



CHILDHOOD IMMUNISATION – SO NEAR AND YET SO FAR

GUEST EDITORIAL

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In this 200th anniversary year of Jenner's observation that inoculation with cowpox protected against smallpox, it is timely to review the status of childhood immunisation in NSW. Considerable effort is made by staff based in Public Health Units and community health services to maintain surveillance of immunisation uptake among young children. Although a vocal minority attests otherwise, immunisation remains a very cost-effective and safe public health intervention, providing benefit to the individual as well as to the community.

The history of immunisation in Australia goes back to 1804, less than a decade after Jenner's discovery, when packets of smallpox vaccine arrived in Sydney Town for use in infants. Mass programs as we now understand them were instituted during the 1940s to provide protection against diphtheria, tetanus and pertussis (whooping cough). Live viral vaccines were added to the schedule later, oral polio vaccine (Sabin) in 1966 and rubella vaccine for schoolgirls in 1971. In the space of little over one generation, we have seen the effects of immunisation – poliomyelitis and diphtheria have been eradicated, the incidence of tetanus has fallen remarkably, and congenital rubella infection is rare. The addition of conjugated vaccines against *Haemophilus influenzae* type b (Hib) to the publicly funded infant vaccination program in 1993 has resulted in more than a 90 per cent decline in the incidence of life-threatening infections caused by this organism.

Despite these enormous successes, substantial challenges remain. The incidence rates of measles and pertussis have undoubtedly declined since the introduction of vaccines. However, these highly infectious diseases require very high levels of 'herd immunity' (immunity in a population) to break the chain of transmission. Our immunisation processes have not achieved control of either measles or pertussis, although there has not yet been time for recent changes to the schedule to take effect (a fifth dose of pertussis vaccine, given before entry to school, and a second dose of measles-mumps-rubella vaccine, given to boys and girls in high school). In 1993 (when the last epidemic peak for both infections occurred), 2,397

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Childhood immunisation editorial

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cases of measles and 1,546 cases of pertussis were notified in NSW, while 603 measles and 1,389 pertussis cases were notified in 1995.

So what has been done and what remains to be done? The Australian Bureau of Statistics survey, *Children's Immunisation Australia*, conducted in April 1995, found that only 54 per cent of NSW children aged three months to six years were fully immunised for their age (Hib vaccines were excluded)¹. Although the validity of these data is open to question because the survey relied on parental recall, it is known that immunisation uptake falls markedly in the second year of life². This is probably due more to the pressures of life within young families and other barriers, than to parents disagreeing with the need for vaccination. Lack of interest, and confusion about the schedule or about vaccine contraindications among some providers, are also contributory factors^{3,4} as is the lack of acceptance of the principle of opportunistic immunisation⁵.

This issue of the *Public Health Bulletin* reports on three studies which used the immunisation provisions of the Public Health Act 1991 to examine immunisation compliance among NSW children. The Public Health Act 1991 was amended in 1992 with provisions relating to immunisation of children attending child-care facilities (long day child-care, preschool, family day care or a registered playgroup) and primary schools. These provisions, which came into effect in 1994, place the onus on directors of child-care facilities and school principals to record the immunisation status of children in their institutions. In addition, the provisions empower the Medical Officer of Health of the local Public Health Unit to direct that healthy but unimmunised children in contact with a case be excluded from the child-care facility or school. The rationale for the amendments was to remind parents to have their children fully immunised. It was envisaged that proper documentation of immunisation would also help in controlling, for example, an outbreak of measles in a school or preschool by simplifying identification of unimmunised contacts. At the same time the recording of immunisation status can provide a valuable means of surveillance of immunisation coverage.

A study of immunisation coverage among two-year-old children attending child care in the Hunter Area (page 117), and the Western Sydney and Wentworth Areas (page 118) suggested that the majority of long day care centres were able to provide information on immunisation status. However, in metropolitan areas at least, it was not feasible for family day care schemes

to collect this information. The authors observed that information from records of immunisation status in child-care facilities does not provide a reliable indicator of immunisation coverage at two years of age, which is a key index of child health promoted by the World Health Organisation. An alternative approach is required, and the Australian Childhood Immunisation Register (ACIR) has the potential to fill this important gap.

Studies carried out in primary schools in Sydney's northern beach suburbs (page 122), South Western Sydney (page 124) and the former Eastern Sydney Area (page 120) used different methods to assess immunisation compliance in kindergarten and year 1 students by review of the official immunisation certificates. Estimates of immunisation compliance varied widely between the three studies; for example, the minimal estimates of the proportion of kindergarten children fully immunised ranged from 45 per cent on the northern beaches to 77 per cent in Eastern Sydney. However, common themes emerged: many children did not provide immunisation certificates; a high proportion of those provided were incorrectly filled out; school staff were often unable to interpret the certificates or other immunisation documents; and in some cases providers needed several reminders to issue certificates to the parents. These authors considered the immunisation provisions of the Public Health Act 1991 would make an important contribution to the improvement of immunisation rates in NSW children. However, there was consensus that school staff and immunisation providers needed much assistance in making the system work effectively.

As a consequence of the introduction of new vaccines and changes in disease epidemiology induced by mass vaccination, the childhood immunisation program is subject to constant change. This causes difficulties for parents and immunisation providers, as well as for public health personnel who must keep the community informed of new developments. One clear message is that vaccines (for example, those against hepatitis B and varicella) must not be added to the routine schedule until combination vaccines become available.

The establishment of the ACIR provides the first opportunity to enlist all immunisation providers and Australian children into a unified system. Once inevitable teething problems with participation and data collection are overcome, the ACIR will be able to generate valuable detailed information on immunisation coverage in any group defined by age or geography.

Despite extensive epidemiological research on childhood immunisation, further research must be encouraged and supported to fill major gaps in knowledge. Little is known about the efficacy of some of our current vaccines

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NSW PUBLIC HEALTH NETWORK REPORT ON IMMUNISATION

PUBLICATIONS

- Title:** **Immunisation census of the 1992 school intake in Central and Southern Sydney.**
Authors: Goldston K, Bek M, Nixon C.
Publication: *NSW Public Health Bulletin* 1993; 4:130-131
Contact: CS PHU
- Title:** **A survey of the uptake of Hepatitis B vaccine by health care workers at an Area General Hospital.**
Authors: Holt D.
Publication: *The Public Health Physician* 1993; 4:24
Contact: NS PHU
- Title:** **Undertaking mass Meningococcal vaccination: criteria and experiences.**
Authors: Holt D, Hort K.
Publication: *Public Health Bulletin* 1994; 5; 9:100
Contact: NS PHU
- Title:** **Immunisation Practices of General Practitioners in Metropolitan Sydney.**
Authors: Rixon G, March L, Holt D.
Publication: *Australian Journal of Public Health* 1994; 18: 258-60
Contact: NS PHU
- Title:** **Hepatitis B vaccination rates among staff at a District General Hospital.**
Authors: Stanford M, Black T, March L, Holt D, Campbell D.
Publication: *Medical Journal of Australia* 1995; 162:304-6
Contact: NS PHU
- Title:** **A retrospective cohort study of childhood immunisation status in Northern Sydney.**
Authors: Skinner J, March L.
Publication: *Australian Journal of Public Health* 1995; 19:58-63
Contact: NS PHU
- Title:** **The integrity of the vaccine cold chain in the Hunter Area of New South Wales.**
Authors: Miles TA.
Publication: *Australian Journal of Public Health* 1993; 17:169-171
Contact: HUN PHU
- Title:** **The capacity of children's services to meet their responsibilities under the Public Health (Amendment) Act 1992.**
Authors: Harris E, Harris M, Ferson MJ, Sherry K.
Publication: *Australian and New Zealand Journal of Public Health* 1996; 20:409-412
Contact: SES PHU
- Title:** **A pilot study of measles immunity in infants aged 4-6 months.**
Authors: Ferson MJ, Whybin LR, Robertson PW.
Publication: *Communicable Diseases Intelligence* 1995; 19:30-31
Contact: SES PHU
- Title:** **Census of school entry immunisation certificates, Eastern Sydney, 1994.**
Authors: Ferson MJ.
Publication: *NSW Public Health Bulletin* 1995; 6:9-10
Contact: SES PHU
- Title:** **Another vaccine, another treadmill?**
Authors: Ferson MJ.
Publication: *Journal of Paediatrics and Child Health* 1995; 31:3-5
Contact: SES PHU
- Title:** **Childhood immunisation update.**
Authors: Ferson MJ.
Publication: *Rattler* 1991; 19:19-20
Contact: SES PHU
- Title:** **Immunisation to get a shot in the arm.**
Authors: Ferson MJ.
Publication: *Australian Doctor* 9 September 1994, 40
Contact: SES PHU
- Title:** **Hib vaccination: a guide for health workers.**
Authors: Ferson MJ.
Publication: *Aboriginal and Islander Health Worker Journal* 1993; 17(2):13-14
Contact: SES PHU
- Title:** **Immunisation state and its documentation in hospital patients.**
Authors: Ferson MJ.
Publication: *Paediatrics Digest* 1991; 2:6-7
Contact: SES PHU
- Title:** **Measles immunisation compliance: poor impact of Bicentennial measles control campaigns on under-five year olds.**
Authors: Ferson MJ, Christie D.
Publication: *Australian Journal of Public Health* 1992; 16: 31-34
Contact: SES PHU
- Title:** **A survey of immunisation and exclusion policies in centre-based child care.**
Authors: Ferson MJ, Christie D.
Publication: *Australian Journal of Early Childhood* 1991; 16(4):10-14
Contact: SES PHU
- Title:** **Antigenuria following Haemophilus influenzae type b vaccination (letter).**
Authors: Ferson MJ, Fisher GT.
Publication: *Journal of Paediatrics and Child Health* 1993; 29:482-483
Contact: SES PHU
- Title:** **Improving exposure of non-English speaking groups to child immunisation health fairs.**
Authors: Ferson MJ, Fitzsimmons GJ.
Publication: *Health Promotion Journal of Australia* 1992; 2(3):28-31
Contact: SES PHU
- Title:** **School health nurse interventions to increase immunisation uptake in school entrants.**
Authors: Ferson MJ, Fitzsimmons GJ, Christie D, Woollett H.
Publication: *Public Health* 1995; 109:25-29
Contact: SES PHU
- Title:** **Cost effectiveness of prevaccination screening of health care workers for immunity to measles, rubella and mumps.**
Authors: Ferson MJ, Robertson PW, Whybin LR.

