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DEPARTMENT OF HEALTH, HOUSING AND COMMUNITY SERVICES

COMMUNICABLE DISEASES NETWORK-AUSTRALIA
A National Network for Communicable Diseases Surveillance

SALMONELLA SURVEILLANCE, AUSTRALIA, THIRD QUARTER 1992

(Reproduced with acknowledgment from the National Salmonella Surveillance Scheme's Human Third Quarter Report, 1992, editor Joan Powling)

There were 1116 reports received by the National *Salmonella* Surveillance Scheme (NSSS) for the third quarter of 1992 (Table 1).

There were 687 Australian acquired cases of *Salmonella* infection reported during this quarter representing an 18% decrease over the total number of cases for the same period last year. There were 83 follow-ups, nine cases from migrants and refugees and 105 cases acquired overseas. There were 109 Australian acquired cases of *Shigella* as against 131 for the corresponding period of 1991, a decrease of 17%.

By comparison to the third quarter of 1991, there was a 9% increase in the *Salmonella* case rate per 100,000 population in Western Australia. All other States and Territories recorded decreased case rates (Table 2). The largest of these were from Tasmania (-80%), the Northern Territory (-35%) and New South Wales (-27%). There had been two outbreaks of salmonellosis in Tasmania in the third quarter of 1991.

The top ten *Salmonella* serovars accounted for 61% of all Australian acquired cases notified to the NSSS (64% in the third quarter of 1991). The most common serovar was *S.* Typhimurium with 207 cases from 28 phage types (PT). The most common of these was PT 9 (66 cases). In third position was *S.* Agona, a serovar not normally in the top ten. A total of 29 *S.* Agona cases were reported, 15 from South Australia and 8 from Victoria.

S. Hadar (21 cases, Victoria 11) and *S.* Enteritidis (18 cases, Queensland 12) remained in the list of the top ten Australian acquired cases of *Salmonella* infection. Of the 12 cases of *S.* Enteritidis from Queensland, [redacted] were of PT 4. Overseas acquired infections of PT 4 were notified from travellers returning from Hong Kong and Thailand. Phage type 31 was reported from a traveller to Hong Kong and PT 6 from a visitor to Poland.

Table 1. Total number of reports received, by State or Territory

	ACT	NSW	Vic	Qld	SA	WA	Tas	NT	Total
Salmonella	10	203	191	193	77	154	17	39	884
Shigella	1	17	24	10	6	54	1	31	144
Aeromonas	0	2	0	0	0	0	0	0	2
Campylobacter	0	0	40	1	0	0	0	0	41
E coli (EPEC)	0	1	0	0	0	0	0	0	1
Plesiomonas	0	1	1	0	0	0	0	0	[redacted]
Vibrio	0	0	2	0	0	0	0	0	2
Yersinia	0	18	9	12	1	0	0	0	40
Total	11	241	268	216	84	208	18	70	1116

Table 2. Case rates per 100,000 for *Salmonella* infections

	ACT	NSW	Vic	Qld	SA	WA	Tas	NT	Total
3rd Quarter 1992	3.6	2.9	3.1	6.5	4.5	8.5	2.3	22.6	687
2nd Quarter 1992	2.8	3.9	4.9	15.7	6.8	11.4	8.0	63.9	1208
3rd Quarter 1991	2.8	4.0	3.9	7.2	5.4	7.8	11.2	34.9	840
3rd Quarter 1990	2.8	4.2	2.9	7.8	5.4	6.7	3.9	41.3	801
3rd Quarter 1989	5.6	3.2	4.0	7.4	4.2	7.5	2.1	52.3	800

Outbreaks

During the reporting period there were two major family outbreaks, one of *S.* Typhimurium PT 1 from north-eastern Victoria and one of *S.* Virchow from Mackay.

There was a small outbreak of *S.* Agona in South Australia. Thirteen cases were notified from Port Pirie and Adelaide beginning on 29 July 1992 and finishing in late August. The surnames of 11 of the persons infected had the same country of origin.

In mid-September, reports were received of the first cases of an outbreak of *Sh. boydii* 1, which has continued into 1993 (see *CDI* 1993;17:189). The first case (16 September 1992) was from Halls Creek in the far north-west of Western Australia.

New and unusual *Salmonella* serovars

Unusual *Salmonella* serovars notified during the quarter were *S.* Düsseldorf (M/50 Victoria ex Indonesia, mixed with *S.* Virchow), *S.* Richmond (M/23, Victoria) and *S.* Babelsberg (M/1 New South Wales). An unusual phage type of *S.* Typhimurium was PT 176 (M/1, South Australia).

S. ser 3,10:r:- was isolated from cultures received from Fiji and also from travellers returning from there. *Sh. dysenteriae* 2 was isolated from a worker (M/28) returning from Somalia. Three different serovars, *S.* Blockley, *S.* Emek and *S.* Hadar, were isolated from three members of the one family returning from a holiday in Bali, and *S.* Brandenburg was acquired (F/31) after three weeks of travel in the Torres Strait Islands.

Typhoid and paratyphoid cases

There were 15 reports of *S.* Typhi, 5 cases of *S.* Paratyphi A and 2 cases of *S.* Paratyphi B (Table 3).

Table 3. Typhoid and paratyphoid cases

Phage type	Sex/Age	State or Territory	Notes
S. Typhi: 15 cases			
A	F/25	WA	ex Indonesia
E1	M/26	SA	no details, Indian surname
E1	F/33	NSW	returned from India
E1	M/35	NSW	husband of F/33 above
E1 degraded	F/40	Vic	fever post appendectomy, from Nauru
E2	M/38	NSW	visitor from the Philippines
E var	M/14	Vic	returned from Samoa
J1	F/4	NSW	no details
M1	M/23	Vic	ex Pakistan
D	M/3	NT	no details
degraded	M/25	Vic	ex Indonesia
untypable j:z66 phase	F/40	NSW	recent return from Indonesia
untypable	F/7	NSW	no details
untypable	F/90	WA	no details
untypable	M/30	SA	ex Indonesia
S. Paratyphi A: 5 cases			
1	F/26	NSW	no details
2	F/25	Vic	in Sri Lanka 3 weeks prior
4 (weak)	F/26	NSW	acquired in Turkey
5	M/19	Qld	visited Bali
RDNC	M/9	NSW	acquired overseas, no details
S. Paratyphi B: 2 cases			
3a var	F/77	Vic	no history of travel
Dundee	F/66	Vic	visited Bali

Isolations from blood, urine and unusual sites

During the quarter, there were 12 reports of bacteraemia, excluding enteric fever, 10 reports of isolates from urine and 5 reports of isolations from unusual sites (Table 4).

Infections acquired overseas

These include migrants and refugees.

ASIA

Unspecified countries: *S.* Bareilly, *S.* Hadar, *S.* Paratyphi B biovar Java 3b var 3, *Sh. sonnei.*
Indonesia: *S.* Berta, *S.* Braenderup, *S.* Düsseldorf (mixed with *S.* Virchow), *S.* Isangi, *S.* Kentucky, *Sh.boydii* 1, *Sh. dysenteriae* 2, *Sh. flexneri* 1a and 3a, *Sh. sonnei* biotype a. **Bali:** *S.* Adelaide, *S.* Agona (5), *S.* Berta, *S.* Blockley (4), *S.* Emek (7), *S.* Hadar (3), *S.* Isangi, *S.* Paratyphi B bv Java 3b var 3 (3), *S.* Kentucky, *S.* Montevideo, *S.* Thompson, *S.* Typhimurium PT 12a, PT 68 and RDNC, *S.* Virchow, *S.* Weltevreden, *Sh. flexneri* 3a (2), *Sh. sonnei* (3), *Sh. sonnei* biotype g.
Thailand: *S.* Cerro, *S.* Derby, *S.* Enteritidis (2) and PT 4 (2), *S.* Hadar, *S.* Stanley, *S.* Tennessee, *S.* Virchow (3).
Malaysia: *S.* Blockley (2), *Sh. flexneri* 2a.
Vietnam: *S.* Agona, *S.* Anatum, *S.* Bareilly, *S.* Blockley, *S.* Kentucky, *S.* Panama, *S.* Weltevreden.
Hong Kong: *S.* Agona, *S.* Derby, *S.* Enteritidis and PT 31, PT 4 (2).
Philippines: *S.* Newport, *S.* Saintpaul.
India: *S.* Mbandaka, *Sh. flexneri* 6.
Sri Lanka: *Sh. flexneri* 2b.

