NSW Public Health Bulletin

Volume 11, Number 12
December 2000

NSW HEALTH

ISSN 1034 7674
State Health Publication PN 000191
www.health.nsw.gov.au/public-health/phb/phb.html

PUBLIC HEALTH SURVEILLANCE DURING THE SYDNEY 2000 OLYMPIC AND PARALYMPIC GAMES

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'I am proud and happy to proclaim that you have presented to the world the best Olympic Games ever.'
Juan Antonio Samaranch
President, International Olympic Committee.

The Sydney Olympic and Paralympic Games ended on the 29th of October 2000 and were hailed as a great success. From a public health perspective, this success reflected the hard work of the 800 staff of NSW Health who were employed for Olympic purposes, and the extensive preparations made by the NSW Department of Health, the area health services and local government.

This article briefly describes the outcome of the NSW Health preparations for health surveillance during the Sydney Games. Overviews of the planning process can be found in the August 2000 edition of the *NSW Public Health Bulletin* (Volume 11, Number 8).[1]

THE SYDNEY 2000 OLYMPIC AND PARALYMPIC GAMES

By the time the Olympic Games began, over 11,300 athletes and 5,100 officials from 200 countries had arrived in Sydney. Over the Games period, a succession of mass gatherings took place, including the Olympic Opening and Closing Ceremonies. The latter event saw 110,000 spectators and thousands of athletes at Stadium Australia, and an estimated 1,000,000 people gather in the city centre and along harbour foreshores. Other Olympic-related activities, such as the Olympic Live Sites and the men's and women's marathons, saw large numbers of people gathered in the city centre, in addition to the 400,000 people who visited the Sydney Olympic Park precinct daily.

HEALTH OLYMPIC COORDINATING CENTRE

During the Games period, a Health Olympic Coordinating Centre (HOCC) was established at the NSW Department of Health, under the direction of the Director-General. The HOCC functioned as the central point of contact between the Department

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of Health, the area health services, hospitals, SOCOG and other agencies, with a twenty-four hour contact number.

HEALTH SURVEILLANCE AND REPORTING

Assessment of health surveillance information was one of the key functions of HOCC. Surveillance for unusual patterns of injury and disease was implemented across Sydney and inside Olympic venues themselves.[2] Existing data collection systems, such as the Notifiable Diseases Database (NDD) were enhanced and new systems were developed, including the Emergency Department Olympic Surveillance System (EDOSS), which involved over 45 staff. Data from these sources were integrated into the Olympic Surveillance System (OSS) as an on-line reporting system utilising the same technology as that developed for the Report of the NSW Chief Health Officer, 2000.[3]

By 8 a.m. every day, seven days per week, for a five week period, the HOCC received data that included reports up to midnight on the previous day. By 11.30 a.m. full reports and commentary from each data source were uploaded onto the NSW Department of Health intranet and a draft daily Health Status Report was produced containing:

- a summary of the previous 24 hours
- trend data
- highlights of any findings of interest.

This daily report was reviewed at 12.00 p.m. by an Olympic Surveillance Review Team, which was chaired by the NSW Public Health Controller and attended by public health experts from the NSW Department of Health and the metropolitan Sydney public health units. Based on input from this meeting, including reports of public actions from the directors of the public health units, a revised version was tabled at a 2 p.m. briefing chaired by the Director-General.

SUMMARY RESULTS

Summary results from the OSS are shown in the Box below. Over the Games period, no infectious disease outbreaks were detected or reported. However, near 'real-time' injury surveillance—conducted for the first time in Australia—identified issues such as glass-related injuries among people attending non-competition Olympic venues, and a spate of injuries related to foot-propelled scooters, that prompted action by relevant authorities.

LESSONS FROM THE GAMES

There are a number of long-term benefits that will be gained from the Games. EDOSS demonstrated the enormous potential utility of near 'real-time' surveillance for specific target conditions in emergency departments, including injuries, illicit drug-related presentations and influenza-like illness. As a result, the NSW Department of Health is exploring opportunities for ongoing surveillance in this setting. The Olympic surveillance effort also fostered a greater understanding of the importance of timely surveillance and reporting of notifiable diseases and raised awareness in hospitals and general practitioners regarding the need to notify scheduled medical conditions. Finally, partnerships between the NSW Department of Health, public health units, emergency departments, laboratories, and local government have all been enhanced. Public health surveillance during the Sydney 2000 Olympic and Paralympic Games was a resounding success.

OVERVIEW OF SURVEILLANCE ACTIVITIES DURING THE OLYMPIC AND PARALYMPIC GAMES PERIOD

- 12,754 people presented to sentinel hospitals with a targeted condition, including 6,640 cases of injury outside the home;
- 930 notifiable conditions reported (344 pertussis, 14 hepatitis A and five measles) in NSW;
- 1,164 consultations at cruise ships;
- 12,000 consultations at Olympic venue medical facilities;
- 7,000 food safety inspection of 1,066 food outlets at Olympic venues;
- 119 environmental inspections;
- 36 cruise ship inspections;
- 4,000 medical interpreter occasions of service.

ACKNOWLEDGEMENTS

The members of the Olympic Surveillance Working Party are: Louisa Jorm (Chair), Pam Albany, Mark Bartlett, Sue Campbell-Lloyd, Kerry Chant, Tim Churches, Valerie Delpech, Bernie Gromek, Mike Hills, Devon Indig, John Kaldor, Jeremy McAnulty, Rob Menzies, Bridget O'Connor, Ross O'Donoghue, Jim Snyder, Sarah Thackway, Maria Visotina, Peter Waples, Rachel Zordan. The authors would also like to thank Michael Ryan, as well as the public health units, emergency departments, and staff of the Public Health Training and Development Unit that were part of the surveillance effort.

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RELEASE OF *NSW PUBLIC HEALTH BULLETIN* DISCUSSION PAPER

The *NSW Public Health Bulletin* was established in May 1990 and has been in continuous production ever since. Throughout this period it has supported public health action in New South Wales. This month a discussion paper was released which makes recommendations regarding the future direction of the Bulletin.

The discussion paper is intended to stimulate a broad discussion and readers' comments are welcome. The comments we receive will help to shape a survey of the Bulletin's readership to be conducted in 2001. The purpose of this readership survey will be to ensure that the *NSW Public Health Bulletin* continues to be a useful and respected tool of the public health workforce in New South Wales.

Copies of the discussion paper are available from Michael Giffin, and can be obtained by phoning (02) 9391 9241; by faxing (02) 9391 9232, or by emailing mgiff@doh.health.nsw.gov.au. The discussion paper is also available from the NSW Department of Health's Web site at **www.health.nsw.gov.au/public-health/phb/phb.html**.

Reader's comments on the discussion paper should be received by 2nd March 2001.

INDIGENOUS STATUS A KEY ISSUE FOR HEALTH SERVICES

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Collectors of health data across all agencies are the targets of a national awareness campaign aimed at improving the quality, completeness and coverage of indigenous health information.

The National Centre for Aboriginal and Torres Strait Islander Statistics (NCATSIS)—based at the Australian Bureau of Statistics (ABS) office in Darwin—is a key player in supporting the Indigenous Status Awareness Campaign, and is disseminating a package of campaign material including special pamphlets and a poster.

In partnership with the Australian Institute of Health and Welfare (AIHW), the ABS has developed a range of resources to help health service providers improve the accuracy of the data they collect about peoples' indigenous status and other data variables. The campaign stresses that good data quality is best achieved by following four steps:

- adoption of a standard question on indigenous status;
- provision of training and support for data collectors;
- raising public awareness on the issue;
- assessing the accuracy of the data when it is collected.

A standard question was developed by the ABS to help ensure consistency in collecting data on indigenous issues. However, research has indicated that health professionals and health service data collectors can experience difficulty when asking the question:

Are you of Aboriginal or Torres Strait islander origin?

For persons of both Aboriginal and Torres Strait Islander origin, mark both 'Yes' boxes.

- ☐ No
- ☐ Yes, Aboriginal
- ☐ Yes, Torres Strait Islander

This may occur if asking the question makes data collectors feel awkward, or if they feel the question is sensitive and may upset the person being questioned. Some people collecting information from clients have also said they do not know how to answer client queries about why the question is being asked, or how to manage some client reaction to the question. In developing best practice methods in data collection it is essential to train collectors to address issues surrounding the collection of indigenous status, particularly:

- understanding the importance of asking the indigenous status question;
- knowing how to ask the question;
- feeling adequately equipped with information to manage client queries and responses.

Raising general client awareness supports staff collecting data and helps them manage client queries. Materials available to assist include two pamphlets:

- one targets all clients of health services and explains why the question is being asked;
- one targets health providers and gives information on the importance of asking the question.

To help assess the accuracy of data, NCATSIS has a comprehensive publication *Assessing the Quality of Identification of Aboriginal and Torres Strait Islander People in Hospital Data*, which includes guidelines for conducting a data quality audit. Procedures involve re-interviewing patients and comparing these results with the information in hospital records.

To assist in other ways the ABS provides related services through its State regional offices, including:

- providing expert advice on effective data capture;
- providing advice on train-the-trainer services for data collectors on how to collect indigenous data, or assisting organisations to adapt this training to suit local requirements;
- providing indigenous status awareness material;
- providing advice and assistance in conducting data quality assessments and assistance with analysis of results.

For further information please contact Janis Shaw, NCATSIS 1800 633216, or by email at: janice.shaw@abs.gov.au.

A list of all ABS publications is available on the ABS Web site at **www.abs.gov.au**.

IMPROVING THE IDENTIFICATION OF ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLES IN HEALTH-RELATED INFORMATION COLLECTION SYSTEMS IN NSW

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NSW Department of Health

Angela Todd
Effective HealthCare Australia
University of Sydney

This article describes two projects undertaken by the NSW Department of Health to improve the identification of Aboriginal and Torres Strait Islander people in our major health information collection systems. The first project described is the development of Better Practice Guidelines for identification, and the second is a training program for frontline staff to improve the accuracy of patient registration information that is collected.

BACKGROUND

The poor health status of Aboriginal and Torres Strait Islander peoples is well documented. Aboriginal infants have lower birth-weights, and higher rates of stillbirth, neonatal and postnatal death compared with non-Aboriginal infants. Aboriginal mothers represent nearly 30 per cent of all maternal deaths but comprise less than three per cent of all deliveries. Chronic diseases are more common among Aboriginals and Torres Strait Islanders, particularly diabetes, renal failure, and eye and ear problems. Aboriginal and Torres Strait Islander peoples are at significantly increased risk of death due to circulatory diseases, respiratory illnesses, injuries and poisoning, and cancer when compared with other Australians. The average estimated life expectancy of Aboriginals and Torres Strait Islanders continues to be around 15–20 years below that of non-indigenous Australians, with estimates of 57 years for indigenous males and 62 years for indigenous females.[1,2,3]

Accurate and reliable information is critical to our efforts to improve the health outcomes of Aboriginal and Torres Strait Islander peoples. However, the quality of much of the available information is poor. One of the most important reasons for this is the under-identification of Aboriginal and Torres Strait Islander peoples in most health-related information collection systems. For example, it has been estimated that the NSW Hospital Inpatient Statistics Collection (ISC) under-enumerates Aboriginals and Torres Strait Islanders by 33 per cent.[4] This problem is further compounded by inconsistent collection practices when the data are collected, in particular the use of various questions about Aboriginal origin, descent and identification.