Publication: *Medical Journal of Australia* 1994; 160:478-482
 Contact: SES PHU
 Title: **The vaccination status of Aboriginal children in the north-coast region of New South Wales.**
 Authors: Young M, Taylor L, Beard J, Randall A, Coldwell S.
 Publication: *Medical Journal of Australia* 1994; 161:301-305
 Contact: NC PHU
 Title: **Outbreak of Whooping Cough in the North Coast Region.**
 Authors: Furber S, Sladden T, Levy M, Beard J.
 Publication: *NSW Public Health Bulletin* 1993; 4:83-4
 Contact: NC PHU
 Title: **Control of Measles in New South Wales (letter).**
 Authors: Roberts C, Bell J, Capon A.
 Publication: *Australian Journal of Public Health* 1992; 16: 330-331.
 Contact: WS PHU
 Title: **Knowledge of Hib disease and vaccine in long day care centres (letter).**
 Authors: Bell J, Jorm L, Whitehead P, Capon A.
 Publication: *Medical Journal of Australia* 1993; 158:718
 Contact: WS PHU
 Title: **The epidemiology of incomplete childhood immunization: An analysis of reported immunization status in outer western Sydney.**
 Authors: Bell JC, Whitehead P, Chey T, Smith W, Capon AG, Jalaludin B.
 Publication: *Journal of Paediatrics and Child Health* 1993; 29:384-388.
 Contact: WS PHU
 Title: **The impact of vaccination against invasive Haemophilus influenzae type b disease in the Sydney region.**
 Authors: McIntyre P, Chey T, Smith W.
 Publication: *Medical Journal of Australia* 1995; 162:245-8
 Contact: WS PHU
 Title: **Measles outbreak in western Sydney: vaccine failure or failure to vaccinate?**
 Authors: McDonnell L, Jorm LR and Patel M.
 Publication: *Medical Journal of Australia* 1995; 162:471-475
 Contact: WS PHU
 Title: **School entry immunisation certificates: a useful tool for immunisation surveillance?**
 Authors: Leckie R, Shah S, Jalaludin B.
 Publication: *Communicable Diseases Intelligence* 1996; 20:6-8
 Contact: WS PHU
 Title: **Tetanus immunity in an older Australian population.**
 Authors: Heath TC, Smith W, Capon AG, Hanlon M, Mitchell P.
 Publication: *Medical Journal of Australia* 1996; 164:593-596.

Contact: WS PHU
 Title: **Immunisation coverage of two year old children in childcare centres in the Illawarra and Shoalhaven regions of New South Wales.**
 Authors: Lloyd G
 Publication: *Communicable Diseases Intelligence* 1996; 20: 217-218
 Contact: ILL PHU
 Title: **Illawarra Sentinel General Practice Surveillance Network, Sentinel Reporting on Influenza-Like Illness in the Illawarra, New South Wales.**
 Authors: Lovegrove, D.
 Publication: *Communicable Diseases Intelligence* 1995; 19:420-422
 Contact: ILL PHU

REPORTS

Title: **Review of the cold chain in Council immunisation services in Central and Southern Sydney Area Health Services, 1994.**
 Authors: Goldston K.
 Publication: *Central Sydney Public Health Unit*
 Source: CS PHU
 Title: **A survey of hepatitis B vaccination and immunity among health care workers at the Canterbury Hospital, 1995.**
 Authors: Morrissey J, Bek M.
 Publication: *Central Sydney Public Health Unit*
 Source: CS PHU
 Title: **The vaccine cold chain in the Hunter Area.**
 Authors: Miles TA.
 Publication: *Hunter Public Health Unit, Hunter Area Health Service, 1992*
 Source: HUN PHU
 Title: **Immunisation rates for Kindergarten children in the South West of NSW, 1992.**
 Authors: Gilchrist K, Kolbe T.
 Publication: *South West Centre for Public Health*
 Source: SW CPH
 Title: **A study of the vaccine cold chain in the South West Districts.**
 Authors: Fisher G.
 Publication: *South West Centre for Public Health*
 Source: SW CPH
 Title: **Nurse Immuniser Training Package.**
 Authors: Ashton L.
 Publication: *South West Centre for Public Health*
 Source: SW CPH
 Title: **Review of immunisation status of children attending kindergarten, South East NSW, 1992.**
 Authors: Sam G.
 Publication: *South East Public Health Unit*
 Source: SE PHU

Title: **Surveillance of immunisation rates in Western Sydney and Wentworth Health Areas.**
 Authors: Conaty S, Jalaludin B, Capon A.
 Western Sector Public Health Unit.
 Source: WS PHU

Title: **Report on the 1995 Aboriginal Immunisation Survey – Eurobodalia Area, South Coast New South Wales.**
 Authors: Sam G, Eldridge R.
 Source: SE PHU

Title: **Immunisation Coverage in the Southern Tablelands, Monaro and South Coast District of New South Wales, 1995.**
 Authors: Sam G.
 Source: SE PHU

Title: **A Model Immunisation Health Outcomes Council Strategic Plan 1995.**
 Authors: Sam G.
 Source: SE PHU

Title: **Strategic Plan for Childhood Immunisation in South Western Sydney.**
 Authors: Division of Population Health, SWSAHS, April 1996
 Source: SWS PHU

Title: **Evaluation of immunisation outcomes in western NSW.**
 Authors: Hall JJ, Jane J, Gander C, Phillips A, Chant K, Jump B, Gilbert E.
 Source: WN PHU

Title: **Compliance with school entry legislation, South West Districts, 1994 (completed).**
 Source: SW CPH

Title: **Evaluation of administration of vaccine through testing for seroconversion.**
 Source: WN PHU

Title: **Evaluation of cold chain and vaccine storage.**
 Source: WN PHU

Title: **Seroprevalence of measles immunity in under five year old NSW children.**
 Source: SES PHU

Title: **Fragmentation of routine immunisation visits among infants receiving hepatitis B immunisation.**
 Source: SES PHU

Title: **Adverse reactions to MMR vaccine in high school children.**
 Source: SES PHU

Title: **Knowledge of Hib disease and vaccine in long day care centres (completed).**
 Source: WS PHU

Title: **The epidemiology of incomplete childhood immunisation: an analysis of reported immunisation status in outer western Sydney (completed).**
 Source: WS PHU

Title: **Survey of tetanus immunisation status in elderly Blue Mountains residents (completed).**
 Source: WS PHU

Title: **Evaluation of cold chain monitoring in hospital and local councils within SWSAHS (completed).**
 Source: SWS PHU

Title: **Immunisation certificate audit – evaluation of compliance with school entry legislation in schools in SWS (1995 and 1996).**
 Source: SWS PHU

Title: **Hib immunisation rates within child care centres within SWSAHS (completed).**
 Source: SWS PHU

Title: **The Vaccine Cold Chain: Vaccine Storage in Pharmacies (completed).**
 Source: CC PHU

Title: **The Vaccine Cold Chain: Vaccine Storage in General Practices.**
 Source: CC PHU

Title: **“Telling it Right” A Guide on Immunisation for Aboriginal Health Workers.**
 Source: NC PHU

WORK IN PROGRESS

Title: **Survey of MMR serology in children (underway).**
 Source: CS PHU

Title: **Immunisation cold chain study (underway).**
 Source: NC PHU

Title: **Economic analysis of a mass vaccination campaign to control an outbreak of serogroup C meningococcal disease.**
 Authors: Hort K, Jan S, Rixon G.
 Publication: *Medical Journal of Australia* (submitted)
 Contact: NS PHU

Title: **Survey of immunisation status of 22 month old children in the South East Health Districts (underway).**
 Source: SE PHU

Title: **Survey of recorded immunisation status of children aged between 2 and 3 years, attending pre-school child care centres South East Health Districts (underway).**
 Source: SE PHU

Title: **Survey of immunisation status of Aboriginal children aged 0-5 years South Coast District (underway).**
 Source: SE PHU

Title: **Effectiveness of Hib vaccination (underway).**
 Source: WS PHU

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TABLE 1

NSW PUBLIC HEALTH UNITS

Code	Unit	Address	Phone	Facsimile
CC PHU	Central Coast Public Health Unit	PO Box 361, GOSFORD NSW 2250	043 20 4545	043 20 4550
CS PHU	Central Sydney Public Health Unit	PO Box 374, CAMPERDOWN NSW 2050	02 9515 3180	02 9515 3182
CW PHU	Central West Public Health Unit	PO Box 143, BATHURST NSW 2795	063 32 8505	063 32 8577
SES PHU	South Eastern Sydney Public Health Unit	Locked Bag 88, RANDWICK NSW 2031	02 9313 8322	02 9313 6291
HUN PHU	Hunter Public Health Unit	PO Box 466, WALLSEND NSW 2287	049 24 6477	049 24 6490
ILL PHU	Illawarra Public Health Unit	PO Box 66, KIERAVILLE NSW 2500	042 26 4677	042 26 4917
NC PHU	North Coast Public Health Unit	PO Box 498, LISMORE NSW 2480	066 21 7231	066 22 2151
ND PHU	Northern Districts Public Health Unit	PO Box 597, TAMWORTH NSW 2340	067 66 2288	067 66 3003
NS PHU	Northern Sydney Public Health Unit	Hornsby Ku-ring-gai Hospital, Palmerston Road, HORNSBY NSW 2077	02 9477 9400	02 482 1650
SE PHU	South Eastern Public Health Unit	Locked Mail Bag 11, GOULBURN NSW 2580	048 27 3428	048 27 3438
SW CPH	South West Centre for Public Health	PO Box 503, ALBURY NSW 2640	060 58 1700	060 58 1701
SWS PHU	South Western Sydney Public Health Unit	Locked Bag 17, LIVERPOOL NSW 2170	02 9828 5944	02 9828 5955
WN PHU	Western NSW Public Health Unit	PO Box M61, EAST DUBBO NSW 2830	068 81 2235	068 84 7223
WS PHU	Western Sector Public Health Unit	13 New Street, NTH PARRAMATTA NSW 2151	02 9840 3603	02 9840 3608

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The *Bulletin* aims to provide its readers with population health data and information to motivate effective public health action. Articles, news and comments should be 1,000 words or less in length and include a summary of the key points to be made in the first paragraph. References should be set out using the Vancouver style, the full text of which can be found in *British Medical Journal* 1988; 296:401-5.

