Volume 16, Number 5–6
May–June 2005

NSW Public Health Bulletin

NSW HEALTH

ISSN 1034 7674
State Health Publication PH 050080

YEAR IN REVIEW: COMMUNICABLE DISEASE SURVEILLANCE, 2004

In this issue we review the trends in reports of notifiable diseases among NSW residents received by the NSW public health units for 2004. Readers interested in the details of notifications for specific diseases are referred to Tables 1–5 where diseases are reported by: year of onset, month of onset, number of cases and rate per 100,000 population by area health service, and number of cases by age group and sex. Table 6 shows the number of people with notifiable conditions who were reported to have died by the time of follow-up by their local public health unit.

TRENDS

Among the 57,783 NSW residents with medical conditions notified by doctors, hospital staff, and laboratories for 2004, highlights included:

Conditions most frequently reported:

- gastroenteritis occurring in institutions (12,784 or 189 per 100,000 population)
- chlamydia (10,020 or 148 per 100,000 population, with, by geographical area, the highest crude rates in the South Eastern Sydney, Central Sydney and New England health service areas)
- hepatitis C (4,974 cases or 74 per 100,000 population, with the highest crude rates in Central Sydney, Mid North Coast, Northern Rivers and Far West health service areas)
- pertussis (3,540 cases or 52 per 100,000 population, with the highest crude rates in the Macquarie, Hunter and Wentworth health service areas)
- hepatitis B (2,835 cases or 42 per 100,000 population, with the highest crude rates in Central Sydney, South Western Sydney and Western Sydney health service areas)
- salmonella infections (2,132 cases or 32 per 100,000 population, with the highest crude rates in the Northern Rivers and New England health service areas).

continued on page 78

CONTENTS

Conditions with the most meaningful declines in the number of notifications compared with previous years:

- hepatitis C (4,974 cases, steadily declining from 8,691 in 2001)
- meningococcal disease (148 cases, steadily declining from 253 in 2000)
- rubella (18 cases, declining from 191 in 2000).

Conditions with the most meaningful increases in the number of notifications compared with previous years:

- chlamydia (10,020 cases, continuing its rise since it became notifiable in the late 1990s), possibly due to both better detection and a real increase in infections
- gastroenteritis occurring in institutions (12,784 cases, up from 3,583 in 2003), due in part to multiple outbreaks in aged care facilities
- pertussis (3,540 cases, up from 2,770 in 2003) across the State
- salmonellosis (2,132 cases, up from 1,838 in 2003), due in part to several outbreaks of different salmonella subspecies
- cryptosporidioisis (357, up from 202 in 2002), most likely due, in part, to transmission via contaminated swimming pools
- legionnaires' disease due to infection with *Legionella pneumophila* (51, up from 23 in 2003), partly the result of a cluster related to eastern Sydney [2]
- shigellosis (96 cases, up from 59 in 2003)
- syphilis (1,047 cases, up from 843 in 2003), due mostly to new infections among inner city men who have sex with men
- mumps (65 cases, up from 35 in 2003), mainly in Sydney.

Conditions least frequently reported

There were no reported cases of chancroid, congenital syphilis, diphtheria, donovanosis, granuloma inguinale, lymphogranuloma venereum, plague, polio, rabies, severe acute respiratory syndrome (SARS), tetanus, typhus, viral haemorrhagic fevers, or yellow fever in 2004.

Conditions associated with the largest numbers of reported deaths

Deaths reported via the surveillance mechanisms for notifiable conditions may not include all deaths associated with these conditions. Public health units routinely investigate all cases of some notifiable conditions (for example tuberculosis, measles, meningoccocal disease) in order to implement control measures and are likely to identify associated deaths. However, there are other notifiable conditions (for example chlamydia and gonorrhoea) where no routine investigation takes place and for which deaths will not be identified. Conversely, some deaths of patients following notification may be due to conditions other than that notified. Deaths were most frequently reported for the following notifiable diseases:

- invasive pneumococcal disease (87)
- HIV infection (52), including 32 people who died from AIDS and 20 people with HIV infection who died of causes other than AIDS.

OUTBREAKS AND THREATS

Several notable disease outbreaks and threats were reported in 2004 in NSW. These included:

- 12 outbreaks of influenza in aged care facilities in September, associated with 34 deaths [5]
- two clusters of measles linked to overseas travel [2]
- several clusters of pertussis (whooping cough) [2]
- 44 outbreaks of food borne disease affecting 550 people
- 452 other gastroenteritis outbreaks (affecting 12,784 people: more than six times the number of outbreaks reported in 2003, when 71 were reported). These occurred largely in institutional settings and were most likely caused by person to person spread of norovirus
- several outbreaks of salmonellosis, including: *Salmonella* Typhimurium phage type 12 (linked to eating chicken prepared at home), *S.* Birkenhead [6] (risk factor undetermined), *S.*Typhimurium PT 126 (linked to eating tiramisu prepared with contaminated raw egg)[5], *S.* Typhimurium PT 135 (linked to a residential facility)[4], and *S.* Typhimurium phage type 170/108 (in part linked to consumption of contaminated chicken)[4]
- a cluster of hepatis A in a school, possibly linked to sharing a lolly jar [3]
- ongoing concerns regarding the emergence of H5N1 avian influenza in south east Asia leading to the deaths of millions of chickens and a small number of people who were exposed to infected fowl [5]
- the transient re-emergence of SARS, following the virus's escape from a laboratory in northern China in April. [2]

SO WHAT DOES IT ALL MEAN?

The data derived from notifiable diseases captures only a subset of infectious diseases that cause disease in people. Nonetheless, analysis of these data indicates that enteric viruses, blood borne viruses, sexually transmissible infections, pertussis, food borne infections and influenza remain important, preventable causes of disease in NSW. These diseases can be further reduced through implementation of a range of measures, including careful attention to hand washing (especially in people with diarrhoea and their carers, and people who handle food), routine immunization, practicing safe sex and the use of sterile injecting equipment.

THANK YOU

It is important to recognise that disease control and prevention

depends on effective surveillance of communicable diseases in the community. We acknowledge all those general and specialist medical practices, laboratories, hospitals, schools, childcare centres, and others, who have notified diseases of public health significance to their local public health units for investigation and control.

REFERENCES

1. NSW Department of Health. Communicable Diseases Report, NSW, for February 2004. *N S W Public Health Bulletin* 2004; 15(4): 76–7.
2. NSW Department of Health. Communicable Diseases Report, NSW, for March and April 2004. *N S W Public Health Bulletin* 2004; 15(5–6): 115–18.
3. NSW Department of Health. Communicable Diseases Report, NSW, for May–June 2004. N S W Public Health Bulletin 2004; 15(7–8): 144–9.
4. NSW Department of Health. Communicable Diseases Report, NSW, for July and August 2004. *N S W Public Health Bulletin* 2004; 15(9–10): 184–5.
5. NSW Department of Health. Communicable Diseases Report, NSW, for September–October 2004. *N S W Public Health Bulletin* 2004; 15(11–12): 220–4.
6. Beard F, Stafford R, Terry J, Morgan G, Ayyar A, Birrell F. Risk factors for sporadic *Salmonella* Birkenhead infection in Queensland and Northern New South Wales: a case control study. *N S W Public Health Bulletin* 2004; 15(9–10): 172–7.

TABLE 1

DISEASE NOTIFICATIONS BY YEAR OF ONSET OF ILLNESS#, NSW, 1991 TO 2004

Conditions	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AIDS	440	432	481	555	480	371	210	180	125	133	98	105	137	82
Adverse event after immunisation	9	31	23	40	28	56	70	95	16	42	111	177	219	183
Arbovirus infection: total*	409	343	656	381	539	1227	1804	783	1220	978	1191	661	1024	1147
Barmah Forest virus infection*	6	6	25	39	271	172	185	134	249	195	402	394	451	403
Ross River virus infection*	297	324	599	331	236	1031	1598	583	952	750	716	181	494	700
Arboviral other*	106	13	32	11	32	24	23	66	19	33	73	86	79	44
Blood lead level ≥ 15μg/dl*	not notifiable until December 1996						710	874	691	988	513	517	338	298
Botulism	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Brucellosis*	2	2	4	4	2	1	3	3	2	1	1	2	2	7
Chancroid*	not notifiable until December 1998								1	0	0	0	0	0
Chlamydia*	not notifiable until August 1998								2469	3504	4500	5824	7784	10020
Cholera*	1	0	1	0	1	3	1	1	2	0	1	1	0	1
Creutzfeldt-Jakob Disease	not notifiable until April 2004													6
Cryptosporidiosis*	not notifiable until December 1996						157	1130	121	133	195	306	202	357
Food-borne illness (NOS)	2765	253	106	213	270	211	255	201	151	147	56	41	1071	550
Gastroenteritis (institutional)	158	406	443	296	1359	554	939	738	673	697	775	1752	3583	12784
Giardiasis*	not notifiable until August 1998								1091	978	967	863	1027	1232
Gonorrhoea*	392	491	382	357	428	522	636	1054	1291	1060	1364	1527	1330	1444
H.influenzae type b: total*	212	217	124	61	29	13	17	11	13	8	7	10	6	5
H.influenzae type b epiglottitis*	15	57	32	21	6	2	5	1	2	2	1	1	0	3
H.influenzae type b meningitis*	48	103	53	17	11	4	3	3	3	1	1	1	0	0
H.influenzae type b septicaemia*	11	26	24	12	8	3	1	4	6	4	2	3	1	2
H.influenzae type b infection (NOS)*	138	31	15	11	4	4	8	3	2	1	3	5	5	0
Hepatitis A*	1119	901	579	585	614	958	1426	927	421	201	197	149	124	137
Hepatitis B: total*	1491	3169	3603	3983	4007	3508	3170	2958	3515	3977	4563	3549	2845	2835
Hepatitis B: acute viral*	409	112	95	74	61	43	53	58	77	99	94	87	70	32
Hepatitis B: other*	1082	3057	3508	3909	3946	3465	3117	2900	3438	3878	4469	3462	2775	2803
Hepatitis C: total*	852	3895	5897	7823	6884	7003	6928	7213	8607	8298	8691	6702	5253	4974
Hepatitis C: acute viral*	22	26	22	16	32	18	19	112	112	222	295	153	121	12
Hepatitis C: other*	830	3869	5875	7807	6852	6985	6909	7101	8495	8076	8396	6549	5132	4962
Hepatitis D*	0	8	12	19	19	9	11	3	14	12	11	9	12	14
Hepatitis E*	0	0	1	2	0	3	6	4	7	9	6	6	6	8
HIV infection*	823	696	56	501	533	447	421	402	373	352	338	389	415	404
Haemolytic uraemic syndrome	not notifiable until December 1996						3	6	11	9	2	7	5	9
Influenza: total*	not notifiable until December 2000										244	1012	861	1012
Influenza: Type A*	not notifiable until December 2000										216	770	767	823
Influenza: Type B*	not notifiable until December 2000										27	241	55	162
Influenza; Type (NOS)*											1	1	39	27
Legionnaires' disease: total*	37	104	66	60	75	74	33	46	41	41	68	44	60	79
Legionnaires' disease: *L. longbeachae**	0	14	13	8	16	30	9	19	12	12	29	21	37	27
Legionnaires' disease: *L. pneumophila**	16	80	34	30	35	34	18	22	22	26	38	22	23	51
Legionnaires' disease: other*	21	10	19	22	24	10	6	5	7	3	1	1	0	1
Leprosy	1	7	5	3	3	2	0	0	1	2	4	0	2	3
Leptospirosis*	28	21	16	14	6	33	33	50	56	54	66	39	39	40
Listeriosis*	11	13	12	10	14	22	23	28	22	18	12	11	28	30
Malaria*	171	110	174	184	96	203	173	158	174	232	157	105	120	101
Measles: total	496	805	2348	1484	596	191	273	119	32	36	31	8	18	12
Measles: laboratory confirmed*	20	76	460	302	138	35	98	19	13	22	18	6	14	11
Measles: other	476	729	1888	1182	458	156	175	100	19	14	13	2	4	1
Meningococcal disease (invasive): total	128	121	153	142	113	161	219	186	221	253	234	216	202	148
Meningococcal disease: type B*	0	3	7	7	23	36	54	55	95	93	90	105	100	81
Meningococcal disease: type C*	0	4	6	9	8	35	55	55	60	64	38	54	45	24
Meningococcal disease: type W135*	0	0	0	0	1	0	2	4	4	4	2	2	2	5
Meningococcal disease: type Y*	0	0	1	1	0	1	0	7	1	7	2	2	5	3
Meningococcal disease: other	128	114	139	125	81	89	108	65	61	85	102	53	50	35
Mumps*	8	23	13	11	14	27	29	39	33	92	28	29	35	65
Paratyphoid*	20	8	9	11	12	15	5	9	5	14	11	13	22	10
Pertussis	49	217	1533	1405	1369	1156	4246	2309	1415	3687	4438	2012	2770	3540
Pneumococcal disease: invasive*	not notifiable until December 2000										444	861	800	905
Psittacosis*	not notifiable until December 2000										38	155	87	80
Q fever*	167	213	403	267	201	287	258	236	164	131	143	309	287	222
Rubella: total*	60	324	1186	233	2376	636	153	78	46	191	58	35	24	18
Rubella*	59	324	1184	229	2375	631	153	78	45	191	58	35	23	17
Rubella: congenital*	1	0	2	4	1	5	0	0	1	0	0	0	1	1
Salmonellosis*	1170	802	980	1101	1366	1224	1698	1812	1438	1396	1643	2100	1838	2132
Shigellosis*	not notifiable until December 2000										134	85	59	96
Syphilis: total	579	873	732	966	834	662	512	612	585	581	546	647	843	1047
Syphilis: infectious*+	1	3	6	29	132	72	57	45	87	81	67	128	245	301
Syphilis: congenital	1	1	0	2	6	3	3	0	3	3	3	3	7	0
Syphilis: other*	577	869	726	935	696	587	452	567	495	497	476	516	591	746
Tetanus	5	2	5	4	0	1	3	3	1	2	0	0	1	0
Tuberculosis*	429	394	389	394	443	410	422	382	484	448	416	447	386	426
Typhoid*	38	20	28	25	27	30	28	18	32	28	32	26	16	39
Verotoxigenic *Escherichia coli* infections*	not notifiable until December 1996						0	2	0	1	1	5	2	3

# year of onset = the earlier of patient reported onset date, specimen date or date of notification; * laboratory-confirmed cases only;
NOS = not otherwise specified; + includes syphilis primary, syphilis secondary, syphilis < 1 yr duration and syphilis-newly acquired
No case of the following diseases have been notified since 1991: diphtheria*, granuloma inguinale*, lymphogranuloma venereum*, plague*, poliomyelitis*, rabies, typhus*, viral haemorrhagic fever and yellow fever