The inaccuracy and unreliability of these data seriously affect their use for planning, evaluation and monitoring purposes at local, State and national levels. In this regard it is of particular concern that 'national' reports about Aboriginal and Torres Strait Islander health often do not include NSW health statistics due to problems with data quality. As a result, the 25 per cent of Aboriginal Australians who reside in NSW are not being represented in the national picture.

BETTER PRACTICE GUIDELINES

The NSW Department of Health's Contract and Service Performance Branch has initiated a number of projects aimed at identifying and supporting better practice within the NSW health system. One of these projects was the development of Better Practice Guidelines to improve the level of identification of Aboriginal and Torres Strait

Islander people in the New South Wales public health system. This project was auspiced by the State Continuous Improvement Steering Committee and commenced in 1998.

The development of better practice guidelines draws on the process of 'benchmarking'. This form of quality improvement compares and contrasts the way a number of organisations perform the same function. The aim is to establish best practice, and then to introduce this practice into the other organisations.

Best practice in relation to the identification of Aboriginal and Torres Strait Islander peoples in major health data collections was established at a national meeting in November 1996. At this meeting it was agreed that the benchmark to collect information about Aboriginality would be the question and responses used by the Australian Bureau of Statistics (ABS) in the five-yearly population census (see Box above).

Are you of Aboriginal or Torres Strait islander origin?

For persons of both Aboriginal and Torres Strait Islander origin, mark both 'Yes' boxes.

- ☐ No
- ☐ Yes, Aboriginal
- ☐ Yes, Torres Strait Islander

A survey of the current collection practices within the NSW health services identified a wide variation in the questions used to collect information describing Aboriginality or indigenous status. This finding led to the publication of a document entitled *Better Practice Guidelines to improve the level of Aboriginal and Torres Strait Islander identification in the New South Wales public health system*.[5] The main aim of this document is to assist health services in addressing the changes needed in their current practices to meet the above benchmark.

The publication of the Better Practice Guidelines is one strategy used to introduce change. Increasing the awareness among staff of the importance of collecting high quality data and understanding the barriers to data collection of this nature has also been targeted, as described in the second project, the development of a training program for frontline staff collecting patient registration information.

TRAINING PROGRAM FOR FRONTLINE STAFF

In 1999, the Aboriginal Health Information Strategy (AHIS) Unit developed a draft training program for frontline staff to raise the awareness about, and to improve the quality of, Aboriginal and Torres Strait Islander origin information collected in NSW hospitals. Frontline staff are clerical or clinical staff who collect patient/client registration information at the first point of contact with health services, including:

- admission or booking offices
- emergency department
- community health centres
- ambulance services.

The draft program was piloted with over 100 frontline staff at five large public hospitals in NSW. A report of the pilot study was released in September 1999,[6] and is available from the AHIS Unit and from the AHIS intranet Web site at: internal.health.nsw.gov.au/iasd/imcs/ahisu/publications.

The subsequent training program addresses the broader area of patient registration information, and the difficulties that can arise collecting various personal details. The program also covers issues specific to the collection of Aboriginal and Torres Strait Islander origin information. The training is being delivered statewide using two approaches:

- delivery of the program by AHIS staff to 'target' hospitals with significant numbers of Aboriginal people in their catchment area;
- training of health staff who can deliver the training program to all other public hospitals.

To supplement this work the AHIS Unit has also recently produced a pamphlet for use by all NSW Health staff to raise their awareness about the importance of accurately collecting and recording information describing the origin of Aboriginal and Torres Strait Islander people.[7]

CONCLUSION

It must be recognised that, despite these strategies, there are a number of factors that are likely to affect efforts to improve the quality of Aboriginal and Torres Strait Islander origin and other patient registration information. These include:

- effectively engaging people at different levels within the public health system;
- communicating with, and gaining the support of external stakeholders, in particular Aboriginal and Torres Strait Islander organisations and medical services;
- acknowledging the existence of negative attitudes towards Aboriginal and Torres Strait Islander people and how these affect their experience of the public health system, and consequently the information they provide;
- recognising the work pressures of frontline staff and providing them with better support and training;
- developing a stronger information culture that values and uses accurate health information.

These issues present many challenges for the public health workforce in NSW.

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For further information and inquiries regarding the Better Practice Guidelines contact Heather Simon, Contract and Service Performance Branch, NSW Department of Health by phone at (02) 9391 9434, or by email at hsimon@doh.health.nsw.gov.au. For the training program and pamphlets contact Peter Williams, Information Management and Clinical Systems, NSW Department of Health by phone at (02) 9392 9110, or by email at pwill@doh.health.nsw.gov.au.

QUALITY OF REPORTING OF ABORIGINALITY TO THE NSW MIDWIVES DATA COLLECTION

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This article describes a study that used capture–recapture methods to assess the quality of information on Aboriginality reported to the NSW Midwives Data Collection (MDC).

The NSW Aboriginal Health Strategic Plan states that: 'In order to measure improvements and effectively target funding to programs which will improve the health of Aboriginal people, strategies are required to develop robust performance indicators, improve data collection and improve reporting processes'.[1] Aboriginality is known to be under-reported on Department of Health data collections in NSW, although it is not known to what extent. Improving the quality of information on Aboriginality in health data collections is an important part of improving the overall quality of information on Aboriginal health in NSW.

The MDC is a population-based surveillance system covering all births in NSW public and private hospitals, as well as homebirths. Births in NSW are required to be reported to the MDC under the NSW Public Health Act 1991. The data are used to monitor trends and variations in mortality and morbidity of mothers and newborns, quality of care and the major risk factors for adverse outcomes for mothers and babies. The MDC encompasses all live births and stillbirths of at least 20 weeks gestation or at least 400 grams birth-weight.

METHODS

The Aboriginality of the mother, rather than the baby, is reported to the MDC, although mother's Aboriginality is frequently used as a proxy measure for the baby's Aboriginality. Consequently, maternal Aboriginality was used for this analysis.

Aboriginal or Torres Straight Islander mothers were counted as one group in the MDC up to 1997 and as two separate groups thereafter. We were therefore unable to examine trends in the quality of reporting for both these groups. For ease of reference, in this report 'Aboriginal' will be used to refer to both groups combined.

Records of births reported to the MDC were linked to birth registration records of the NSW Registry of Births, Deaths and Marriages for births occurring in the five-year period 1994–98. Records from the two files were matched using a probabilistic linkage software (Automatch). Prior

TABLE 1

BIRTHS TO ABORIGINAL MOTHERS BY SOURCE OF BIRTH REPORT, YEAR OF BIRTH AND URBAN–RURAL HEALTH AREA OF HOSPITAL, NSW 1994–98

Urban/Rural locality of hospital/ Year	MDC births	RBDM births	Births reported to both MDC/RBDM	Estimated Aboriginal births	Estimated Aboriginal births reported	95% confidence interval of estimated births reported
	No.	No.	No.	No.	%	
Urban						
1994	553	665	268	1371	40.3	37.7–42.9
1995	642	742	345	1380	46.5	43.9–49.2
1996	593	794	338	1392	42.6	40.0–45.2
1997	658	1066	441	1590	41.4	39.0–43.8
1998	785	1053	495	1669	47.0	44.6–49.4
Rural						
1994	990	747	561	1318	75.1	72.8–77.4
1995	1117	887	689	1438	77.7	75.5–79.8
1996	1131	941	679	1567	72.2	70.0–74.4
1997	1196	1011	789	1532	78.0	76.0–80.1
1998	1280	901	771	1496	85.6	83.8–87.4
NSW						
1994	1543	1412	829	2628	58.7	56.8–60.6
1995	1759	1629	1034	2771	63.5	61.7–65.3
1996	1724	1735	1017	2941	58.6	56.8–60.4
1997	1854	2077	1230	3130	59.2	57.5–60.9
1998	2065	1954	1266	3187	64.8	63.1–66.5

Note: 'Urban' and 'Rural' refer to urban or rural Health Area of Hospital as reported to the MDC. Urban hospitals include those in the following health areas: Central Sydney, Northern Sydney, Western Sydney, Wentworth, South Western Sydney, South Eastern Sydney, Central Coast, Hunter and Illawarra. Home births are excluded.

Source: Linked NSW Midwives Data Collection and Registry of Births, Deaths and Marriages birth registration data.

to matching, residential address and mothers' name were standardised using a standardisation software (Autostan). The overall linkage rate was 96.6 per cent of MDC records (97.8 per cent of birth registration records).

Capture–recapture methods are used to adjust estimates of counts to reflect ascertainment level or undercounting. Capture–recapture was carried out using the method described by McCarty et al.[2] Analysis was carried out using SAS version 6.12. Analyses concerning geographic location were based on health area of hospital of birth as reported to the MDC. Home births were excluded from the analysis.

RESULTS

The estimated percentage of births to Aboriginal mothers in NSW, which were reported as Aboriginal in the MDC, rose from 58.7 to 64.8 per cent over the five-year period 1994–98 (Table 1, Figure 1). Reporting was better in rural hospitals than urban hospitals: in 1998 47.0 per cent of births to Aboriginal mothers in urban hospitals were reported compared to 85.6 per cent in rural hospitals, though there was a trend towards improved reporting in both urban and rural hospitals.

In 1998, the highest ascertainment rate was in hospitals in the New England Area (93.3 per cent) and the lowest in hospitals in the Northern Sydney Area (15.8 per cent) (Table 2). The number of reported births to Aboriginal mothers in Northern Sydney Area hospitals was small for both the MDC and the Registry of Births, Deaths and Marriages and the estimate of total births for this Area is not very reliable, as indicated by the wide confidence intervals (8.7–23.0 per cent).

Of the nine urban health areas, only three (Central Sydney, Wentworth, and Illawarra) had ascertainment rates of maternal Aboriginality of more than 50 per cent in 1998. All rural areas had ascertainment rates of more than 70 per cent.

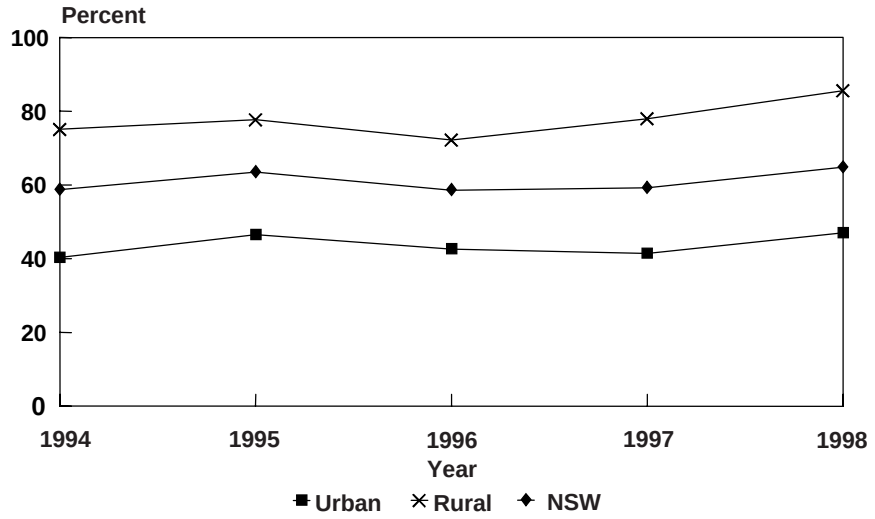
DISCUSSION

In using capture–recapture methods, three conditions need to be met:

- the two systems should be independent;
- all true matches and only matches should be identified;
- all cases identified by the two or more surveillance systems should be true cases that occurred in the

FIGURE 1

BIRTHS TO ABORIGINAL MOTHERS BY YEAR OF BIRTH AND URBAN–RURAL HEALTH AREA OF HOSPITAL, NSW 1994–98



Note: Home births excluded.

