLA VIRUS	0	0	1	1	0	0	0	2
1532	HEPATITIS B ANTIGEN	8	12	0	1	71	0	33	125
1535	HEPATITIS A ANTIBODY	5	3	0	0	1	1	2	12
1541	CHLAMYDIA A - C. TRACHOMATIS	21	20	25	1	43	0	8	118
1556	CMV - CYTOMEGALOVIRUS	19	6	7	3	20	0	9	64
1564	ROTAVIRUS	2	4	27	19	11	0	0	63
1566	NORWALK AGENT	0	0	0	1	0	0	0	1
1599	ENTEROVIRUS TYPING PENDING	0	0	0	6	1	0	0	7
9902	POXVIRUS GROUP NOT TYPED	1	0	0	0	0	0	0	1
9992	ROSS RIVER VIRUS	17	0	2	0	0	0	0	19
9994	SMALL VIRUS (LIKE) PARTICLE	0	0	0	0	0	1	0	1
9998	ARBO. GROUP B. (UNSPECIFIED)	1	2	0	0	0	0	0	3
TOTAL		257	140	153	102	369	21	210	1252

AUSTRALIA - COMMUNICABLE DISEASES INTELLIGENCE

VIRAL IDENTIFICATIONS BY CLINICAL INFORMATION TABLE 1.

Period 3-5-88 to 16-5-88.

1. CODE 00, 99 ..... - NO ILL OR DATA
2. CODE 01, 02, 11, 12 - RESPIRATORY
3. CODE E3 ..... - ENCEPHALITIS
4. CODE M3 ..... - MENINGITIS
5. CODE 04 ..... - PARALYSIS
6. CODE 05, 13 ..... - CNS OTHER UNSPEC
7. CODE 07, 49 - GASTRO INTESTINAL
8. CODE 17, 47 - HEPATIC
9. CODE 19 ... - CVS
10. CODE 89 ... - URINARY TRA CT
11. CODE 06 ... - SKIN MUCOUS