TABLE 2

DISEASE NOTIFICATIONS BY MONTH OF ONSET OF ILLNESS#, NSW, 2004

Conditions	Month of Onset JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
AIDS	11	6	12	9	6	8	4	4	3	9	4	6	82
Adverse event after immunisation	9	20	30	11	24	13	12	15	12	13	14	10	183
Arbovirus infection: total*	71	111	181	216	180	80	41	35	49	46	76	61	1147
Barmah Forest virus infection*	28	32	38	55	45	38	21	17	29	29	37	34	403
Ross River virus infection*	38	76	138	158	131	41	14	15	16	14	33	26	700
Arboviral:other*	5	3	5	3	4	1	6	3	4	3	6	1	44
Blood lead level ≥ 15µg/dl*	29	34	18	23	30	21	32	23	36	9	27	16	298
Botulism	0	1	0	0	0	0	0	0	0	0	0	0	1
Brucellosis*	0	0	2	0	1	1	0	1	0	1	1	0	7
Chlamydia*	832	856	958	786	836	831	812	813	859	773	904	760	10020
Cholera*	0	0	0	0	0	0	0	1	0	0	0	0	1
Creutzfeldt-Jakob disease*	0	0	0	0	0	1	3	0	0	0	2	0	6
Cryptosporidiosis*	65	52	46	36	21	3	6	12	7	10	39	60	357
Giardiasis*	103	145	138	102	125	105	76	92	90	74	98	84	1232
Gonorrhoea*	140	134	154	114	115	133	116	123	107	101	115	92	1444
H.influenzae type b: total*	0	0	1	0	0	1	1	0	0	0	1	1	5
H.influenzae type b epiglottitis*	0	0	0	0	0	1	0	0	0	0	1	1	3
H.influenzae type b septicaemia*	0	0	1	0	0	0	1	0	0	0	0	0	2
Hepatitis A*	18	20	10	12	5	17	9	10	5	10	11	10	137
Hepatitis B: total*	244	217	232	218	215	227	260	258	250	250	247	217	2835
Hepatitis B: acute viral*	6	5	2	8	8	1	2	0	0	0	0	0	32
Hepatitis B: other*	238	212	230	210	207	226	258	258	250	250	247	217	2803
Hepatitis C: total*	449	416	452	363	408	420	413	456	400	420	451	326	4974
Hepatitis C: acute viral*	3	3	2	1	2	1	0	0	0	0	0	0	12
Hepatitis C: other*	446	413	450	362	406	419	413	456	400	420	451	326	4962
Hepatitis D*	1	1	2	0	0	2	1	1	3	1	1	1	14
Hepatitis E*	1	1	2	0	1	0	1	0	0	0	0	2	8
HIV infection*	38	37	40	28	29	38	26	23	34	36	40	35	404
Haemolytic uraemic syndrome	1	0	1	0	1	1	1	0	1	1	2	0	9
Influenza: total*	16	14	23	16	29	61	48	125	294	165	133	88	1012
Influenza: Type A*	6	9	13	10	17	41	42	110	240	142	116	77	823
Influenza: Type B*	8	5	10	5	10	14	6	14	43	19	17	11	162
Influenza: Type (NOS)*	2	0	0	1	2	6	0	1	11	4	0	0	27
Legionnaires' disease: total*	6	9	10	18	4	5	4	2	3	5	8	5	79
Legionnaires' disease: *L.longbeachae**	3	4	2	3	2	2	2	1	2	2	3	1	27
Legionnaires' disease: *L. pneumophila**	3	5	8	14	2	3	2	1	1	3	5	4	51
Legionnaires' disease: other*	0	0	0	1	0	0	0	0	0	0	0	0	1
Leprosy	0	0	1	0	0	1	0	1	0	0	0	0	3
Leptospirosis*	2	4	6	0	3	4	3	4	3	4	1	6	40
Listeriosis*	3	2	1	5	5	3	1	1	3	2	1	3	30
Malaria*	7	6	7	4	11	5	11	12	9	9	11	9	101
Measles: total	1	0	5	0	1	0	1	0	0	0	2	2	12
Measles: laboratory confirmed*	1	0	5	0	1	0	1	0	0	0	2	1	11
Measles: other	0	0	0	0	0	0	0	0	0	0	0	1	1
Meningococcal disease (invasive): total	11	9	11	13	16	17	18	9	12	18	9	5	148
Meningococcal disease: type B*	6	5	6	7	7	11	9	4	7	9	6	4	81
Meningococcal disease: type C*	2	2	1	2	4	2	3	2	3	3	0	0	24
Meningococcal disease: type W135*	0	0	0	1	0	1	1	0	1	1	0	0	5
Meningococcal disease: type Y*	0	0	0	1	0	1	1	0	0	0	0	0	3
Meningococcal disease: other	3	2	4	2	5	2	4	3	1	5	3	1	35
Mumps*	4	8	3	6	1	7	5	5	3	7	8	8	65
Paratyphoid*	5	1	0	1	1	2	0	0	0	0	0	0	10
Pertussis	206	179	167	203	212	260	295	357	553	407	380	321	3540
Pneumococcal disease: invasive*	32	31	47	48	97	111	127	133	114	62	61	42	905
Psittacosis*	6	4	5	4	11	3	7	8	11	6	4	11	80
Q fever*	17	17	20	19	20	16	15	25	16	17	21	19	222
Rubella: total*	2	1	3	2	3	1	1	2	1	0	1	1	18
Rubella*	2	1	2	2	3	1	1	2	1	0	1	1	17
Rubella: congenital*	0	0	1	0	0	0	0	0	0	0	0	0	1
Salmonellosis*	243	285	259	248	187	96	99	78	89	119	185	244	2132
Shigellosis*	12	8	9	6	7	7	10	4	5	19	3	6	96
Syphilis: total	103	93	108	74	68	77	103	90	104	72	80	75	1047
Syphilis: infectious*+	29	19	27	20	19	25	25	24	37	29	26	21	301
Syphilis: other*	74	74	81	54	49	52	78	66	67	43	54	54	746
Tuberculosis*	43	40	39	32	38	30	31	45	32	32	29	35	426
Typhoid*	5	8	1	1	4	2	3	1	0	6	3	5	39
Verotoxigenic *Escherichia coli* infections*	1	0	1	0	0	0	0	0	0	0	1	0	3

onset = the earlier of patient reported onset date, specimen date or date of notification
* laboratory-confirmed cases only NOS = not otherwise specified
+ includes syphilis primary, syphilis secondary, syphilis < 1 yr duration and syphilis—newly acquired

TABLE 3

DISEASE NOTIFICATIONS BY AREA HEALTH SERVICE OF RESIDENCE (2005 AHS BOUNDARIES), CRUDE RATES PER 100,000 POPULATION, NSW, 2004#

	Greater Southern		Greater Western			Hunter/ New England		North Coast	
Conditions	**GMA**	**SA**	**FWA**	**MAC**	**MWA**	**HUN**	**NEA**	**MNC**	**NRA**
AIDS	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4	1.5
Adverse event after immunisation	14.7	13.9	0.0	4.7	6.3	1.6	0.6	2.5	1.1
Arbovirus infection: total*	18.5	15.4	58.2	26.5	11.5	21.0	60.4	130.4	101.6
Barmah Forest virus infection*	5.7	3.5	6.2	1.9	0.0	5.3	7.8	70.9	43.3
Ross River virus infection*	12.4	8.0	49.9	24.6	10.4	15.0	50.4	59.1	57.2
Arboviral: other*	0.4	4.0	2.1	0.0	1.2	0.7	2.2	0.4	1.1
Blood lead level ≥ 15μg/dl*	0.4	1.5	58.2	18.9	2.9	10.6	2.8	2.2	5.1
Botulism	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0
Brucellosis*	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Chlamydia*	135.6	98.1	193.2	132.5	150.9	172.2	199.5	136.5	157.7
Cholera*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Creutzfeldt-Jakob disease*	0.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Cryptosporidiosis*	10.2	2.5	2.1	24.6	8.1	3.7	8.9	12.2	6.6
Giardiasis*	8.7	13.0	20.8	21.8	26.5	14.1	29.4	10.1	1.5
Gonorrhoea*	2.6	3.5	12.5	8.5	7.5	7.6	10.0	10.1	16.4
H.influenzae type b: total*	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
H.influenzae type b epiglottitis*	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
H.influenzae type b septicaemia*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hepatitis A*	0.0	0.5	2.1	0.9	1.2	0.0	3.3	2.5	1.8
Hepatitis B: total*	8.3	7.0	41.5	16.1	8.6	9.5	12.2	6.8	7.6
Hepatitis B: acute viral*	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.4	0.4
Hepatitis B: other*	8.3	7.0	41.5	16.1	8.6	8.8	12.2	6.5	7.3
Hepatitis C: total*	41.4	57.8	85.2	83.3	74.9	57.2	40.4	90.0	87.8
Hepatitis C: acute viral*	0.0	2.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0
Hepatitis C: other*	41.4	55.8	85.2	83.3	74.9	57.0	39.9	90.0	87.8
Hepatitis D*	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.7
Hepatitis E*	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
HIV infection*	1.5	0.0	2.1	0.9	1.2	2.3	2.2	1.1	2.2
Haemolytic uraemic syndrome	0.4	0.5	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Influenza: total*	3.0	5.0	0.0	19.9	5.2	12.2	1.1	3.6	11.3
Influenza: type A*	2.6	4.5	0.0	18.9	5.2	8.7	1.1	2.9	9.5
Influenza: type B*	0.4	0.5	0.0	0.9	0.0	3.5	0.0	0.7	1.8
Influenza: : NOS*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Legionnaires' disease: total*	0.4	0.5	0.0	0.0	3.5	0.2	0.6	0.4	0.0
Legionnaires' disease: *L.longbeachae**	0.0	0.5	0.0	0.0	1.7	0.0	0.6	0.4	0.0
Legionnaires' disease: *L. pneumophila**	0.4	0.0	0.0	0.0	1.7	0.2	0.0	0.0	0.0
Legionnaires' disease: other*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leprosy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leptospirosis*	0.0	0.5	0.0	0.9	1.2	1.1	6.6	1.4	3.3
Listeriosis*	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.7
Malaria*	3.4	0.5	0.0	0.0	0.0	1.6	0.0	0.4	0.7
Measles: total	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.4
Measles Lab Confirm*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Measles: other	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Meningococcal disease (invasive): total	1.5	2.0	4.2	2.8	1.7	3.7	1.1	0.7	1.8
Meningococcal disease: type B*	0.8	0.0	0.0	0.9	1.7	3.2	0.6	0.4	1.5
Meningococcal disease: type C*	0.8	2.0	0.0	0.0	0.0	0.4	0.6	0.0	0.0
Meningococcal disease: type W135*	0.0	0.0	2.1	0.0	0.0	0.2	0.0	0.0	0.0
Meningococcal disease: type Y*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Meningococcal disease: other	0.0	0.0	2.1	1.9	0.0	0.0	0.0	0.4	0.0
Mumps*	0.4	0.0	0.0	2.8	0.0	0.5	0.0	0.0	0.0
Paratyphoid*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pertussis	46.7	42.8	16.6	216.8	42.1	74.7	32.1	32.1	41.5
Pneumococcal disease: invasive*	10.5	12.0	16.6	10.4	12.1	19.4	5.0	13.0	8.4
Psittacosis*	3.0	0.5	0.0	0.9	2.3	4.1	5.5	1.4	1.8
Q fever*	1.9	4.0	22.9	61.5	3.5	2.1	29.9	7.6	8.4
Rubella: total*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Rubella*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Rubella: congenital*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salmonellosis*	27.9	19.9	35.3	31.2	23.6	23.0	56.5	37.8	71.4
Shigellosis*	0.8	0.0	6.2	0.0	1.7	0.4	5.0	1.1	3.3
Syphilis: total	3.4	2.0	45.7	6.6	7.5	3.0	7.2	2.5	8.0
Syphilis: infectious*+	2.3	0.0	2.1	0.0	0.6	1.6	1.7	0.0	3.3
Syphilis: other*	1.1	2.0	43.6	6.6	6.9	1.4	5.5	2.5	4.7
Tuberculosis*	0.8	1.5	4.2	0.9	0.6	2.1	0.0	2.2	0.7
Typhoid*	0.0	0.0	2.1	0.0	0.0	0.0	0.6	0.0	0.0
Verotoxigenic *Escherichia coli* infections*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

year of onset =the earlier of patient reported onset date, specimen date or date of notification
* laboratory-confirmed cases only NOS = not otherwise specified
+ includes syphilis primary, syphilis secondary, syphilis < 1 yr duration and syphilis-newly acquired
Area health service population estimates 2004:
CCA = Central Coast Area (309 425) CSA = Central Sydney Area (503 030) FWA = Far West Area (47 656) GMA = Greater Murray Area (258 985)
HUN = Hunter Area (547 325) ILL = Illawarra Area (355 533) MAC = Macquarie Area (103 907) MNC = Mid North Coast Area (270 433)
MWA = Mid Western Area (168 363) NEA = New England Area (172 560) NRA = Northern Rivers Area (273 731) NSA = North Sydney Area (788 117)
SA = Southern Area (188 744) SES= South Eastern Sydney (785 045) SWS = South Western Sydney (823 429) WEN = Wentworth Area (327 059)
WSA = Western Sydney Area (711 165) TOTAL = Total population in NSW (6 634 507)

TABLE 3 *continued*

DISEASE NOTIFICATIONS BY AREA HEALTH SERVICE OF RESIDENCE (2005 AHS BOUNDARIES), CRUDE RATES PER 100,000 POPULATION, NSW, 2004#