Source: Linked NSW Midwives Data Collection and Registry of Births, Deaths and Marriages birth registration data.

population under investigation and within the appropriate time period.[3]

These three conditions are reasonably well met in this study. First, the two sources of data are independent. Second, the data linkage was carried out in such a way that the likelihood of obtaining true matches was maximised. For the third criteria, it is not known how many mothers in each data collection were incorrectly identified as Aboriginal. It is more likely that mothers would be incorrectly identified as non-Aboriginal than Aboriginal in NSW. If some mothers were incorrectly reported as Aboriginal in either data collection, this study would result in a larger estimate of total births to Aboriginal mothers than is actually the case.

A limitation of this study is that it is restricted to an estimation of the number of births to Aboriginal mothers. Paternal Aboriginality also influences the baby's Aboriginality, and when this is not taken into account the number of Aboriginal babies born in NSW is further under-enumerated. For 1998, the linked data set created for this study showed a further 980 births where the father was reported as Aboriginal and the mother was reported as non-Aboriginal both on the MDC and on the birth registration record. Assuming the reporting of paternal Aboriginality on the birth registration record is correct, these 980 births could be added to the 3,187 births to Aboriginal mothers in 1998, estimated by this study, to give an estimated total of 4,167 births of Aboriginal babies born in NSW in 1998. This is 4.8 per cent of all births in NSW in 1998 and double the 2.4 per cent of births to Aboriginal mothers reported to the MDC in 1998. As for maternal Aboriginality, it is likely that paternal Aboriginality is also under-reported and the true number of Aboriginal babies may be even higher.

In summary, while improvements have been made in the reporting of maternal Aboriginality to the MDC, resulting in a rise from 58.7 to 64.8 per cent of births to Aboriginal mothers being reported as Aboriginal over the five years 1994–98, there is still a need for substantial improvement in reporting of maternal Aboriginality, particularly in urban hospitals. Also, consideration could be given as to whether information on paternal Aboriginality should be obtained from birth registration records on a regular basis and included in reports of the numbers of Aboriginal babies.

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TABLE 2

BIRTHS TO ABORIGINAL MOTHERS BY SOURCE OF BIRTH REPORT, YEAR AND HEALTH AREA OF BIRTH HOSPITAL, NSW 1994–98

Health Area of hospital/ Year	MDC births	RBDM births	Births reported to both MDC/RBDM	Estimated Aboriginal births	Estimated Aboriginal births reported	95% confidence interval of estimated births reported
	No.	No.	No.	No.	%	
Central Sydney						
1994	123	84	65	159	77.5	71.0–84.0
1995	113	78	63	140	80.9	74.4–87.4
1996	84	70	51	115	73.0	64.9–81.1
1997	86	101	56	155	55.6	47.8–63.4
1998	73	90	51	129	56.8	48.2–65.4
Northern Sydney						
1994	19	23	11	39	48.7	33.0–64.4
1995	13	24	7	43	30.4	16.6–44.2
1996	13	27	8	43	30.5	16.7–44.4
1997	8	35	6	45	17.7	6.6–28.8
1998	16	29	4	101	15.8	8.7–23.0
Western Sydney						
1994	77	93	32	221	34.8	28.5–41.1
1995	85	102	36	238	35.7	29.6–41.7
1996	67	130	42	206	32.5	26.1–38.9
1997	76	144	48	227	33.5	27.4–39.6
1998	127	162	80	257	49.5	43.4–55.6
Wentworth						
1994	66	73	31	154	42.9	35.1–50.7
1995	82	88	44	163	50.3	42.6–57.9
1996	84	97	40	202	41.5	34.8–48.3
1997	88	140	55	223	39.4	33.0–45.9
1998	131	146	80	239	54.9	48.6–61.2
South Western						
1994	76	120	25	357	21.3	17.0–25.5
1995	88	141	52	237	37.1	30.9–43.2
1996	91	142	48	267	34.0	28.3–39.7
1997	84	181	47	321	26.1	21.3–30.9
1998	112	208	63	368	30.4	25.7–35.1
Central Coast						
1994	15	34	9	55	27.3	15.5–39.0
1995	20	36	12	59	34.0	21.9–46.1
1996	27	48	21	61	44.0	31.6–56.4
1997	36	58	24	86	41.7	31.3–52.1
1998	42	55	24	95	44.1	34.1–54.0
Hunter						
1994	67	101	32	209	32.0	25.7–38.4
1995	94	127	52	228	41.1	34.8–47.5
1996	101	132	56	237	42.6	36.3–48.9
1997	123	183	92	244	50.3	44.1–56.6
1998	111	162	78	230	48.2	41.8–54.7
Illawarra						
1994	81	78	45	140	57.9	49.7–66.1
1995	112	83	60	155	72.4	65.4–79.5
1996	101	86	59	147	68.8	61.3–76.2
1997	124	122	86	176	70.6	63.8–77.3
1998	113	109	80	154	73.5	66.5–80.4
South Eastern Sydney						
1994	29	59	18	94	30.9	21.6–40.3
1995	35	63	19	114	30.6	22.2–39.1
1996	25	62	13	116	21.6	14.1–29.0
1997	33	102	27	124	26.6	18.8–34.4
1998	60	92	35	157	38.3	30.7–45.9

Note: Home births excluded.

Source: Linked NSW Midwives Data Collection and Registry of Births, Deaths and Marriages birth registration data.

TABLE 2

BIRTHS TO ABORIGINAL MOTHERS BY SOURCE OF BIRTH REPORT, YEAR AND HEALTH AREA OF BIRTH HOSPITAL, NSW 1994–98 *continued*

Health Area of hospital/ Year	MDC births	RBDM births	Births reported to both MDC/RBDM	Estimated Aboriginal births	Estimated Aboriginal births reported	95% confidence interval of estimated births reported
	No.	No.	No.	No.	%	
Northern Rivers						
1994	122	111	74	183	66.8	60.0–73.6
1995	165	120	95	208	79.2	73.7–84.7
1996	143	104	76	195	73.2	67.0–79.4
1997	160	151	111	218	73.6	67.7–79.4
1998	180	131	102	231	77.9	72.6–83.3
Mid North Coast						
1994	141	108	77	197	71.4	65.1–77.7
1995	158	121	92	208	76.1	70.3–81.9
1996	159	135	94	228	69.7	63.8–75.7
1997	174	148	104	247	70.4	64.7–76.0
1998	168	99	82	203	82.9	77.7–88.1
New England						
1994	199	154	122	251	79.3	74.3–84.3
1995	212	163	144	240	88.4	84.3–92.4
1996	246	178	149	294	83.7	79.5–88.0
1997	267	227	197	308	86.8	83.0–90.6
1998	283	208	194	303	93.3	90.5–96.1
Macquarie						
1994	193	143	117	236	81.9	76.9–86.8
1995	185	159	114	258	71.8	66.3–77.3
1996	238	210	149	335	71.0	66.1–75.9
1997	261	184	157	306	85.4	81.4–89.3
1998	257	181	164	284	90.6	87.2–94.0
Mid Western						
1994	100	74	53	139	71.8	64.3–79.3
1995	102	90	64	143	71.2	63.8–78.6
1996	103	111	68	168	61.4	54.0–68.7
1997	93	93	66	131	71.1	63.3–78.8
1998	106	91	67	144	73.7	66.5–80.9
Far West						
1994	93	56	51	102	91.1	85.6–96.7
1995	122	77	73	129	94.8	91.0–98.7
1996	76	46	41	85	89.2	82.7–95.8
1997	77	47	39	93	83.2	75.5–90.8
1998	90	52	46	102	88.6	82.4–94.8
Greater Murray						
1994	101	72	46	157	64.2	56.7–71.6
1995	107	107	69	166	64.6	57.3–71.9
1996	128	121	83	186	68.7	62.0–75.3
1997	113	118	86	155	72.9	65.9–79.9
1998	132	101	86	155	85.2	79.6–90.8
Southern						
1994	41	29	21	56	72.9	61.2–84.5
1995	66	50	38	87	76.2	67.2–85.2
1996	38	36	19	71	53.4	41.8–65.0
1997	51	43	29	75	67.8	57.2–78.3
1998	64	38	30	81	79.2	70.4–88.1

Note: Home births excluded.

Source: Linked NSW Midwives Data Collection and Registry of Births, Deaths and Marriages birth registration data.

HEPATITIS B: WHERE ARE WE NOW?

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This article reviews the current literature regarding HBV epidemiology, locally and internationally, and outlines current vaccination policies and immunisation procedures. The World Health Organization (WHO) estimates that about two billion people have been infected with the hepatitis B virus (HBV) worldwide, and about 350 million of them are chronic carriers.[1] About 0.5 per cent of people with acute symptomatic HBV infection will die of fulminant hepatitis, and about 20 per cent of people with chronic HBV infection will die from its long-term sequelae (chronic active hepatitis, cirrhosis and hepatocellular carcinoma).[1]

The risk of becoming a chronic carrier of HBV is inversely related to the age at which infection occurs. Infected neonates have approximately 90 per cent risk of becoming chronic carriers, children aged less than seven years have about 25 per cent risk, while persons aged more than seven years have a risk of approximately five per cent.[2–4] Immunocompromised persons are more likely than persons with normal immune function to become chronic carriers.[4]

EPIDEMIOLOGY: AUSTRALIA AND NSW

The epidemiological pattern of hepatitis B (HB) in Australia is similar to that of other low prevalence countries where most of the cases of acute HB notified to health authorities are people aged 14–40 years belonging to well-recognised risk groups:

- injecting drug users
- prisoners
- men who have sex with men
- people working in the sex industry
- health care workers.