Table 4. Isolations from blood, urine and unusual sites

Organism name	Sex/Age	State or Territory	Notes
Bacteraemias excluding enteric fever (12)			
C. jejuni	F/83	Vic	diabetic, febrile
S. Berta	F/49	Vic	acquired in Bali
S. Bovismorbificans	M/87	Vic	pneumonia
S. Bovismorbificans	F/77	Vic	faeces also
S. Enteritidis	F/39	Vic	no details
S. Enteritidis	M/1	Qld	Japanese visitor to Queensland
S. Typhimurium PT 141	M/44	Vic	deceased
S. Typhimurium PT 9	F/72	Vic	
S. Virchow	F/16	NSW	
S. Virchow	F/18	Qld	
Sh. sonnei	F/27	NSW	
Y. enterocolitica O:3 Bio 4	M/63	Qld	
Urines (10)			
S. Agona	F/80	SA	
S. Birkenhead	F/1	NSW	
S. Birkenhead	ns[1]/32	NSW	
S. Enteritidis PT 6	F/38	Vic	from Poland, not in faeces
S. Hadar	F/5	NSW	
S. Havana	F/80	NSW	
S. Havana	F/<1	Qld	
S. Havana	F/44	Qld	urinary tract infection
S. Poona	M/3	Qld	urinary tract infection
S. Typhimurium PT 2	M/61	Vic	oncology patient
Unusual Sites (5)			Site
S. Bovismorbificans PT 13	M/59	SA	hip wound
S. Newport	F/85	VIC	gall bladder
S. Orion	M/34	ACT	bone biopsy
S. Saintpaul	F/14	NT	endocervical swab
S. Typhimurium PT 135	F/<1	SA	cerebrospinal fluid

1. ns not specified

Table 5. Cases of *Shigella* acquired in Australia, by State or Territory

Organism	ACT	NSW	Vic	Qld	SA	WA	Tas	NT	Total
Shigella species	0	1	0	0	0	0	0	0	1
Sh. boydii	0	1	0	0	0	0	0	0	1
Sh. boydii 1	0	0	0	0	0	3	0	1	4
Sh. dysenteriae	0	0	1	0	0	0	0	0	1
Sh. flexneri	0	1	0	0	0	0	0	0	1
Sh. flexneri 1b	0	1	0	0	0	0	0	0	1
Sh. flexneri 2a	0	0	3	3	3	25	0	7	41
Sh. flexneri 3a	0	0	0	0	0	1	0	0	1
Sh. flexneri 3b	0	1	0	0	0	0	0	0	1
Sh. flexneri 6	0	0	0	3	0	9	0	5	17
Sh. flexneri var Y	0	0	0	0	0	0	1	4	5
Sh. sonnei	0	1	0	2	0	6	0	0	9
Sh. sonnei biotype a	0	6	2	2	0	0	0	7	17
Sh. sonnei biotype g	0	3	3	0	1	0	0	2	9
Total	0	15	9	10	4	44	1	26	109

AFRICA

Somalia: *Sh. dysenteriae* 2.

MIDDLE EAST

Iraq: *Sh. flexneri* 3b.
Israel: *S.* Typhimurium PT 29.
Lebanon: *Sh. sonnei* biotype g.

EUROPE

Poland: *S.* Enteritidis PT 6.
Albania: *Sh. flexneri* 4a.

PACIFIC

New Caledonia: *Sh. sonnei.*
Solomon Islands: *S.* Bovismorbificans PT 2.
Fiji: *S.* ser 3,10:r:- *S.* Virchow (2).
Tonga: *S.* Typhimurium 170 (2).

UNSPECIFIED COUNTRIES

S. Braenderup, *S.* Enteritidis PT 1, *S.* Hadar, *S.* Kentucky, *S.* Montevideo, *S.* Senftenberg, *S.* Singapore, *S.* Tennessee, *S.* Typhimurium 12a, *S.* Virchow, *Sh. flexneri* 2a, 3a, 4a mannitol neg, *Sh. sonnei*, *Sh. sonnei* biotype g (2).

Shigella infections

A total of 144 notifications of *Shigella* infections was received for this quarter. Of these, seven were follow-up specimens, one was from a migrant or refugee and 28 were notified from travellers returning from overseas. This left a total of 109 cases reported as acquired in Australia (Table 5).

The most common was *Sh. flexneri* 2a with 41 cases followed by *Sh. flexneri* 6 and *Sh. sonnei* biotype a, both with 17 cases. Of the total acquired in Australia, 69% were of these three serotypes, the same percentage as for the previous quarter. In mid-September the first cases were reported from the major outbreak of *Sh. boydii* 1 from the north-west of Western Australia.

Shigella infections acquired overseas include *Sh. boydii* 1 (Indonesia), *Sh. dysenteriae* 2 (Indonesia, Somalia), *Sh. flexneri* 1a (Indonesia), *Sh. flexneri* 2a (Malaysia), *Sh. flexneri* 2b (Sri Lanka), *Sh. flexneri* 3a (Indonesia including Bali), *Sh. sonnei* (Bali), *Sh. flexneri* 4a (Albania), *Sh. flexneri* 4a mannitol negative (tourist, not specified), *Sh. flexneri* 6 (India), *Sh. flexneri* var Y (British tourist), *Sh. sonnei* (Bali, New Caledonia), *Sh. sonnei* biotype a (Indonesia), *Sh. sonnei* biotype g (Lebanon, Bali).

Mixed infections

There were 18 reports of mixed infections for the third quarter of 1992 (Table 6).

Top ten *Salmonella* serovars

Of the 687 Australian acquired cases of *Salmonella* infection, 421 (61%) were isolates from the top ten serovars (Table 7). *S.* Typhimurium, with 207 cases from 28 phage types, was the most common serovar and accounted for 30% of the total Australian acquired cases, the same percentage as for the previous quarter.

Phage type 9 was the most common *S.* Typhimurium phage type with 66 cases. Seventy-seven per cent were from New South Wales and Victoria (Table 8). The top five phage types accounted for 50% of Australian acquired cases of *S.* Typhimurium.

Table 6. Mixed infections

Organisms isolated	Sex/Age	State or Territory
S. Typhimurium 8, *Giardia* species	M/1	NSW
S. Enteritidis PT4, *S.* Paratyphi A RDNC	M/12	NSW
S. Tennessee, *S.* Chester	M/<1	WA
S. Typhimurium 9, *S.* Bovismorbificans	F/<1	WA
S. Ball, *S.* Tennessee	M/62	NT
S. Saintpaul, *E. coli* O125:K70:B15	F/<1	Qld
S. Saintpaul, *Cryptosporidium* species	F/2	Qld
S. Havana, *Cryptosporidium* species	M/1	Qld
S. Anatum, *Campylobacter* species	M/1	ACT
S. Havana, *S.* Typhimurium PT 9	M/8	SA
S. Give, *S.* Typhimurium PT 8	F/21	NT
Sh. flexneri 1b, *Giardia* species	M/29	NSW
S. Anatum, *C. jejuni*	F/<1	Qld
S. Oranienburg, *C. coli*	F/<1	NT
S. Hvittingfoss, *S.* Urbana	M/36	WA
S. Heidelberg, *Campylobacter* species	M/18	NSW
S. Hadar, *C. jejuni* subspecies *jejuni*	M/12	Vic
S. Typhimurium PT 9, *Aeromonas hydrophila*	F/3	Vic

CDI Editorial Comment

A total of 884 notifications of salmonellosis (not otherwise classified) was received by the National Notifiable Diseases Surveillance System for the third quarter of 1992. This compared with 1157 for the second quarter of 1992 and 967 for the third quarter of 1991. The corresponding figures for typhoid were 15, 8 and 17 notifications, respectively. For shigellosis, they were 168, 168 and 197. All these infections are notifiable in all States and Territories of Australia. (Typhoid notifications include paratyphoid in Victoria and New South Wales.)

Table 7. Top ten *Salmonella* serovars

Serovar	Position in 2nd quarter, 1992	Number of cases	% of total	Origin and number of cases
S. Typhimurium	1	207	30.1	NSW 68, Vic 65, WA 39
S. Virchow	2	47	6.8	Qld 30
S. Agona[1]	-	29	4.2	SA 15, Vic 8
S. Saintpaul	4	27	3.9	Qld 10, SA 8
S. Birkenhead	8	24	3.5	Qld 15, NSW 8
S. Hadar	9	21	3.1	Vic 11, NSW 4
S. Enteritidis	10	18	2.6	Qld 12, NSW 3
S. Anatum	-	17	2.5	Qld 8
S. Chester	5	16	2.3	WA 4, NT 4, Qld 3, NSW 3
S. Heidelberg	6	15	2.2	Qld 9, NSW 5
S. Bovismorbificans	3	15	2.2	Vic 5, WA 5
S. Havana	-	15	2.2	Qld 5, NSW 4
Total		421	61.2	

In: *S.* Agona, *S.* Anatum.
Out: *S.* Infantis (12 cases).
Just out: *S.* Muenchen (14 cases, six from Western Australia).
1. Associated with outbreaks.