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IMMUNISATION STATUS OF TWO-YEAR-OLD CHILDREN IN THE HUNTER AREA

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The aim of the investigation described in this article was to estimate the proportion of two-year-old children attending child-care centres in the Hunter Health Area who had received age-appropriate immunisation. Age-appropriate immunisation was defined as having received diphtheria-tetanus-pertussis (DTP 4), sabin (OPV 3) and measles-mumps-rubella (MMR) immunisations within one month of the due date.

There are three types of child-care centres in the Hunter area. One type is home-based child care which is provided by registered people in their own homes. Each person is effectively the director of child care for a very small number of children. A second type is family day care, usually run by local councils. In this case an administrator coordinates the allocation of children to carers and acts as a director of a family day care centre. Such centres cater for a large number of children at different locations. A third type, usually described simply as a child care centre, is organised like a small school with a director and appropriate staff.

The directors of home-based and child-care centres and the administrators of family day care centres are responsible for the maintenance of an up-to-date immunisation register under the 1992 amendment of the Public Health Act 1991. In practice the fulfilment of this requirement is greatly facilitated by frequent contact between the parents and staff members of the centres. However, administrators of family day care are likely to meet with parents only when the children are enrolled into the system. As a result, an unknown number of age-appropriate vaccinations may never be reported to centre staffs or may be recorded in centre registers some considerable time after the immunisations.

METHODS

Omitting preschools, a list of all 177 child-care centres in the Hunter Health Area was compiled and a 20 per cent random sample of these (comprising 35 centres) was selected. On July 3, 1995 a letter introducing the study was sent to all the centres on the list, not only those sampled. This was partly to provide information to all providers of child care as a courtesy and partly to remind them of their obligation to maintain an up-to-date immunisation register.

A questionnaire was prepared and survey forms were sent to the directors of the listed centres on July 17, 1995, requesting return by August 11, 1995.

The Immunisation Coordinator telephoned centres not responding by the designated date to discuss ways in which the Public Health Unit could facilitate completion of the survey.

RESULTS

Thirty-three centres responded. Twelve centres reported caring for two-year-old children. Ten of these 12 centres provided relevant information on a total of 226 children. The other two centres did not respond despite follow-up telephone calls.

Information on whether the children were Aboriginal or Torres Strait Islanders was omitted in only four cases. None

of the remaining 222 children was identified as Aboriginal or Torres Strait Islander.

Data on *Haemophilus influenzae* type b (Hib) immunisation followed no particular pattern. This may have been due to changes in Hib vaccine pricing policy in July and September 1993. Consequently the Hib vaccination rate was not investigated.

The proportions of the 226 children found to have received age-appropriate immunisation were:

DTP 4	43%
OPV 3	67%
MMR	58%

These rates were based on the responses pertaining to 171 family day care children and 69 others. Rates for family day care children alone were very low compared with the rates for the remaining children. This was attributed to a low level of immunisation reporting by parents to family day care centre staff. It was therefore decided to calculate the required proportions from the data provided by child-care centres other than family day care centres.

The proportions of the remaining 69 children found to have received age-appropriate immunisation were:

DTP 4	77%
OPV 3	83%
MMR	83%

DISCUSSION

The total number of two-year-old children in the Hunter Area is about 7,500. Extrapolation of the findings of this study to all Hunter two-year-old children is not possible. There is no available information on the immunisation status of two-year-old children who do not attend child care. Two sets of estimates are provided by this survey. The first describes the immunisation status of most of the sampled children but is considered to be a gross under-estimate. The second set of estimates is considered more likely to represent the true immunisation status of Hunter children in child care.

In view of the questionable validity of data from family day care centres and the difficulty of carrying out a related study which had to be abandoned, it is recommended that the NSW Health Department works co-operatively with family day care administration to improve the procedures for registering vaccinations. Discussion of possible changes could include the assumption by the carer of the responsibility for obtaining and recording immunisation data and transmitting it to the administrator.

It is also suggested that the set of estimates based on the sample which excluded family day care children be regarded as the best indices available at present for Hunter children.

The Immunisation Program Coordinator, NSW Health Department, has recently had discussions with the president of the Family Day Care Association in an effort to identify ways of assisting family day care personnel to comply with the immunisation provisions of the Public Health Act 1991. The Coordinator will address the association's February 1997 meeting on this matter.

— EDITOR

LONG DAY CARE CENTRE IMMUNISATION RATES IN WESTERN SYDNEY

Bin Jalaludin and Cissy Chow
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In April 1995 the Western Sector Public Health Unit conducted a postal survey of immunisation status of children aged two to three years attending long day care centres (LDCCs) in greater western Sydney. The results reported here provide baseline immunisation rates for an ongoing immunisation surveillance program.

Changes were introduced to the NSW Public Health Act 1991 in 1992. The Public Health Act now requires parents of all children enrolling in schools, preschools and child-care centres to provide documented evidence of immunisation to school and child-care authorities¹. Schools and child-care centres are required to maintain immunisation registers which may be used as a surveillance tool for monitoring immunisation status of young children in our community. This is important as children attending schools, preschools and day care centres are at higher risk of contracting communicable diseases including vaccine-preventable diseases^{2,3}. LDCCs provide care for children under school age on a regular full-time or part-time basis, and are required to be open for at least eight hours a day, five days a week and 48 weeks a year.

We did not measure immunisation rates for *Haemophilus influenzae* type b (Hib) as this vaccine was added to the childhood immunisation schedule after this study cohort of children were born.

METHODS

We surveyed all 34 LDCCs in the Wentworth Health Area and all 80 in the Western Sydney Health Area. We excluded family day care centres, occasional child-care centres and preschool kindergarten from this survey.

We sent an initial letter to the directors of the 114 LDCCs in mid-March 1995 to inform them of the survey, and asked them to ensure their immunisation register was updated. Early in April 1995 a questionnaire was sent to all LDCCs. The questionnaire elicited information on name, date of birth, gender and Aboriginality of all two- to three-year-old children, and if and when triple antigen (DTP), Sabin oral polio (OPV) and measles-mumps-rubella (MMR) vaccines had been given.

We entered the data into a database⁴, and used the SAS statistical program for analysis⁵. We interpreted missing immunisation records as 'not immunised'. We calculated immunisation rates in two ways: first, for children at the age of two years (up-to-date immunisation rates), and second, at the time of the survey (when children were aged between two and three years). For the first calculation, children had to have received all the relevant immunisations and have recorded dates for the fourth DTP, third OPV and MMR. Those without recorded immunisation dates were excluded from this analysis.

RESULTS

We received completed questionnaires from 95 of 114 long day care centres (83 per cent) [28 from Wentworth Health Area (82 per cent), and 67 from Western Sydney Health Area (84 per cent)].

A total of 1,092 two- to three-year-old children was enrolled

TABLE 2

IMMUNISATION RATES FOR DTP, OPV AND MMR IN WESTERN SYDNEY, LDCC IMMUNISATION SURVEY - APRIL 1995

	Percent immunised by two years of age ¹		Percent immunised at time of survey	
	N	%	N	%
DTP (3 doses)	928	94.1	1,092	95.0
OPV (3 doses)	930	92.4	1,092	93.6
MMR (1 dose)	932	91.3	1,092	93.5
DTP (4 doses)	933	77.6	1,092	83.9*
All eight immunisations (4 DTP, 3 OPV & MMR)	911	76.2	1,092	81.7**

1. Immunisation rates calculated after excluding children without recorded immunisation dates.

2. N is the denominator for both Health Areas combined.

*Immunisation rates by age of two years compared to immunisation rates at time of survey; $p < 0.01$.

**Immunisation rates by age of two years compared to immunisation rates at time of survey; $p < 0.05$.

in the 95 LDCCs. Only five children were identified as Aboriginal (Aboriginality was not recorded in 53 cases). There were more boys (50 per cent) than girls (47 per cent) enrolled in LDCCs that completed the questionnaire. The median age of children in the survey was 31.1 months.

As we found no differences in immunisation rates between the two Health Areas, we present results for both Areas combined. By two years of age, more than 90 per cent of children had received three doses of DTP and OPV, and one dose of MMR (Table 2). About 17 per cent fewer children had received four doses of DTP compared to three doses of DTP. Immunisations for all the scheduled childhood immunisations up to the age of 18 months (eight doses of vaccine) were completed by just over 76 per cent of children. There were no gender differences for immunisation rates at the age of two years.

Immunisation rates at the time of the survey for children aged 2-3 years (these rates cover only the children who had received the stated number of immunisations at the time of the survey), for three doses of DTP and OPV, and one dose of MMR were similar to immunisation rates calculated for immunisations received by the age of two years (Table 2). However, immunisation rates for four doses of DTP and all eight immunisations were significantly higher than rates calculated for immunisations received by the age of two years (four doses DTP, $p < 0.001$; all eight vaccines; $p < 0.05$).

There were no differences in immunisation rates at the time of the survey between boys and girls for three doses of DTP, three doses of OPV and one dose of MMR. Boys had significantly lower immunisation rates for four doses of DTP (boys: 82 per cent, girls: 86 per cent; $p < 0.05$) and for all eight doses of vaccine (boys: 79 per cent, girls: 84 per cent; $p < 0.05$). These gender differences persisted within the Health Areas, but were not significant.