	Northern Sydney/ Central Coast		South Eastern Syd/ Illawarra		Sydney South West		Sydney West		
Conditions	**CCA**	**NSA**	**ILL**	**SES**	**CSA**	**SWS**	**WEN**	**WSA**	**TOTAL [(a)]**
AIDS	0.7	0.2	1.1	3.3	3.4	0.7	0.6	0.9	1.2
Adverse event after immunisation	4.2	1.0	0.5	2.4	1.4	1.5	1.9	1.8	2.7
Arbovirus infection: total*	8.1	3.0	5.4	1.9	0.8	0.8	4.3	1.4	17.0
Barmah Forest virus infection*	1.3	0.4	1.6	0.1	0.2	0.0	0.3	0.0	6.0
Ross River virus infection*	6.8	1.9	3.8	1.1	0.6	0.6	3.4	0.9	10.4
Arboviral: other*	0.0	0.7	0.0	0.6	0.0	0.2	0.6	0.4	0.7
Blood lead level ≥ 15μg/dl**	2.9	1.6	5.2	0.9	2.6	5.6	2.8	5.4	4.4
Botulism	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brucellosis*	0.0	0.0	0.0	0.1	0.4	0.1	0.0	0.1	0.1
Chlamydia*	116.6	137.1	102.1	236.1	220.7	86.9	94.3	107.3	148.4
Cholera*	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Creutzfeldt-Jakob disease*	0.0	0.2	0.0	0.0	0.0	0.0	0.6	0.0	0.1
Cryptosporidiosis*	1.3	2.6	2.4	7.0	5.0	3.5	5.9	4.1	5.3
Giardiasis*	17.3	27.4	12.2	25.9	18.2	10.3	21.6	22.2	18.2
Gonorrhoea*	4.9	12.3	10.3	73.0	69.5	8.7	6.5	9.5	21.4
H.influenzae type b: total*	0.0	0.0	0.0	0.1	0.0	0.0	0.6	0.0	0.1
H.influenzae type b epiglottitis*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
H.influenzae type b septicaemia*	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Hepatitis A*	2.3	2.2	0.8	1.4	4.2	3.2	0.3	3.7	2.0
Hepatitis B: total*	13.4	40.8	7.1	49.6	103.1	88.5	15.1	66.7	42.0
Hepatitis B: acute viral*	0.0	0.2	0.8	0.9	0.6	1.1	0.0	0.0	0.5
Hepatitis B: other*	13.4	40.5	6.2	48.7	102.5	87.4	15.1	66.7	41.5
Hepatitis C: total*	74.3	30.3	61.4	72.1	92.3	81.2	55.3	54.2	73.7
Hepatitis C: acute viral*	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.2
Hepatitis C: other*	74.3	30.2	60.8	72.1	92.3	81.2	55.3	54.2	73.5
Hepatitis D*	0.0	0.0	0.3	0.1	0.0	0.5	0.0	0.5	0.2
Hepatitis E*	0.0	0.0	0.0	0.5	0.2	0.1	0.3	0.0	0.1
HIV infection*	3.3	3.1	3.5	17.1	20.2	2.8	1.5	3.7	6.0
Haemolytic uraemic syndrome	0.3	0.1	0.3	0.0	0.0	0.2	0.3	0.0	0.1
Influenza: total*	2.6	14.3	4.1	39.8	16.0	16.0	5.3	21.9	15.0
Influenza: type A*	2.3	12.8	3.8	31.3	8.6	13.7	4.6	19.2	12.2
Influenza: type B*	0.3	1.0	0.0	8.4	3.2	2.3	0.3	2.7	2.4
Influenza: : NOS*	0.0	0.5	0.3	0.0	4.2	0.0	0.3	0.0	0.4
Legionnaires' disease: total*	1.3	1.0	4.9	2.3	0.6	0.6	0.9	1.1	1.2
Legionnaires' disease: *L.longbeachae**	0.7	0.1	2.4	0.4	0.0	0.1	0.3	0.4	0.4
Legionnaires' disease: *L. pneumophila**	0.7	0.9	2.4	1.8	0.6	0.5	0.6	0.7	0.8
Legionnaires' disease: other*	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Leprosy	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0
Leptospirosis*	0.0	0.1	0.3	0.1	0.0	0.1	0.0	0.0	0.6
Listeriosis*	0.3	0.9	0.0	1.5	0.4	0.2	0.9	0.0	0.4
Malaria*	0.7	1.5	0.5	1.9	1.0	1.8	1.2	2.7	1.5
Measles: total	0.0	0.0	0.0	0.6	0.2	0.1	0.3	0.3	0.2
Measles Lab Confirm*	0.0	0.0	0.0	0.6	0.2	0.1	0.3	0.3	0.2
Measles: other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meningococcal disease (invasive): total	1.0	2.4	3.3	2.9	3.0	1.7	1.9	1.4	2.2
Meningococcal disease: type B*	1.0	0.7	1.6	1.3	2.0	0.8	1.2	0.7	1.2
Meningococcal disease: type C*	0.0	0.7	0.5	0.4	0.2	0.2	0.3	0.0	0.4
Meningococcal disease: type W135*	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.1
Meningococcal disease: type Y*	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.0
Meningococcal disease: other	0.0	0.7	1.1	1.0	0.8	0.5	0.0	0.7	0.5
Mumps*	1.0	1.9	1.6	1.5	1.6	0.7	0.3	0.8	1.0
Paratyphoid*	0.0	0.1	0.0	0.3	0.0	0.4	0.0	0.4	0.1
Pertussis	37.1	43.7	39.1	66.6	55.3	37.1	70.5	52.2	52.4
Pneumococcal disease: invasive*	16.3	12.0	12.8	14.6	14.8	10.9	15.8	14.6	13.4
Psittacosis*	0.0	0.2	1.6	0.4	0.2	0.4	2.2	0.3	1.2
Q fever*	0.7	0.2	1.9	0.1	0.0	0.4	0.0	0.3	3.3
Rubella: total*	0.3	0.5	0.8	0.5	0.8	0.0	0.0	0.1	0.3
Rubella*	0.3	0.5	0.8	0.5	0.6	0.0	0.0	0.1	0.3
Rubella: congenital*	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Salmonellosis*	29.3	30.8	16.3	31.0	29.4	28.1	37.7	31.8	31.6
Shigellosis*	1.0	1.5	0.0	1.4	2.2	0.7	0.0	3.0	1.4
Syphilis: total	7.2	11.8	4.3	30.8	39.8	29.6	4.6	11.5	15.5
Syphilis: infectious*+	0.3	0.5	1.1	20.0	15.4	0.8	0.0	2.6	4.5
Syphilis: other*	6.8	11.3	3.3	10.8	24.4	28.7	4.6	8.9	11.0
Tuberculosis*	2.9	5.6	0.8	9.9	15.0	9.3	4.6	11.8	6.3
Typhoid*	0.0	0.2	0.0	1.1	0.4	1.0	0.0	2.2	0.6
Verotoxigenic *Escherichia coli* infections*	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0

year of onset =the earlier of patient reported onset date, specimen date or date of notification
* laboratory-confirmed cases only NOS = not otherwise specified
(a) = includes cases from Justice Health Service and with unknown public health unit
+ includes syphilis primary, syphilis secondary, syphilis < 1 yr duration and syphilis-newly acquired
Area health service population estimates 2004:
CCA = Central Coast Area (309 425) CSA = Central Sydney Area (503 030) FWA = Far West Area (47 656) GMA = Greater Murray Area (258 985)
HUN = Hunter Area (547 325) ILL = Illawarra Area (355 533) MAC = Macquarie Area (103 907) MNC = Mid North Coast Area (270 433)
MWA = Mid Western Area (168 363) NEA = New England Area (172 560) NRA = Northern Rivers Area (273 731) NSA = North Sydney Area (788 117)
SA = Southern Area (188 744) SES= South Eastern Sydney (785 045) SWS = South Western Sydney (823 429) WEN = Wentworth Area (327 059)
WSA = Western Sydney Area (711 165) TOTAL = Total population in NSW (6 634 507)

TABLE 4

NUMBER OF DISEASE NOTIFICATIONS BY AREA HEALTH SERVICE OF RESIDENCE (2005 AHS BOUNDARIES), NSW, 2004#

	Greater Southern		Greater Western			Hunter/ New England		North Coast	
Conditions	**GMA**	**SA**	**FWA**	**MAC**	**MWA**	**HUN**	**NEA**	**MNC**	**NRA**
AIDS	0	0	0	0	0	1	0	1	4
Adverse event after immunisation	39	28	0	5	11	9	1	7	3
Arbovirus infection: total*	49	31	28	28	20	119	109	362	279
Barmah Forest virus infection*	15	7	3	2	0	30	14	197	119
Ross River virus infection*	33	16	24	26	18	85	91	164	157
Arboviral: other*	1	8	1	0	2	4	4	1	3
Blood lead level ≥ 15μg/dl*	1	3	28	20	5	60	5	6	14
Botulism	0	0	0	1	0	0	0	0	0
Brucellosis*	1	0	0	0	0	0	0	1	0
Chlamydia*	360	197	93	140	262	975	360	379	433
Cholera*	0	0	0	0	0	0	0	0	0
Creutzfeldt-Jakob disease*	1	0	0	0	0	1	0	0	0
Cryptosporidiosis*	27	5	1	26	14	21	16	34	18
Giardiasis*	23	26	10	23	46	80	53	28	4
Gonorrhoea*	7	7	6	9	13	43	18	28	45
H.influenzae type b: total*	0	0	0	0	0	1	0	0	0
H.influenzae type b epiglottitis*	0	0	0	0	0	1	0	0	0
H.influenzae type b septicaemia*	0	0	0	0	0	0	0	0	0
Hepatitis A*	0	1	1	1	2	0	6	7	5
Hepatitis B: total*	22	14	20	17	15	54	22	19	21
Hepatitis B: acute viral*	0	0	0	0	0	4	0	1	1
Hepatitis B: other*	22	14	20	17	15	50	22	18	20
Hepatitis C: total*	110	116	41	88	130	324	73	250	241
Hepatitis C: acute viral*	0	4	0	0	0	1	1	0	0
Hepatitis C: other*	110	112	41	88	130	323	72	250	241
Hepatitis D*	0	0	0	0	1	0	0	0	2
Hepatitis E*	0	0	0	0	0	1	0	0	0
HIV infection*	4	0	1	1	2	13	4	3	6
Haemolytic uraemic syndrome	1	1	0	0	0	0	1	0	0
Influenza: total*	8	10	0	21	9	69	2	10	31
Influenza: type A*	7	9	0	20	9	49	2	8	26
Influenza: type B*	1	1	0	1	0	20	0	2	5
Influenza: : NOS*	0	0	0	0	0	0	0	0	0
Legionnaires' disease: total*	1	1	0	0	6	1	1	1	0
Legionnaires' disease: *L.longbeachae**	0	1	0	0	3	0	1	1	0
Legionnaires' disease: *L. pneumophila**	1	0	0	0	3	1	0	0	0
Legionnaires' disease: other*	0	0	0	0	0	0	0	0	0
Leprosy	0	0	0	0	0	0	0	0	0
Leptospirosis*	0	1	0	1	2	6	12	4	9
Listeriosis*	0	0	0	0	0	1	0	0	2
Malaria*	9	1	0	0	0	9	0	1	2
Measles: total	0	0	1	0	0	0	0	0	1
Measles Lab Confirm*	0	0	0	0	0	0	0	0	1
Measles: other	0	0	1	0	0	0	0	0	0
Meningococcal disease (invasive): total	4	4	2	3	3	21	2	2	5
Meningococcal disease: type B*	2	0	0	1	3	18	1	1	4
Meningococcal disease: type C*	2	4	0	0	0	2	1	0	0
Meningococcal disease: type W135*	0	0	1	0	0	1	0	0	0
Meningococcal disease: type Y*	0	0	0	0	0	0	0	0	1
Meningococcal disease: other	0	0	1	2	0	0	0	1	0
Mumps*	1	0	0	3	0	3	0	0	0
Paratyphoid*	0	0	0	0	0	0	0	0	0
Pertussis	124	86	8	229	73	423	58	89	114
Pneumococcal disease: invasive*	28	24	8	11	21	110	9	36	23
Psittacosis*	8	1	0	1	4	23	10	4	5
Q fever*	5	8	11	65	6	12	54	21	23
Rubella: total*	0	0	0	0	0	0	0	0	1
Rubella*	0	0	0	0	0	0	0	0	1
Rubella: congenital*	0	0	0	0	0	0	0	0	0
Salmonellosis*	74	40	17	33	41	130	102	105	196
Shigellosis*	2	0	3	0	3	2	9	3	9
Syphilis: total	9	4	22	7	13	17	13	7	22
Syphilis: infectious*+	6	0	1	0	1	9	3	0	9
Syphilis: other*	3	4	21	7	12	8	10	7	13
Tuberculosis*	2	3	2	1	1	12	0	6	2
Typhoid*	0	0	1	0	0	0	1	0	0
Verotoxigenic *Escherichia coli* infections*	0	0	0	0	0	0	0	0	0

year of onset =the earlier of patient reported onset date, specimen date or date of notification
* laboratory-confirmed cases only NOS = not otherwise specified
+ includes syphilis primary, syphilis secondary, syphilis < 1 yr duration and syphilis-newly acquired
Area health service population estimates 2004:
CCA = Central Coast Area (309 425) CSA = Central Sydney Area (503 030) FWA = Far West Area (47 656) GMA = Greater Murray Area (258 985)
HUN = Hunter Area (547 325) ILL = Illawarra Area (355 533) MAC = Macquarie Area (103 907) MNC = Mid North Coast Area (270 433)
MWA = Mid Western Area (168 363) NEA = New England Area (172 560) NRA = Northern Rivers Area (273 731) NSA = North Sydney Area (788 117)
SA = Southern Area (188 744) SES= South Eastern Sydney (785 045) SWS = South Western Sydney (823 429) WEN = Wentworth Area (327 059)
WSA = Western Sydney Area (711 165) TOTAL = Total population in NSW (6 634 507)

TABLE 4 *continued*

NUMBER OF DISEASE NOTIFICATIONS BY AREA HEALTH SERVICE OF RESIDENCE (2005 AHS BOUNDARIES), NSW, 2004#

	Northern Sydney/ Central Coast		South Eastern Syd/ Illawarra		Sydney South West		Sydney West		
Conditions	**CCA**	**NSA**	**ILL**	**SES**	**CSA**	**SWS**	**WEN**	**WSA**	**TOTAL [(a)]**
AIDS	2	2	4	26	17	6	2	7	82
Adverse event after immunisation	13	8	2	19	7	12	6	13	183
Arbovirus infection: total*	25	24	20	15	4	7	14	10	1147
Barmah Forest virus infection*	4	3	6	1	1	0	1	0	403
Ross River virus infection*	21	15	14	9	3	5	11	7	700
Arboviral: other*	0	6	0	5	0	2	2	3	44
Blood lead level ≥ 15μg/dl*	9	13	19	7	13	46	9	40	298
Botulism	0	0	0	0	0	0	0	0	1
Brucellosis*	0	0	0	1	2	1	0	1	7
Chlamydia*	358	1099	376	1876	1102	717	305	794	10020
Cholera*	0	0	0	0	0	0	1	0	1
Creutzfeldt-Jakob disease*	0	2	0	0	0	0	2	0	6
Cryptosporidiosis*	4	21	9	56	25	29	19	30	357
Giardiasis*	53	220	45	206	91	85	70	164	1232
Gonorrhoea*	15	99	38	580	347	72	21	70	1444
H.influenzae type b: total*	0	0	0	1	0	0	2	0	5
H.influenzae type b epiglottitis*	0	0	0	1	0	0	0	0	3
H.influenzae type b septicaemia*	0	0	0	0	0	0	2	0	2
Hepatitis A*	7	18	3	11	21	26	1	27	137
Hepatitis B: total*	41	327	26	394	515	730	49	493	2835
Hepatitis B: acute viral*	0	2	3	7	3	9	0	0	32
Hepatitis B: other*	41	325	23	387	512	721	49	493	2803
Hepatitis C: total*	228	243	226	573	461	670	179	401	4974
Hepatitis C: acute viral*	0	1	2	0	0	0	0	0	12
Hepatitis C: other*	228	242	224	573	461	670	179	401	4962
Hepatitis D*	0	0	1	1	0	4	0	4	14
Hepatitis E*	0	0	0	4	1	1	1	0	8
HIV infection*	10	25	13	136	101	23	5	27	404
Haemolytic uraemic syndrome	1	1	1	0	0	2	1	0	9
Influenza: total*	8	115	15	316	80	132	17	162	1012
Influenza: type A*	7	103	14	249	43	113	15	142	823
Influenza: type B*	1	8	0	67	16	19	1	20	162
Influenza: : NOS*	0	4	1	0	21	0	1	0	27
Legionnaires' disease: total*	4	8	18	18	3	5	3	8	79
Legionnaires' disease: *L.longbeachae**	2	1	9	3	0	1	1	3	27
Legionnaires' disease: *L. pneumophila**	2	7	9	14	3	4	2	5	51
Legionnaires' disease: other*	0	0	0	1	0	0	0	0	1
Leprosy	0	0	0	0	1	1	0	1	3
Leptospirosis*	0	1	1	1	0	1	0	0	40
Listeriosis*	1	7	0	12	2	2	3	0	30
Malaria*	2	12	2	15	5	15	4	20	101
Measles: total	0	0	0	5	1	1	1	2	12
Measles Lab Confirm*	0	0	0	5	1	1	1	2	11
Measles: other	0	0	0	0	0	0	0	0	1
Meningococcal disease (invasive): total	3	19	12	23	15	14	6	10	148
Meningococcal disease: type B*	3	6	6	10	10	7	4	5	81
Meningococcal disease: type C*	0	6	2	3	1	2	1	0	24
Meningococcal disease: type W135*	0	1	0	2	0	0	0	0	5
Meningococcal disease: type Y*	0	0	0	0	0	1	1	0	3
Meningococcal disease: other	0	6	4	8	4	4	0	5	35
Mumps*	3	15	6	12	8	6	1	6	65
Paratyphoid*	0	1	0	2	0	3	0	3	10
Pertussis	114	350	144	529	276	306	228	386	3540
Pneumococcal disease: invasive*	50	96	47	116	74	90	51	108	905
Psittacosis*	0	2	6	3	1	3	7	2	80
Q fever*	2	2	7	1	0	3	0	2	222
Rubella: total*	1	4	3	4	4	0	0	1	18
Rubella*	1	4	3	4	3	0	0	1	17
Rubella: congenital*	0	0	0	0	1	0	0	0	1
Salmonellosis*	90	247	60	246	147	232	122	235	2132
Shigellosis*	3	12	0	11	11	6	0	22	96
Syphilis: total	22	95	16	245	199	244	15	85	1047
Syphilis: infectious*+	1	4	4	159	77	7	0	19	301
Syphilis; other*	21	91	12	86	122	237	15	66	746
Tuberculosis*	9	45	3	79	75	77	15	87	426
Typhoid*	0	2	0	9	2	8	0	16	39
Verotoxigenic *Escherichia coli* infections*	0	0	0	2	0	0	1	1	3