Table 8. Top five phage types of *S.* Typhimurium

Phage type	Position in 2nd quarter, 1992	Number of cases	% of total	Origin and number of cases
9	1	66	31.9	Vic 32, NSW 19, WA 6
135	2	11	5.3	Vic 3, SA 3
170	3	11	5.3	NSW 6, Vic 5
1	-	8	3.9	Vic 5
179	-	8	3.9	NSW 5
Total		104	50.2	

SALMONELLA TYPHIMURIUM IN AUSTRALIA 1987 TO 1992

(Reprinted with permission from the Australian Salmonella Reference Laboratory Monthly Report - April 1993, editors Chris Murray and Dianne Davos)

Salmonella serovar Typhimurium has remained the most common serovar isolated from humans in Australia for many years. It is widespread in food animals which are a major source of the organisms entering the human food chain. This report is a compilation of six years' isolations of this serovar made from 1987 to 1992 at the Australian Salmonella Reference Laboratory, Institute of Medical and Veterinary Science, Adelaide.

Over this period, *S.* Typhimurium has comprised 31.4% of all *Salmonella* isolates from humans, and high proportions from cattle, sheep, pigs, chicken and red meat (Table 1).

The widespread distribution of the serovar makes epidemiological investigation difficult without a more definitive means of identifying strains. Phage typing is still the most useful method of subdividing strains for routine monitoring. Serovar Typhimurium is phage typed at the Australian Salmonella Reference Laboratory using the international scheme which provides more relevant information of the distribution of phage types between humans and food animals.

Phage type 9 is the most common in humans (Table 2). It is the predominant phage type in cattle and sheep and occurs at a relatively high frequency in the raw red meats. It occurs in low frequency in pigs and chicken. Phage type 135 is common in humans and occurs at a relatively high frequency in cattle and chicken while its frequency among other animals is much lower.

Phage type 170 has been common in humans for many years however it appears only in cattle, pigs and chickens and at low frequency. Phage type 179 has been

Table 1. Frequency of *Salmonella* Typhimurium isolations from humans, food animals and red meats, 1987 to 1992

	Total	% Typhimurium
Humans	31615	31.4
Cattle	2752	36.2
Sheep	1771	43.6
Pigs	638	16.8
Chicken	22594	19.9
Red meat	2724	6.9

Figure. *Salmonella* Typhimurium phage type 126 isolates from humans and chickens, 1989 to 1992, by quarter, as percentage of all *Salmonella* Typhimurium

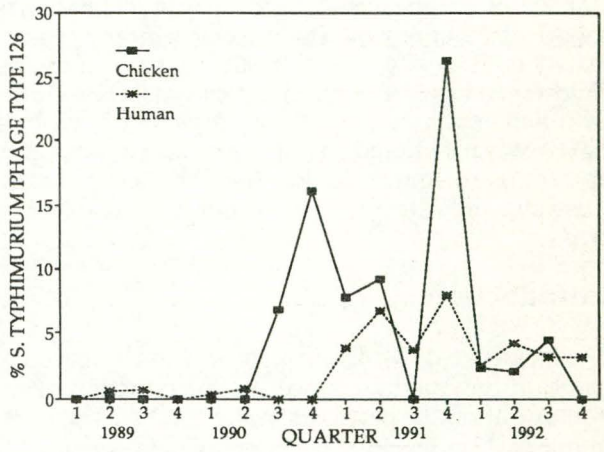


Table 2. Most common phage types of *Salmonella* Typhimurium from humans, as percentage of *S.* Typhimurium isolates from humans, food animals and red meats, 1987 to 1992

	% of total *S.* Typhimurium					
Phage type	Human	Cattle	Sheep	Pigs	Chicken	Red Meats
9	15.1	21.6	28.4	1.3	0.7	8.4
135	12.9	17.0	5.3	3.8	16.4	3.9
170	6.2	1.0	0	1.3	0.7	0
12a	5.0	3.3	1.4	5.4	0.6	5.2
179	3.4	0	0	0	5.0	0.6
4	3.2	7.2	1.7	0	0.2	6.5
44	2.9	5.9	0	0	1.9	0
141	2.8	4.3	1.0	16.7	<0.1	0
108	2.7	2.6	2.6	0	1.5	5.2
26	2.6	0	0	0	13.9	0
RDNC	8.0	3.1	14.6	10.3	4.0	9.0
Untypable	7.3	3.7	7.6	17.9	17.4	25.2

associated with chicken for many years, while type 44 is found in both cattle and chicken. Type 141 is found at the highest frequency in pigs while type 108 was not recorded from that source.

Phage type 12a has remained a common type from humans for many years. It is found in all food animals but its lowest frequency is in chickens.

Phage type 26 was common in humans and chicken in 1987-88 then disappeared from both sources. Its coincidental occurrence strongly suggests that chickens were the source of the phage type in the human population.

Phage type 126, while not common enough to appear in Table 2, was a type which also appeared in chickens in the period 1990 to 1992, and flowed on into the human population. Its increase in humans followed several months after its appearance in chickens during 1990 (Figure).

BORDETELLA PERTUSSIS IN AN ACT SCHOOL: OUTBREAK INVESTIGATION AND VACCINE EFFICACY STUDY

(Ana Herceg, ACT Health and the National Centre for Epidemiology and Population Health; Cathy Mead and Irene Passaris, ACT Health; Andrew Gordon, Woden Valley Hospital)

Abstract

An outbreak of 13 cases of pertussis associated with an infants school in Canberra in April and May 1993 was investigated. Three cases were confirmed by bacterial culture and one case was hospitalised. The outbreak did not arise from a single source of the infection. The efficacy of the pertussis vaccine was estimated in a cohort of 52 children. The vaccine efficacy was estimated as 68% (95% CI -3% to 90%) in fully immunised children and as 67% (95% CI -3% to 89%) when children who had received only three doses of triple antigen (DTP) were included in the fully immunised group. Low rates of immunisation for *Bordetella pertussis* in Australia indicate there is potential for further outbreaks.

Introduction

The incidence of *Bordetella pertussis* has decreased dramatically in Australia since the introduction of mass immunisation for pertussis in the 1940's[1]. The current immunisation level for pertussis of children aged 0 to 6 years of 80%, based on National Health Survey data[2], is insufficient to prevent outbreaks of whooping cough. In the first five months of 1993 the number of reported cases of pertussis in Australia has been 625, which is 3.3 times the number recorded for the same period in 1992[3].

An outbreak of *Bordetella pertussis* occurred associated with an ACT infants school in April and May 1993. This outbreak illustrates some of the difficulties associated with the recognition and diagnosis of pertussis in a partially immunised community and highlights the potential for more outbreaks in Australia.

Outbreak investigation

ACT Health was notified on 4 May 1993 of a culture confirmed case of pertussis and of two non-confirmed cases at the same infants school in Canberra. An investigation of the outbreak was commenced on 5 May 1993. The index, culture confirmed, case had been hospitalised for exacerbated asthma and was swabbed for pertussis but not treated for it until after culture was confirmed five days later.

In the investigation, a case was defined as:

- isolation of *Bordetella pertussis* with clinically compatible symptoms, or
- a cough lasting at least two weeks without other cause and epidemiologically linked to a confirmed case, or
- characteristic paroxysmal cough ending in apnoea or vomiting or with inspiratory 'whoop' without other cause in an illness lasting at least two weeks.

Cases were sought in the school and in household and other contacts of cases. Local general practitioners were contacted and asked to refer for testing any patients suspected of having whooping cough. Nasopharyngeal swabs were obtained by microbiology staff at Woden Valley Hospital. Parents of cases were contacted by phone to obtain further details of the illness and its management. ACT Health issued a press release after five cases were identified warning of the outbreak and encouraging immunisation.