DISCUSSION

In this study of immunisation rates in children aged 2-3 years enrolled in LDCCs in greater western Sydney, the up-to-date immunisation rates at two years of age for three doses of DTP, four doses of DTP, three doses of OPV, one dose of MMR and all eight immunisations were 94 per cent, 78 per cent, 92 per cent, 91 per cent and 76 per cent respectively. There is a precipitous drop in the rate of immunisation with the fourth dose of DTP. Reasons for non-immunisation with the fourth dose of DTP were not elicited, but need to be examined. Not unexpectedly, immunisation rates at the time of the survey were higher compared to immunisation rates at two years of age.

The National Immunisation Strategy (NIS)⁶ aims to achieve >90 per cent coverage of children aged two years for all diseases specified in the childhood immunisation schedule by 2000. In this survey of LDCCs, NIS targets for three doses of DTP, three doses of OPV and one dose of MMR were achieved, but immunisation rates for four doses of DTP and hence for all eight immunisations were substantially lower than the 2000 target. This is of concern since we would expect children attending LDCCs to have higher immunisation rates than non-attenders⁷.

Immunisation registers in LDCCs in NSW are used as surveillance tools. However, only about 14 per cent of all children <4 years of age in NSW attend LDCCs^{8,9}. The immunisation status of these children may be quite different from children who do not attend LDCCs, and we should be cautious when generalising such results to children who do not attend LDCCs. Preschools may provide an additional source of surveillance information which may complement data from LDCCs.

We presented two sets of immunisation rates (including up-to-date rates) in this study. Whether immunisation rates should be presented as age-appropriate rates (not presented here) or as up-to-date rates is debated^{10,11}. There are also views on how age-appropriate immunisation rates should be calculated. Standard definitions for age-appropriate and

up-to-date immunisation rates should be developed to allow immunisation rates within and between States and Territories to be compared.

The low rates for four doses of DTP and all eight immunisations at the age of two years indicate that we need to target groups identified to have poor immunisation rates. We need to understand reasons for non-immunisation and delayed immunisation, and instigate innovative programs to ensure that more children – especially high-risk children – are immunised, and at the recommended age, to enable us to achieve NIS targets.

ACKNOWLEDGEMENTS

We thank all the directors and staff of the long day care centres who participated in this study. We also thank Susan DeBrincat-Trapuzzano for data entry, and the NSW Health Department for the SSISS methodology.

1. NSW Immunisation Requirements for school entry from 1994, State Health Publication Number (EB) 92-87, ISBN 0730535975.
2. Klein JO. Infectious diseases and day care. *Review of Infectious Diseases* 1986; 8(4):521-6.
3. Thacker SB, Addiss DG, Goodman RA et al. Infectious diseases and injuries in child day care. Opportunities for healthier children. *Journal of the American Medical Association* 1992; 268(13):1720-6.
4. Microsoft Access. Relational database management system for windows, Version 2.0. Microsoft Corporation 1994.
5. SAS Institute Inc. SAS[®] Procedures Guide, Release 6.03 Edition. Cary, NC: SAS Institute Inc, 1988. 441 pp.
6. National Immunisation Strategy. Report by the Panel on a National Immunisation Strategy on behalf of the Communicable Diseases Standing Committee. NHMRC April 1993. Commonwealth of Australia 1993.
7. Hinman AR. Vaccine-preventable diseases and child day care. *Review of Infectious Diseases* 1986; 8(4):573-83.
8. 1991 Census of Child Care Services Summary. Department of Human Services and Health. Commonwealth of Australia 1994. Australian Government Publishing Service, Canberra. ISBN 0 644 354801.
9. Australian Bureau of Statistics. 1991 Demography New South Wales. Commonwealth of Australia. Catalogue No 3311.1.
10. Varrasso DA, Redlener I. Defining delayed immunisation. (Letter) *Pediatric Infectious Disease Journal* 1992; 11:897.
11. Dietz DJ, Zell ER, Stevenson J. Defining delayed immunisation. (Letter) *Pediatric Infectious Disease Journal* 1993; 12(4):353-354.

Childhood immunisation editorial

► Continued from page 112

or about age-specific susceptibility to the major vaccine-preventable diseases. Until this information is available, and is used to tailor the childhood (and adult) immunisation program, control of highly infectious diseases such as measles and pertussis is but a pipedream.

1. Australian Bureau of Statistics. Children's immunisation, Australia, April 1995. Canberra: ABS, 1996. Catalogue no. 4352.0.
2. Herceg A, Daley C, Schubert P, Hall R, Longbottom H. A population-based survey of immunisation coverage in two-year-old children. *Aust J Public Health* 1995; 19:645-470.
3. Ferson MJ, Christie D. True and false contraindications to pertussis vaccine. *Med J Aust* 1990; 153:568-569.
4. Rixon G, March L, Holt DA. Immunisation practices of general practitioners in metropolitan Sydney. *Aust J Public Health* 1994; 18:258-260.
5. Burgess MA, Levy M, Alperstein G et al. 'On the spot' vaccination: does it work? *J Paediatr Child Health* 1996; 32:63-67.

ISSUES IN ADMINISTRATION OF THE IMMUNISATION PROVISIONS OF THE PUBLIC HEALTH ACT, 1991

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This article reports on a survey of vaccine coverage among kindergarten children in the (former) Eastern Sydney Area. The survey was designed to assess compliance with the immunisation requirements of the Public Health Act 1991, and to identify difficulties experienced by parents and school staff in providing and collecting official immunisation certificates.

The immunisation provisions of the Act are a major initiative towards improving immunisation rates of NSW children. Under the Act, parents of children starting kindergarten from 1994 are asked to furnish an official immunisation certificate to the school at time of enrolment. The certificates provide a means to identify unimmunised children in event of an outbreak, serve as a reminder for parents to have their children fully immunised, and provide a mechanism for monitoring immunisation rates.

In 1994 the Eastern Sydney Public Health Unit carried out an immunisation survey among school kindergarten children¹. The study showed that 80.9 per cent of children had an official immunisation certificate, of which 89.9 per cent were complete. The present study provided comparative information.

METHODS

In November 1995 a brief questionnaire with a covering letter was mailed to the 73 primary schools in the former Eastern Sydney Health Area. The letter explained the immunisation provisions of the Public Health Act 1991, while the questionnaire sought information on the number of children enrolled in kindergarten in 1995, the number of official immunisation certificates provided, and the number with the 'complete' box ticked (see Figure 1 for a reproduction of the immunisation certificate form). Questions were included on measles and pertussis immunisation status among those with certificates indicating incomplete immunisation. School principals were asked to return the questionnaires within two weeks.

In addition, face-to-face interviews with principals and a review of immunisation records were conducted in 10 schools (14 per cent) selected at random. At the interviews the principals were asked about their understanding of vaccine-preventable diseases, their awareness of the responsibility to notify cases, their knowledge of the importance of excluding unimmunised children during an outbreak, the methods which they used to inform parents about providing official immunisation certificates, the problems of collecting and interpreting certificates, and the difficulties reported by parents. Immunisation certificates held by the school were inspected and compared with the data sent by schools earlier in the survey.

RESULTS

Postal survey

Of the 73 primary schools in the former Eastern Sydney Health Area, the principals of 69 schools (95 per cent), representing 2,829 children, returned their questionnaires within four weeks. These indicated that 2,340 children

(83 per cent) had official immunisation certificates, while 489 had not provided a certificate. Of the 2,340 immunisation certificates, 2,135 (91 per cent) recorded complete immunisation, while 205 recorded incomplete immunisation. According to information provided by schools, 48 of the 205 children with certificates recording incomplete immunisation were recorded as not having received measles vaccination and 90 children as having incomplete pertussis immunisation.

Record review

In an inspection of the records held by the 10 randomly selected primary schools with 392 kindergarten children, we found that 326 children (83 per cent) had official certificates, of which 303 (93 per cent) recorded complete immunisation. Of the 23 children with incomplete certificates, six were incomplete for measles vaccination and 22 for pertussis vaccination. The remaining 66 children (17 per cent) had not provided an immunisation certificate.

Interviews with school principals

Principals provided information on difficulties in collecting the immunisation certificates in both phases of the survey. Principals of four of the 10 schools visited were completely unaware of their responsibilities under the Act, and two did not know of the *Procedure Manual*. Six accepted the *Personal Health Record* in place of an immunisation certificate, and one accepted other forms of documentation, including letters from doctors or foreign documents. In four schools parents had needed a number of reminders to provide the certificate, and five reported having had to ask their doctors repeatedly to issue certificates. Finally, certificates, when issued, were often filled in incorrectly. For example, some had the 'Complete' box ticked alone or the last box for each vaccine type. In other cases, the 'Complete' box was ticked, but there was no tick in the fifth diphtheria, tetanus and pertussis boxes.

School staff (who had no expertise in interpretation of the immunisation schedule) felt required to make a judgment about the meaning of these incorrectly completed certificates and other forms of documentation.

DISCUSSION

According to school principals, 91 per cent of Eastern Sydney kindergarten children were fully immunised (the 'minimum estimate' figure was 76 per cent if all children without certificates were considered unimmunised – an unlikely situation²). This compares with 95 per cent (minimum estimate, 79 per cent) in Northern Sydney public schools³; 90 per cent (minimum estimate, 71 per cent) in Central Coast children²; and 57 per cent (minimum estimate, 41 per cent) in Auburn municipality⁴. In Eastern Sydney, return rates and completion rates were slightly higher than the 1994 survey¹, possibly because the present survey was carried out later in the school year. A further important finding from the record review was an uptake of 98 per cent for measles and 93 per cent for pertussis vaccination (81 per cent and 77 per cent respectively, if those without records were considered unimmunised).