year of onset =the earlier of patient reported onset date, specimen date or date of notification
* laboratory-confirmed cases only NOS = not otherwise specified
(a) = includes cases from Justice Health Service and with unknown public health unit
+ includes syphilis primary, syphilis secondary, syphilis < 1 yr duration and syphilis-newly acquired
Area health service population estimates 2004:
CCA = Central Coast Area (309 425) CSA = Central Sydney Area (503 030) FWA = Far West Area (47 656) GMA = Greater Murray Area (258 985)
HUN = Hunter Area (547 325) ILL = Illawarra Area (355 533) MAC = Macquarie Area (103 907) MNC = Mid North Coast Area (270 433)
MWA = Mid Western Area (168 363) NEA = New England Area (172 560) NRA = Northern Rivers Area (273 731) NSA = North Sydney Area (788 117)
SA = Southern Area (188 744) SES= South Eastern Sydney (785 045) SWS = South Western Sydney (823 429) WEN = Wentworth Area (327 059)
WSA = Western Sydney Area (711 165) TOTAL = Total population in NSW (6 634 507)

TABLE 5

DISEASE NOTIFICATIONS BY AGE GROUP AND SEX OF THE CASE, NSW, 2004#

	0–4 yrs		5–24 yrs		25–44 yrs		45–64 yrs		65 + yrs		Total [(a)]		
Conditions	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**Total**
AIDS	0	0	0	0	41	4	32	1	2	1	75	6	82[b]
Adverse event after immunisation	38	35	36	43	2	13	4	7	4	1	84	99	183
Arbovirus infection: total*	4	3	56	53	210	240	248	197	70	63	588	556	1147[a]
Barmah Forest virus infection*	1	1	23	16	62	71	96	69	33	28	215	185	403[a]
Ross River virus infection*	3	2	26	33	137	158	147	124	36	34	349	351	700
Arboviral: other*	0	0	7	4	11	11	5	4	1	1	24	20	44
Blood lead level ≥ 15μg/dl*	44	17	27	2	108	5	82	7	6	0	267	31	298
Botulism	0	1	0	0	0	0	0	0	0	0	0	1	1
Brucellosis*	0	0	2	1	2	0	1	0	1	0	6	1	7
Chlamydia*	20	18	1715	3797	2222	1812	287	107	15	4	4260	5738	10020[a]
Cholera*	0	0	0	0	0	0	1	0	0	0	1	0	1
Creutzfeldt-Jakob disease*	0	0	0	0	0	0	1	2	0	3	1	5	6
Cryptosporidiosis*	88	72	52	69	28	28	6	5	2	5	176	179	357[a]
Giardiasis*	183	144	139	111	215	201	106	79	21	32	664	567	1232[a]
Gonorrhoea*	2	0	294	74	831	81	138	8	12	0	1277	163	1444[a]
H.influenzae type b: total*	1	0	1	0	0	1	0	1	1	0	3	2	5
H.influenzae type b epiglottitis*	0	0	1	0	0	0	0	1	1	0	2	1	3
H.influenzae type b septicaemia*	1	0	0	0	0	1	0	0	0	0	1	1	2
Hepatitis A*	4	3	29	16	23	21	17	6	7	11	80	57	137
Hepatitis B: total*	9	2	225	232	834	704	413	270	64	63	1546	1271	
Hepatitis B: acute viral*	0	0	6	4	16	4	2	0	0	0	24	8	32
Hepatitis B: other*	9	2	219	228	818	700	411	270	64	63	1522	1263	2803 [a,b]
Hepatitis C: total*	22	8	397	332	1833	1084	762	364	82	66	3099	1854	4974[a]
Hepatitis C: acute viral*	0	0	1	2	3	4	2	0	0	0	6	6	12
Hepatitis C: other*	22	8	396	330	1830	1080	760	364	82	66	3093	1848	4962[a]
Hepatitis D*	0	0	0	0	5	2	4	2	0	1	9	5	14
Hepatitis E*	0	0	0	1	4	0	0	2	0	1	4	4	8
HIV infection*	0	1	19	9	254	37	63	11	4	2	340	60	404[a]
Haemolytic uraemic syndrome	1	3	0	0	0	0	1	1	0	3	2	7	9
Influenza: total*	77	67	62	81	124	167	89	128	98	116	450	560	1012[a]
Influenza: type A*	71	57	52	74	107	129	62	101	81	86	373	448	823[a]
Influenza: type B*	5	9	8	7	16	31	23	24	14	25	66	96	162
Influenza: : NOS*	1	1	2	0	1	7	4	3	3	5	11	16	27
Legionnaires' disease: total*	0	0	3	0	4	3	26	9	29	5	62	17	79
Legionnaires' disease: *L.longbeachae**	0	0	1	0	0	1	6	2	14	3	21	6	27
Legionnaires' disease: *L. pneumophila**	0	0	2	0	4	2	20	7	14	2	40	11	51
Legionnaires' disease: other*	0	0	0	0	0	0	0	0	1	0	1	0	1
Leprosy	0	0	0	0	0	0	0	1	0	2	0	3	3
Leptospirosis*	0	0	4	1	13	3	12	4	2	1	31	9	40
Listeriosis*	0	1	0	0	1	2	5	2	13	6	19	11	30
Malaria*	2	2	20	14	38	9	9	6	0	0	69	31	101[a]
Measles: total	2	1	2	1	4	2	0	0	0	0	8	4	12
Measles Lab Confirm*	2	1	1	1	4	2	0	0	0	0	7	4	11
Measles: other	0	0	1	0	0	0	0	0	0	0	1	0	1
Meningococcal disease (invasive): total	27	23	24	23	11	7	12	16	2	3	76	72	148
Meningococcal disease: type B*	20	17	13	13	3	1	4	7	2	1	42	39	81
Meningococcal disease: type C*	1	0	5	2	4	3	5	3	0	1	15	9	24
Meningococcal disease: type W135*	0	0	1	0	0	0	1	3	0	0	2	3	5
Meningococcal disease: type Y*	0	0	1	0	0	0	1	0	0	1	2	1	3
Meningococcal disease: other	6	6	4	8	4	3	1	3	0	0	15	20	35
Mumps*	5	1	7	2	14	15	8	7	2	4	36	29	65
Paratyphoid*	0	2	4	0	1	3	0	0	0	0	5	5	10
Pertussis	131	111	424	513	389	575	384	633	164	214	1492	2046	3540[a]
Pneumococcal disease: invasive*	160	108	36	22	62	62	117	61	140	135	515	388	905[a]
Psittacosis*	0	0	2	4	13	13	18	17	9	4	42	38	80
Q fever*	2	0	25	8	67	22	64	19	10	4	168	53	222[b]
Rubella: total*	4	1	3	5	3	2	0	0	0	0	10	8	18
Rubella*	3	1	3	5	3	2	0	0	0	0	9	8	17
Rubella: congenital*	1	0	0	0	0	0	0	0	0	0	1	0	1
Salmonellosis*	362	273	337	286	215	196	142	139	72	102	1128	996	2132[a]
Shigellosis*	6	11	10	12	15	19	9	9	2	2	42	53	96[a]
Syphilis: total	2	2	42	44	355	177	239	49	87	48	725	320	1047[a]
Syphilis: infectious*+	0	1	23	8	198	14	51	2	3	1	275	26	301
Syphilis other*	2	1	19	36	157	163	188	47	84	47	450	294	746[a]
Tuberculosis*	3	3	31	34	79	98	38	35	61	42	212	212	426[b]
Typhoid*	4	0	5	9	9	7	2	2	0	1	20	19	39
Verotoxigenic *Escherichia coli* infections*	0	0	0	1	1	0	0	0	0	1	1	2	3

onset =the earlier of patient reported onset date, specimen date or date of notification
* laboratory-confirmed cases only NOS = not otherwise specified
+ includes syphilis primary, syphilis secondary, syphilis < 1 yr duration and syphilis-newly acquired
a = includes cases with unknown age and sex
b = includes 1 transgender case with 25–44 age group

TABLE 6

REPORTED DEATHS OF RESIDENTS BY YEAR OF ONSET OF ILLNESS#, NSW, 1991 TO 2004

Conditions	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Adverse event after immunisation	0	1	0	1	0	2	1	0	1	1	2	1	0	0
Arbovirus infection: total*	2	1	0	0	0	0	0	0	0	0	1	0	0	0
Ross River virus infections*	2	1	0	0	0	0	0	0	0	0	1	0	0	0
Blood lead level ≥ 15µg/dl*	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Chlamydia trachomatis infections*	not notifiable until August 1998								0	0	0	1	0	0
Cryptosporidiosis*	not notifiable until December 1996						0	0	0	0	0	0	0	0
Giardiasis*	not notifiable until August 1998								0	1	0	0	0	0
Gonorrhoea*	0	1	0	0	0	0	0	1	0	0	0	0	0	0
H.influenzae type b: total*	4	4	4	1	0	2	0	0	0	1	1	0	0	0
H.influenzae type b epiglottitis*	0	1	0	0	0	0	0	0	0	1	0	0	0	0
H.influenzae type b infection (NOS)*	2	0	1	0	0	0	0	0	0	0	1	0	0	0
H.influenzae type b meningitis*	2	3	3	0	0	0	0	0	0	0	0	0	0	0
H.influenzae type b septicaemia*	0	0	0	1	0	2	0	0	0	0	0	0	0	0
Hepatitis A*	2	1	0	0	0	0	1	2	0	0	0	1	0	0
Hepatitis B: total*	4	5	6	1	1	1	1	1	1	1	4	1	2	0
Hepatitis B: acute viral*	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Hepatitis B: other*	4	5	5	1	1	1	1	1	1	1	4	1	1	0
Hepatitis C: total*	4	12	6	6	8	15	23	13	17	20	18	10	8	6
Hepatitis C: acute viral*	0	1	0	0	0	0	0	0	0	0	2	0	0	0
Hepatitis C: other*	4	11	6	6	8	15	23	13	17	20	16	10	8	6
Hepatitis E*	0	0	0	0	0	0	0	0	0	0	1	0	0	0
HIV infection: total*£	349	336	390	432	364	281	132	74	70	81	49	57	46	52
AIDS	349	335	390	432	364	280	132	74	69	79	45	41	41	32
Haemolytic uraemic syndrome	not notifiable until December 1996						0	0	1	1	0	1	0	1
Influenza: total*	not notifiable until December 2000										0	0	1	1
Influenza—Type A*	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Legionnaires' disease: total*	6	12	8	8	7	9	2	6	4	2	3	1	2	5
Legionnaires' disease—L. longbeachae*	0	1	2	0	1	1	0	5	1	1	1	1	0	3
Legionnaires' disease—*L. pneumophila**	1	10	5	3	4	6	2	0	2	1	2	0	2	2
Legionnaires' disease—other	5	1	1	5	2	2	0	1	1	0	0	0	0	0
Leptospirosis*	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Listeriosis*	0	0	2	2	2	9	1	5	4	4	3	1	6	3
Malaria*	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Measles: total	3	2	0	0	0	0	0	0	0	0	0	0	0	0
Measles laboratory confirmed*	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Measles: other	2	2	0	0	0	0	0	0	0	0	0	0	0	0
Meningococcal disease (invasive): total	0	0	2	2	3	2	6	13	12	11	7	18	12	6
Meningococcal disease—Type B*	0	0	1	1	3	0	4	2	7	6	2	8	6	4
Meningococcal disease—Type C*	0	0	1	1	0	2	2	10	4	4	5	10	6	1
Meningococcal disease—Type W135*	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Meningococcal disease—Type Y*	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Meningococcal disease—other	3	8	9	13	4	5	1	4	2	3	0	1	2	1
Pertussis	0	0	0	0	2	2	3	1	1	2	0	0	1	1
Pneumococcal disease: invasive*	not notifiable until December 2000									0	6	96	68	87
Psittacosis*	not notifiable until December 2000									0	1	1	0	0
Q fever*	0	0	0	1	0	1	0	0	2	0	0	1	0	0
Salmonella infection*	3	0	0	0	4	4	4	3	3	1	2	3	0	1
Syphilis: total	0	0	0	1	1	0	1	0	1	2	1	1	1	0
Syphilis infection*+	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Syphilis congenital	0	0	0	1	1	0	0	0	0	1	0	0	0	0
Syphilis other*	0	0	0	0	0	0	1	0	1	1	1	0	1	0
Tetanus	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Tuberculosis*	10	26	31	25	23	16	21	25	29	40	33	39	19	0

year of onset =the earlier of patient reported onset date, specimen date or date of notification
* laboratory-confirmed cases only NOS = not otherwise specified
£ deaths in people with HIV may be reported as related to AIDS or, where the cause is apparently unrelated, to their HIV infection
+ includes syphilis primary, syphilis secondary and syphilis < 1 yr duration

IMPORTED MALARIA NOTIFIED IN NEW SOUTH WALES AND THE AUSTRALIAN CAPITAL TERRITORY, INCLUDING TRENDS IN NOTIFICATIONS OF *PLASMODIUM FALCIPARUM*, 1989 TO 2003

John Walker
Formerly with the Centre for Infectious Diseases and Microbiology at Westmead Hospital

Richard Taylor
School of Population Health
The University of Queensland

Melanie Figtree
Resident Medical Officer
Royal North Shore Hospital

Malaria is the most common tropical parasitic infection imported into NSW. This article presents a review of all cases of malaria diagnosed and notified in NSW and the Australian Capital Territory from 1989 to the end of 2003. Of the four species of malaria infecting humans, *Plasmodium falciparum*, *P. vivax*, *P. ovale* and *P. malariae, P. falciparum* is most likely to be associated with serious illness and death. Therefore, trends in the occurrence of this species over the period are examined. This information is of value to clinicians and public health professionals in highlighting both the importance of rapid and accurate diagnosis of malaria and the changing trends in the origin of imported cases.