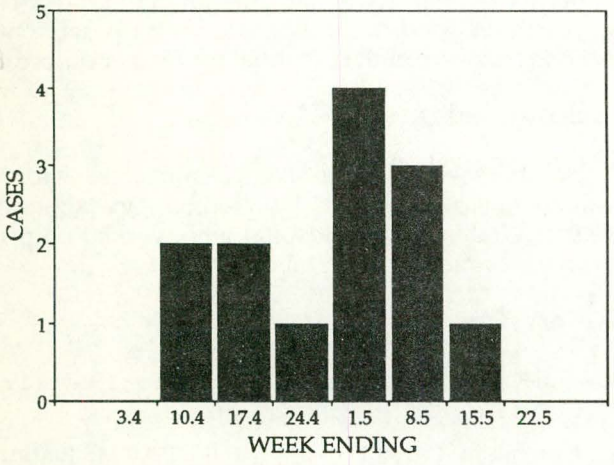
Parents were notified by the school of the outbreak and many voluntarily kept their unimmunised children away from school. These children were advised to remain away until 14 days after the last case had attended school. Cases were excluded from school until after five days of erythromycin were completed. Unimmunised household contacts aged less than seven years were also excluded until after five days of erythromycin were completed. An information sheet about whooping cough was sent to parents. School staff and parents were very cooperative at all stages of the investigation.

The investigation initially identified eight cases either at the school or in household contacts. Fifteen children from the school or household contacts had nasopharyngeal swabs done for pertussis at Woden Valley Hospital and this confirmed a further two cases. Three more cases were identified in the preschool and kinder-

garten classes by a questionnaire sent out to parents asking about any cough lasting two weeks or more in their children in the past six weeks.

Of the total identified 13 cases, one was an adult and 12 were children aged between nine months and seven years. Onset of illness was between 5 April and 10 May 1993 (Figure). All cases had a cough, eight cases (62%) had a classical 'whoop' and eight cases (62%) had post-cough vomiting. Six cases had pathology testing for *Bordetella pertussis*; three were culture positive. One of the culture negative cases was tested more than four weeks after the onset of the illness.

Figure. Pertussis cases, by week of onset of cough, April to May 1993



Of the 12 infected children, five cases (42%) were unimmunised for pertussis, five (42%) were fully immunised and two (17%) had not had the fourth dose of DTP at 18 months. All cases were treated with erythromycin except those identified retrospectively where the infective period of four weeks had passed and one who was allergic to erythromycin.

The one infected adult identified believed he had caught whooping cough from a relative in New South Wales and that he had subsequently infected a household contact who attended the school in question. This child however was not the index case at the school and in fact the onset of illness of several cases at the school was before the onset of illness of the adult. This strongly suggests more than one source of pertussis at the school.

Vaccine efficacy study

A vaccine efficacy study was undertaken involving a cohort of all the 52 children, aged three to five years, in the preschool and kindergarten classes.

Parents were requested by letter to supply the immunisation record of their child for review. When this record was not kept at home the information was sought by letter from the child's general practitioner, accompanied by a parental consent form. When the parent identified the child as not immunised for pertussis and the immunisation record was not sighted, the child was classified as not immunised for the purpose of the analysis.

There were nine cases among the 52 children in the two classes. Immunisation records were supplied for 47 children (90%). A further three children (6%) were identified by their parents as not immunised for pertussis. The parents of two children (4%) refused to supply immunisation records and these children were excluded from the vaccine efficacy analysis. One non-case child who had received only two doses of pertussis vaccine was also excluded. The final analysis included 49 of the 52 children (94%).

Of the 52 children 71% were fully immunised for *Bordetella pertussis*, having received four doses of DTP. A further 10% had received only three doses of DTP. Seven children (13%) were unimmunised for pertussis.

The attack rate of pertussis in the unimmunised was 43%. In those who had received only three doses of DTP the attack rate was 20% and in those who were fully immunised the attack rate was 14% (Table).

Table. Attack rates and vaccine efficacy estimates by triple antigen (DTP) immunisation status

Vaccination status	Number of cases	Attack rate	Vaccine efficacy (95% CI)
0 doses DTP (n = 7)	3	43%	-
3 doses of DTP only (n = 5)	1	20%	-
4 or more doses DTP (n = 37)	5	14%	68% (-3 to 90)
3 or more doses DTP (n = 42)	6	14%	67 % (-3 to 89)

The vaccine efficacy (VE) was estimated using the following formula[4]:

VE (per cent) = (1 - ARV / ARU) × 100

where ARV is the attack rate in the vaccinated and ARU is the attack rate in the unvaccinated.

The vaccine efficacy for children who had received three or more doses of DTP was estimated to be 67% (95% confidence interval -3% to 89%). When children who had received only 3 doses of DTP were excluded from the analysis the vaccine efficacy rose only slightly to 68% (95% confidence interval -3% to 90%) (Table). A vaccine efficacy was not calculated for three doses of DTP only, due to the small number of children in this group.

Discussion

Despite the increased reporting of *Bordetella pertussis* in 1993 whooping cough is still underdiagnosed. This outbreak may not have been identified if the index case had not been swabbed and subsequently diagnosed on positive culture for pertussis. Mild clinical cases are frequently not recognised by medical practitioners, especially cases in adults[5]. Cases in immunised children, in very young children and in adults frequently do not have the classic symptoms of whooping cough[6]. More florid cases may not have the typical 'whoop' while attending a medical practitioner and may again be missed.

Whooping cough may be a re-emerging public health problem in Australia. Vaccination coverage for pertussis declined in the 1980s in many countries due to fears about the side effects of the pertussis vaccine[6]. The immunisation rate has not recovered despite these fears being largely unfounded. The Australian immunisation coverage rate for pertussis of 80% is insufficient to protect the community from outbreaks. In addition there is evidence that the vaccine efficacy wanes over time[6], allowing adults and older children to contract and transmit the disease to younger children who are most at risk from the disease.

The difficulty in testing for pertussis is another reason for underdiagnosis. Bacterial culture, the gold standard for laboratory diagnosis, yields a maximum of 80% culture positivity of suspected cases under optimum conditions[6]. Ideal conditions cannot be achieved by routine nasopharyngeal swabbing in a general practitioner's surgery without specialised equipment.

The fact that this outbreak in the ACT appeared to stem from more than one source illustrates the fact that there are more pertussis infections in the community than are generally recognised and reported.

Estimates of the vaccine efficacy of whole cell pertussis vaccine vary with case definition and with the number of doses of vaccine given. A recent study in the United States of 347 households estimated the efficacy to be 73% (95% CI 56-84%) using a case definition of a cough lasting 14 days or more in those exposed and 'vaccinated' being three or more doses of DTP[7]. Using the same case definition, the study found the efficacy of three doses of DTP to be 64% and the efficacy of 4 doses of DTP to be 78%[7].

The results of our ACT study are consistent with these United States results. Our vaccine efficacy estimate of 67% has much wider confidence intervals due to small numbers. The efficacy changes little with the exclusion of children vaccinated with three doses of DTP for the same reason. While we are able to demonstrate a gradient of decreasing attack rate with increasing number of doses of vaccine, our numbers of children vaccinated with three doses of DTP are too small to show a gradient in vaccine efficacy.

Improvements in immunisation coverage in Australia are required to prevent outbreaks of vaccine preventable diseases. Fears about the safety of pertussis vaccine have contributed to low rates of immunisation with DTP. Strategies to allay these fears may be needed to improve immunisation rates. Acellular pertussis vaccines, may, when introduced, contribute to increased confidence in the safety of vaccines due to their lower adverse effect rates.

Because of difficulties in diagnosis the incidence rates of pertussis are likely to be higher than those reported in Australia. Medical and public health practitioners need to be aware of the potential for further outbreak[redacted]

Acknowledgments

The authors would like to thank Deanna Hazell for her valuable help and the many microbiology laboratory staff at Woden Valley Hospital who worked on processing specimens during this outbreak.

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MENINGOCOCCAL MENINGITIS AT A RETIREMENT VILLAGE, MELBOURNE, 1992 - *NEISSERIA MENINGITIDIS* CARRIAGE SURVEY AND PROPHYLAXIS OF CONTACTS

(Raina MacIntyre, Infectious Diseases Unit, Health and Community Services Victoria, and Communicable Diseases Network Australia; Anne Murphy and Kath Taylor, Infectious Diseases Unit, Health and Community Services Victoria)

Introduction

On 15 May 1992 we visited a retirement village in Melbourne where a case of group C meningococcal meningitis had occurred. The retirement village had 121 residents and 57 staff members. The case of meningitis occurred in an 84 year old male resident who subsequently died in hospital.

A second case of group C meningococcal meningitis occurred on 30 September in a 90 year old woman. We returned to the retirement village on 10 October.

Methods

On 15 May, we took nasopharyngeal swabs from staff and residents of the retirement village who had contact with the first case. This included staff who attended him during the ten days prior to hospital admission, and residents with whom he socialised and dined, as determined by the matron of the village. We swabbed 55 residents and 57 staff.