Each year Australian health departments are notified of approximately 7,000 persons who are hepatitis B surface antigen (HBsAg) positive, with approximately half of them from New South Wales (NSW).[5] Nationally, about 250 of these notifications are known to be the result of acute infection. However, there is considerable under reporting of incident cases due to inconsistent data collection. In 1996, Kaldor et al. estimated that each year in Australia approximately 100 adults and between 108 and 1,080 infants—depending on the success of the neonatal hepatitis B immunoglobulin (HBIg) and immunisation program—become chronic carriers of HBV.[6]

HEPATITIS B VACCINATION POLICY IN AUSTRALIA

HB vaccines have been available in Australia since the early 1980s and were initially recommended for risk groups only. However, persons belonging to risk groups defined by risk behaviours cannot be identified as 'at risk' until after exposure to the risk behaviour. Even then, the 'at risk' individual will need to admit the risk behaviour to a vaccine provider before immunisation against HB can be offered. The proportion of each risk group vaccinated has not been sufficient to achieve control of HB. Continuing difficulties in ensuring the identification and immunisation of 'at risk' individuals lead the National Health and Medical Research Council (NHMRC) to add universal infant and pre-adolescent immunisation to its recommendations for HB prevention in 1996.[7] This recommendation followed the 1991 recommendation of WHO that HB immunisation be integrated into national immunisation programs.[8] By 1998, national or regional programs for universal infant and/or adolescent HB immunisation had been adopted in more than 100 countries.[9]

RESPONSE TO HEPATITIS B IMMUNISATION

HB vaccines derived from HBsAg positive plasma and from recombinant DNA technology are equally effective.[10] As age increases, the immune response (seroconversion rate and geometric mean titre) to HB vaccine decreases.[4] More than 95 per cent of healthy individuals aged less than 30 years seroconvert following administration of three doses of HB vaccine in the standard 0, 1, 6 month dosing schedule. Children and infants make the strongest responses, while only 50 per cent of vaccinees aged more than 60 years seroconvert. Predictors of poor anti-HBs response include:

- advancing age
- immunosuppression
- human immunodeficiency virus (HIV) infection
- liver disease
- renal failure
- type 1 diabetes
- injecting drug use
- smoking
- male gender
- obesity
- HLA type
- administration of the vaccine in the buttocks instead of the arm or leg.[4,11–15]

Freezing the vaccine is known to decrease its immunogenicity.[16]

TABLE 3 NHMRC HEPATITIS B IMMUNISATION RECOMMENDATIONS AND PROGRAMS SPECIFICALLY FUNDED BY NSW HEALTH

Current NHMRC recommendations for hepatitis B immunisation[32]	Funding source & date funding initiated	Free vaccine* available through:
Infants of HBsAg positive mothers. (All pregnant women should be tested for HBsAg). Give HBIg 100 IU intramuscularly (when infant is physiologically stable—preferably <12 hours after birth—efficacy decreases markedly if HBIg is delayed >48 hours). Give the first dose of vaccine as soon as possible (and <7 days) after birth in opposite thigh to HBIg. Three further doses of hepatitis B vaccine should be given in accordance with the schedule of the universal infant immunisation program (see below).	NSW Health Since 1987	Maternity Units (HBIg plus vaccine dose 1). GPs, Councils or Community Health Centres (remaining vaccine doses)
All other infants (universal infant immunisation program) A dose of hepatitis B vaccine at birth followed by doses given in multivalent vaccines at 2, 4, and either 6 or 12 months is now recommended for all children. If the monovalent dose at birth is missed, vaccination against hepatitis B should continue with a multivalent vaccine, following the routine schedule. Preterm babies (<32 weeks gestation) should either be vaccinated at birth and given an extra booster (using a 0, 2, 4, 6, 12 month schedule) or hepatitis B vaccine should be delayed until the baby is 2 months old and a 2, 4, 6, 12 month schedule used. Until a thimerosal-free monovalent hepatitis B vaccine is available, the latter option is preferred for pre-term babies whose mothers are HBsAg negative. For preterm or term babies of carrier mothers, a birth dose of vaccine and hepatitis B immunoglobulin must be given.	NSW Health Since May 2000	Maternity Units (vaccine dose 1). GPs, Councils or Community Health Centres (remaining vaccine doses)
All pre-adolescent children Immunisation recommended. Pre-immunisation testing for HBV markers is not recommended.	NSW Health Children aged 10 Since June 1999	GPs, Councils or Community Health Centres
Household contacts of acute or chronic hepatitis B cases Investigate the HBV marker status of each household member. Immunisation is recommended for those who are HBV naïve.	NSW Health Since 1987	Sexual Health Clinics
Sexual contacts of acute or chronic hepatitis B cases Investigate the HBV marker status of each sexual contact. Immunisation is recommended for those who are HBV naïve. If sexual contact with a case of acute HB occurred within the last 14 days administer HBIg 400 IU and a course of HB immunisation to HBV naïve sexual contacts (treatment should be initiated as soon as possible)	Not specifically funded	Sexual Health Clinics
Attendees at sexual health clinics Immunisation recommended. HIV positive individuals should receive double the normal volume of vaccine at each vaccination	NSW Health Since 1999	Sexual Health Clinics
Sexually active men who have sex with men Immunisation recommended. HIV positive individuals should receive double the normal volume of vaccine at each vaccination. The combined hepatitis A and B vaccine may be appropriate for those not immune to either disease.	NSW Health Since 1999	Sexual Health Clinics
Injecting drug users Immunisation recommended for those who are HBV naïve. HIV positive individuals should receive double the normal volume of vaccine at each vaccination.	NSW Health Since 1999	Sexual Health Clinics
Individuals with chronic liver disease and/or hepatitis C. Immunisation recommended for hepatitis B naïve subjects.	Not specifically funded	(AHSU) treating the individual†
Haemodialysis patients Immunisation recommended. Haemodialysis patients should receive double the normal volume of vaccine at each vaccination.	Not specifically funded	AHSU treating the individual†
Recipients of certain blood products (blood product concentrates for clotting disorders) Immunisation recommended from the time the clotting disorder is identified.	Not specifically funded	AHSU treating the individual†
Persons in facilities for persons with intellectual disabilities Immunisation recommended for HBV naïve intellectually impaired persons in residential and non-residential care.	Not specifically funded	Institution†, AHSU treating the patient†
Staff of facilities for persons with intellectual disabilities Immunisation recommended for staff involved in the care of intellectually impaired persons in residential and non-residential care.	Not specifically funded	Employer† (OH&S requirement)[40]
Inmates of correctional institutions and Juvenile Justice Centres Offer screening and immunisation.	NSW Health Since 1992	Corrections Health Services Juvenile Justice Centres
Staff of correctional institutions and Juvenile Justice Centres Immunisation recommended.	Not specifically funded	Employer†(OH&S requirement)[40]
Health Care Workers and embalmers Immunisation recommended for all staff directly involved in patient care, embalming or handling of human blood or tissue.	Not specifically funded	Employer† (OH&S requirement)[40]
Persons adopting children from overseas These children should be tested for hepatitis B, and if HBsAg positive members of the adoptive family should be vaccinated.	Not funded	
Police, armed forces, Emergency Services personnel. Offer immunisation to those whose duties put them at increased risk.	Not funded	Employer† (OH&S requirement)[40]
Travellers to areas with a high prevalence of hepatitis B infection. Offer immunisation to those who will reside in high prevalence areas for prolonged periods and those who do not wish to avoid sexual contact, injecting drug use, tattooing or body piercing while in high prevalence areas.	Not funded	
Contact sports Although the risk is very low, immunisation should not be discouraged.	Not funded	
Accelerated schedule In circumstances where more rapid protection is required (for example, contacts of hepatitis B carriers and vaccination of travellers), only one product, Engerix B, is registered for use in an accelerated schedule. The accelerated schedule for adults using Engerix B is 0, 7, and 21 days with a booster at 12 months.		

NHMRC[32] recommends the combined hepatitis A–hepatitis B vaccines should be considered for those at risk of acquiring both infections including:

- Expatriates and long term visitors to developing countries
- At-risk health care workers and medical and nursing students
- Men who have sex with men
- Injecting drug users

NHMRC[32] recommends post-vaccination anti-HBs testing three months after the third dose of vaccine for:

- persons at occupational risk
- persons at risk of severe or complicated disease (e.g. pre-existing liver disease unrelated to hepatitis B)
- persons in whom poor response to hepatitis B vaccine is expected (e.g. immunocompromised, persons requiring haemodialysis)

* For those not qualifying for free vaccine, consumer-pays immunisation against HBV infection is available through General Practitioners † Policies regarding charging for vaccination vary
HB = hepatitis B HBV = hepatitis B virus HBV naïve = no serological markers for HBV infection or vaccination OH&S = Occupational Health and Safety AHSU = Area Health Service Unit

MANAGEMENT OF NON-RESPONDERS

In general, of those adults who make no anti-HBs response at all following the three-dose vaccination, only 10 per cent will respond to an extra dose of vaccine. While, of those who make a poor response in which anti-HBs does not rise above 10 mIU/mL, approximately 40 to 50 per cent will produce an anti-HBs response of more than 100 mIU/mL in response to a fourth dose of vaccine.[17–20] Administration of two or three additional doses to initial non-responder adults fails to produce an adequate anti-HBs response in up to 40 per cent.[17–20] Between 68 per cent and 94 per cent of non- or poor-responder babies develop adequate anti-HBs levels in response to one or two additional doses of HB vaccine.[21,22]

DURATION OF PROTECTION

The duration of anti-HBs following immunisation depends on the peak level of anti-HBs attained.[10,23,24] Approximately 90 per cent of anti-HBs is lost in the first 12 months following immunisation and thereafter anti-HBs levels halve every 14 months.[24]

Questions remain about the duration of protection afforded by immunisation and the need for booster doses. Based on the information available in August 1999 a committee of European HB experts concluded that, as yet, there is no need to recommend booster doses for immunocompetent individuals who have responded to the primary immunisation course.[25] The available evidence shows that immunological memory permits a protective anamnestic anti-HBs response to antigen challenge. When re-exposure to HBsAg occurs, clones of HBsAg-responsive memory B lymphocytes remaining after primary HB immunisation can expand to produce increased levels of anti-HBs as quickly as within 3–5 days, even in individuals whose anti-HBs is no longer detectable.[26–28] It is this ability to respond rapidly to HBsAg re-exposure that is thought to provide protection against clinically apparent infection. Certainly, the breakthrough infections observed to date have not produced recognised clinical hepatitis. The most common event that indicates breakthrough infection with HBV is an anamnestic rise in anti-HBs levels.[10, 29–31] This has been seen in 3.5 per cent to 20 per cent of vaccinees who belonged to populations in which HB is common and who were followed five to 12 years.[10,29–31] Some individuals may have multiple anamnestic response episodes.[10] The frequency of these 'natural boosts' of anti-HBs did not correlate with initial post-immunisation anti-HBs levels in one study.[29]

Breakthrough infections may also be shown by detection of HBsAg or by anti-HBc seroconversion. Breakthrough infection rates as determined by HBsAg detection or anti-HBc seroconversion are inversely related to initial post-immunisation anti-HBs levels.[23,31]

A study of Taiwanese children vaccinated at birth showed that lower post-immunisation anti-HBs levels were correlated with early loss of anti-HBs and increased rate of breakthrough infection.[23] Children whose anti-HBs declined to undetectable levels by age five years were more than twice as likely to become infected by age 10 years (RR 2.42, 95% CI 1.22–4.81, p=0.02) than those who retained anti-HBs.[23] In agreement with other studies, none of the breakthrough infections caused clinical manifestations. To date, this is the only study to show HBsAg carriage following breakthrough infection: three cases of HBsAg carriage occurred in children aged 1–2 years among the 113 breakthrough infections that occurred during 10 years of follow-up.[23] The authors did not report if the chronic infections were caused by vaccine escape variants of HBV. Currently, booster immunisations are not recommended for immunocompetent individuals who have lost anti-HBs.[25,32]

Immunosuppressed persons, such as those with chronic renal failure or HIV infection produce poorer anti-HBs responses than do immunocompetent individuals. [8,15] Little data are available on the duration of immunological memory in immunocompromised persons. However, there are reports of clinically significant HBsAg positive breakthrough infections in dialysis patients who have lost anti-HBs. Booster immunisations are recommended for immunocompromised persons whose anti-HBs declines to <10mIU/mL.[25,32]

PENETRATION OF VACCINE INTO IDENTIFIED RISK GROUPS, AUSTRALIA AND NSW

The best-vaccinated risk groups in Australia are:

- health care workers (HCWs)
- babies of HBsAg positive mothers
- babies of mothers who belong to ethnic groups recognised to have high HBV infection rates.