		1	2	3	4	6	7	8	10	11	TOTAL
0100	ADENOVIRUS NOT TYPED	1	16	0	0	0	15	0	0	1	33
0101	ADENOVIRUS TYPE 1	1	2	0	0	0	1	0	0	0	4
0102	ADENOVIRUS TYPE 2	0	4	0	0	0	1	0	0	0	5
0103	ADENOVIRUS TYPE 3	1	4	0	0	0	0	0	0	0	5
0105	ADENOVIRUS TYPE 5	0	3	0	0	0	0	0	0	0	3
0109	ADENOVIRUS TYPE 9	0	0	0	0	0	1	0	0	0	1
0114	ADENOVIRUS TYPE 14	0	0	0	0	0	1	0	0	0	1
0125	ADENOVIRUS TYPE 25	0	0	0	0	0	1	0	0	0	1
0199	ADENOVIRUS TYPING PENDING	0	2	0	0	0	0	0	0	0	2
0203	INFLUENZA B VIRUS	0	4	0	0	0	0	0	0	0	4
0301	PARAINFLUENZA VIRUS TYPE 1	0	24	0	0	1	0	0	0	0	25
0302	PARAINFLUENZA VIRUS TYPE 2	0	9	0	0	0	0	0	0	0	9
0303	PARAINFLUENZA VIRUS TYPE 3	1	22	0	0	0	0	0	0	0	23
0399	PARAINFLUENZA VIRUS TYPING PEN	0	13	0	0	0	0	0	0	0	13
0400	RESPIRATORY SYNCYTIAL VIRUS (R	0	42	0	0	0	0	0	0	0	42
0500	RHINOVIRUS (ALL TYPES)	0	13	0	0	0	0	0	0	0	13
0600	MYCOPLASMA PNEUMONIAE	0	31	0	1	0	0	0	0	0	32
0700	ORNITHOSIS-PSITTACOSIS	0	6	0	0	0	0	0	0	0	6
0805	COXSACKIEVIRUS A5	0	1	0	0	0	0	0	0	0	1
0809	COXSACKIEVIRUS A9	0	2	1	1	0	1	0	0	0	5
0901	COXSACKIEVIRUS B1	0	1	0	0	0	0	0	0	0	1
0902	COXSACKIEVIRUS B2	0	0	0	2	0	7	0	0	0	9
0905	COXSACKIEVIRUS B5	0	1	0	2	0	1	0	0	0	4
1005	ECHOVIRUS TYPE 5	0	1	1	0	0	1	0	0	1	4
1006	ECHOVIRUS TYPE 6	0	0	0	1	0	0	0	0	0	1
1014	ECHOVIRUS TYPE 14	1	0	0	0	0	0	0	0	0	1
1015	ECHOVIRUS TYPE 15	0	1	0	0	0	0	0	0	0	1
1019	ECHOVIRUS TYPE 19	1	0	0	0	0	0	0	0	0	1
1022	ECHOVIRUS TYPE 22	0	2	0	0	0	0	0	0	0	2
1025	ECHOVIRUS TYPE 25	0	1	0	0	0	0	0	0	0	1
1101	POLIOVIRUS TYPE 1	0	1	0	0	0	1	0	0	0	2
1102	POLIOVIRUS TYPE 2	0	0	0	0	0	3	0	0	0	3
1103	POLIOVIRUS TYPE 3	1	0	0	0	0	1	0	0	0	2
1300	HERPES VIRUS GROUP - NOT TYPED	9	1	1	0	0	0	0	0	13	24
1301	HERPES SIMPLEX VIRUS - NOT TYP	1	0	0	1	0	0	0	0	2	4
1302	EPSTEIN-BARR VIRUS (EB VIRUS)	3	3	1	0	0	0	1	0	0	8
1303	VARICELLA-ZOSTER VIRUS	7	0	0	0	0	0	0	0	10	17
1306	HERPES SIMPLEX TYPE 1	3	11	0	0	0	2	0	2	54	72
1307	HERPES SIMPLEX TYPE 2	14	0	0	0	1	0	0	0	62	77
1399	HERPES VIRUS TYPING PENDING	0	0	0	0	0	0	0	0	5	5
1401	COXIELLA BURNETI	1	0	0	0	0	0	0	0	0	1
1502	PICORNIA VIRUS - NOT TYPED = E	1	8	0	0	5	7	0	0	0	21
1521	MEASLES VIRUS	1	0	0	1	0	0	0	0	1	3
1522	RUBELLA VIRUS	0	0	0	0	0	0	0	0	2	2
1532	HEPATITIS B ANTIGEN	64	0	0	0	0	0	58	0	0	122
1535	HEPATITIS A ANTIBODY	3	0	0	0	0	0	9	0	0	12
1541	CHLAMYDIA A - C. TRACHOMATIS	20	0	0	0	0	1	0	0	0	21
1556	CMV - CYTOMEGALOVIRUS	7	9	0	1	0	2	3	5	0	27
1564	ROTAVIRUS	0	0	0	0	0	63	0	0	0	63
1566	NORWALK AGENT	0	1	0	0	0	0	0	0	0	1
1599	ENTEROVIRUS TYPING PENDING	0	2	0	2	0	0	0	0	0	4
9902	POXVIRUS GROUP NOT TYPED	0	0	0	0	0	0	0	0	1	1
9992	ROSS RIVER VIRUS	2	0	0	0	1	0	0	0	0	3
9994	SMALL VIRUS (LIKE) PARTICLE	0	0	0	0	0	1	0	0	0	1
9998	ARBO. GROUP B. (UNSPECIFIED)	1	0	0	1	0	0	0	0	0	2
TOTAL		144	241	4	13	8	111	71	7	152	751

AUSTRALIA - COMMUNICABLE DISEASES INTELLIGENCE

VIRAL IDENTIFICATIONS BY CLINICAL INFORMATION TABLE 2.

Period 3-5-88 to 16-5-88.