Those whose cultures grew *Neisseria meningitidis* were given prophylaxis consisting of four doses of 600mg of rifampicin over two days. Other contacts were placed under routine surveillance.

On 10 October, after the second case, we took nasopharyngeal swabs from all staff and residents (174), to establish carriage rates.

All testing was performed at the Microbiological Diagnostic Unit, University of Melbourne.

Results

Six of the 57 staff members tested in May 1992 were *Neisseria meningitidis* carriers (11%). There were only two carriers of group C organisms. The staff carriers included one nurse, one personal care attendant, two food domestic aides, one pathologist and one member of the maintenance staff.

There was only one carrier of group B meningococcus among the residents tested, and no group C carriers.

All specimens positive for group C meningococcus were sent to Canada for subtyping. These results are pending.

In October 1992, all carriers identified in May were re-swabbed. The second case had not been a contact of the index case, and had not been swabbed in May. Her carrier status prior to becoming ill is therefore unknown.

There were no carriers of meningococcus identified among the 174 staff and residents tested. All seven of those who had previously been identified as carriers tested negative.

Candida albicans was identified in the nasopharyngeal specimens of two of the persons previously identified as carriers.

Discussion

Up to 10% of people in non-endemic areas, and up to 50% of household contacts of a case, carry pathogenic *N. meningitidis* in their nasopharynx[1]. This casts doubt on the interpretation and cost effectiveness of widespread carriage surveys. Extensive testing of contacts can also create undue panic and result in previously overlooked 'contacts', who are at low risk, presenting for testing. The outcome of this may be unforseen costs and use of resources, and the unnecessary administration of rifampicin prophylaxis.

We carried out extensive testing in order to try and establish, through subtyping, a link between cases and contacts. We felt this was justified due to the implications of such an outbreak within a residential care facility[2], and the potential of spread from, for example, a staff carrier to debilitated patients. If a staff carrier had transmitted the disease to the index case at the retirement village, we might have expected a higher carriage rate among residents of the village. However, only one resident had a positive culture and it was not group C meningococcus.

A more practical approach in a community outbreak would be to offer prophylaxis to close contacts only, and carry out surveillance for other contacts.

Rifampicin prophylaxis was successful in eliminating *N. meningitidis* from the nasopharynxes of all carriers at the retirement village. They were negative five months after prophylaxis was administered. Studies have shown that rifampicin prophylaxis reduces carriage in contacts of cases, but its efficacy in preventing disease is not proven[3,4].

There have been no further cases of meningococcal meningitis at the retirement village.

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OVERSEAS BRIEFS

In the last two weeks, the following information has been supplied by the World Health Organization.

Epidemic diarrhoea due to *Vibrio cholerae* non-O1

(Reproduced from Weekly Epidemiological Record 1993;68:141-142)

This year, reports have begun to be received describing outbreaks in 2 countries of southern Asia of a diarrhoeal disease clinically resembling cholera. Investigators have reported that the micro-organism responsible for the current wave of epidemics is not *V. cholerae* O1, the bacterium considered, until now, to be the only organism responsible for cholera. Instead, the current epidemics are caused by a previously unrecognised serogroup of *V. cholerae*, designated by researchers as serogroup O139, which has the ability to produce a toxin indistinguishable from that which is responsible for the disease caused by *V. cholerae* O1.

The occurrence of epidemics of cholera caused by previously unrecognised organism represents a significant new development inthe history of this well-studied disease. *V. cholerae* non O1 serogroups have been previously identified throughout the world and are known to cause, in addition to occasional cases of extra-intestinal disease, severe dehydrating diarrhoea resembling cholera. Until now, however, they have been associated only with sporadic cases or relatively confined outbreaks. The current epidemics have involved tens of thousands of cases and have been responsible for substantial mortality. Although this new strain has to date reported only from southern Asia, its spread to other areas, as has been occurring with *V. cholerae* O1 El Tor since 1961, is an ominous possibility. Scientists in the 2 affected countries and elsewhere are currently working to characterise further the magnitude of the epidemic, specific risk factors that favour disease transmission, the cholera like toxin elaborated by the epidemic strain, and its microbiological properties.

Given that an unusually high proportion of cases in the recent epidemics have occurred in adults, populations living in cholera-endemic areas appear to lack immunity to the new serogroup. The clinical syndrome which has been described in the reports is, for all practical purposes, cholera. Consequently, existing treatment guidelines apply. There is no evidence at this time that the modes of transmission of the new organism differ significantly from those of *V. cholerae* O1, and current recommendations for the prevention of transmission also remain valid. It is worth noting that parenterally-administered, killed whole cell cholera vaccine, derived from *V. cholerae* O1, which is still produced and utilised in several countries despite longstanding World Health Organization (WHO) recommendations to the contrary, could not be expected to have any protective effect against the new *V. cholerae* serogroup.

Cholera is subject to the existing International Health Regulations and cases therefore must be reported to the WHO by member states. No etiological organism is specified in the Regulations as the cause of cholera. The disease under discussion is reported to be clinically and epidemiologically indistinguishable from cholera caused by *V. cholerae* O1, and is therefore presumed to pose identical public health risks. Any country detecting cases caused by the new serogroup is urged to report them as is required for cholera.

The pathogenesis and treatment of cholera are well known. The clinical features of the patients described in this reported are identical to those of usual cholera patients - they are severe, but treatable with simple and previously described rehydration techniques. The new organism has, so far, been sensitive to tetracycline which is recommended as the antibiotic of choice for the treatment of cholera patients with severe dehydration. It is, however, resistant to cotrimoxazole and furazolidone, other antibiotics commonly used as adjunctive treatment for cholera. The reported case-fatality rate of approximately 5% might be further reduced by early recognition and treatment.

Specific diagnosis of the epidemic strain, designated *V. cholerae* O139, can be made using antiserum which can be obtained from the Department of Microbiology, Faculty of Medicine, Kyoto University, Japan.

Cholera Update

Cases have been reported for April and May from Brazil, Chile, Costa Rica, El Salvador, Guatemala, India, Malawi, Mozambique, Peru, Togo and Zimbabwe.

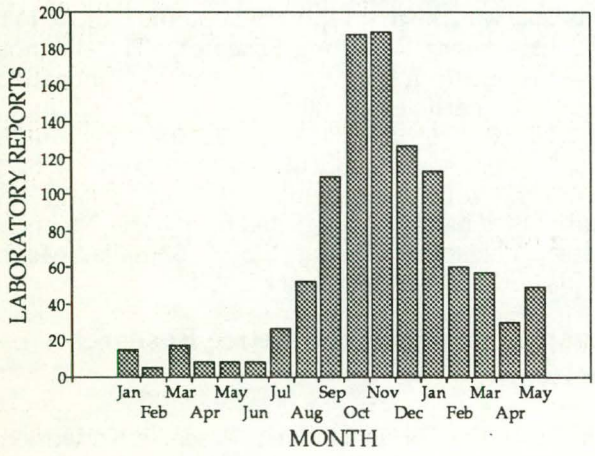
COMMUNICABLE DISEASES SURVEILLANCE

Laboratory Reporting Schemes

There were 1842 reports received in the *CDI* Virology and Serology Reporting Scheme this fortnight (Tables 9, 10 and 11).

- **Measles** was reported for 6 patients. Three were from Tasmania, as were 3 others in the last month. The others were from Queensland (2 from Townsville, one from Rockhampton). The ages ranged from 14 to 31 years.
- There were 30 **rubella** reports this fortnight. Included were 3 reports in females in the age group 15 to 44 years. After falling each month since November, the number of rubella reports increased in May (Figure 1).

Figure 1. Rubella laboratory reports, July 1992 to May 1993, by month of specimen collection



- There were 95 reports of **Ross River virus** infection. All diagnoses were presumptive (IgM). Locations (or reporting laboratories) were Victoria (3 reports), New South Wales (2), Western Australia (3), Northern Territory (2) and Queensland (55). Specimen collection dates were March (5), April (62) and May (28). There have been 1268 reports of Ross River virus infection so far this year, peaking in March.
- **Barmah Forest virus** was reported for 15 patients (all IgM). All were aged between 16 and 68 years and all had specimen collection dates in April and May. Three were from Western Australia, one was from Darwin and the remainder were from Queensland.
- **Dengue type 2** was reported for 48 patients. Forty-seven were from Townsville and one was reported from Mackay. All nine **untyped dengue** reported were also from the Townsville area, as were 8 **untyped flaviviruses**. All the diagnoses were presumptive (demonstration of IgM). Specimen collection dates were mainly in March and April. There have now been 110 reports of dengue 2 with 1993 specimen collection dates, and 31 of untyped dengue.
- **Adenovirus type 3** reports continue to be received at a greater rate than usual. Included in the 5 this fortnight was a male patient with eye disease. The virus had been isolated from a corneal scraping.
- **Varicella-zoster virus** was reported for 35 patients. Included were an 11 day old female and a nine month old male who also had *Haemophilus influenzae* meningitis (both antigen detections in skin samples).
- There were 12 reports of **influenza**, 5 of **influenza A** (3 single high titres, 2 antigen detections) and 7 of **influenza B** (3 isolations, one antigen detection and 3 single high titres). The influenza A and one influenza B were reported in patients aged over 65 years.