In 1997, 86 per cent of HCWs were anti-HBs positive at the time of an occupational exposure to blood or body fluids.[33] A limited number of studies show that during the 1990s almost all babies of HBsAg positive women in some areas of NSW received HBIg and the first dose of vaccine, and 70 per cent to 98 per cent completed the three dose vaccination (South Western Sydney and Hunter Public Health Units unpublished data, 1999).[34,35] However, in the early 1990s, possibly as few as 77 per cent of pregnant women may be tested for HBsAg.[36,37] In NSW, a limited number of studies showed that poorly vaccinated risk groups include:

- men who have sex with men (28 per cent)
- people working in the sex industry (28 per cent)[38]
- injecting drug users (7–10 per cent)[38]
- prisoners (nine per cent).[39]

TABLE 4

NHMRC RECOMMENDATIONS FOR POST-IMMUNISATION FOLLOW-UP OF PERSONS RECEIVING HEPATITIS B IMMUNISATION [32]

Vaccinees	Post-vaccination anti-HBs test	Booster vaccination
Immunocompetent Infants Children Adolescents Adults	No	Not required*
Immunocompromised persons, HIV positive persons, persons with renal failure	Test for seroconversion (>10mIU/mL) three months after primary immunisation.†	Check HBsAg status of those who have not seroconverted. Administer additional vaccine dose(s)§. Check anti-HBs level every 6–12 months. If <10mIU/mL, administer booster.
Persons at occupational risk, persons at risk of severe or complicated disease (e.g. pre-existing liver disease not related to hepatitis B), persons in whom poor response to hepatitis B vaccination is expected.	Test for seroconversion (>10mIU/mL) three months after primary immunisation.	Check HBsAg status of those who have not seroconverted. Administer additional vaccine dose(s)§.

* There is good evidence that a completed primary course of hepatitis B vaccination provides long-lasting protection in immunocompetent individuals, so booster doses are not recommended.

† See Table 3 for NHMRC recommendations of immunisation of immunocompromised persons.

§ If post-vaccination testing shows anti-HBs <10mIU/mL: test for carriage of HBsAg. Those who are HBsAg negative and have not responded should be offered further doses of vaccine. This can be either a fourth double dose or a further three doses at monthly intervals with testing 2 weeks after each additional dose. Persistent non-responders should be informed about the need for hepatitis B immunoglobulin (HBIG) within 48 hours of parenteral exposure to HBV.

CURRENT IMMUNISATION RECOMMENDATIONS

Given the failure to date of the selective HB immunisation programs to control the transmission of the virus, the NHMRC has recommended the pursuit of universal infant and pre-adolescent immunisation in addition to strengthening the current selective immunisation programs that target specific at-risk groups.[7,32] In 1999 the NSW Department of Health introduced funding for HB immunisation of all children aged 10 years and persons attending sexual health clinics and, now that suitable multi-valent vaccines that include HBsAg are available, universal immunisation of infants against HBV commenced in May 2000.

The current NHMRC recommendations for HB immunisation and the programs specifically funded by the NSW Department of Health are listed in Table 3. Recommendations for limited follow-up of vaccinees are listed in Table 4.

FUTURE DIRECTIONS

The poor penetration of hepatitis B vaccination into at-risk groups in which risk of exposure is determined by risk-behaviours, for example:

- injecting drug users
- men who have sex with men
- sex workers

has resulted in the realisation that prevention of hepatitis B transmission within these at-risk groups may have to rely on the recently instituted universal childhood hepatitis B vaccination program, or await the development of more targeted vaccination programs. If pre-adolescent hepatitis B vaccination programs fail to deliver hepatitis B vaccination to a significant proportion of the population, a minimum of 15 years will pass before individuals immunised as infants begin to take up at-risk behaviours. Therefore, at-risk groups should still be targeted for hepatitis B vaccination with the development of vaccination delivery programs that are accessible and user-friendly for members of the at-risk groups. More research is needed to determine how best to overcome barriers to effective delivery of hepatitis B vaccination programs to these at-risk groups.

ACKNOWLEDGEMENTS

We are grateful to Christine Carr, Immunisation Coordinator, Hunter Public Health Unit, for valuable criticism of a draft of this article.

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PROGRAM FOR ENHANCED POPULATION HEALTH INFOSTRUCTURE (PEPHI)

- *How healthy are the people in my local area?*
- *What are the main health problems that send people to hospital in my local area?*
- *What are the most common preventable diseases in my local area?*

The Epidemiology and Surveillance Branch of the NSW Department of Health is currently planning the Program for Enhanced Population Health Infostructure (PEPHI). The program will comprise a series of projects and initiatives designed to expand the available information on the health of the population of NSW and make that information more easily accessible.

Useful and meaningful information about the health of people living in the community is central to providing health services and other public health interventions that meet community needs. The health information referred to here includes statistical data describing the health and disease status of people living in the community, the health services used by these people, and the health outcomes of those services.

PEPHI is aimed at better meeting the information needs of:

- health professionals working outside the public health system, administrators, planners and policy analysts working in non-health sectors, students, and the general public;
- public health system staff at all levels;
- population health data analysts and researchers.

A discussion paper on PEPHI has been produced. Comments on the discussion paper are welcome as they will ensure that PEPHI projects and initiatives are designed to meet health information needs.

Copies of the discussion paper are available from David Muscatello, and can be obtained by phoning (02) 9391 9408; by faxing 9391 9232; or by emailing dmusc@doh.health.nsw.gov.au. The discussion paper is also available from the Department of Health's Web site at **www.health.nsw.gov.au/public-health/pephi**.

HIV INFECTION AND AIDS IN NSW, 1981 TO 1999

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Human Immunodeficiency Virus (HIV) is transmitted via body fluids, through behaviours such as unprotected sexual contact and sharing of intravenous injection equipment, or through transfusion with infected blood products. Initial infection may cause an acute mononucleosis-like illness within several weeks to months, lasting a week or two. Infected people are then usually free of symptoms for many months or years. However, the immune system becomes progressively damaged by the virus, eventually leading to the development of one or more opportunistic infections and cancers. This stage of the illness is described as Acquired Immune Deficiency Syndrome (AIDS). In the absence of effective treatment, the average time from HIV infection to AIDS is eight years, and from AIDS to death is approximately one year. The introduction of effective prophylactic treatments a decade ago increased average survival before AIDS to 10 years. The introduction in 1995 of combination antiretroviral therapy, including protease inhibitors, improved survival dramatically, by approximately 450 per cent.[1]

It is estimated that, at the end of 1997, over 30 million people had acquired HIV infection worldwide, 11.7 million of whom had died. Approximately 90 per cent of people living with HIV are in sub-Saharan Africa or the developing countries of Asia.[1]

METHODS

Under the NSW Public Health Act 1991, HIV reference laboratories are required to notify confirmed HIV infection to the NSW Department of Health. Requesting doctors are required to provide those laboratories with the information required for notification, which includes risk exposures, previous tests and clinical status. Medical practitioners and hospitals are required to notify their local public health unit of cases of AIDS. To protect patient's confidentiality, notifications of HIV and AIDS do not include full names or addresses.

The National Centre in HIV Epidemiology and Clinical Research (NCHECR) collates data collected by States and Territories into the National HIV Database and the National AIDS Register. The data presented here on notifications of HIV, AIDS and death with AIDS, are from these sources.

Population data were obtained from National Census estimates for 1999, available through the Health Outcome Information Statistical Toolkit (HOIST), Epidemiology Branch, NSW Department of Health.

Estimates of the number of people living with HIV were calculated as follows. The cumulative number of notifications in NSW and each area health service were adjusted for the estimated number of multiple reports,[2] AIDS deaths and an estimated range of 10–30 per cent of cases diagnosed with HIV at AIDS diagnosis.

RESULTS

HIV Notifications

A total of 11,753 new diagnoses of HIV infection have been notified to the end of 1999 in NSW residents. Of those, between 7,200 and 9,700 were estimated to be living with HIV in 1999 (Table 7). HIV notifications for 1999 (389) were the lowest for any year since testing began in 1985, continuing a downward trend since the peak in 1987 (Table 5). Where information on the cases is available, 95 per cent are male, 70 per cent are aged 25–44 years, 70 per cent reside in Central or South Eastern Sydney Area Health Services, and 90 per cent reside in Sydney.

Where information on risk exposures has been reported, 6,805 (81 per cent) report male to male sexual contact, 255 (three per cent) male to male sex and injecting drug use, and 710 (eight per cent) heterosexual contact. Where further information was available on heterosexual exposure, 90 (35 per cent) were born in a high prevalence country, and 100 (39 per cent) reported sexual contact with a person from a high prevalence country. Injecting drug use without male to male sexual contact was reported

TABLE 5

PATIENTS NOTIFIED, BY YEAR OF HIV DIAGNOSIS, AIDS DIAGNOSIS, AND DEATH WITH AIDS, NSW, 1981–1999

Year of diagnosis	HIV diagnosis[1] (Cases/100,000 /year)	AIDS diagnoses	Death with AIDS (% of all AIDS cases)
1981		1	1 (100)
1982		1	0 (0)
1983		3	1 (33)
1984	199	30	6 (20)
1985	987	90	46 (51)
1986	1,110	160	107 (67)
1987	1,635	249	143 (57)
1988	1,144	314	138 (44)
1989	982	347	235 (68)
1990	805	421	315 (75)
1991	811	439	336 (77)
1992	710	429	305 (71)
1993	607	468	369 (79)
1994	512	534	410 (77)
1995	541	463	343 (74)
1996	465	350	254 (73)
1997	441	199	110 (55)
1998	414	165	69 (42)
1999	389	90	50 (56)
Total	**11,753(11.6)**	**4,753(4.0)**	**3,238(68)**

1.The HIV test was first developed in 1984.

by 364 (four per cent). There have been 31 (0.4 per cent) cases of reported mother-to-child transmission.

There has been a strong decreasing trend over the years in the number of people that report male to male sex: 466 (80 per cent where exposure is known) in 1992 to 237 (72 per cent) in 1999. For heterosexual contact there has been little change in the total numbers reported by year, but they have increased as a proportion of total notifications received: 47 (eight per cent) in 1992 to 62 (19 per cent) in 1999. Of those, the number of people reporting being born in a high prevalence country increased: three in 1992 to 20 in 1998, as well as the number of people reporting sexual contact with someone from a high prevalence country: four in 1992 to 23 in 1998.