This study uses data collected by the NSW Malaria Register. The register, which closed at the end of 2003, had its origins in the Australian Malaria Register that was established at the School of Public Health and Tropical Medicine, University of Sydney, in 1969. The NSW component became a separate entity, maintained at the Centre for Infectious Diseases and Microbiology, Westmead Hospital, in 1988, shortly after the School of Public Health and Tropical Medicine closed in 1987.

TABLE 1

NUMBER OF MALARIA INFECTIONS NOTIFIED IN NEW SOUTH WALES AND THE AUSTRALIAN CAPITAL TERRITORY, 1989–2003

Year	All malaria species (*n*)	*P. falciparum* infections	
		n	%
1989	149	38	25
1990	202	50	25
1991	230	52	23
1992	193	38	20
1993	226	42	19
1994	231	62	27
1995	206	49	24
1996	261	50	19
1997	213	66	31
1998	189	50	26
1999	220	63	29
2000	248	49	20
2001	197	54	27
2002	145	43	30
2003	164	53	32

Source: NSW Malaria Register

METHODS

This is a retrospective case series of all microscopically confirmed malaria infections notified in NSW and the Australian Capital Territory between 1989 and 2003. Blood films from all notified malaria infections were sent to the NSW Malaria Reference Laboratory (at the Institute for Clinical Pathology and Medical Research, Westmead Hospital) for confirmation of diagnosis. The accuracy of the original diagnosis was assessed by an expert malaria microscopist who reviewed all submitted films and reported back to the referring laboratory, thus providing quality assurance on malaria diagnosis. Additional information about the patient's illness was obtained by sending the referring doctor a form to complete.

The information collected about each case included the geographic region in which the illness was acquired, the interval between onset of symptoms and diagnosis, accuracy of species identification, parasite count, and prophylaxis usage. Disease outcome was classified as non-severe, severe, or fatal. Severe infections were those where the patient required admission to an intensive care unit.

The information describing the geographic origin of infections was categorised into eight regions based on epidemiological rather than political criteria. For example, the geographic region 'Australasia' used here includes Papua New Guinea, the Solomon Islands, Vanuatu, West Papua and Australia, a grouping based largely on the similarity of the *Anopheles* vectors in the region.

Data were analysed using EpiInfo Version 6.04 and Statcalc. During the period of the study 85 per cent of questionnaires sent to referring doctors were completed. To avoid distortion of the results of analyses, cases for which information on a factor was missing (date of onset, for example), were excluded from the analysis of that factor.

The efficacy of chemoprophylaxis was examined through the analysis of information describing its use by 592 Australian citizens who acquired malaria in Papua New Guinea. This group was selected because Australian citizens would almost certainly be non-immune to malaria and are likely to have received some pre-travel advice regarding the use of malaria prophylaxis. The analysis was restricted to malaria acquired in Papua New Guinea to minimise variability in transmission patterns between geographical regions, which have different vector species.

RESULTS

There were 3,074 malaria infections notified in NSW for the period. The number of notifications for each year is presented in Table 1.

Information describing the geographic location where the patient acquired their infection was available for 2,933 (95%) cases (see Table 2). Forty per cent of the imported cases came from Papua New Guinea.

The proportion of cases imported from Africa increased significantly from 14 per cent in 1995 to 23 per cent in 1996 and this increase has persisted (see Table 3) (Chi square = 38.9; p = 0.000).

Three infections of *Plasmodium vivax* were acquired locally: two congenital infections occurred in infants born in Sydney to mothers born overseas, and one infection diagnosed in Sydney was acquired in far north Queensland in 2002.

Species of imported malaria

All four species of human malaria are imported into NSW, but *Plasmodium vivax* is the most common. The numbers of notifications involving each species are presented in Table 4. There were 13 blood films referred to the reference laboratory in which the species could not be determined, either because there was a very low density of parasites or the blood film was of a poor quality. These infections are listed in the table as indeterminate species.

Reason stated by patient for their presence in malarious country

The reasons cited by patients for being in a malarious country were available for 2,648 cases and are summarised in Table 5. Most people acquire malaria while travelling overseas on holiday.

P. falciparum infections

Table 1 presents the number of notifications of *P. falciparum* infections in NSW for each year in the period 1989 to 2003; it also presents the notifications as a proportion of all malaria infections that were notified in each year. Analysis of these data for a linear trend reveals there has been a slight but significant increase in the proportion of *P. falciparum* infections over the period (Chi square = 6.07; p = 0.014).

Severity of infections

In individuals who are not immune to malaria there is usually a direct relationship between the density of parasitaemia and the severity of infections with *P. falciparum*. Parasite density counts were available for 209 *P. falciparum* infections and these were stratified as to the severity of the infection (see Table 6). There was a significant relationship (chi square 46.7; p = 0.000) between the severity of the illness and the percentage of red blood cells infected with parasites. There were three deaths due to malaria in this period.

TABLE 2

GEOGRAPHIC REGION OF ORIGIN OF IMPORTED MALARIA INFECTIONS IN NEW SOUTH WALES AND THE AUSTRALIAN CAPITAL TERRITORY 1989–2003 AND PROPORTION OF P. FALCIPARUM

Geographic region	All malaria species *n*	%	Proportion of *P.falciparum* (%)
Australasia	1,506	51.0	21
South East Asia	552	19.0	18
Africa	469	16.0	62
Southern Asia	378	13.0	6
Central America	14	0.5	7
South America	7	0.2	14
East Asia	4	0.1	0
West Asia	3	0.1	0

Source: NSW Malaria Register

TABLE 3

COMPARISON OF PROPORTION OF MALARIA CASES IMPORTED FROM AFRICA AND OTHER REGIONS FOR THE PERIODS 1989–1995 AND 1996–2003

Years	Africa		Other regions	
	n	%	*n*	%
1989–1995	160	11.5	1,227	88.5
1996– 2003	309	19.9	1,237	80.1

Source: NSW Malaria Register

TABLE 4

SPECIES OF IMPORTED MALARIA IN NSW, 1989–2003

Malaria species	Infections (*n*)
Plasmodium falciparum	737
P. falciparum and *P. malariae*	1
P. falciparum and *P. ovale*	3
P. falciparum and *P. vivax*	18
P. vivax	2,163
P. vivax and *P. malariae*	1
P. ovale	95
P. malariae	43
Indeterminate species	13
Total	3,074

Source: NSW Malaria Register

Onset of illness

For most cases of malaria (88 per cent) the onset of symptoms occurred after the patient had arrived in Australia. However, in 27 per cent of infections with *P. falciparum*, the onset of illness occurred while the patient was overseas. The interval between onset of symptoms and diagnosis was slightly longer for the severe or fatal infections (median 6 days) than for the non-severe *P. falciparum* infections (median three days) (Chi square = 10.7, df = 1, p = 0.00).

TABLE 5

REASON STATED BY THE PATIENT FOR THEIR PRESENCE IN MALARIOUS COUNTRY

Reason for presence in malarious country	*n*	%	Patients with *P. falciparum*
Holiday travel	913	34	26
Business travel or employment or companion	716	27	30
Resident of malarious country visiting or emigrating to Australia	625	24	28
Resident of Australia visiting relatives in country of birth	233	9	42
Education-related travel to malarious country	27	1	18
Other reason (including travel as member of Australian Defence Forces)	134	5	2

Source: NSW Malaria Register

TABLE 6

MEDIAN PARASITE DENSITY FOR *P. FALCIPARUM* INFECTIONS AND SEVERITY OF INFECTION IN 209 PATIENTS

Clinical severity of malaria infection	Number of patients	Percentage of red blood cells infected
Severe and fatal infections	25	9.9
Non-severe infections	184	0.4

Source: NSW Malaria Register

TABLE 7

PROPHYLAXIS USAGE AMONG PATIENTS WITH MALARIA

Patients	Took prophylaxis		Took no prophylaxis	
	n	%	*n*	%
Infected with *P. falciparum*	53	12	41	26
Infected with another species	380	88	118	74

Source: NSW Malaria Register

Diagnosis

The diagnostic error rate was higher for cases with *P. falciparum* (15 per cent incorrect) than for other species of malaria (eight per cent). The most frequent error (22 per cent of total) was *P. falciparum* being identified as *P. vivax*. In seven per cent of misdiagnoses the infection was missed at the initial examination of the blood film, but subsequently detected by another laboratory.

Prophylaxis usage

For the 592 Australian citizens who acquired malaria in Papua New Guinea, the risk of acquiring *P. falciparum* was significantly greater for those who did not use prophylaxis (see Table 7) (Chi square = 15.98; p = 0.000).

The highest rate of *P. falciparum* infections occurred in patients who had visited relatives in their country of birth (Table 5); of these 62 per cent were not taking prophylaxis, compared with 41 per cent of patients who did not take prophylaxis when travelling for other reasons.

DISCUSSION

Malaria is a laboratory notifiable infection in all states and territories in Australia. It is likely that most infections are reported. In the case of the infections notified to the NSW Malaria Register, this was highly probable because the referring laboratories received free quality assurance on their diagnostic capability. Although it was not mandatory for referring doctors to provide information concerning their patients, the majority did return the questionnaire.

Despite decades of attempts at control, *P. falciparum* remains one of the major causes of death in the world and non-immune travellers are especially vulnerable.[1] This species is widely distributed in tropical and sub-tropical regions but is particularly prevalent in African countries. Hence, travellers to that continent are more likely, if they become infected with malaria, to acquire *P. falciparum*. Whether the increase in infections imported from Africa that has persisted since 1996 is due to increased travel to the region or to the deteriorating malaria situation there, is not known.

One issue of concern is the frequency with which travellers become ill with *P. falciparum* whilst still overseas. The signs and symptoms of this infection are non-specific and mimic common illnesses such as influenza, making it likely that some individuals will not seek medical attention as soon as they would in their home environment.

The major risk factor for developing severe malaria is a delay in the diagnosis and in establishing appropriate management.[2] In this study the median time between the onset of symptoms and diagnosis for non-severe infections was three days, while for the severe and fatal infections the interval was six days. This delay often occurred because the patient had not sought medical attention. However, in one of the three fatal infections no blood films were made at the initial presentation despite the patient providing a suggestive history. The other two deaths illustrate the unpredictable nature of *P. falciparum* infections. In each, the diagnosis was made and initially successful management begun. However, both patients suddenly and unexpectedly deteriorated and died.

The much higher density of parasitaemia in the patients with severe and fatal infections attests to the need for early

diagnosis and treatment. Consequently, the high diagnostic error rate, especially that involving *P. falciparum*, is of concern. In six of the 25 severe infections the diagnosis was initially incorrect. New, rapid diagnostic tests specific for *P. falciparum* should help address this problem.[3] The difficulty that some laboratories have with malaria diagnosis highlights the contribution that can be provided by a diagnostic reference laboratory.

The increasing drug resistance of malaria parasites and the breakthroughs in illness that occur following incorrect use of prophylaxis have led to suggestions that anti-malarial prophylaxis is not efficacious. While prophylaxis cannot prevent late onset infections with *P. vivax* or *P. ovale* [4], the findings presented here for Australian citizens travelling to Papua New Guinea strongly support its use for protection against *P. falciparum*.

Previous residents of malarious regions who have emigrated to developed countries such as Australia are at risk of acquiring malaria when they visit their previous home.[5] Interventions for these groups could include information about the prevention of malaria to be included in ethnic language newspapers or television networks, and in local medical centres.

There has been a recent decline in the total number of malaria infections notified in NSW. There has, however, been an increase in the number of infections acquired in Africa and because most of these are caused by the potentially fatal *P. falciparum*, malaria must remain high on the list of differential diagnoses for febrile travellers.

REFERENCES

1. World Health Organization. *International travel and health*. Geneva, World Health Organization, 2002.
2. World Health Organization. Severe falciparum malaria. *Trans R Soc Trop Med Hyg* 2000 Apr; 94 Suppl 1: S1–90.
3. Playford EG, Walker J. Evaluation of the ICT Malaria P.f/P.v and the OptiMal rapid diagnostic tests for malaria in febrile returned travellers. *J Clin Microbiol* 2002; 40(11): 4166–71.
4. Taylor T, Strickland G. Malaria. In: Strickland G, editor *Hunter's tropical medicine and emerging infectious diseases,* 8th edition. Philadelphia: WB Saunders Company, 2000: 614–42.
5. Phillips-Howard PA, Bradley DJ, Blaze M, Hurn M. Malaria in Britain: 1977–86. *BMJ* 1988; 296: 245–8.

HEALTH IMPACT ASSESSMENT COLLOQUIUM: 9 DECEMBER 2005

The Centre for Health Equity Training, Research and Evaluation (CHETRE), in conjunction with the NSW Department of Health, is holding a colloquium on health impact assessment in NSW. The colloquium will provide an opportunity for anyone with an interest in health impact assessment to meet, network and learn from others.

The colloquium will address a range of issues including:

- What can we learn from the health impact assessments that have been undertaken?
- How can we build collaboration within and beyond the health sector to undertake health impact assessment?
- How does health impact assessment relate to other forms of assessment such as social impact assessment or environmental impact assessment?
- How are we building capacity?

The colloquium will be of interest to anyone who works with or wants to know more about health impact assessment; for example, workers in population health, local government, health promotion, urban planning and environmental health; health service planners; clinicians; community and allied health professionals; Aboriginal health workers; students; academics and community representatives.

DATE

Friday 9 December 2005, 9:00am–5:00pm

VENUE

Swiss Grand Hotel, Corner Campbell Parade and Beach Road, Bondi, NSW

COST

$50, including lunch

For more information please visit http://chetre.med.unsw.edu.au/hia/colloquium.htm or telephone (02) 9828 6230.

NSW TELEHEALTH INITIATIVE—2005 SYMPOSIUM

The NSW Telehealth Initiative was established in 1996 to improve access to health services, especially for people in rural and remote communities, by using telecommunications to link health services and provide local access to clinical advice, specialist consultation, education and training services.

> Many definitions for telehealth, telemedicine and e-health can be found. The NSW Health definition is: 'Telehealth is the transmission of images, voice and data between two or more health units via digital telecommunications, to provide clinical advice, consultation, education and training services'.