  There has been a total of 108 reports of influenza with 1993 specimen collection dates (Table 1). Although there have been more reports of influenza A than of influenza B, more reports of influenza B have been made on the basis of isolations, antigen detection, IgM or fourfold change in titre. Nine of these more 'significant' results for influenza B have been reported from Western Australia, 11 from South Australia, 2 from Victoria and one from Queensland. For influenza A, they have come from New South Wales (2), South Australia (3), Victoria (2) and Western Australia (3).

Table 1. Influenza laboratory reports, 1993, by type and diagnosis method

	Isolation	Antigen detection	IgM	Fourfold change	Other serological	Total
Influenza A, untyped	4	3	1	2	53	63
Influenza A H_3N_2	1					1
Influenza A H_1N_1				1	1	1
Influenza B	16	6		1	20	43

- There were 247 reports of **respiratory syncytial virus** infection, bringing the total for May to 334 and for the year to 697.
- There were 111 **rotavirus** reports this fortnight. This brought the total for May to 99 and for the year to 363. Included were a 6 year old female with neuroblastoma, and a 2 month old male with the clinical diagnosis 'failure to thrive'. Rotavirus reports usually peak in August-September.
- The 26 cases of **Q fever** reported came from laboratories in Queensland, New South Wales and Western Australia. There have been 191 reports of Q fever so far this year, more than the 96 reported by this time last year. This fortnight's patients comprised 3 females (aged 43 years, 46 years and 47 years) and 23 males (age range 17 to 79 years). Three were described as meat workers and one other had animal contact reported.
- ***Bordetella pertussis*** or ***Bordetella*** **species** infections were reported for 38 patients, 27 from Victoria and 11 from Queensland. One patient was an 18 year old female with the clinical diagnosis of asthma. These reports have not been collected by the *CDI* Laboratory Reporting Schemes for very long, but it is apparent that the number of reports has risen over the last month.
- There were 5 reports of ***Streptococcus*** **Group A** infection. For one 5 year old female patient, rheumatic fever was the reported syndrome.

Case of acute hepatitis E in Victoria

A ten year old boy presented for medical attention to the Alfred Hospital, Melbourne in September 1992, with a one week history of nausea and increasing jaundice. The boy had been in Pakistan for 8 weeks whilst en route to Australia. The diagnosis of acute hepatitis E (HEV) was suspected after exclusion of other recognised causes of viral hepatitis. This clinical suspicion was confirmed by the detection of hepatitis E virus particles in a faecal sample collected 3 weeks after the onset of illness as well as the demonstration of rising levels of anti-HEV IgG in pairs of acute and convalescent serum samples. The avidity of the anti-HEV IgG rose from 26% in the acute phase to 87% in the early convalescent phase. The anti-HEV serology was determined using enzyme immunoassays from Genelabs Inc. (USA) which include two recombinant proteins derived from open reading frame 2 of HEV, for both the Burmese and Mexican strains. The initial serum samples and faeces were also positive for HEV RNA using the polymerase chain reaction (PCR) assay.

This patient had serological and virological evidence of acute infection with HEV. The patient was managed at home, treated symptomatically and made a complete and uneventful recovery.

(Leonard D Moaven, Virology Department, Fairfield Hospital; Andrew J Fuller, Infectious Diseases Department, Alfred Hospital; Jennifer C Doultree, Virology Department, Fairfield Hospital; John A Marshall, Virology Department, Fairfield Hospital; D Scott Bowden, Virology Department, Fairfield Hospital; Randolph A Moeckli, Genelabs Inc., Redwood City, California, USA; and Stephen A Locarnini, Virology Department, Fairfield Hospital, Fairfield, Victoria)

CDI **Editorial Comment**

This case was the first report of hepatitis E made to the *CDI* Laboratory Reporting Schemes. The diagnosis, based on electron microscopy detection of hepatitis E virus like particles in faeces, was reported in *CDI* 1992;16:502. Hepatitis E is transmitted by contaminated water and probably from person to person by the faecal-oral route. Epidemics thought to have been caused by it have been recorded from India, Myanmar, Nepal, Pakistan, Algeria, Libya, Somalia, Mexico, China and parts of the former USSR.

Australian Sentinel Practice Research Network

The Australian Sentinel Practice Research Network collected data from 5817 patient encounters in Week 24 and from 4096 patient encounters in Week 25 (Table 2). The rate of reporting of influenza was higher in week 25 than in any previous week this year.

Table 2. Australian Sentinel Practice Research Network, Weeks 24 and 25 1993

Condition	Week 24, to 13 June 1993		Week 25, to 20 June 1993	
	Reports	Rate per 1000 encounters	Reports	Rate per 1000 encounters
Influenza	56	9.6	50	12.2
Measles	0	0	0	0
Rubella	2	0.3	0	0
Pertussis	1	0.2	2	0.5
Genital herpes	1	0.2	1	0.2
Gastroenteritis	60	10.3	47	11.5

Australian Encephalitis Sentinel Chicken Surveillance Programme: Serological results - April and May 1993

Sentinel chicken serology was undertaken for 22 of 24 flocks in the Kimberley and Pilbara regions of Western Australia (Table 3).

Results for April 1993

There were 7/11 seroconversions to flaviviruses in chickens from Wyndham, 4 to Murray Valley encephalitis virus (MVE) and 3 were dual infections by MVE and Kunjin viruses. A new flock was established in Kununurra at the end of March, 5 of which seroconverted to MVE in April. In Broome, where 3 flocks are located, one flock at Roebuck Plains had 5 chickens seroconverting, 4 to MVE and one with a dual infection. At Halls Creek, 9 chickens seroconverted, 7 to MVE and 2 to both viruses. The first widespread evidence of virus activity in 1993 was also observed in the Pilbara. At Port Hedland, 2 of 12 chickens seroconverted to MVE; at Shay Gap, 6 of 8 chickens seroconverted, 5 to MVE and one dual infection; at Marble Bar, 4 of 11 chickens seroconverted to MVE; and at Ophthalmia, 2 of 9 chickens seroconverted, one to MVE and one dual infection. Thus 26 seroconversions occurred in flocks in the Kimberley region in April, and 14 in the Pilbara region.

Results for May 1993

At Wyndham, the last seronegative chicken in the flock seroconverted to MVE. At Derby, where two flocks are located, 10 of 12 chickens seroconverted, 8 to MVE and 2 dual infections. At the second Derby site, one chicken of 11 seroconverted to MVE. At Kalumburu, all chickens in the flock seroconverted, 11 to MVE and one dual infection. At Fitzroy Crossing, 5 chickens seroconverted, all to MVE. A new flock established at Broome Roebuck Plains site had 3 of 6 chickens seroconverting, 12 to MVE and one dual infection. A single seroconversion to MVE was observed in the flock at the second Broome locations, in the township, and 3 seroconversions, all to MVE, were found in the flock of 11 chickens at the third Broome location, the RAOU Bird Observatory. In Kununurra, 5 of 11 chickens seroconverted, 4 to MVE and one dual infection. In the Pilbara, 2 further

Table 3. Sentinel chicken seroconversion in Western Australia during April and May

Location	Flock size	Prior seroconversion[1]	Seroconversion[2]		1993 Total
			April	May	
Broome (Roebuck)[3]	12	7	5(1)	-	12
Broome (Roebuck)	6	-	-	3(1)	3
Broome (Town)	8	0	0	1	1
Broome (RAOU)	11	0	0	3	3
Derby (site 1)	12	1	0	10(2)	11
Derby (site 2)	11	0	0	1	1
Fitzroy Crossing	9	3	NT	5	8
Halls Creek	11	2	9(2)	-	11
Kalumburu	12	0	NT	12(1)	12
Kununurra	12	-[4]	5	5(1)	10
Wyndham	11	3	7(3)	1	11
Harding Dam (site 1)	7	0	0	2(1)	2
Harding Dam (site 2)	12	0	0	6(1)[5]	6
Marble Bar	11	0	4	2	6
Ophthalmia	10	1	2(1)	1(1)	4
Port Hedland	12	0	2	0	2
Shay Gap	8	0	6(1)	2	8
Karratha	10	0	0	0	0
BHP Iron Ore	12	0	0	0	0
Pannawonica	12	0	0	0	0
Tom Price	11	0	NT	NT	0
Exmouth	11	0	0	0	0
Carnarvon	12	0	0	NT	0

1. Prior seroconversions during March 1993 were reported in *CDI* 1993;17:169.
2. Number is total seroconversions, with dual MVE and Kunjin seroconversions in parentheses.
3. Broome (Roebuck) - the flock was replaced in April.
4. Kununurra - the flock was replaced at the beginning of April.
5. The number in parentheses for Harding Dam (site 2) indicates a single seroconversion to Kunjin alone.