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FIGURE 1

NSW HEALTH DEPARTMENT		School Copy			
IMMUNISATION CERTIFICATE					
<i>for Primary School Enrolment</i>					
CHILD'S PERSONAL DETAILS					
NAME: _____	DOB: _____				
<small>SURNAME</small>	<small>GIVEN NAMES</small>				
ADDRESS: _____		POST CODE: _____			
SCHOOL: _____					
SECTION A: COMPLETE IMMUNISATION					
<i>Please tick appropriate boxes indicating number of DOSES administered</i>					
	(DOSE)				
DIPHTHERIA	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
TETANUS	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
PERTUSSIS (Whooping Cough)	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
POLIO	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	
MEASLES or Measles/Mumps/Rubella	1 <input type="checkbox"/>				
COMPLETE <input type="checkbox"/> <i>(Please tick OR if incomplete, go to section B)</i>					
SECTION B: INCOMPLETE IMMUNISATION					
Please tick the reason why the child has not been fully immunised:					
Medical contraindication	<input type="checkbox"/>	Religious objection	<input type="checkbox"/>		
Conscientious objection	<input type="checkbox"/>	Other:	<input type="checkbox"/>		
ISSUER'S DECLARATION					
(Please tick appropriate box)					
I certify that:					
I have sighted all appropriate documentation to issue a Complete Certificate					(Section A) <input type="checkbox"/>
<u>OR</u> I have issued an Incomplete Certificate and I have explained that, in the event of an outbreak of a vaccine preventable disease, the unimmunised child will be excluded from attending school for the duration of the outbreak.					(Section B) <input type="checkbox"/>
DOCTOR/ISSUER'S NAME: _____					
ADDRESS: _____					
TELEPHONE: _____					
SIGNATURE & STAMP: _____					
DATE: _____					

A REVIEW OF SCHOOL ENTRY IMMUNISATION CERTIFICATES IN THE MANLY, WARRINGAH AND PITTWATER AREA, 1995

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This article reports on a review of immunisation certificates (issued under the Public Health Act 1991) in schools in the Manly, Warringah and Pittwater local government areas. The aims of the review were to assess compliance with the immunisation provisions of the Act, examine schools' difficulties in complying with the Act, and suggest ways of overcoming these difficulties.

The 1992 amendment of the Public Health Act 1991¹ requires that school principals obtain immunisation certificates for all children entering school from 1994 onwards. This requirement serves three main purposes:

- To improve immunisation rates among school-aged children.
- To ensure that the immunisation status of all children can be readily determined by health authorities in the event of an outbreak of a vaccine-preventable disease in a school.
- To provide surveillance data on the immunisation status of schoolchildren in NSW.

Reviews of immunisation certificates in Auburn² and in the Central Coast Area Health Service³ in 1994 raised concerns about the numbers of certificates presented and, more important, the high proportion of certificates which were incorrectly completed and hence technically invalid.

METHODS

The study was carried out in the second school term of 1995. Ten primary schools (six government and four non-government) in the Manly, Warringah and Pittwater local government areas were selected at random from 58 primary schools in the area. We examined immunisation records for all the 1995 kindergarten enrolments and the records of students who were in year 1 in 1995 (i.e. those who had been in kindergarten in 1994).

The records retained by the schools comprised a mixture of official immunisation certificates and a variety of other documents. All records available on the school premises were examined by two members of the Community Health Services' school health team. Data were collected using a standard data collection sheet which included a list of definitions to ensure uniformity.

The immunisation certificate comprises four panels (Figure 1, page 121). The first panel is for the child's personal details – name, address, date of birth, and school. The second panel records details of *complete* immunisation. The third panel records the reason for *incomplete* immunisation. The fourth panel is a declaration by the issuer of the certificate.

The following definitions were used in this review.

Complete immunisation: Section A was correctly completed with all boxes ticked and the appropriate box in the issuer declaration also ticked.

Incomplete immunisation: Section B was correctly completed and the appropriate box in the issuer declaration ticked.

Invalid certificate: The certificate was incorrectly completed – (i) there was a failure to tick all boxes in Section A or Section B, and/or (ii) the appropriate box in the

issuer declaration was not ticked, and/or (iii) the issuer's identification was incomplete.

Invalid certificates and any other documentation available on individual children's immunisation history (for example, copies of sections of the Personal Health Record) were also examined to gather any further information on children's likely immunisation status.

RESULTS

The principals of all 10 schools which had been selected agreed to participate in the study. The 10 schools represented a 1995 student population of 1,065 in kindergarten (520 children) and year 1 (545 children). For the majority of certificates the issuer was a general practitioner.

Of year 1 students, 62 per cent had provided an immunisation certificate. Only 60 per cent of these had been correctly filled in, i.e. 37 per cent of the year 1 students had provided a correctly filled certificate.

A higher proportion (77 per cent) of 1995 kindergarten children had provided immunisation certificates, of which 63 per cent had been correctly filled in. Thus 45 per cent of the kindergarten children had provided a correctly filled certificate.

In both years the major errors in the certificates were the incorrect use of Section A. This accounted for 84 per cent of invalid certificates provided by kindergarten children and 50 per cent of those provided by year 1 students.

If the provision of a correctly filled certificate is taken as an indicator, only 34 per cent of children enrolled in kindergarten in 1994 and 45 per cent of children enrolled in 1995 would be considered fully immunised.

However, if an assessment of immunisation status were based on an examination of all available records (including invalid certificates and other forms of documentation), 58 per cent and 71 per cent of children enrolling in kindergarten in 1994 and 1995 respectively were likely to have been fully immunised.

If children who provided no documentation on their immunisation status are excluded, the immunisation rates were 87 per cent and 90 per cent for 1994 and 1995 kindergarten enrollees respectively. This is consistent with existing records in the Area based on parent recall⁴.

DISCUSSION

A reliable assessment of immunisation status could be made for only the 60 or 63 per cent of children with certificates which were correctly filled out. Twenty per cent of kindergarten children and 34 per cent of year 1 children in 1995 had provided no documentation of immunisation. In the event of an outbreak of a vaccine-preventable disease, these children would be considered to be unimmunised. This could lead to the unnecessary exclusion of large numbers of children from school or to significant time delays, created by the need to identify those children truly at risk, with a resultant adverse impact on outbreak control.

The immunisation certificate was also designed to provide surveillance data. The large number of invalid certificates (from 37 per cent of kindergarten children and 40 per cent of year 1 children) must reduce the utility of data from certificates for surveillance purposes. The new National

TABLE 3

RESULTS OF SCHOOL IMMUNISATION SURVEY

	Year 1	Kindergarten	Total
Total number of students	545	520	1,065
Pupils with Immunisation certificates	62% (338)	77% (401)	69% (739)
'Complete' (as % of all certificates)	55% (187)	59% (236)	57% (423)
'Incomplete' (as % of all certificates)	4% (15)	4% (16)	4% (31)
'Invalid' (as % of all certificates)	40% (136)	37% (149)	39% (285)
Other documentation	4% (24)	2.5% (13)	3% (37)
No Immunisation documentation	34% (183)	20% (106)	27% (289)
Minimum % all pupils fully immunised ('Complete' certificates)	34% (187)	45% (236)	40% (423)
Maximum % all pupils fully immunised (Based on clinical judgment)	58% (315)	71% (371)	64% (686)

Childhood Immunisation Register may provide a mechanism for improving surveillance, but the register will not generate comprehensive data on school-aged children for 6-7 years.

Our results suggest that attention should be given to:

- the design of the immunisation certificate, especially Section A;
- information for health professionals to promote correct filling in of the certificate; and
- the dissemination of information to schools and the broader community.

With regard to the last point, there is a need to increase parental awareness of the requirement for immunisation certificates to be completed and presented for all children, regardless of their immunisation status at the time of school entry. School health services are well placed to do this in the course of their orientation talks to kindergarten parents and through their regular contact with schools.

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We thank Susie Lough (CNS-Child and Family Health Service) for her participation in this project. We also acknowledge the support of the staff of the participating schools and Denise Wilton, clerical assistant at Queensland.

END NOTE

The study was repeated in 45 schools in the area in 1996, with the following results:

	Kindergarten
Total number of students	2,285
Pupils with immunisation certificates	78% (1,775)
'Complete' (as % of all certificates)	54% (964)
'Incomplete' (as % of all certificates)	5% (82)
'Invalid' (as % of all certificates)	42% (739)
Other documentation	4% (81)
No documentation	19% (432)

Although there was some increase in the proportion of students who presented certificates, a high proportion of these were still classified as 'invalid'.

1. New South Wales Immunisation Requirements for School Entry from 1994: Procedure Manual. NSW State Publication No (EB)92-87 1992.
2. Leckie R, Shah S, Jalaludin B. School Entry Immunisation Certificates: A Useful Tool for Immunisation Surveillance? *Communicable Diseases Intelligence* 1996; 20:6-8.
3. Watt P. An evaluation of 1994 school entry immunisation certificates on the Central Coast of New South Wales. *J Paediatr Child Health* 1996; 32 (2): 125-131.
4. School Health Database, Manly Hospital and Community Health Services 1989-1993.

Despite extensive field testing of the immunisation certificate form design before its introduction, some problems with the use of the form have emerged. In 1997 the NSW Health Department plans to evaluate compliance with the immunisation provisions of the Public Health Act 1991. This will take into account three full years of experience with the provisions, which were introduced in 1994. Findings such as those reported here will feed into the evaluation.

— EDITOR

SCHOOL ENTRY IMMUNISATION CERTIFICATES IN SOUTH WESTERN SYDNEY, 1995

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This article reports on a review of immunisation certificates (issued under the Public Health Act 1991) in schools in South Western Sydney in 1995.

An amendment to the NSW Public Health Act 1991¹ requires school principals and directors of child care centres to obtain documented evidence of the immunisation status of children enrolling in schools, preschools and child care centres. Parents of children who do not provide documented proof of immunisation are informed that their child *may* be excluded from school in the event of an outbreak of a vaccine-preventable disease. This requirement came into effect in 1994.

METHOD

With the approval of regional authorities of the Department of School Education, the South Western Sydney Public Health Unit (SWSPHU) wrote to the principals of all primary schools within the boundaries of the South Western Sydney Area Health Service (SWSAHS) in September 1995 requesting their participation in a review of immunisation records.

The school principals were asked to complete a questionnaire seeking immunisation data on children who were in kindergarten or year 1 in 1995. These data were obtainable from the immunisation certificates which had (or should have) been collected when the children enrolled, in accordance with the requirements of the Act. For children who had provided an immunisation certificate, the principals were asked to report whether immunisation was recorded complete, incomplete for medical reasons, or incomplete for other reasons. The principals also reported on the number of children for whom no certificate had been provided.