NSW Health has established one of the largest integrated telehealth networks in the world, with over 235 sites in public hospitals, community health centres, Aboriginal Medical Services, correctional health centres and the Mental Health Review Tribunal. Details of current telehealth services and sites can be found at the Department's telehealth website at *www.health.nsw.gov.au.*

The telehealth network supports clinical consultations, workforce training and health administration using videoconferencing and image capture, store and forward modalities. Examples of telehealth in operation include:

- clinicians in metropolitan and regional centres conduct consultations via videoconference link to patients in rural and remote towns
- rural clinicians and regional/metropolitan specialists regularly conduct case conferences to discuss patient progress and develop treatment plans supported by technology such as image capture and videoconferencing
- the telehealth videoconferencing network supports the delivery of staff training, peer support and collegiate networking across the State.

THE 2005 SYMPOSIUM

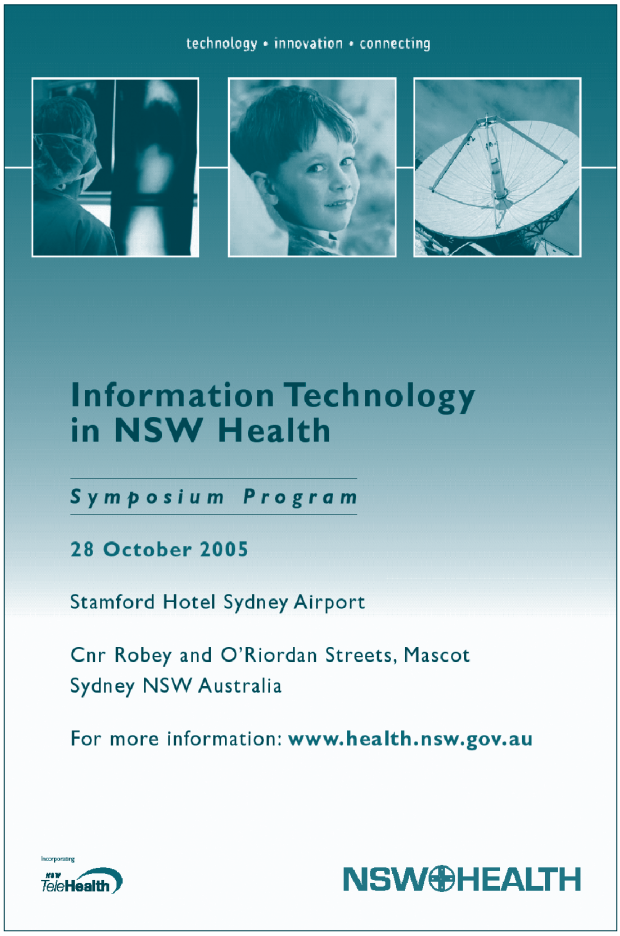
The 2005 Information Technology in NSW Health Symposium will provide an overview of the current status of telehealth and its proposed future developments.

The keynote speaker in the morning will be Dr Karl Kruszelnicki, Julius Sumner Miller Fellow at Sydney University, speaking on 'Great Moments in Future Medicine'. There will be three concurrent sessions throughout the day including:

- Electronic Health and Medical Records
- Telehealth: Delivering Health Care
- Clinical Tools: Using Best Practice to Deliver Services
- Clinical Services ReDesign Convergence with E-Health
- Standards and Architecture.

To view the program and register, please visit www.health.nsw.gov.au/pmd/telehealth/.

For more information regarding strategic information management and NSW Health Information Management and Technology Initiatives telephone (02) 9391 9857.



CELEBRATING 15 YEARS OF BUG BREAKFAST

Lynne Madden
Editor

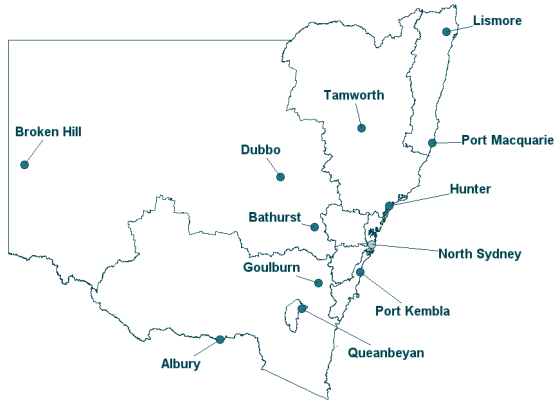
Jeremy McAnulty
Director, Communicable Diseases
NSW Department of Health

Bug Breakfast is the name given to a monthly series of hour-long breakfast seminars on communicable diseases delivered by the Division of Population Health of the NSW Department of Health. The Centre for Epidemiology and Research and the Centre for Health Protection coordinate the content and delivery of the sessions. First delivered in 1990, the purpose of Bug Breakfast is to keep participants abreast of current issues relating to the management of communicable diseases in NSW. It also forms part of the training for public health officer trainees.

The audience for Bug Breakfast has grown considerably over the past 15 years. Since 1999 the sessions have been made available to rural public health sites across NSW by videoconferencing through the resources of the NSW Telehealth Initiative. Currently 11 sites (see Figure 1) are routinely connected to Bug Breakfast, with the seminar transmitted from the live site at the NSW Department of Health, North Sydney. Over a hundred people regularly participate in each session.

FIGURE 1

VIDEOCONFERENCING SITES ROUTINELY CONNECTED TO BUG BREAKFAST



Here we describe two new developments: first, a series of Bug Breakfast web pages for the NSW Health Intranet site and second, a regular feature for the Bulletin, 'Bug Breakfast in the Bulletin', where the content of the recent Bug Breakfast will be summarised.

BUG BREAKFAST ON THE NSW HEALTH INTRANET

Carlie Naylor
NSW Public Health Officer Training Program
NSW Department of Health

To streamline the organisation of Bug Breakfast and ensure that all public health units in NSW have timely access to the information on each session, a series of Bug Breakfast web pages has been developed for the NSW Health Intranet site. Here we describe the content of each of those pages and where they can be accessed.

HOME PAGE

The Bug Breakfast home page provides a brief description of Bug Breakfast and presents the calendar of dates and session topics for the year. Guidelines have been developed to assist presenters when preparing PowerPoint presentations to be delivered via videoconferencing and these can also be accessed from this page.

PARTICIPANT INFORMATION PAGE

The *participant information* page contains a link to the promotional Bug Breakfast flyer, which has a list of locations that are receiving the session and local contact information. Eventually it is anticipated that where speakers make their PowerPoint presentations available these will be loaded onto the website prior to the session. Participants will then be able to access these presentations from this page. Feedback on Bug Breakfast sessions from participants is encouraged and to facilitate this process a Bug Breakfast email address has been established. Participants can click on the link and provide comments and suggestions about the session.

SITE REGISTRATION PAGE

The *site registration* web page allows public health units to register their site to participate via videoconference. The site registration form contains several fields, including a dropdown box containing session details, the public health unit name, the facilitator's contact information and the name of the videoconference site for the broadcast. Once the site registration form has been completed and submitted the user receives a message indicating whether they have been successful in registering their unit.

The June 2005 Bug Breakfast was the first session for which the Bug Breakfast web pages were operational. Several public health units accessed the web page, registered their attendance for the videoconference broadcast and provided feedback on the session.

BUG BREAKFAST IN THE *BULLETIN* OUTBREAKS: THE PAST, PRESENT AND FUTURE

Isabel Hess
NSW Public Health Officer Training Program
NSW Department of Health

Peter Curson
Department of Human Geography
Macquarie University, NSW

Aileen Plant
Centre for International Health
Curtin University of Technology, WA

Since its inception 15 years ago, Bug Breakfast has been an important venue for discussing outbreaks of communicable and, occasionally, non-communicable diseases. For its 15th anniversary celebration, the theme of Bug Breakfast was *Outbreaks of the Past, Present, and Future in New South Wales*.

THE PRESENT

Numerous outbreaks have been investigated by staff of the public health units and NSW Health over the past 15 years. To highlight the varying types of outbreaks that can occur, five representing different modes of transmission of infection were discussed.

Water borne outbreak

A statewide outbreak of cryptosporidiosis emerged during the summer of 1997/1998, when over 1,000 laboratory confirmed cases were notified to NSW Health.[1] Investigations, including a case control study and an environmental investigation, revealed a link to contaminated public swimming pools. In response, NSW Health developed new risk minimisation protocols for pools and spas[2], including the recommendation for regular super-chlorination of public swimming pools.

Food borne outbreak

A large outbreak of hepatitis A involving over 450 cases was identified in 1997.[3] A case control study linked illness to consumption of oysters. Further investigation identified a single contaminated estuary as the source of the oysters. The results of this investigation led to a clean-up program of the estuary in which the oysters were grown, and promoted the importance of clean estuaries in general.

Blood borne outbreak

Patient-to-patient transmission of HIV was reported to the NSW Department of Health in 1993.[4] Four patients were likely to have acquired HIV through inadequate infection control measures whilst having minor surgery. Infection control measures remain an important tool for controlling blood borne diseases.

Respiratory outbreak

A large outbreak of respiratory disease occurred among the passengers and crew of a cruise ship returning to Sydney in September 2000. Over 200 cases presented to the ship's medical clinic during the voyage.[5] A public health team met the ship off the coast of NSW to investigate. The cause was identified as an outbreak of influenza. In this outbreak, rapid test kits helped diagnosis. A history of prior influenza immunisation was not associated with a reduced risk of disease.

Zoonotic outbreak

An outbreak of psittacosis, including over 50 cases, was identified in the Blue Mountains in 2002.[6] A case control study linked illness to direct contact with live or dead wild birds, as well as lawn mowing without a grass catcher. This outbreak could easily have been missed had it not been for alert clinicians and a careful investigation. The risk of psittacosis may be reduced by avoiding contact with dust from birds.

THE PAST

Examination of the history of epidemics in NSW is important for a number of reasons. First, while most epidemics were not demographic crises, their psycho-social impact on society was large. They captured public attention and were responsible for fear, panic and hysteria. Second, in many cases they became the stimulus for public health reform. In particular they focused public attention on living and working conditions in NSW towns and cities. Third, they tested how governments manage extreme crises.

Notable historic outbreaks

The scarlet fever epidemic of 1875–76 possibly killed more than 1,500 young children in NSW, including almost 600 in Sydney, and produced the first tentative moves towards an infectious disease policy. The smallpox epidemics of 1881–82 and 1913–17 in Sydney, and the plague epidemic of 1900, saw the emergence of formal policies of isolation, quarantine, fumigation and cleansing, as well as vaccination.

THE FUTURE

It is important to note that outbreaks that are occurring today are likely to be occurring in the future. However, there are factors that will affect the presentation of future outbreaks, such as the increasing population, population movements and climate change.

Six diseases of potential future significance were described:

- influenza: an outbreak is a certainty and only a question of when
- hospital-acquired infections, including infections due to multi-resistant organisms
- Nipah virus: the virus was originally described in Malaysia and has spread from bats to pigs to humans. It is important for Australia because bat colonies from Malaysia to Melbourne interact and therefore provide a route for the virus to travel

- West Nile virus and Japanese encephalitis virus: both viruses could be a danger for Australia, more so Japanese encephalitis virus. The latter has caused disease in the Torres Strait Islands and has the potential to spread further south
- variant Creutzfeldt-Jacob disease: this disease is still not fully understood and Australians who have lived in countries where bovine spongiform encephalitis has occurred may be at risk
- HIV infection: clusters are still a possibility in some populations.

In order to control future outbreaks of these diseases, it is important to maintain good surveillance, adequate laboratory capacity and the capability to initiate appropriate interventions.

CONCLUSIONS

Investigating outbreaks of disease provides a unique opportunity to learn about the characteristics of the disease, such as the biology, epidemiology, control and prevention measures. Dealing with current diseases and an understanding of how we have managed in the past will help us to deal with unpredictable diseases of the future.

REFERENCES:

1. Puech MC, McAnulty JM, Lesjak M, et al. A statewide outbreak of cryptosporidiosis in New South Wales associated with swimming at public pools. *Epidemiol Infect.* 2001; 126: 389–96.
2. NSW Health Department. *Protocol for minimising the risk of cryptosporidium contamination in public swimming pools and spa pools.* Sydney, NSW Health Department, 1999.
3. Conaty S, Bird P, Bell G, et al. Hepatitis A in New South Wales, Australia, from consumption of oysters: the first reported outbreak. *Epidemiol Infect.* 2000; 124: 121–30.
4. Chant K, Lowe D, Rubin G, et al. Patient-to-patient transmission of HIV in private surgical consulting rooms [letter to the Editor]. *Lancet* 1993; 342: 1548–9.
5. Brotherton JML, Delpech VC, Gilbert GL, et al. A large outbreak of influenza A and B on a cruise ship causing widespread morbidity. *Epidemiol Infect.* 2003; 130: 263–71.
6. Telfer BL, Moberley SA, Hort KP, et al. Probable psittacosis outbreak linked to wild birds. *Emerg Infect Dis.* 2005; 11: 391–7.

The Bug Breakfast web pages can be accessed from the NSW Health Intranet site at the following web address: http://internal.health.nsw.gov.au/public-health/bugbreakfast/index.html. Links to the Bug Breakfast web page can also be found on the Communicable Diseases and the Public Health Training and Development Branch web pages.

COMMUNICABLE DISEASES REPORT, MARCH AND APRIL 2005

For updated information, including data and facts on specific diseases, visit www.health.nsw.gov.au and click on **Infectious Diseases.**

TRENDS

Tables 2 and 3 and Figure 1 show reports of communicable diseases received through to the end of March and April 2005 in NSW.

Reports of cases of the mosquito-borne **Ross River virus** (59 cases) and **Barmah Forest virus** (34 cases) infections increased in March, mainly in the North Coast and Hunter/New England Areas.

A rise in case reports of laboratory-confirmed **mumps** was identified earlier in 2005 (15 cases in January, 12 cases in February) and affected mainly men and women in their twenties in the Northern Sydney/Central Coast Area. Reports of cases declined to six in March and seven in April.

A large increase in reported cases of **malaria** (94 cases) occurred in March. This was largely due to screening of newly arrived refugees from Africa who settled in the Sydney West, Sydney South West and Hunter/New England Areas. These are all imported cases as the *Anopheles* mosquito required to transmit malaria does not survive in NSW.

ENTERIC DISEASE

Reports of diarrhoea due to **giardiasis** (151 cases) and **shigellosis** (11 cases) were elevated in March, although cases were scattered across several areas of the State and no common source for the outbreaks has been identified. The number of notifications of **cryptosporidiosis** continued to increase in March (41 cases) and April (69 cases) compared to the same period in 2004, signifying a later rise than usual for the summer period spanning 2004–2005 than for previous years. No common source outbreaks have been identified.

There have been 236 cases of **salmonellosis** caused by infection with *Salmonella* Typhimurium phage type 170/108 (STM 170/108) reported in NSW since mid-October 2004. A state-wide case-control study to identify the cause commenced in March. Eighty-three patients with *S*. Typhimurium and 49 disease-free individuals were interviewed. The aim of the study is to determine whether certain dietary risk factors are associated with STM170/108 infection. NSW Health is working with the NSW Food Authority to follow up any common food sources that are identified through the study.