NT Not tested.

chickens seroconverted to MVE at Shay Gap, and 2 chickens seroconverted to MVE at Marble Bar. The first seroconversions for 1993 also occurred at the Harding Dam where two sentinel flocks are located; at the first site 2 of 7 chickens seroconverted, one to MVE and one dual infection, and at the second site, 6 of 11 chickens seroconverted, 5 to MVE and one to Kunjin. One additional chicken seroconverted to a dual infection at Ophthalmia. Thus 41 chickens seroconverted in flocks in the Kimberley region during May, and 13 in the Pilbara region.

These sentinel chicken seroconversion results clearly show that considerable and widespread flavivirus activity is continuing in the Kimberley region. This activity spilt over into the Pilbara region in April, and is continuing to spread during May. A general health warning was issued for the Pilbara region by the Health Department of Western Australia on Friday 14 May 1993.

Flavivirus serology was also carried out for 2/6 flocks in April and 4/6 flocks in May from the Northern Territory. All of the flock's chickens (9) seroconverted to MVE at Palumpa in April. There were no seroconversions to flaviviruses at Leanyear in April but there was one seroconversion to MVE and one seroconversion to Kunjin in the flock in May. There were no new seroconversions to flaviviruses at Murganella or Smith Point but 5/13 of the chickens at Howard Springs (near Darwin) seroconverted to MVE in May.

Information on the location of sentinel chicken flocks was presented in *CDI* 1992;**16**:55-57, and *CDI* 1992;**16**:169.

(AK Broome and JS Mackenzie, Department of Microbiology, The University of Western Australia)

Victorian Influenza Surveillance System

Included in this issue of *CDI* are results for the second fortnight in 1993 for the Victorian Influenza Surveillance System (Table 4). This system has been set up by the Infectious Diseases Unit of Health and Community Services, Victoria, and includes surveillance data supplied by sentinel general practitioners, diagnostic laboratories, hospital, schools and industry. Total deaths (which usually increase during influenza epidemics) are also being monitored.

The rate of general practice consultations for influenza is higher than that recorded for last fortnight.

(Raina MacIntyre, Health and Community Services, Victoria)

Table 4. Victorian Influenza Surveillance System, fortnight 2, 1993

	Fortnight 1 17 to 28 May
General practices (34) Influenza cases (per 100 patients seen)	28 (0.9)
Laboratories (2) Influenza cases	0
Schools (30) Total absenteeism, Tuesday	1711 (12.2%)
Deaths, total from all causes (per 10,000 population)	1212 (2.9)

Table 5. LabDOSS reports of blood isolates, by organism and clinical information

Organism	Total[1]	Clinical Information						Risk Factors					Total reported this year
		Bone/Joint	Lower respiratory	Endocarditis	Gastrointestinal	Urinary Tract	Skin	Surgery	Immunosuppressed	IV line	Perinatal	Neonatal	
Staphylococcus aureus	40[2]	3			1	1	15	5	7	9			350
Staphylococcus epidermidis	9							1		7			200
Staphylococcus coagulase negative	15[3]							1	1	7		1	403
Enterococcus species	6[4]				1	1	1	1		4			66
Streptococcus pneumoniae	12		9						1				59
Escherichia coli	37		1		6	19		4	13	4			406
Enterobacter species	9[5]				1		1	1					92
Serratia marcescens	5				1			1		2			22
Klebsiella pneumonia	7				2			1	2	1		1	76
Klebsiella species	5[6]				1								22
Pseudomonas aeruginosa	11				2			1	5	2		1	96

1. Only organisms with 5 or more reports are included in this table.
2. MRSA 9.
3. *Staphylococcus cohnii* 1.
4. *Enterococcus faecalis* 5, *E. faecium* 1.
5. *Enterobacter cloacae* 7.
6. *Klebsiella oxytoca* 3.

Sterile Sites Surveillance (LabDOSS)

Data for this fortnight have been provided by 9 laboratories. A total of 243 reports has been included (146 males, 96 females); ICPMR, Westmead 57, Royal Prince Alfred Sydney 67, Sullivan Nicolaides, Queensland 13, IMVS, Adelaide 50, Royal North Shore Hospital, Sydney 35, Northern Tasmanian Pathology Service 8, Nambour Hospital, Queensland 5, Towoomba Pathology 6, Central Queensland Pathology Service 2.

Only reports of isolates collected after the first day of the previous month are included in the fortnightly *CDI* report. Additional data prior to this period have been included in the 1993 total LabDOSS file (Royal Prince Alfred 112 reports, IMVS 39 reports).

Organisms reported 5 or more times from blood are detailed in Table 5. Other blood isolates were:

Gram positive: 3 *Streptococcus* Group A, 4 *Streptococcus* Group B (ages 2 months, 34 years, 40 years, 66 years, 84 years), 1 *Streptococcus* Group G, 4 *Streptococcus* 'milleri', 2 *Streptococcus sanguis*, 3 *Streptococcus mitis*, 1 *Streptococcus salivarius*, 1 *Streptococcus* 'viridans', 1 *Streptococcus* species, 1 *Arcanobacterium* species, 1 *Micrococcus* species.

Gram negative: 3 *Acinetobacter* sp, 1 *Citrobacter diversus*, 2 *Pseudomonas cepacia*, 1 *Pseudomonas pseudomallei* (56 year old diabetic male), 4 *Haemophilus influenzae* (3 type b; 5 month old female with periorbital cellulitis, 13 month old female with epiglottitis, 71 year old female), 1 *Neisseria meningitidis* group B (patient aged less than 1 year), 1 *Morganella morganii*, 3 *Proteus mirabilis*, 1 *Flavobacterium* species, 2 *Xanthomonas maltophilia*, 1 *Providencia alcalifaciens*, 1 *Cardiobacterium hominis* (endocarditis, 22 year old).

Anaerobes: 2 *Bacteroides fragilis* species, 1 *Peptostreptococcus* species.

Fungi: 4 *Candida* species (1 *C. albicans*,1 *C. krusei*).

Most of the blood isolates of bacteria were from patients aged 55 and over (Figure 2).

CSF isolates and meningitis reports

There were 7 reports of CSF isolates and/or meningitis (Table 6).

Isolates from Sites other than Blood or CSF

Peritoneal dialysate: 1 *Enterobacter cloacae*, 2 *Staphylococcus aureus*, 7 *Staphylococcus epidermidis*, 2 *Staphylococcus* coagulase negative, 1 *Streptococcus* species, 1 *Streptococcus* group D (non enterococcal).

Joint fluid: 4 *Staphylococcus aureus*, 1 *Staphylococcus* coagulase negative, 1 *Streptococcus* Group G.

Other: 1 *Aspergillus* species, 1 *Bacillus* species, 1 *Corynebacterium* species, 1 *Enterococcus* species, 2 *Escherichia coli*, 1 *Kingella kingae*, 1 *Serratia marcescens*, 1 *Staphylococcus aureus*, 1 *Candida* species.

Hospital acquired infections

Accurate case definitions of hospital acquired infection are complex. The LabDOSS scheme arbitrarily accepts 'hospital acquired' as a risk factor if the infection was acquired greater than 48 hours after admission. This risk factor was reported for 42 of the 206 reports of bacteraemia. IV lines were listed as a risk factor in 22, 10 patients were immunocompromised and 7 had undergone surgery.