One school was randomly selected from each sector of the SWSAHS for a validation study (six schools altogether). For children in these schools, staff of the SWSPHU compared principals' reports of immunisation data with their own assessments of the immunisation certificates. The immunisation certificate form is reproduced in Figure 1 (page 121). Children were defined as being completely immunised only if *all* the boxes in Section A of the form were ticked. Certificates with only the 'complete' box ticked were not accepted as evidence of complete immunisation. Small numbers of children had provided other forms of documentation, e.g. photocopies of Personal Health Records and letters from general practitioners; these were not accepted. The validation study was carried out in 1996, and covered children who were in years 1 and 2 at the time (i.e. those who had been in kindergarten and year 1 respectively in 1995).

RESULTS

The principals of a total of 70 schools (52 per cent of the total number) agreed to participate. These schools represented 7,553 students in 1995 (3,778 in year 1 and 3,775 in kindergarten). Four special purpose primary schools were ineligible to participate because they had no children enrolled in kindergarten or year 1. None of the schools within one local government area participated.

TABLE 4

SCHOOL PRINCIPALS' REPORTS OF IMMUNISATION CERTIFICATE DATA FOR YEAR 1 CHILDREN, 1995

Immunisation status on Certificate	Number of children	Percentage
Complete	3,036	80
Incomplete	190	5
Incomplete (for medical reasons)	19	0.5
No certificate	535	14
Total	3,778	100

TABLE 5

SCHOOL PRINCIPALS' REPORTS OF IMMUNISATION CERTIFICATE DATA FOR KINDERGARTEN CHILDREN, 1995

Immunisation status on Certificate	Number of children	Percentage
Complete	3,084	82
Incomplete	201	5
Incomplete (for medical reasons)	17	0.4
No certificate	473	12
Total	3,775	100

The principals reported that 80 per cent of year 1 and 82 per cent of year 2 children were completely immunised (Tables 4 and 5).

The six schools selected for the validation study represented 721 children who had been enrolled in kindergarten and Year 1 in 1995. However, when the validation was conducted in 1996, only 607 of these children were still enrolled in years 1 and 2 respectively. The loss of 114 children from the sample (16 per cent) may have been due to movement of children from one school to another (due to changes of home address).

According to principals' reports, 88 per cent of these 721 children had immunisation certificates showing complete immunisation, with 8 per cent having no certificate. However, staff of the SWSPHU assessed that only 60 per cent had certificates showing complete immunisation, while 30 per cent had no certificates (Table 6).

DISCUSSION

Our results indicate that school principals in South Western Sydney overestimated the number of kindergarten and year 1 children who had complete immunisation in 1995. Similar findings have been reported from elsewhere in NSW.

According to school principals, the sample of children involved in the validation study had a higher rate of complete immunisation than those in the 70 schools which participated in the overall survey (88 per cent, compared with 80-82 per cent). The validation study was done in 1996, when only 84 per cent of the original sample (based on 1995

TABLE 6

SCHOOL PRINCIPALS' REPORTS OF IMMUNISATION CERTIFICATE DATA FOR YEAR 1 AND YEAR 2 CHILDREN, 1996 COMPARED WITH SWSPHU ASSESSMENT

School principal's assessment of immunisation status	Number of children	Percentage
Complete	638	88
Incomplete	22	3
No certificate	61	8
Total	721	100
SWSPHU assessment of immunisation status	Number of children	Percentage
Complete	368	60
Incomplete	56	9
No certificate	183	30
Total	607	100

enrolments) was available for review. The loss of 114 children from follow-up is likely to reflect migration from school to school; principals reported migration rates ranging from under 5 per cent to almost 40 per cent, with the higher rates tending to occur in areas of high public housing.

Among the 607 children available for the validation study, the SWSPHU found that only 60 per cent had certificates showing complete immunisation, compared with the figure of 88 per cent obtained from school principals. The fact that principals reported only 8 per cent as having no certificate, while SWSPHU found that 30 per cent had no certificate, indicates that principals tended to accept documentation other than the official immunisation certificate form.

Schools in one local government area in the SWSAHS did not respond to the questionnaires. The council had been an active participant in immunisation and had conducted an immunisation review in schools just months before our survey. Principals of the schools in this LGA may have been reluctant to respond to our questionnaire because they had recently provided information for the other survey.

Our results suggest there is a need for the NSW Health Department to work with the Department of School Education to ensure children's immunisation certificates are correctly interpreted.

Despite school principals' problems of interpretation, it appears that correctly interpreted immunisation certificates have the potential for identifying localities with low immunisation rates.

1. NSW Public Health Act 1991.

2. Leckie R, Shah S, Jalaludin B. School entry immunisation certificates: a useful tool for immunisation surveillance? *Communicable Diseases Intelligence* 1996; 20:6-8.

The NSW Health Department has had discussions with the Department of School Education about practical aspects of implementation of the immunisation provisions of the Public Health Act 1991. These discussions will continue in the light of the Health Department's proposed 1997 evaluation of compliance with the immunisation provisions.

— EDITOR

Administration of immunisation provisions

► Continued from page 120

For comparison, the 1995 Australian Bureau of Statistics survey *Children's Immunisation Australia* found that 94 per cent of five-year-old children were immunised against measles and 68 per cent against pertussis⁵.

Telephone and site interviews with school staff revealed difficulties faced by schools and parents. There was some misunderstanding of issues surrounding the Act, including notification requirements for vaccine-preventable diseases and exclusion procedures. In relation to documentation, some schools were not clear about their obligation to collect official immunisation certificates and the role of general practitioners as the main providers of certificates. A major finding of this and other surveys has been the reliance by some schools on documents other than the official certificates, and the large number of certificates which was completed incorrectly^{2,4}. Despite insufficient expertise, school staff felt obliged to interpret these documents. As a consequence, school records of immunisation status are likely to contain some inaccuracies.

CONCLUSIONS

The value of immunisation certificates as reminders to parents is clear. Sole reliance on the certificates as an accurate source of information on immunisation coverage and status during an outbreak would require strategies to increase understanding and cooperation among schools and immunisation providers. Such strategies might include simplifying the certificate form, providing certificates to schools for distribution to parents, and further education of parents, providers and primary school staff on the rationale and requirements of the Act.

ACKNOWLEDGMENTS

We acknowledge the thoughtful assistance of all school staff involved in the survey.

1. Ferson MJ. Census of school entry immunisation certificates, Eastern Sydney, 1994. *NSW Public Health Bulletin* 1995; 2:9-10.
2. Watt PD. An evaluation of 1994 school entry immunisation certificates on the Central Coast of New South Wales. *J Paediatr Child Health* 1996; 32:125-131.
3. Rixon G, Hort K, Liddle J. School entry certificate survey, Northern Sydney Area. *NSW Public Health Bulletin* 1994; 5:92.
4. Leckie R, Shah S, Jalaludin B. School entry immunisation certificates: A useful tool for immunisation surveillance? *Communicable Diseases Intelligence* 1996; 20:6-8.
5. Australian Bureau of Statistics. *Children's immunisation Australia, April 1995*. (Cat No 4352.0) Canberra: Australian Bureau of Statistics, 1996.

INFECTIOUS DISEASES

TRENDS

Following the winter of 1996 – during which there were outbreaks of **meningococcal disease** and **rotavirus** (Figures 2 and 3) – the finer weather of spring heralds increased reports of **measles** and **rubella**.

Measles and rubella

While well down on historical numbers, an increased number of **measles** cases was reported in September (17) and August (21) compared with July (9) (Figure 2). The September cases were mainly reported from the Northern Rivers (5 cases, none with a history of vaccination), and South Eastern Sydney (3) (Table 7, page 130). After reaching a two-year low of 7 in June, **rubella** is likewise on the rise, with 17 cases reported in September, mainly from the Hunter (7) and Central Sydney (4).

The last influenza surveillance report for 1996

The 1996 season was similar in severity to recent years, according to both laboratory and general practitioner reports. Laboratory reports were almost all influenza A.

The average consultation rate for influenza-like illness (ILI) from the NSW Sentinel GP Surveillance Scheme^a in the first week of October was 0.4 per cent (Figure 4), lower than the average for the previous few years. The average school absentee rate^b has continued at low levels into October (Figure 5).

Reports from Westmead, Prince of Wales and Liverpool hospital laboratories indicate that during the first two weeks of October, the number of diagnoses of influenza A was low (1 virological, 2 serological cases) – similar to that reported for the previous two weeks (3 virological, 0 serological cases). There were no reports of influenza B in either fortnight.