Data completeness has improved over the years but there is still room for improvement. In 1992 information on risk exposure was available in 82 per cent of notifications, compared to 84 per cent in 1999.

AIDS diagnoses and deaths

A total of 4,753 AIDS cases have been notified up to 1999, of which 3,238 have died, leaving a total of 1,515 living with AIDS. The first case of AIDS diagnosed in Australia was in Sydney in 1982. One person who died in 1981 was retrospectively diagnosed with AIDS and reported in 1994.[3] AIDS notifications and deaths peaked in 1994 (534 cases, 410 deaths) and decreased markedly from 1997 onwards. As was the case for HIV notifications, AIDS cases

TABLE 6

CHARACTERISTICS OF PATIENTS NOTIFIED WITH HIV INFECTION, AIDS AND DEATH WITH AIDS, NSW, 1981–1999

Case characteristics	HIV diagnosis (% of total where data available)	AIDS (% of total where data available)	Death with AIDS (% of all AIDS cases)
Sex			
Male	10,889 (94.6)	4,555 (95.8)	3,117 (68)
Female	599 (5.2)	187 (3.9)	114 (61)
Transgender	20 (0.2)	11 (0.2)	7 (64)
Age group			
0–4	41 (0.4)	11 (0.2)	5 (45)
5–14	49 (0.4)	10 (0.2)	9 (90)
15–24	1,764 (15.1)	170 (3.6)	122 (72)
25–34	4,903 (42.0)	1,659 (34.9)	1,121 (68)
35–44	3,268 (28.0)	1,786 (37.6)	1,204 (67)
45–54	1,176 (10.1)	811 (17.1)	562 (69)
55–64	354 (3.0)	233 (4.9)	155 (67)
65+	105 (0.9)	73 (1.5)	60 (82)
Risk Exposure			
Male–male sex	6,805 (81.0)	3,876 (81.5)	2,699 (70)
Male–male sex + IDU	255 (3.0)	174 (3.7)	120 (69)
Male–female sex + IDU	364 (4.3)	136 (2.9)	75 (55)
Male–female sex (total)	710 (8.4)	218 (4.6)	97 (44)
• From high prevalence country	90 (1.1)	41 (0.9)	10 (24)
• Sex with person from high prev.	100 (1.2)	24 (0.5)	12 (50)
• Sex with bisexual	47 (0.6)	12 (0.3)	7 (58)
• Sex with IDU	47 (0.6)	12 (0.3)	5 (42)
• Sex with other	27 (0.3)	10 (0.2)	8 (80)
• Hetero not further specified	456 (5.4)	119 (2.5)	55 (46)
Receipt of blood products	261 (3.1)	155 (3.3)	134 (86)
Other	11 (0.1)	17 (0.4)	10 (59)
Not stated	3,317	177	103 (58)
AIDS-defining illness[1]			
Candidiasis–oesophageal		721 (15.2)	444 (62)
Cryptococcosis		234 (4.9)	172 (74)
Cryptosporidiosis		164 (3.5)	114 (70)
Cytomegalovirus		328 (6.9)	264 (80)
Herpes simplex		172 (3.6)	122 (71)
HIV Encephalopathy		268 (5.6)	174 (65)
HIV Wasting Syndrome		456 (9.6)	272 (60)
Kaposi's sarcoma		772 (16.2)	526 (68)
Lymphoma–non-Hodgkin's		229 (4.8)	177 (77)
Mycobacterial–atypical		366 (7.7)	266 (73)
Pneumocystis pneumonia		1,546 (32.5)	1,132 (73)
Toxoplasmosis		207 (4.4)	164 (79)
Other		226 (4.8)	138 (61)

1. Cases may report more than one AIDS-defining illness at AIDS diagnosis

TABLE 7

CUMULATIVE NOTIFICATIONS OF HIV DIAGNOSIS, AIDS, DEATH WITH AIDS, AND ESTIMATED NUMBER LIVING WITH HIV INFECTION, BY AREA HEALTH SERVICE OF RESIDENCE AT DIAGNOSIS, NSW (1981–1999)

Area Health Service	HIV diagnosis (annual rate/100,000 population)	AIDS diagnoses (annual rate/100,000 population)	Death with AIDS (% of all AIDS cases)	Number living with HIV
Central Coast	97 (2.2)	87 (1.7)	66 (76)	100-140
Central Sydney	1,500 (19.5)	1,056 (11.6)	755 (71)	1,500–2,100
Far West	8 (1.0)	3 (0.3)	1 (33)	7–10
Greater Murray	37 (0.9)	30 (0.6)	16 (53)	35–50
Hunter	203 (2.4)	162 (1.6)	113 (70)	210–280
Illawarra	103 (1.9)	93 (1.4)	57 (61)	110–145
Macquarie	16 (1.0)	15 (0.8)	7 (47)	15–20
Mid North Coast	85 (2.1)	72 (1.5)	40 (56)	85–115
Mid West	53 (2.0)	21 (0.7)	15 (71)	55–80
New England	17 (0.6)	15 (0.4)	7 (47)	15–20
Northern Rivers	73 (1.8)	131 (2.7)	75 (57)	80–105
Northern Sydney	595 (4.9)	417 (2.9)	314 (75)	620–830
Southern	20 (0.7)	23 (0.7)	12 (52)	20–30
South Eastern Sydney	3,347 (27.8)	1,927 (13.5)	1,267 (66)	3,500–4,700
South Western Sydney	297 (2.5)	167 (1.2)	104 (62)	310–420
Wentworth	156 (3.2)	138 (2.4)	102 (74)	165–220
Western Sydney	316 (3.0)	240 (1.9)	159 (66)	330–450
Not stated	4,832	156	128 (82)	
Total	**11,755 (11.6)**	**4,753 (4.0)**	**3,238 (68)**	**7,200–9,700**

and deaths were predominantly in males (96 per cent), aged 25–44 years (72 per cent), reported male to male sexual contact (89 per cent for cases, 90 per cent for deaths), and resided in Central or South Eastern Sydney (65 per cent), where information was available for those variables.

Pneumocystis carinii pneumonia was the most commonly reported AIDS defining illness (33 per cent of cases), followed by Kaposi's sarcoma (16 per cent) and oesophageal candidiasis (15 per cent). Data completeness is very high for AIDS notifications.

DISCUSSION

These data reflect an HIV–AIDS epidemic that, in comparison with almost any country in the world, has been successfully contained in NSW to date. HIV transmission has been predominantly through male to male sexual contact in NSW. Transmission through injecting drug use is uncommon; the number of notifications that reported injecting drug use is low, and surveys of clients of needle and syringe programs report seroprevalence of less than two per cent in those that do not also report male to male sexual contact.[4] Transmission through heterosexual contact is also relatively uncommon, and the majority of cases either originated from a high prevalence country, or had sexual contact with a person from a high prevalence country. In particular, confirmed cases of heterosexual transmission, where neither partner was in a high-risk group, were rare.

The figures for AIDS cases and deaths reflect the considerable success of new combination therapies introduced in 1996. The figures for 1999 are incomplete, but after adjustment for reporting delay, a substantial decrease is still apparent.[4]

Prevention measures such as safe sex campaigns targeting men who have sex with men and the sex industry, and needle and syringe programs, have been critically important in containing the epidemic. However, recent increases in notification rates of gonorrhoea, and other sexually transmitted infections in men who have sex with men,[5] indicate that at-risk behaviours continue and permanent containment of the epidemic is never guaranteed.

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FACT SHEET

NSW HEALTH

INFLUENZA

WHAT IS INFLUENZA?

Influenza (known as 'the flu') is a highly contagious acute respiratory illness. It is mostly caused by two types of influenza viruses, known as A and B.

HOW IS INFLUENZA SPREAD?

The virus is spread from person to person through infectious droplets when an infected person coughs or sneezes. It is easier to catch in crowded areas and in confined spaces. Epidemics generally last several weeks and peak in NSW between June and September.

WHAT ARE THE SYMPTOMS?

- A person generally has a sudden onset of:
  - fever
  - headache
  - muscle and joint pain
  - feeling tired
  - sore throat
  - cough
  - runny or stuffy nose
  - often extreme fatigue.
- Symptoms usually appear within 1–3 days of being infected, and a person is considered contagious for another 3–4 days after symptoms appear. Children may be infectious for seven days.
- Most people recover within 2–7 days. Compared with other viral respiratory infections like common colds, influenza causes more severe complications such as pneumonia, particularly in elderly people and other vulnerable groups.

HOW CAN INFLUENZA BE TREATED?

There are some specific drugs that can help reduce the symptoms of flu. The symptoms can also be treated with rest, good nutrition, and plenty of fluids. Medication may be required to combat fever, headache and muscle aches and pain. Antibiotics may be used if someone has a secondary bacterial infection. Your doctor can provide advice on all the appropriate medications.

HOW CAN I PREVENT INFLUENZA?

- Vaccination is the most effective protection against influenza infection. Anyone who wishes to avoid the flu should think about getting vaccinated each year well before winter begins.
- Influenza vaccination is strongly recommended for:
  - all adults aged 65 years and over;
  - Aboriginal and Torres Strait Islander adults aged 50 years and over;
  - adults and children (6 months or older) with chronic diseases affecting the heart, lungs, kidneys or that require regular medical follow up and/or hospitalisation (including diabetes mellitus, asthma, and people whose immune system is suppressed);
  - residents of nursing homes and other long term care facilities;
  - children and teenagers (six months to 18 years) on long term aspirin therapy;
  - persons infected with HIV;
  - health care providers, staff of nursing homes and long-term facilities, providers of home care to persons at high risk (for example, nurses, volunteer workers), household members (including children six months or older) of persons in increased-risk groups;
  - travellers, especially those in large tourist groups (such as on cruise ships) or travelling to parts of the world where influenza is circulating;
  - women who will be pregnant during the influenza season between June and September.
- If you or a family member is diagnosed with the flu, to prevent the spread to other people, it is advisable for you or your family not to attend work, school or childcare.

WHEN SHOULD I BE VACCINATED?

The best time to be vaccinated against influenza is in autumn, prior to the winter influenza season.

WHERE CAN I RECEIVE MY VACCINATION?

Your doctor can vaccinate you with the current vaccine for the season.

WILL I HAVE TO PAY FOR THE VACCINE?

If you are 65 years or older, or are Aboriginal or Torres Strait Islander aged 50 years or older, or are 15–49 years of age, who meet the recommendations for immunisation based on the NHMRC risk factor assessment, the vaccine will be free. However, the doctor may charge a consultation fee.

IS THE VACCINE SAFE?

- Yes. The most frequent side effect of vaccination is soreness at the vaccination site, which may last up to two days.

- Mild 'flu-like' symptoms such as fever, fatigue, and muscle soreness may occur but are not common.
- Other side effects are rare; ask your doctor for further information.

IS IT POSSIBLE TO CATCH THE FLU AFTER I HAVE BEEN VACCINATED?