12. CODE 10 - EYE
13. CODE 59 - GENITAL
14. CODE 39 - ENDOCRINE/SALIVARY GL.
15. CODE 38 - RETICULO-ENDOTHELIAL
16. CODE 29 - MUSCLE/JOINT
17. CODE 69 - CONGENTIAL
18. CODE P8 - PUO
19. CODE G8 - FEVER/MALAISE
20. CODE 09 - OTHER
21. CODE A1 - SIDS

		12	13	14	15	16	17	18	19	20	21	TOTAL
0100	ADENOVIRUS NOT TYPED	1	0	0	0	1	0	2	3	0	0	7
0103	ADENOVIRUS TYPE 3	3	0	0	0	0	0	0	0	0	0	3
0104	ADENOVIRUS TYPE 4	1	0	0	0	0	0	0	0	0	0	1
0105	ADENOVIRUS TYPE 5	0	0	0	0	0	0	0	1	0	0	1
0135		0	0	0	0	0	0	0	0	1	0	1
0201	INFLUENZA A VIRUS	0	0	0	0	0	0	0	0	2	0	2
0203	INFLUENZA B VIRUS	0	0	0	0	0	0	0	0	1	0	1
0301	PARAINFLUENZA VIRUS TYPE 1	0	0	0	0	0	0	0	2	0	0	2
0303	PARAINFLUENZA VIRUS TYPE 3	0	0	0	0	0	0	0	1	0	0	1
0500	RHINOVIRUS (ALL TYPES)	0	0	0	0	0	0	0	1	0	0	1
0600	MYCOPLASMA PNEUMONIAE	0	0	0	0	0	0	0	1	0	0	1
0700	ORNITHOSIS-PSITTACOSIS	0	0	0	0	0	0	1	0	0	0	1
0809	COXSACKIEVIRUS A9	0	0	1	0	0	0	0	0	1	0	2
0824	COXSACKIEVIRUS A24 = ECHOVIRUS	1	0	0	0	0	0	0	0	0	0	1
0902	COXSACKIEVIRUS B2	0	0	0	0	0	0	2	0	0	0	2
0905	COXSACKIEVIRUS B5	0	0	0	0	0	0	1	0	0	0	1
1018	ECHOVIRUS TYPE 18	0	0	0	0	0	0	0	1	0	0	1
1020	ECHOVIRUS TYPE 20	0	0	0	0	0	0	0	0	1	0	1
1300	HERPES VIRUS GROUP - NOT TYPED	3	10	0	0	0	0	0	0	1	0	14
1301	HERPES SIMPLEX VIRUS - NOT TYP	0	3	0	0	0	0	0	1	0	0	4
1302	EPSTEIN-BARR VIRUS (EB VIRUS)	0	0	4	0	0	0	0	1	1	0	6
1303	VARICELLA-ZOSTER VIRUS	0	1	0	0	0	0	0	0	0	0	1
1306	HERPES SIMPLEX TYPE 1	3	66	0	0	0	0	0	0	1	0	70
1307	HERPES SIMPLEX TYPE 2	0	216	1	0	0	0	0	0	1	0	218
1401	COXIELLA BURNETI	0	0	0	0	0	0	0	1	0	0	1
1532	HEPATITIS B ANTIGEN	0	0	0	0	0	0	0	1	2	0	3
1541	CHLAMYDIA A - C. TRACHOMATIS	1	96	0	0	0	0	0	0	0	0	97
1556	CMV - CYTOMEGALOVIRUS	1	2	1	1	0	4	2	1	23	2	37
1599	ENTEROVIRUS TYPING PENDING	0	0	0	0	0	0	0	2	1	0	3
9992	ROSS RIVER VIRUS	0	0	0	0	16	0	0	0	0	0	16
9998	ARBO. GROUP B. (UNSPECIFIED)	0	0	0	0	1	0	0	0	0	0	1
TOTAL		14	394	7	1	18	4	8	17	36	2	501