Typhoid and paratyphoid in travellers

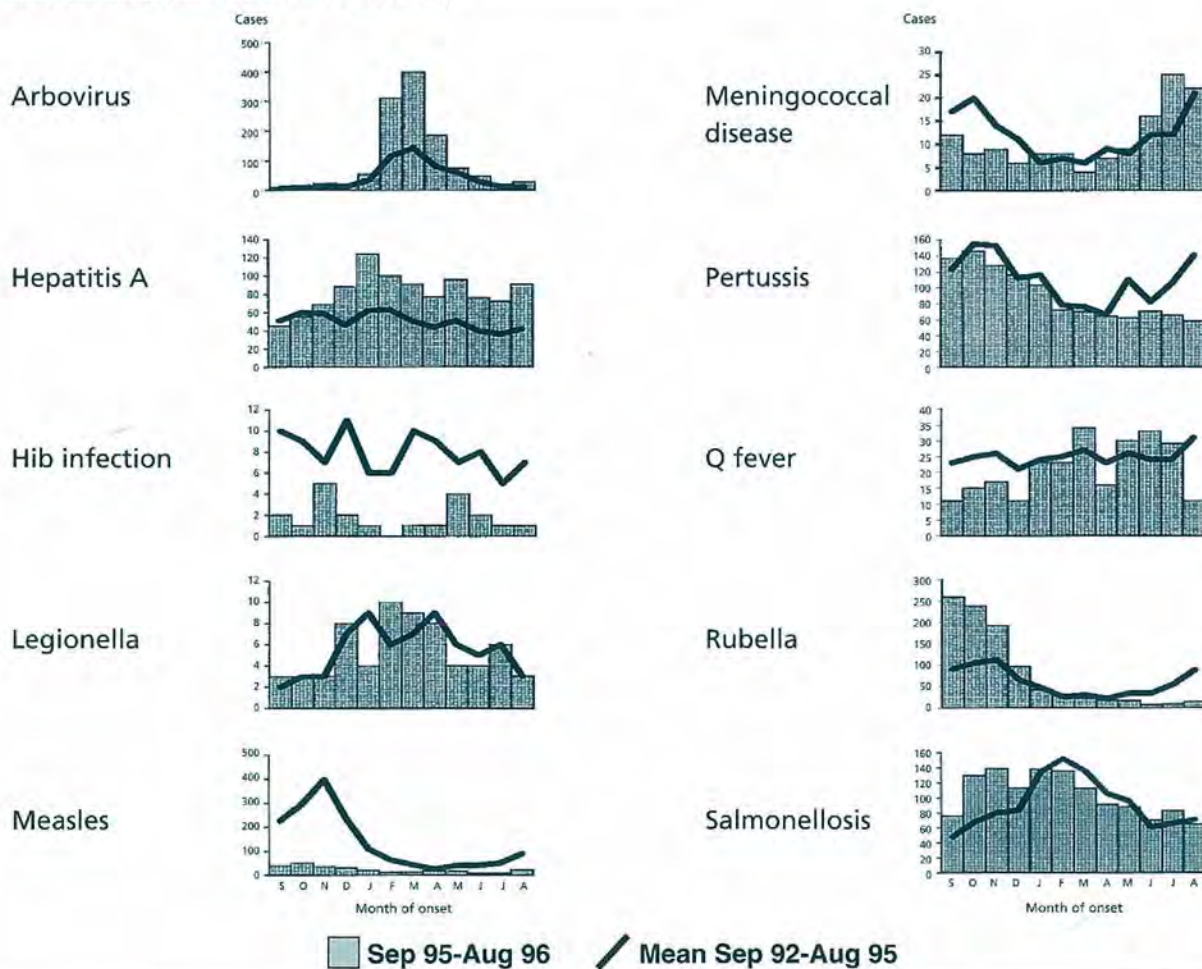
To the end of September 1996, 16 cases of typhoid and 13 cases of paratyphoid were reported in NSW. Each year from

a. Including about 6,000 consultations a week to 50 doctors reported to five Public Health Units.

b. Monitored from 10 schools including about 9,000 students, reported to four Public Health Units.

FIGURE 2

REPORTS OF SELECTED INFECTIOUS DISEASES, NSW, 12 MONTHS TO AUGUST 1996 BY MONTH OF ONSET (WITH HISTORICAL COMPARISON)



1992 until 1995, between 20 and 28 cases of typhoid and 8 and 12 cases of paratyphoid were reported. Most cases are travellers returning from high-risk countries, where they acquired infection as tourists, or while visiting family or friends.

Typhoid is a bacterial disease characterised by fever, severe continuous headache, malaise, anorexia, relatively slow heart rate (for the fever), enlarged spleen, spots on the trunk (rose spots), dry cough, and constipation. Vomiting and diarrhoea are usually absent. Many patients may have only mild or atypical symptoms. Without treatment, 10 per cent of patients will die. The death rate is reduced to <1 per cent with prompt therapy. Relapses can occur in up to 20 per cent of cases. About 2-5 per cent of cases become chronic carriers¹.

The disease is caused by a bacterium, *Salmonella typhi*, and is diagnosed by finding bacteria in blood, urine, stools, or in skin lesions. Paratyphoid, caused by *Salmonella paratyphi*, is a similar, but usually milder, illness¹.

Typhoid occurs throughout the developing world, with an estimated 17 million cases and 600,000 deaths annually worldwide¹. In developed countries, with chlorinated water supplies and good sewerage systems, infection is uncommon, and mainly among travellers returning from endemic areas.

The bacteria are almost exclusively carried by humans, although rarely domestic animals (e.g. dairy cows) can be infected with *S. paratyphi*. The bacteria are transmitted by food and water contaminated by faeces or urine of patients and carriers. High-risk foods include shellfish, raw fruits and vegetables, and milk, contaminated by faeces, either directly or through flies or food handlers who are carrying the bacteria. The incubation period is usually 1-3 weeks. Patients can be infectious to others as long as they excrete the bacteria in their stools, usually at least a week. Ten per cent of untreated patients will excrete bacteria for three months, and 2-5 per cent will become life-long carriers¹.

Prevention

Prevention depends on not consuming contaminated food and water. Travellers to developing countries should consume only chlorinated, safely bottled or boiled water, and eat food that is either freshly cooked and still hot, or that they have peeled themselves. Hand washing after using the toilet and before handling food is very important.

Patients and carriers should not prepare food or water for others, or care for children or the elderly until cleared of infection (with three consecutive negative stool tests).

Typhoid vaccine is recommended for travellers to countries where hygiene is poor and drinking water unsafe, although most short-term travellers who eat at international tourist-class establishments will not need the vaccine. It is not recommended for pregnant women, people with previous severe reactions to the vaccine and those with an intercurrent fever².

Typhoid and paratyphoid are notifiable by laboratories and hospital CEOs under the Public Health Act. Notified cases are routinely investigated by Public Health Unit staff to determine how the disease was acquired, to counsel the patient about the disease, and to prevent further spread.

FIGURE 3

LABORATORY REPORTS OF SELECTED INFECTIOUS DISEASES, EASTERN SYDNEY LABORATORY SURVEILLANCE PROGRAM, 13 X 4 WEEK PERIODS (1 YEAR) TO SEPTEMBER 6, 1996 (AND HISTORICAL COMPARISON)

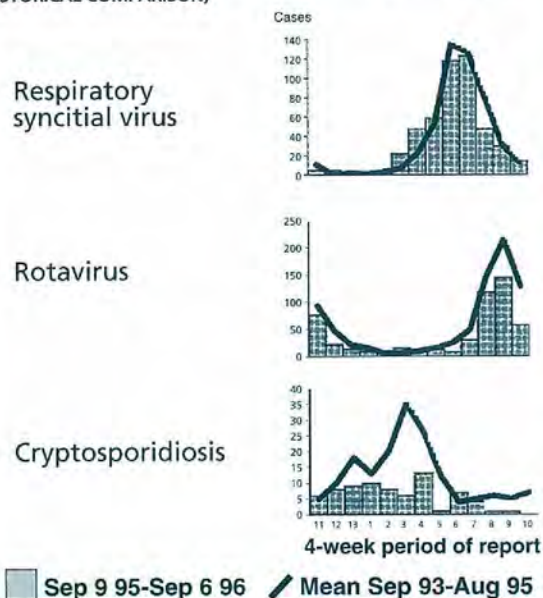


FIGURE 4

NSW GP SENTINEL SURVEILLANCE INFLUENZA-LIKE ILLNESS 1996

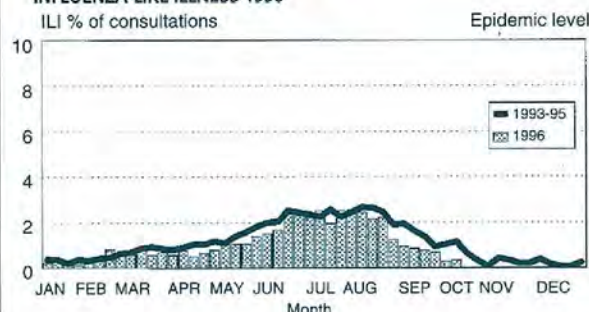
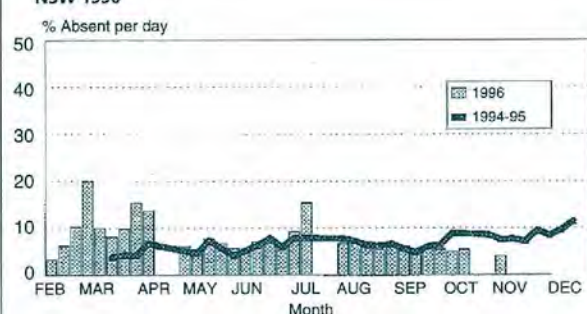


FIGURE 5

SCHOOL ABSENTEE RATE SURVEILLANCE NSW 1996



► Continued on page 128

Infectious diseases

► Continued from page 127

GASTROENTERITIS IN INSTITUTIONS

In September, 84 cases of gastroenteritis among people residing in institutions were reported. Reports of institutional gastroenteritis typically peak in winter and spring, when they are often due to agents such as Norwalk-like virus. Symptoms include nausea, vomiting, diarrhoea, abdominal pain, myalgia, headache, malaise and low-grade fever. Infections can rapidly spread through the faecal-oral route (and possibly aerosolised vomitus) to cause large outbreaks within institutions such as nursing homes.

To confirm the cause of such outbreaks, stool samples from ill staff or residents should be taken early. These samples should be transported swiftly to a laboratory. In addition to standard microbiology and parasitology tests, viral studies should be specifically requested. Food samples should be held for testing, until food poisoning is excluded.

Outbreaks of gastroenteritis within institutions should be notified to the PHU on first suspicion, so recommendations on investigation, control and prevention can be made early.

PHUs can advise on prevention and control measures, but they will usually involve:

- Strict hygiene measures for staff, residents and visitors, particularly hand washing after attending the bathroom, before handling food, and before and after all resident contact. The latter applies both to in-house and visiting staff. Hand washing awareness posters next to hand-basins can be useful reminders.
- Symptomatic staff should be sent off duty, not to return until 24 hours after symptoms (diarrhoea and/or vomiting) have subsided. A delay of 48 hours may be advisable for food handlers.
- Ideally, ill residents should be isolated in a common ward or wards (cohorted), and staff attending those people should not care for people in other areas. Non-essential staff should not enter the affected area. Use of communal rooms should be discouraged during an outbreak. The facility should not accept new admissions during the outbreak period.
- Single-use disposable gloves should be worn when contact with blood and/or body fluids is anticipated. A new pair of gloves must be worn for contact with each patient. After removing gloves, hands must be washed.
- Any surface or article contaminated by vomit or faeces should first be thoroughly washed with warm water and a neutral detergent, and then disinfected with freshly prepared diluted bleach (see below). Carpet should be cleaned as above (no bleach) then professionally shampooed with industrial carpet cleaner. Colour-coding of cleaning materials is the most effective way to restrict equipment to individual areas of a facility.
- Staff (nursing or domestic) performing such cleaning should wear appropriate over clothing (e.g. plastic aprons) and disposable gloves. After cleaning activities, protective clothing should be removed while still wearing gloves, gloves removed, then hands thoroughly washed.