- It will take about two weeks for your body to develop immunity against the influenza virus after your vaccination.
- The influenza virus changes from time to time and the vaccine is designed to match the current circulating virus. The vaccine will provide about 70 per cent protection against infection for about one year. However, even if you do catch the flu, the likelihood of developing complications from the infection will be reduced.

DO I NEED TO RECEIVE A FLU VACCINE EVERY YEAR?

Yes. Annual vaccination is necessary to provide continuing protection against the most recent influenza virus.

For further information contact your doctor, community health care centre or your nearest Public Health Unit.

COMMUNICABLE DISEASES, NSW: DECEMBER 2000

MEASLES RE-EMERGES

By early November, 17 cases of **measles** had been reported in NSW since July 2000. Of these cases, 14 resided in NSW and three were visitors, just over half were 18–30 year olds and most (70 per cent) were females. Two separate clusters of cases have been identified.

The first cluster of 10 cases, mainly young adults, has been linked to Northern Sydney. Six of the cases reside in Northern Sydney, and three others may have been infected while visiting Northern Sydney. The remaining case may have been exposed to one of these cases in an adjacent area. The cluster began with a person who returned from Malaysia with the infection in late August 2000. To date, four subsequent generations of transmission have been identified within the cluster.

The second cluster of five cases has been identified recently in children who have not been immunised in Western, South Western and Central Sydney areas. Links between four of these cases have been confirmed.

RUBELLA RE-EMERGES

By early November, 100 cases of **rubella** had been notified in NSW since July. Most (73 per cent) of these occurred in 18–30 year olds and in males (80 per cent). By place of residence of the patients, 40 per cent lived in the Hunter Area and 29 per cent in South Eastern Sydney.

The importance of immunisation

A single dose of MMR vaccine will provide immunity against measles, mumps and rubella to 95 per cent of those vaccinated. The NSW Department of Health is currently promoting the immunisation of young adults to reduce the ongoing transmission of these diseases including congenital rubella syndrome. In August 2000, the Federal Government announced funding over the next 12 months to provide free MMR vaccine to persons aged between 18–30 years.

Check rubella immunity before pregnancy

Because of the potential consequences for the foetus, women should have their immunity checked prior to pregnancy, and if inadequate, be vaccinated with MMR. MMR vaccine should not be given to a woman known to be pregnant and pregnancy should be avoided for two months after vaccination.

END OF THE INFLUENZA SEASON

Reports of **influenza** declined sharply in October after peaking in September. Seasonal influenza surveillance (involving sentinel laboratories and general practitioners) ceased in early November.

SYPHILIS SURVEILLANCE IN CENTRAL SYDNEY

Belinda O'Sullivan and Patrick Maywood

Syphilis is an acute and chronic sexually transmitted disease (STD) caused by infection with *Treponema Pallidum*. It is characterised by skin and mucous membrane lesions in the acute infectious phase (early syphilis) and lesions of the bone, viscera, cardiovascular and neurological systems in the chronic non-infectious phase (late syphilis). Pregnant women with syphilis who have not received adequate penicillin therapy may transmit the infection to their foetus at any clinical stage of their disease causing congenital syphilis in infants. Therefore, it is NSW Health policy to screen all mothers for syphilis.

Recent syphilis outbreaks have been reported in large cities among disadvantaged groups and men who have sex with men, and has been linked to enhanced transmission of HIV.[1,2] While syphilis can be controlled in the community through safe sex practices and through

appropriate contact tracing and treatment, the successful implementation of these strategies relies on adequate access to well-coordinated health services.

It is currently difficult to ascertain statewide trends in syphilis incidence, since about 50 per cent of reported cases in 1999 in NSW were not classified by disease stage. It is common practice for public health units to follow up all recent syphilis cases to offer doctors information and support with contact tracing. However, the Communicable Diseases Surveillance and Control Unit of the NSW Department of Health recently recommended that public health units start to discern the case classification by disease stage for all single syphilis notifications. This article presents the results of upgraded syphilis surveillance undertaken by the infectious diseases team at the Central Sydney Public Health Unit for the 12-month period 1 April 1999 to 31 March 2000.

Surveillance method

For all new syphilis notifications in the Central Sydney Area Health Service, doctors were sent a 'syphilis package' including a fact sheet, questionnaire (covering demographic details, case classification, signs and symptoms, screening and contact tracing) and criteria for accurate case classification based on serological and clinical indicators. If questionnaires were not returned within a month, they were re-mailed. Returned questionnaires were analysed using Epi Info.

Results

Of the 135 notifications for syphilis, 117 (87 per cent) questionnaires were returned (Table 8).

Demographics

Of 117 cases, most (61 per cent) were male, the mean age was 45 years and only 31 per cent of cases were born in Australia or New Zealand. Of those born outside of Australia, country of birth was reported as Asia (18 per cent), mainly Vietnam (eight per cent), and Europe (nine per cent) , UK and Ireland (three per cent), Africa (two per cent) and other unknown (38 per cent). Syphilis was commonly reported to have been acquired in Australia (37 per cent), or overseas (41 per cent) with the most frequent regions being Asia (14 per cent) and Fiji and Cook Islands (seven per cent). In 22 per cent the country where syphilis was acquired was not stated.

Aboriginal and Torres Strait Islander people represented 12 per cent of the cases received. Employment type was reported as unemployed (15 per cent), pensioners (11 per cent), retired (five per cent) home duties (five per cent) and unknown (26 per cent).

Testing

A high proportion (74 per cent) of syphilis cases were asymptomatic on presentation. Diagnosis of asymptomatic cases occurred in the context of routine sexual health screening and targeted screening of groups born in countries where syphilis is endemic. Syphilis cases were diagnosed at GP clinics (50 per cent), sexual health centres (20 per cent) and hospitals (20 per cent). In addition, 15 (13 per cent) of cases were identified through routine antenatal screening. Of the nine 'early' or infectious cases, eight (89 per cent) were female, and three were identified through antenatal screening.

Case Classification

In the year April 1 1998 to March 31 1999, prior to upgraded surveillance, 91 per cent of syphilis notifications in Central Sydney were classified as 'unspecified'.[3] By undertaking upgraded surveillance between 1 April 1999 and 31 March 2000, 95 per cent of all notifications were classified. Only eight per cent of cases were classified as early disease and the majority of cases (84 per cent) were classified as greater than one year duration (non-infectious). Only three per cent were neurosyphilis, and no cases of congenital syphilis were recorded.

Contact tracing

One element of the upgraded surveillance system was the provision of referral support and information for doctors undertaking contact tracing. Nine cases were classified as early disease and contact tracing occurred as appropriate in all of these cases; however, it is interesting to note that doctors reported undertaking contact tracing for 50 (43 per cent) cases overall. No linked cases were identified.

TABLE 8

SUMMARY OF RESULTS: UPGRADED SYPHILIS SURVEILLANCE IN CSAHS

(*n*=117 returned questionnaires)

Variable	%
Demographics	
Sex	61% male
Mean age	45 years
Aboriginal or Torres Strait Islander	12%
Country of birth	
Australia or New Zealand	31%
Unknown	38%
Overseas	31% (Asia 18%)
Country where syphilis acquired	
Australia	37%
Overseas	41% (Asia 14%)
Not stated	22%
Disease classification	
Notifications classified	95%
Disease stage	
Early disease (infectious)	8%
> one year duration (non-infectious)	84%
Neurosyphilis	3%
Congenital syphilis	0%
Contact tracing	
Cases traced	43%
Who undertook contact tracing	
Sexual Health Centre	21%
General Practitioner	17%
Hospital	3%

Sexual health centres, as a common referral source, undertook most (21 per cent) contact tracing with 17 per cent done through general practitioners and very little (three per cent) done through hospitals.

Conclusions

The upgraded surveillance system at CSPHU achieved a high questionnaire return rate which allowed the classification of 95 per cent of all syphilis compared with 53 per cent in the year prior to the upgraded surveillance. The recent NSW Department of Health policy encouraging public health units to undertake classification of all single notifications of syphilis will be likely to improve statewide information of syphilis incidence, the detection of outbreaks, enhanced contact tracing at the local level, and will help to identify regional patterns and groups at high risk of contracting syphilis.

Acknowledgement

The authors would like to acknowledge the work of the Central Sydney Public Health Unit communicable diseases team, especially Virginia Lawrence and Rebecca Hundy in developing and undertaking syphilis surveillance in the Central Sydney Area Health Service.

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MANAGING DELIBERATE BIOLOGICAL INCIDENTS

Louise Coole

In recent years, following well-publicised events such as the United Nations response to the Iraqi weapons programs, and the terrorist activities of the Aum Sect in Japan, international attention has increasingly focused on the identification and disarmanent of biological weapons.[1] As a result, many public health agencies in industrialised nations have begun developing response plans. In this article we review the characteristics of deliberate biological releases, and approaches to planning and response.

Background

Biological weapons can be described as weapons that attempt to cause disease by the dissemination of micro-organisms or their toxins. Biological weapons have low visibility, high potency, are accessible, and can be delivered with relative ease. Many of the potential agents have the ability to reach extremely large numbers of people and have a high fatality rate. A millionth of a gram of anthrax inhaled may be lethal. A kilogram (depending on meteorological conditions) could kill hundreds of thousands of people in a metropolitan area.[2] Many of the agents occur naturally in the environment. Access to materials is not difficult, and the production cost is low. Much of the technology required to produce weapons is available to both military personnel and civilians. As only small quantities are required, the concealment, transport, and dissemination of weapons is easy. Complicated and expensive delivery systems, for example missiles, are not required.

These features mean that biological weapons are accessible to small groups of people with modest finances and can be used as weapons for threatening civilian populations. Not only would the health of individuals be affected, but also the whole health care system would be flooded with enquires and demands for treatment and protection. Such an event could also affect many aspects of the infrastructure necessary to support large populations such as sanitation, environmental health, communications and transport.

The Biological and Toxin Weapons Convention of 1972 secured agreement to stop the development of biological weapons and to destroy existing supplies. Prior to this agreement many of the superpowers had developed and tested biological weapons. The agents considered most likely to be used are those responsible for smallpox, anthrax, plague, tularaemia, botulism, and viral haemorrhagic fevers.

Risk management

In developing a strategy for risk management it is important to acknowledge that the likelihood of a serious biological release is low, however the consequences could be devastating. With some forward planning it may be possible to reduce the effects of such an incident.[3]

The two threads of a risk-management approach are recognition and response. Since the latter depends on the former, recognition is key. The difficulty in detecting biological weapons at the point of release has been mentioned and is outside of the public health function; however, it is possible to enhance event recognition and this would most likely involve health care workers through:

- clinical case recognition
- laboratory diagnostic ability
- epidemiological recognition of an unusual event (that is, surveillance).

To minimise the effect of a biological event health care professionals and public health authorities must be aware of the threat, have some understanding of the classes of agents that can be involved and their effects after inhalation.

Surveillance of background disease activity in a population with follow-up of unusual events is a key component, and through close attention to patterns of disease it may be possible to recognise a situation in time to act to protect communities. An event of

deliberate biological exposure could be associated with:

- a compressed epidemic curve
- large epidemics
- localised epidemics in multiple locations
- high symptomatic rate among those exposed
- an increase in respiratory infections
- cases of an unusual disease
- vector-borne disease in a vector free area
- more than one epidemic occurring at one time
- higher morbidity and mortality than expected for the disease
- lower attack rates in people protected from aerosol exposure (that is, inside buildings)
- cases in animals.