The investigation into a community-wide outbreak of **salmonellosis** caused by infection with *Salmonella* Typhimurium phage type 197 continued, with 31 cases notified during February and March. Twenty-three patients were interviewed. The majority (19) were of Lebanese descent and a case-control study to identify the likely cause of the outbreak is underway.

An investigation commenced into an increase in the number of cases of ***Salmonella* Reading** (10 cases) in April, a rare serovar in NSW and Australia generally. Half of the patients lived in an area on the North Coast of NSW. No common links have been identified among patients.

PERTUSSIS

Pertussis remains a common cause of serious illness in the community. In babies symptoms can be severe (with the classic triad of chronic paroxysmal coughing, post tussive vomiting and inspiratory whooping), and in adults symptoms are generally milder (mainly an irritating chronic cough). Cases are infectious from the prodrome to up to three weeks after onset of the cough. The infection is spread by respiratory droplets, and close contacts (especially household members) are at risk of infection. While cases are presenting across the State, the number of notifications of pertussis has continued to fall since peaking in September 2004 (see: http://www.health.nsw.gov.au/data/diseases/pertussis.html). Several notable incidents have been reported in recent weeks and these are described below.

A pertussis case

The Hunter Population Health Unit reported that in early April 2005 it was notified that a health care worker who worked in obstetrics had been diagnosed with pertussis. The patient's symptoms—paroxysmal, non-productive cough without vomiting or an inspiratory whoop—had begun in late March 2005 and the patient had consulted a doctor a few days later. The doctor had taken a nasopharyngeal swab to test for pertussis using a polymerase chain reaction assay. The person had worked for several days before the diagnosis of pertussis was made, and therefore whilst infectious. The Hunter Population Health Unit recommended follow-up of those exposed. Twenty-one mothers and 22 babies were identified as contacts and advised to receive antibiotic prophylaxis to prevent infection. Three community contacts were identified and one of these was advised to have antibiotic prophylaxis because of a pre-existing chronic respiratory illness.

Cluster 1

The Penrith office of the Sydney West Area Health Service Centre for Population Health reported a case of pertussis in a health care worker at a local hospital. The worker reported a coughing illness lasting several weeks before medical attention was sought. The person had been working while infectious. The centre wrote to the parents of all babies born during the period the worker was infectoius, advising them to watch for and report any signs and symptoms of pertussis. One of the mothers reported suffering from a cough for approximately two weeks and was immediately tested for pertussis. The test was positive. Her baby had been in the neonatal intensive care unit for approximately five weeks since birth and the mother had visited the unit

regularly. Although the mother had been wearing a mask for most of the visits to the unit's nursery, prophylaxis was recommended for all infants in the unit exposed to the mother while she was infectious. Letters were written to families advising them to take their newborn infant to their doctor for antibiotics. No further cases of pertussis were identified among the infants in, or parents visiting, the neonatal intensive care unit. However, three of the mother's extended family members and a second healthcare worker at the hospital were subsequently diagnosed with pertussis. Alerts issued by the infection control staff at the hospital allowed prompt diagnosis and treatment of this case.

Cluster 2

The South Eastern Sydney and Illawarra Area Health Service Public Health Unit's Sydney office reported two pertussis clusters in maternity units during February and March.

In February the unit was notified of an obstetric worker who had become ill with pertussis at the end of January. Over the subsequent month, further confirmed cases were identified, including three staff members of the facility and two patients: an infant and a mother. The baby most likely acquired infection from the mother, as the baby developed symptoms approximately one month after discharge from the facility. Of interest, a healthy woman potentially exposed in hospital was tested by her family doctor and found to be positive for *Bordetella* IgA, suggestive of asymptomatic pertussis infection. The hospital was advised to write to patient contacts regarding the need for chemoprophylaxis and observation, and inform their medical attendants; staff were educated through in-service talks about pertussis and offered prophylaxis if appropriate, and the hospital brought forward its staff diphtheria-tetanus-pertussis vaccination program. Staff at the unit also telephoned patient contacts who had already been discharged to alert them to the need for prophylaxis and the significance of symptoms in mothers and babies. In all, as part of the public health response the this cluster, approximately 190 patients who were considered to be potentially exposed were provided with information in writing and/or by telephone. Of these, about 160 individuals were advised to take prophylactic antibiotics.

Cluster 3

The same public health unit office was notified in mid-March of two cases of confirmed pertussis related to a second obstetric unit, one in an infant born in the unit and one in an obstetric worker. These cases did not have contact with each other. The ensuing investigation identified two further confirmed staff cases and one in an antenatal clinic patient, all with onset in February or March. The occupational health and public health responses were similar to those actions taken in response to cluster 2. Information was provided to approximately 110 patient contacts and prophylactic antibiotics were recommended to approximately 30 patient contacts.

A pertussis outbreak

The Northern Sydney Public Health Unit reported an outbreak of pertussis in a local health care facility. Since January 2005, 10 cases in staff and 30 in residents of this facility had been notified. On advice from the public health unit, the facility implemented control measures (including rapid identification, testing and isolation of suspected cases) and the number of new cases declined. However, a small number of new cases in staff and patients were subsequently reported and it was suggested that vaccination might be helpful in preventing further cases. There is no evidence for the role of adult pertussis vaccination in the control of outbreaks, and the available formulation (a combined diphtheria-tetanus-pertussis booster vaccine) is relatively new and expensive. However, following discussions with the public health unit and the Communicable Diseases Branch of the NSW Department of Health, the facility decided to offer vaccination to susceptible patients and staff. As a result, 74 patients and 101 staff were vaccinated. The success of the intervention in controlling the outbreak is being evaluated.

Comment

These clusters and outbreaks illustrate how easily pertussis can spread among high-risk individuals. Public health interventions are aimed at controlling the spread of pertussis. These include maximising routine immunisation of the community in early childhood (at ages two, four and six months, with boosters at four years and in high school), and outbreak control. Outbreak control includes early identification and reporting to the local public health unit of possible cases, and the counselling and treatment of contacts at high risk of developing complications. Health care workers, particularly those who work with children, should be immunised in accordance with NSW Health's policy directive *Occupational Screening and Vaccination Against Infectious Diseases* (PD2005_338). Other people who regularly deal with young children, including new parents and childcare workers, should also be immunised against pertussis. Clinicians should report suspected cases to, and work with, their local public health unit to help identify close contacts at risk for severe disease (especially children aged under one year old, or other infants who are not fulling immunised), or who could transmit infection to these groups (for example pregnant women and susceptible people in child care centres).

REVISED TUBERCULOSIS GUIDELINES

NSW Health recently released three revised policy directives and one policy guideline relating to the provision of tuberculosis services. The *Tuberculosis Contact Tracing (PD2005_581)* policy directive has been revised and includes new advice related to the timing of contact tracing and notification of contacts, use of the *Public Health Act*, and procedures for screening exposed airline passengers. (See: www.health.nsw.gov.au/policies/PD/2005/PD2005_581.html.) The *Tuberculin Skin Testing*

(TST) (PD2005_580) policy directive has been revised to include information on composition, safety, dosage, storage, administration, consent, indications, interpretation, boosting, and use of alternative tests for the identification of infection with tuberculosis. (See: www.health.nsw.gov.au/policies/PD/2005/PD2005_580.html.)

The *Charging for Tuberculosis Related Services (PD2005_579)* policy directive has been revised to clarify issues around visa screening, referral to private providers, payment of Medicare benefits, services provided to detainees in immigration detention centres and the financial responsibility for people on an employer-sponsored long term business entry visa. (See: www.health.nsw.gov.au/policies/PD/2005/PD2005_579.html.) The *Tuberculosis in Children and Adolescents (GL2005_060)* guideline has been revised in light of current evidence regarding risk of infection and infectivity, and provides guidance on the diagnosis, prevention and treatment of tuberculosis in children and adolescents. (See: www.health.nsw.gov.au/policies/gl/2005/GL2005_060.html.)

OUTBREAK OF ENTEROVIRAL MENINGITIS, SOUTH-EASTERN SYDNEY, FEBRUARY 2005

Apo Demirkol, Mark J Ferson, Keira Morgan
South Eastern Sydney Public Health Unit

On 22 February 2005, a local public school contacted the South Eastern Sydney Public Health Unit to seek advice concerning the occurrence of two cases of meningitis among children in the same class. Initial enquiries revealed that around the same time, several students from the same public school had been admitted to Sydney Children's Hospital with suspected viral meningitis. It was decided to mount a public health response to determine whether an outbreak was occurring and, if so, its extent and aetiology.

Investigation

Since this was an investigation of a non-notifiable condition, we contacted local emergency departments to inform them of the investigation and to seek their collaboration in reporting new cases. In consultation with South Eastern Area Laboratory Services microbiologists, we asked clinicians to request the following tests on new cases: enterovirus polymerase chain reaction assay (PCR) and viral culture on cerebrospinal fluid (CSF) and faeces. In order to investigate possible common exposures, we developed a questionnaire seeking information on acute illness in the household and involvement in recreational water activities within the previous two weeks. A visit was made to the school that made the initial report to assess the toilets and handwashing facilities, and to inform and reassure the staff.

Results

Active case finding during the three weeks after the initial report revealed 16 cases of viral meningitis in children aged one month to nine years, five of whom attended the same primary school, and one in a young adult aged 20. All the patients lived in Sydney's eastern and southern suburbs. Onset dates for their illnesses ranged from 21 February to 4 March. All bacterial cultures were negative, and enterovirus infection was confirmed by PCR in three cases on CSF samples and in one case on stool. Echovirus was isolated from the CSF of one of these cases. A questionnaire was completed for 13 cases. Fever followed by headache were universal symptoms, whilst seven (54 per cent) experienced neck stiffness. Four (31 per cent) cases denied recent recreational water use, and there were no common recreational water exposures in the remaining nine cases. Seven (54 per cent) had had at least one family member who had been acutely ill within the previous two weeks. Information was provided to the school that had made the initial enquiry about the illness. Inspection of the school's facilities found that cleaning of the children's toilets and washbasins could be improved, and this was brought to the attention of the principal. School staff put significant effort into encouraging the children to use good personal hygiene procedures.

Comment

Enteroviruses, composed of more than 70 serotypes, circulate predominantly in summer and autumn. They may cause asymptomatic infection and diverse illnesses, including hand, food and mouth disease, influenza-like illness, gastroenteritis and viral meningitis.[1] Transmission is generally from person-to-person by the faecal-oral route. However, outbreaks of enterovirus infection have been attributed to sewage contamination of drinking or recreational waters.[2] As common environmental exposures were ruled out, we worked on the hypothesis that a strain of enterovirus was circulating in the community and causing a range of illnesses, including meningitis. In the absence of a common source, it was decided to cease active surveillance. Information was provided to other local schools to reassure staff and parents of the relatively benign nature of the infection and to highlight the role of good hygiene in preventing spread.

References

1. Sawyer MH. Enterovirus infections: diagnosis and treatment, *Pediatr Infect Dis J* 1999; 18:1033–40.
2. Gosbell I, Robinson D, Chant K, Crone S. Outbreak of echovirus 30 meningitis in Wingecarribee Shire, New South Wales. *Commun Dis Intell* 2000, 24:12–124.

FIGURE 1

REPORTS OF SELECTED COMMUNICABLE DISEASES, NSW, FEB 1999 TO APRIL 2005, BY MONTH OF ONSET

Preliminary data: case counts in recent months may increase because of reporting delays.

Laboratory-confirmed cases only, except for measles, meningococcal disease and pertussis

BFV = Barmah Forest virus infections,
RRV = Ross River virus infections

lab+ = laboratory confirmed

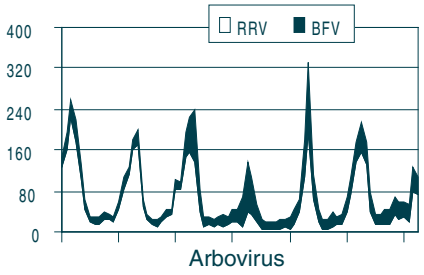
Men Gp C and Gp B = meningococcal disease due to serogroup C and serogroup B infection, other/unk = other or unknown serogroups.

NB: multiple series in graphs are stacked, except gastroenteritis outbreaks.

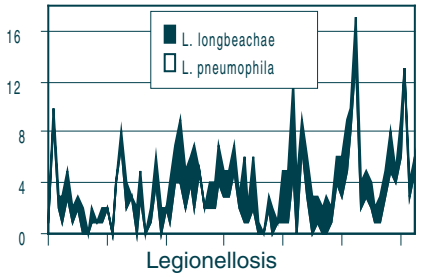
NB: Outbreaks are more likely to be reported by nursing homes and hospitals than from other institutions

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

Feb 05–April 05	
Male	49%
<5	1%
5–24	9%
25–64	81%
65+	9%
Rural	85%



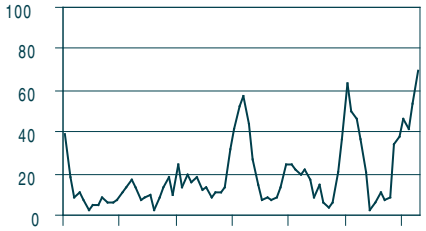
Arbovirus



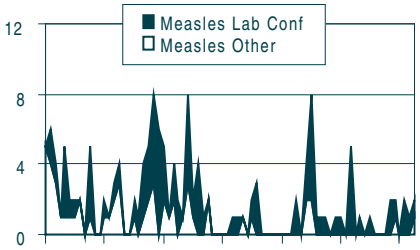
Legionellosis

Feb 05–April 05	
Male	69%
<5	0%
5–24	4%
25–64	61%
65+	35%
Rural	64%

Feb 05–April 05	
Male	48%
<5	46%
5–24	29%
25–64	21%
65+	4%
Rural	46%



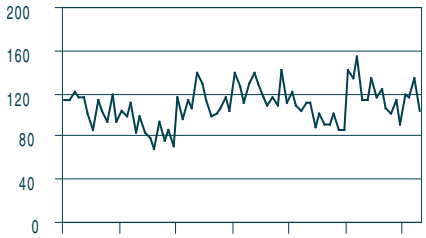
Cryptosporidiosis



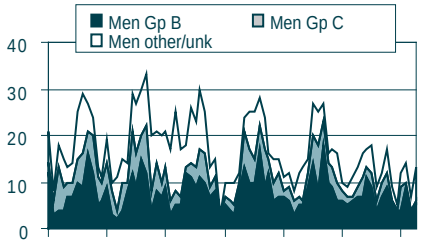
Measles

Feb 05–April 05	
Male	60%
<5	0%
5–24	40%
25–64	60%
65+	0%
Rural	0%

Feb 05–April 05	
Male	88%
<5	0%
5–24	26%
25–64	74%
65+	0%
Rural	18%



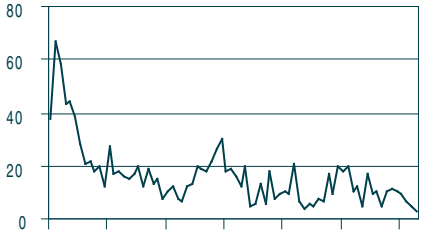
Gonorrhoea



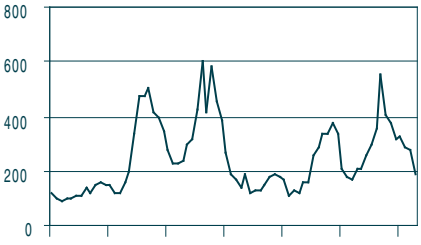
Meningococcal disease

Feb 05–April 05	
Male	53%
<5	44%
5–24	27%
25–64	23%
65+	6%
Rural	41%

Feb 05–April 05	
Male	60%
<5	7%
5–24	60%
25–64	13%
65+	20%
Rural	13%



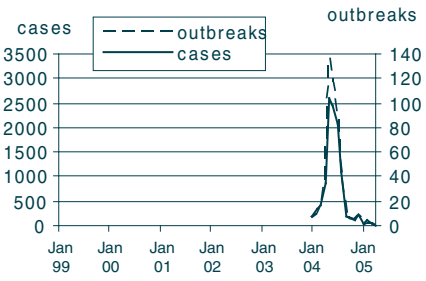
Hepatitis A



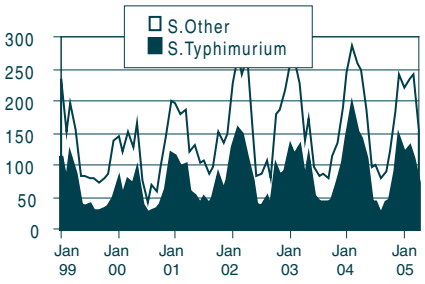
Pertussis

Feb 05–April 05	
Male	41%
<5	7%
5–24	17%
25–64	66%
65+	10%
Rural	36%

Feb 05–April 05	
All outbreaks	6
Nursing homes	3
Hospitals	0
Child care	3
Schools	0
Other	0