- Special attention should be given to cleaning of bathroom areas (including toilet flush buttons, taps and door knobs), and to environmental surfaces (e.g., benches, hand rails) that may have been contaminated by aerosol or other spread. Potentially contaminated linen should be changed.
- Potentially contaminated food (such as bedside fruit) should be discarded.

Disinfection using diluted bleach:

Household bleach diluted 1 part bleach to 9 parts water is a cheap and effective disinfectant. The solution must be freshly prepared on a daily basis. Care must be taken when preparing the solution – staff should wear gloves, waterproof protective clothing and eye protection. Always add bleach to water – not water to bleach – and mix well. Never mix bleach with any other cleaning material.

Adapted from: South Western Sydney, South Eastern Sydney, Central Sydney Public Health Units. Control of gastroenteritis in nursing homes/hostels. 1996.

STOP PRESS

BAT LYSSAVIRUS INFORMATION FOR MEDICAL PRACTITIONERS

Recommendations of the Lyssavirus Expert Group meeting, November 11, 1996, endorsed by the Communicable Diseases Network Australia New Zealand.

This information provides a background to the newly identified bat *Lyssavirus* and recommendations for dealing with patients who have been in contact with bats.

Background

A new *Lyssavirus* has been identified during 1996 in two species of bat in Australia. The two species are the Black flying fox (*Pteropus alecto*) and Little Red flying fox (*Pteropus scapulatus*). In November 1996 a woman in Queensland developed encephalitis, probably due to the virus, after being bitten and scratched by bats.

The genus *Lyssavirus* falls within the family Rhabdoviridae. Hitherto, six genotypes were recognised: the classic rabies virus, Lagos bat virus, Mokola virus, Duvenhage virus and the two European bat *Lyssaviruses*. These viruses have not previously been reported to occur in Australia. The newly identified seventh *Lyssavirus* is closely related to, but is distinct from, the classic rabies virus. In laboratory animals, rabies vaccine and rabies immunoglobulin are protective against this new *Lyssavirus*.

Non-rabies *Lyssaviruses* usually do not spread among terrestrial animals and human infections are rare. The newly identified *Lyssavirus* is known to infect only fruit bats (flying foxes) and humans. Overseas, insectivorous bats are known to carry other *Lyssaviruses* and therefore cannot be discounted as a potential risk, at this stage.

Rabies virus and other *Lyssaviruses* are usually transmitted to humans via bites or scratches which provide direct access of the virus in saliva to exposed tissue and nerve endings. This means most people would not be exposed to *Lyssavirus* through casual contact with bats.

As the bat *Lyssavirus* is closely related to classic rabies virus, infection may be prevented by rabies vaccine and

rabies immunoglobulin. Recommendations for administering these are provided below. Further research is being conducted into the distribution and transmissibility of the virus. Recommendations may be updated as more information becomes available.

Recommendations

Pre-exposure vaccination

Pre-exposure vaccination should be recommended to those occupationally or recreationally exposed to bats, where there is a risk of being bitten or scratched, for example:

- bat carers;
- veterinarians;
- wildlife officers (including local government officers);
- veterinary laboratory staff;
- managers of display or research colonies;
- members of indigenous communities who may catch bats for consumption; and
- power-line workers who frequently remove bats from power lines.

Pre-exposure vaccination consists of three intramuscular doses of 1ml rabies vaccine given on days 0, 7 and 28. Doses should be given in the deltoid area, as rabies-neutralising antibody titres may be reduced after administration in other sites. In children, administration into the anterolateral aspect of the thigh is also acceptable.

People bitten or scratched by bats

The wound should be scrubbed thoroughly as soon as possible with soap and water. Proper cleansing of the wound is the single most effective measure for reducing the transmission. Where possible, the bat should be kept for further investigation by the State veterinary laboratory.

Guidelines have been developed to aid the decision on whether to administer vaccine alone or combined with rabies immunoglobulin. Factors include the type of wound, how recent the exposure was and the behaviour of the bat. Please contact your Public Health Unit, which will provide advice on the appropriate course of action.

Contact such as patting bats or exposure to urine and faeces does not constitute an at-risk exposure. Pre-exposure

vaccination should be offered if the person has ongoing contact with bats.

CIRCULARS

Australian Childhood Immunisation Register: Guidelines for the active follow-up of children overdue for immunisation. Circular 96/62, August 26, 1996.

The Australian Childhood Immunisation Register was introduced in January 1996 to provide information about immunisation rates among Australian children, to remind parents when their children's immunisations are due and to assist in the follow-up of unimmunised children. Parents can opt out of the reminder scheme at any time. The Health Insurance Commission will soon begin forwarding to NSW Health lists of children overdue for immunisations. These data will be sent to PHUs for follow-up in collaboration with local immunisation service providers. All identifying information is covered by strict confidentiality provisions.

Follow-up of unimmunised children should be carried out in the least intrusive manner, and may include:

- a telephone call to the last immunisation provider;
- a telephone call to the parent to offer assistance;
- a letter to the parent; or
- a home visit to the parent, with the offer of on-the-spot immunisation.

Individual follow-up is preferred, but population-based approaches, such as targeted education or immunisation clinics, may be more efficient, depending on local circumstances.

To give informed consent, parents must be advised about the benefits and risks of, and contraindications to, immunisation. The home visits should be a last resort, and occur only after first attempting to contact the parent/guardian. Of course, decisions by a parent/guardian not to immunise should be respected.

1. Benenson AS (Ed). Control of Communicable Diseases Manual (16th Edition). American Public Health Association. Washington: 1995.
2. NHMRC. The Australian immunisation procedures handbook. 5th Edition. Commonwealth Department of Human Services and Health Canberra: 1995.

TABLE 7

INFECTIOUS DISEASE NOTIFICATIONS FOR NSW IN SEPTEMBER 1996, RECEIVED BY AREA HEALTH SERVICE

Condition	Area Health Service																	Period	
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	Total for Sep	Year to date
	Blood-borne and sexually transmitted																		
AIDS	-	2	2	1	-	-	-	-	1	-	-	-	-	-	-	1	-	7	201
HIV infection	1	1	1	-	-	-	1	-	7	1	-	-	-	-	-	-	1	30	305
Hepatitis B - acute viral	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	25
Hepatitis B - other	60	28	31	3	41	4	2	1	31	-	2	9	1	-	-	4	1	219	3,351
Hepatitis C - acute viral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Hepatitis C - other	39	43	48	15	32	19	37	11	83	27	11	5	5	9	1	16	10	411	6,098
Hepatitis D - unspecified	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Hepatitis, acute viral (NOS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Gonorrhoea	6	2	2	-	-	1	-	-	15	-	-	-	-	-	-	-	-	26	372
Syphilis	3	3	2	1	9	1	2	-	13	3	-	7	-	2	-	-	-	46	587
Vector-borne																			
Arboviral infection	-	-	-	-	-	1	1	-	-	5	-	-	-	-	-	-	1	8	1,126
Malaria	5	5	-	-	1	-	-	-	6	1	-	-	-	-	-	3	-	21	181
Zoonoses																			
Brucellosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hydatid disease	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	10
Leptospirosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22
Q fever	-	-	-	-	-	-	-	-	-	1	2	5	7	1	-	-	-	16	215
Respiratory/other																			
Legionnaires' disease	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	49
Meningococcal (invasive) infection	1	-	2	-	1	-	2	-	5	1	1	2	-	-	-	1	1	17	116
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Mycobacterial tuberculosis	2	4	5	-	1	-	-	-	-	-	1	-	-	-	-	-	-	13	256
Mycobacteria other than TB	1	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	294
Vaccine-preventable																			
Adverse event after immunisation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34
<i>H. influenzae</i> (invasive) infection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Measles	1	-	1	2	1	-	-	2	3	5	-	-	-	1	-	1	-	17	139
Mumps	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	21
Pertussis	1	5	2	6	1	5	3	-	7	-	5	2	-	1	-	-	-	39	603
Rubella	4	-	2	2	-	-	7	1	1	-	-	-	-	-	-	-	-	17	177
Faecal-oral																			
Cholera	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Foodborne illness (NOS)	-	-	-	-	-	3	1	-	-	10	-	-	-	-	-	-	-	14	73
Gastroenteritis (instit)	21	6	-	5	1	27	18	-	-	-	-	-	-	-	-	6	-	84	398
Hepatitis A	7	3	-	2	3	8	2	1	12	1	-	3	2	-	4	1	1	51	778
Listeriosis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Salmonellosis (NOS)	2	11	7	1	3	1	1	2	4	2	1	3	-	-	3	-	-	41	825
Typhoid and paratyphoid	-	-	1	-	-	-	-	-	3	-	-	-	-	-	-	1	-	5	29

Abbreviations used in this Bulletin:

CSA Central Sydney Health Area, SES South Eastern Sydney Health Area, SWS South Western Sydney Health Area, WSA Western Sydney Health Area, WEN Wentworth Health Area, NSA Northern Sydney Health Area, CCA Central Coast Health Area, ILL Illawarra Health Area, HUN Hunter Health Area, NRA Northern Rivers Health Area, MNC Mid North Coast Health Area, NEA New England Health Area, MAC Macquarie Health Area, MWA Mid West Health Area, FWA Far West Health Area, GMA Greater Murray Health Area, SA Southern Health Area, OTH Interstate/Overseas, U/K Unknown, NOS Not Otherwise Stated.

Please note that the data contained in this Bulletin are provisional and subject to change because of late reports or changes in case classification. Data are tabulated where possible by area of residence and by the disease onset date and not simply the date of notification or receipt of such notification.