Characteristics of biological agents suitable for weapon use.

- easy to produce in quantity
- easy to store while maintaining virulence and stability
- minimal population immunity
- high virulence with low infective dose
- relatively short incubation period
- suitable for aerosol delivery
- potential for genetic manipulation of features such as virulence or antibiotic resistance.

There is also sometimes prior intelligence (that is, warnings from terrorist groups) and identification of a delivery vehicle. The timing of an exposure may also provide an indication of an unusual occurrence.

Incident management

Management of an incident includes:

- clinical management and therapy for cases
- chemoprophylaxis of exposed persons where appropriate
- vaccination of exposed persons where appropriate
- dissemination of information
- mechanism for mobilisation of appropriate response.

There are resource issues with respect to laboratory diagnosis, clinical management and infection-control requirements and medicines. It is necessary to determine the need for the acquisition of special stocks of pharmaceuticals–vaccines–antitoxins etc, the estimated available sources in an emergency, and to explore the mechanisms for attaining extra supplies at short notice.

Preparing for such events has cost implications. Assets invested should be appropriate to the magnitude of the threat and must be balanced against other competing health priorities. An economic analysis of preparedness measures in the United States indicates a clear cost-benefit in the potential for harm minimisation in the event of an incident taking place.[4]

Specific issues for forward planning include:

- defining 'exposed' populations
- delivery of prophylaxis–vaccination
- methods for case finding
- protocols for treatment, quarantine and isolation procedures
- dissemination of information to health care workers and the community
- criteria for local evacuations
- readiness to institute epidemiological and other investigations.

Conclusion

Many countries have begun the process of planning for deliberate biological events. In NSW, public health units provide a network of public health surveillance and response teams whose job it is to identify and control infectious disease outbreaks. In addition, in recent months, NSW Health has begun a program of training for public health and emergency health workers, under the auspices of the Disaster Planning Unit. An expert advisory committee, the Risk Management Group—Biological Weapons, including experts in microbiology, infectious diseases, pharmaceuticals and public health has been established to assist in the planning process. The planning process will be ongoing.

References

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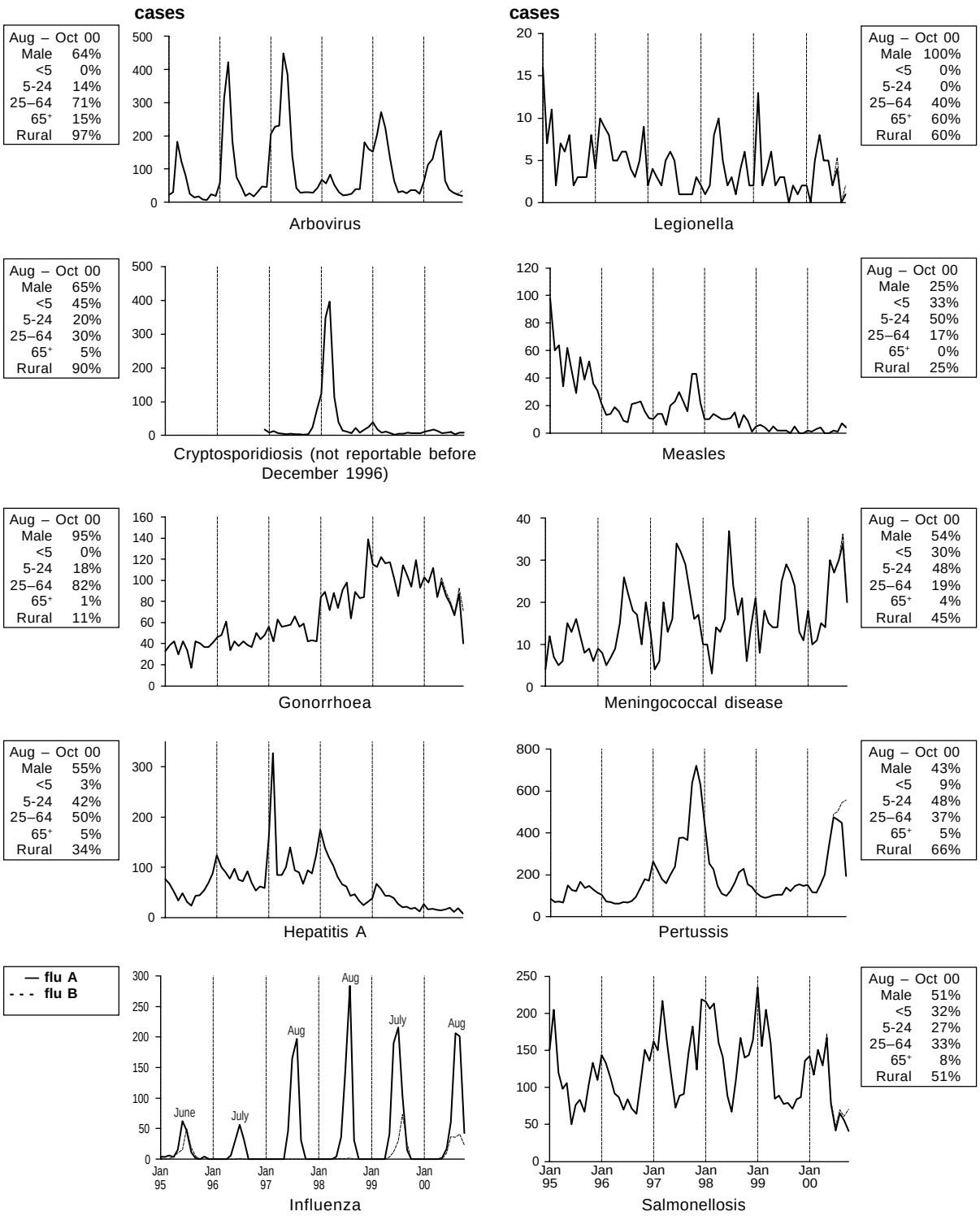
FIGURE 2

REPORTS OF SELECTED COMMUNICABLE DISEASES, NSW, JANUARY 1995 TO OCTOBER 2000, BY MONTH OF ONSET

These are preliminary data: case counts for recent months may increase because of reporting delays. Laboratory-confirmed cases, except for measles, meningococcal disease and pertussis — actual ___ predicted after adjusting for likely reporting delays

NSW population	
Male	50%
<5	7%
5–24	28%
25–64	52%
65+	13%
Rural*	42%



* For definition, see *NSW Public Health Bulletin*, April 2000

TABLE 9

REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN OCTOBER 2000 BY AREA HEALTH SERVICES

Condition	Area Health Service (2000)																		Total	
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	CHS	for Oct†	To date†
Blood-borne and sexually transmitted																				
AIDS	1	1	-	-	1	1	-	-	-	1	-	-	-	-	1	-	-	-	6	102
HIV infection*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	226
Hepatitis B - acute viral*	-	-	-	1	2	-	1	-	3	-	-	-	-	-	-	-	-	-	7	77
Hepatitis B - other*	42	37	52	8	35	4	9	7	62	2	2	2	3	2	-	-	4	1	276	3,478
Hepatitis C - acute viral*	-	1	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-	4	104
Hepatitis C - other*	43	28	21	25	12	33	33	49	88	43	40	12	9	14	2	14	20	42	534	7,004
Hepatitis D - unspecified*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Hepatitis, acute viral (not otherwise specified)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	38	26	29	12	8	8	26	16	68	7	8	10	4	2	3	8	7	2	287	2,670
Gonorrhoea*	26	6	4	-	-	-	1	1	38	2	1	2	-	1	-	-	-	-	84	914
Syphilis	5	-	3	-	3	-	-	-	15	3	1	1	2	2	-	1	-	3	40	437
Vector-borne																				
Arboviral infection (BFV)*	-	-	-	-	-	-	-	-	-	2	7	-	-	-	-	-	2	-	11	167
Arboviral infection (RRV)*	-	-	-	-	-	-	2	-	-	3	5	2	2	1	1	2	1	-	19	704
Arboviral infection (Other)*	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	27
Malaria*	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	199
Zoonoses																				
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Leptospirosis*	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	3	40
Q fever*	-	-	-	-	-	-	-	2	-	5	3	1	2	1	1	-	1	-	16	103
Respiratory and other																				
Blood lead level*	-	2	-	5	1	-	2	1	2	-	-	1	2	1	40	-	1	-	58	872
Legionnaires' Longbeachae*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
Legionnaires' Pneumophila*	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	23
Legionnaires' (Other)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Meningococcal infection (invasive)	1	2	2	1	3	3	3	2	4	2	-	1	1	-	-	-	-	-	26	210
Mycobacterial tuberculosis	3	4	2	1	5	-	1	-	5	-	1	-	-	-	-	1	-	-	23	339
Mycobacteria other than TB	4	3	-	1	1	1	2	2	1	-	-	1	-	-	-	1	-	-	17	299
Vaccine-preventable																				
Adverse event after immunisation	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	19
H.influenzae b infection (invasive)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Measles	-	4	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	6	24
Mumps*	4	1	-	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	9	84
Pertussis	10	40	73	11	24	6	101	13	42	19	16	17	14	42	-	14	15	-	457	2,761
Rubella*	-	4	-	-	1	-	20	-	10	-	1	1	-	-	-	-	-	-	38	111
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Faecal-oral																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptosporidiosis*	-	-	1	-	-	-	-	2	-	1	-	5	1	-	-	-	-	-	10	99
Giardiasis*	5	11	3	2	1	-	5	4	6	10	3	3	-	-	-	-	2	-	55	808
Food borne illness (not otherwise specified)	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	3	148
Gastroenteritis (in an institution)	-	-	6	13	-	-	30	-	-	-	-	-	-	-	-	-	-	-	49	432
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	5
Hepatitis A*	2	-	2	-	2	2	-	-	2	-	1	-	-	2	-	-	-	-	14	175
Hepatitis E*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Listeriosis*	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	10
Salmonellosis (not otherwise specified)*	6	9	-	2	1	2	5	4	7	11	3	3	2	2	-	4	1	-	62	1,053
Typhoid and paratyphoid*	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3	42
Verotoxin producing Ecoli*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

* lab-confirmed cases only

† includes cases with unknown postcode

CSA = Central Sydney Area
NSA = Northern Sydney Area
WSA = Western Sydney Area
WEN = Wentworth Area
SWS = South Western Sydney Area
CCA = Central Coast Area
HUN = Hunter Area
ILL = Illawarra Area
SES = South Eastern Sydney Area
NRA = Northern Rivers Area
MNC = North Coast Area
NEA = New England Area
MAC = Macquarie Area
MWA = Mid Western Area
FWA = Far West Area
GMA = Greater Murray Area
SA = Southern Area
CHS = Corrections Health Service

NSW PUBLIC HEALTH BULLETIN

The *NSW Public Health Bulletin* is a publication of the NSW Department of Health.
The acting editor is Ms Allison Salmon, Acting Manager, Public Health Training and Development Unit.
Dr Michael Giffin is managing editor.

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