Gastroenteritis outbreaks in institutions



Salmonella infections

Feb 05–April 05	
Male	51%
<5	26%
5–24	30%
25–64	37%
65+	7%
Rural	40%

TABLE 1 REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN MARCH 2005 BY AREA HEALTH SERVICES

Condition	Area Health Service (2005)																		Total	
	CS	NS	WS	WEN	SWS	CC	HUN	ILL	SES	NR	MNC	NE	MAC	MW	FW	GM	S	JH	for March+	To date+
Blood-borne and sexually transmitted																				
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	115	113	92	23	62	43	100	51	239	51	34	38	19	24	5	39	29	2	1087	2868
Gonorrhoea*	19	7	8	-	4	-	6	2	65	6	1	3	-	1	-	-	-	-	130	364
Hepatitis B–acute viral*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis B–other*	54	41	50	2	13	1	10	8	59	6	-	5	4	2	4	1	4	2	268	832
Hepatitis C–acute viral*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis C–other*	69	17	50	31	8	34	47	25	76	31	26	11	6	11	-	12	15	32	514	1433
Hepatitis D–unspecified*	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	2
Syphilis	26	1	15	3	15	-	2	2	26	3	-	3	-	1	-	-	2	-	99	242
Vector-borne																				
Barmah Forest virus*	-	-	1	-	-	-	7	-	1	10	11	2	-	-	-	-	2	-	34	100
Ross River virus*	-	-	1	1	-	-	4	1	1	26	13	6	1	-	2	2	1	-	59	103
Arboviral infection (other)*	1	-	-	-	2	-	-	-	2	-	-	-	-	-	-	1	2	-	8	14
Malaria*	1	1	42	1	14	2	16	7	1	-	1	-	-	-	-	-	-	-	94	112
Zoonoses																				
Anthrax*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptospirosis*	-	-	-	-	1	1	-	-	-	1	1	-	-	1	-	-	1	-	7	18
Lyssavirus*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis*	1	1	-	3	1	2	-	1	-	-	1	-	-	-	-	1	-	-	11	27
Q fever*	-	-	-	-	1	-	2	1	-	3	-	2	1	-	-	-	1	-	11	32
Respiratory and other																				
Blood lead level*	1	2	-	-	2	-	11	-	-	-	-	-	2	2	-	-	-	-	20	38
Influenza*	5	8	14	1	11	2	1	3	22	-	-	-	7	-	-	1	-	-	76	298
Invasive pneumococcal infection*	3	6	2	1	4	3	4	3	5	-	2	-	2	2	1	2	-	-	40	123
Legionella *longbeachae* infection*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4
Legionella *pneumophila* infection*	-	2	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	5	23
Legionnaires' disease (other)*	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	2
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meningococcal infection (invasive)*	-	1	1	-	-	-	1	1	1	1	-	-	-	-	1	-	-	-	7	33
Tuberculosis	4	7	7	1	-	-	2	1	5	-	-	-	-	1	-	-	-	-	28	101
Vaccine-preventable																				
Adverse event after immunisation**	1	-	1	1	-	2	4	-	2	1	-	-	-	-	-	3	-	-	15	24
H. Influenzae b infection (invasive)*	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	3
Measles	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	3	5
Mumps*	2	2	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	6	34
Pertussis	25	47	22	18	23	8	33	16	66	29	6	5	2	3	-	9	7	-	319	935
Rubella*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Enteric																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptosporidiosis*	4	3	3	-	2	3	5	4	11	2	-	2	2	-	-	-	-	-	41	130
Giardiasis*	16	25	19	3	13	6	20	4	23	4	1	7	2	5	-	2	1	-	151	383
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
HepatitisA*	-	1	2	-	1	-	1	-	2	-	-	-	-	-	-	-	-	-	8	25
HepatitisE*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Listeriosis*	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	3	8
Salmonellosis*	15	34	28	6	33	14	16	10	20	42	13	7	4	1	-	7	3	-	253	729
Shigellosis*	2	2	1	-	1	1	-	-	-	-	1	-	1	-	1	-	-	-	11	35
Typhoid and paratyphoid*	2	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	16
Verotoxin producing *E. coli**	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	2
Miscellaneous																				
Creutzfeldt-Jakob disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meningococcal conjunctivitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* lab-confirmed cases only + includes cases with unknown postcode ** HIV and AIDS data are reported separately in the Public Health Bulletin quarterly

** AEFIs notified by the school vaccination teams during the National Meningococcal C Program are not included in these figures. These notifications are reviewed regularly by a panel of experts and the results will be published quarterly in the Public Health Bulletin in 2004

CS = Central Sydney (Sydney South West)
NS = Northern Sydney (Northern Sydney / Central Coast)
WS = Western Sydney (Sydney West)
WEN = Wentworth (Sydney West)
SWS = South West Sydney (Sydney Souh West)
CC = Central Coast (Northern Sydney / Central Coast)
HUN = Hunter (Hunter / New England)
ILL = Illawarra (South Eastern Sydney / Illawarra)
SES = South Eastern Sydney (South Eastern Sydney / Illawarra)
NR = Northern Rivers (North Coast)
MNC = Mid North Coast (North Coast)
NE = Hunter (Hunter / New England)
MAC = Macquarie (Greater Western)
MW = Mid West (Greater Western)
FW = Far West (Greater Western)
GM = Greater Murray (Greater Southern)
S = Southern (Greater Southern)
JH = Justice Health

TABLE 2 REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN APRIL 2005 BY AREA HEALTH SERVICES

	Area Health Service (2005)																			
	Greater Southern		Greater Western			Hunter / New England		North Coast		Northern Syd / Central Coast		South Eastern Syd / Illawarra		Sydney South West		Sydney West			Total	
Condition	GM	S	FW	MAC	MW	HUN	NE	MNC	NR	CC	NS	SES	ILL	CS	SWS	WEN	WS	JH	for Apr+	To date+
Blood-borne and sexually transmitted																				
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	27	15	17	13	19	97	26	38	38	25	99	145	41	91	59	6	67	4	851	3746
Gonorrhoea*	2	1	-	5	1	4	1	1	4	3	7	48	11	29	4	3	5	1	130	496
Hepatitis B–acute viral*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis B–other*	1	-	3	1	1	7	4	1	3	2	37	46	4	74	92	-	46	-	325	1274
Hepatitis C–acute viral*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis C–other*	10	10	5	7	18	30	12	44	19	31	38	85	23	49	88	15	40	34	559	2085
Hepatitis D–unspecified*	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Syphilis	-	-	5	2	1	-	2	3	3	2	7	20	-	21	2	-	14	-	84	311
Vector-borne																				
Barmah Forest virus*	6	1	-	-	-	6	2	37	12	1	-	-	-	-	-	-	-	-	65	165
Ross River virus*	8	3	2	3	1	24	3	35	17	-	-	1	-	2	-	-	-	-	99	202
Arboviral infection (other)*	-	1	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	1	15
Malaria*	-	1	-	-	-	2	-	-	-	-	-	7	1	-	5	-	2	-	18	130
Zoonoses																				
Anthrax*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptospirosis*	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	21
Lyssavirus*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis*	1	-	-	-	1	3	-	-	2	-	-	-	3	-	2	4	1	-	17	44
Q fever*	-	2	2	-	-	1	-	2	1	-	-	-	1	-	-	-	-	-	9	41
Respiratory and other																				
Blood lead level*	-	5	-	2	-	7	-	-	-	-	-	-	-	2	1	-	-	-	17	59
Influenza*	1	-	-	2	-	-	-	1	-	1	14	46	1	12	4	-	8	-	91	389
Invasive pneumococcal infection*	1	1	-	-	2	1	-	3	1	1	2	2	1	4	6	-	3	-	28	153
Legionella *longbeachae* infection*	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	5
Legionella *pneumophila* infection*	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	1	-	4	27
Legionnaires- disease (Other)*	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1
Meningococcal infection (invasive)*	-	1	-	-	-	-	-	-	1	3	1	2	-	1	1	1	1	-	12	45
Tuberculosis	-	-	-	-	-	-	1	-	-	1	4	3	1	3	-	1	5	1	20	122
Vaccine-preventable																				
Adverse event after immunisation**	2	-	-	-	-	1	1	1	-	2	-	1	-	-	-	-	2	-	10	34
H. Influenzae b infection (invasive)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Measles	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2	6
Mumps*	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	1	-	-	5	39
Pertussis	6	5	1	12	2	29	1	15	10	14	43	43	17	42	15	26	26	-	307	1249
Rubella*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	4
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Enteric																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptosporidiosis*	2	2	-	1	-	5	1	3	4	8	20	11	3	6	4	6	3	-	79	213
Giardiasis*	11	3	-	1	4	5	3	3	-	3	23	25	5	9	10	9	14	-	128	513
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
HepatitisA*	-	-	-	-	-	1	-	-	-	-	1	-	-	1	1	-	-	-	4	29
HepatitisE*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Listeriosis*	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	2	10
Salmonellosis*	6	5	2	2	1	16	1	16	15	5	23	22	10	20	18	1	33	-	198	934
Shigellosis*	1	-	3	4	-	1	-	1	1	3	-	1	-	2	2	-	-	-	19	54
Typhoid and paratyphoid*	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	3	19
Verotoxin producing *E. coli**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	3
Miscellaneous																				
Creutzfeldt-Jakob disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Meningococcal conjunctivitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* lab-confirmed cases only + includes cases with unknown postcode ** HIV and AIDS data are reported separately in the Public Health Bulletin quarterly

** AEFIs notified by the school vaccination teams during the National Meningococcal C Program are not included in these figures. These notifications are reviewed regularly by a panel of experts and the results will be published quarterly in the Public Health Bulletin in 2004

CS = Central Sydney (Sydney South West)
NS = Northern Sydney (Northern Sydney / Central Coast)
WS = Western Sydney (Sydney West)
WEN = Wentworth (Sydney West)
SWS = South West Sydney (Sydney Souh West)
CC = Central Coast (Northern Sydney / Central Coast)
HUN = Hunter (Hunter / New England)
ILL = Illawarra (South Eastern Sydney / Illawarra)
SES = South Eastern Sydney (South Eastern Sydney / Illawarra)
NR = Northern Rivers (North Coast)
MNC = Mid North Coast (North Coast)
NE = Hunter (Hunter / New England)
MAC = Macquarie (Greater Western)
MW = Mid West (Greater Western)
FW = Far West (Greater Western)
GM = Greater Murray (Greater Southern)
S = Southern (Greater Southern)
JH = Justice Health

NSW PUBLIC HEALTH BULLETIN

The *NSW Public Health Bulletin* is a publication of the NSW Department of Health. The editor is Dr Lynne Madden, Manager, Public Health Training and Development Branch. The *Bulletin* provides population health data and information to support public health action. The *Bulletin* is indexed by Medline and *Index Medicus*.

Submission of articles

A *Bulletin* article should be about 1500 words, not including tables and figures. News, comments and other reports should be 500–600 words. All articles should include a short introductory abstract that reflects the structure of the paper. References should be set out in Vancouver style (see www.nlm.nih.gov/bsd/uniform_requirements.html). Send submitted manuscripts on paper and in electronic form, either on disc (preferably Word for Windows) or by email. The paper copy must be accompanied by a letter signed by all the authors. Full instructions for authors are available on request from the editorial office.

Editorial correspondence

Please address all correspondence and contributions to

The Editor, *NSW Public Health Bulletin*

Locked Mail Bag 961

North Sydney, NSW 2059

Australia.

Send email to phbulletin@doh.health.nsw.gov.au.

Telephone (61 2) 9391 9241, fax (61 2) 9391 9232.

Distribution

To obtain copies of the *NSW Public Health Bulletin* please contact your local public health unit or telephone (61 2) 9391 9942. A form for new subscribers or changes of address is printed in most issues of the *Bulletin*. There is also an online subscription form on the *Bulletin*'s website. Copies of the current issue and all back issues can be downloaded in both PDF and HTML formats from www.health.nsw.gov.au/public-health/phb/phb.html. Back issues of the printed version are available from:

Public Health Training and Development Branch

NSW Department of Health

Locked Mail Bag 961

North Sydney, NSW 2059

Australia.

NSW HEALTH

NEW SUBSCRIBERS–CHANGE OF ADDRESS FORM

Please return to:

NSW Public Health Bulletin
NSW Department of Health
Locked Mail Bag 961, North Sydney NSW 2059, Australia

Fax: 61 2 9391 9232

SUBSCRIBE AND UNSUBSCRIBE

☐ I wish to be placed on the mailing list

☐ Please remove me from the mailing list

Name: _____

Organisation: _____

Mailing address: _____

_____

City: _____ State: _____

Postcode: _____ Country: _____

Telephone: _____ Facsimile: _____

Email: _____

CHANGE OF ADDRESS

☐ I wish to change my mailing details, as follows:

FROM: _____

_____

_____

_____

TO: _____

_____

_____

_____

SUBSCRIBE TO THE WEB VERSION

The *Bulletin* can be accessed via the Internet from our Web site at **www.health.nsw.gov.au/public-health/phb/phb.html**. If you would like to be informed by email when new issues of the *Bulletin* become available, please subscribe to the Internet mailing list when you next visit the site.