The organisms implicated were: 1 *Acinetobacter* species, 2 *Enterobacter cloacae*, 2 *Enterococcus faecalis*, 8 *Escherichia coli*, 2 *Klebsiella oxytoca*, 3 *Klebsiella pneumoniae*, 1 *Proteus mirabilis*, 2 *Pseudomonas aeruginosa*, 2 *Serratia marcescens*, 8 *Staphylococcus aureus*, 1 *Staphylococcus* coagulase negative, 7 *Staphylococcus epidermidis*, 1 *Streptococcus* group B, 1 *Streptococcus* 'milleri', 1 *Xanthomonas maltophilia*.

Figure 2. LabDOSS reports of blood isolates of bacteria, by age group

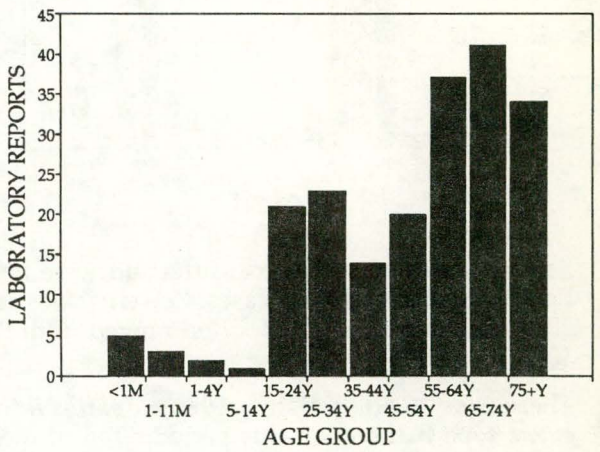


Table 6. LabDOSS meningitis reports, by organism and age group

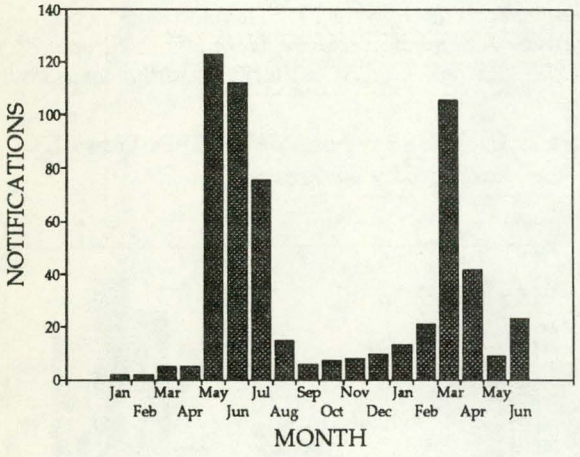
	1-11 months	1-4 years	35-44 years	55-64 years	75 + years	Total	Total reported this year
Haemophilus influenzae type b	1	2				3	20
Streptococcus pneumoniae				1	1	2	9
Cryptococcus neoformans			2 (HIV)			2	18

National Notifiable Diseases Surveillance System, 30 May to 12 June 1993

A total of 1,540 reports was received for this period (Tables 7, 8 and 9, and Figure 6).

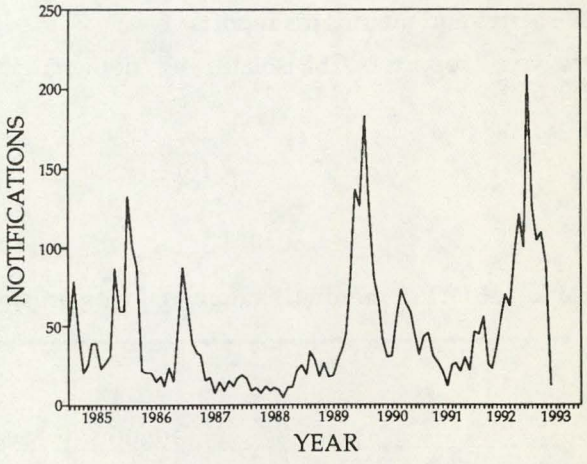
- Reports were received of 133 cases of **Ross River virus infection.** These reports were for 67 males, 55 females and sex was not recorded for 11 cases. Ages recorded ranged from the 10-14 to the 85-89 years age groups. Locations were reported as in the Australian Capital Territory, Sydney, south-eastern New South Wales, Brisbane and widespread areas of rural Queensland and north-western Western Australia.
- There were 38 reports of **dengue** to bring the total for the year to 200, an increase of 277% over the same period in 1992 (Figure 3). Sexes reported were 18 males and 20 females. Ages recorded ranged from the 10-14 to the 50-54 years age groups. Locations were reported as Townsville and surrounds (29 cases), Charters Towers (1 case), Hughenden (7 cases) and Mareeba(1 case).

Figure 3. Dengue notifications by month, 1992-1993



- Seventy cases of **gonococcal infection** were notified this period. Of these cases, 49 were males and 20 were females. Ages reported ranged from the 10-14 to the 75-79 years age groups.
- There were 16 notifications of ***Haemophilus influenzae* type b infection** this period. Ten of these were males and 6 females. Four cases were aged less than one year and 9 were less than 5 years. There were no apparent clusters of cases.
- Sixty-one reports of **hepatitis A** were received, 31 males, 29 females and in one case sex was unreported. The majority of cases (11 of the 61) were in the 0-4 years age group, ages ranged up to the 65-69 years age group.
- There was a single case of **hydatid infection** notified, in a male in the 60-65 years age group in Tasmania.
- Seven notifications of **legionellosis** were received, including an apparent cluster of 2 cases in a single postcode area. Three cases were males, 3 females and sex was unreported for one case. A single case was in the 35-39 years age group, the others in age groups between 50-54 years and 70-74 years.
- There were 2 cases of **leptospirosis** reported for males in the 25-29 and 60-65 years age groups. They came from rural areas of Western Australia and Tasmania.
- There were 7 reports of **malaria,** 6 were males and one was a female. Dates of onset were in April (3 cases), May (2 cases) and June (2 cases).
- **Measles** was notified for 66 cases. Of these, 29 were males and 37 were females. In 3 cases the age was recorded as less than one year, and the mean age was 12.9 years. There were 11 apparent clusters in separate postcode areas with 2 to 7 cases each. Ten of these apparent clusters were in Tasmania.
- There were 7 reports of **meningococcal infection** received. Of these, 5 were males and 2 were females, recorded ages were in the 0-4 (5 cases) and 15-19 (2 cases) years age groups.
- **Pertussis** was notified for 50 cases to bring the total for the year to 688, compared with 197 over the same period in 1992. There was an increase in pertussis notifications owver the summer of 1992-1993, 3 years after the last major episode (Figure 4). Twenty-nine were males and 21 were females. A single case was aged less than one year, 2 were aged less than 5 years and ages ranged up to the 90-95 years age group. There were 4 apparent clusters of 2 cases each in separate postcode areas. Intervals between the index and further cases ranged from onset on the following day to 30 days.

Figure 4. Pertussis notifications by month, 1985-1993



- There were 22 notifications of **Q fever.** Of these, 19 were males and 3 females. Ages ranged from the 5-9 to the 75-79 years age groups. Cases were re-

ported from Brisbane and rural areas of New South Wales, Queensland, Victoria and Western Australia.

- **Rubella** was notified for 65 cases, 39 males and 26 females. To date there have been 1,353 cases in 1993, compared with 200 notified cases before the epidemic started at about this time in 1992 (Figure 5). Two cases were recorded as being aged less than one year. The mean age was 18.3 years and there were 14 reports for females in the 15-44 years age group. There was 10 apparent clusters of 2 cases each in separate postcode areas.
- There were 64 notifications of **syphilis** received this period. Of these, half were males and half were females. The age was recorded as one year in one case and less than 15 in 3 cases.
- There was a single report of **tetanus** in a female in the 75-79 years age group.
- There were 23 notifications of **tuberculosis**, 11 males and 12 females. Ages ranged from the 0-4 to the 0-84 years age groups.

Figure 5. Rubella notifications by month, 1992-1993

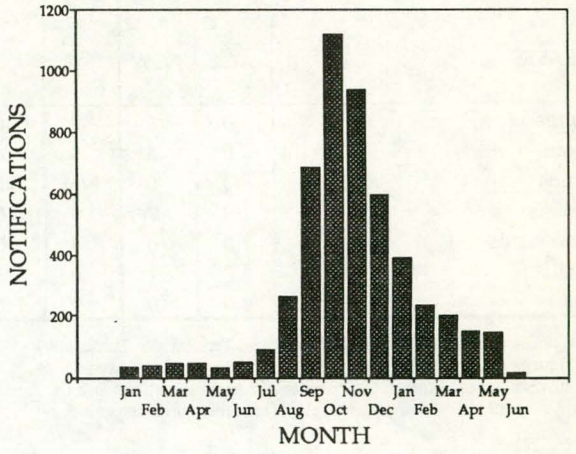
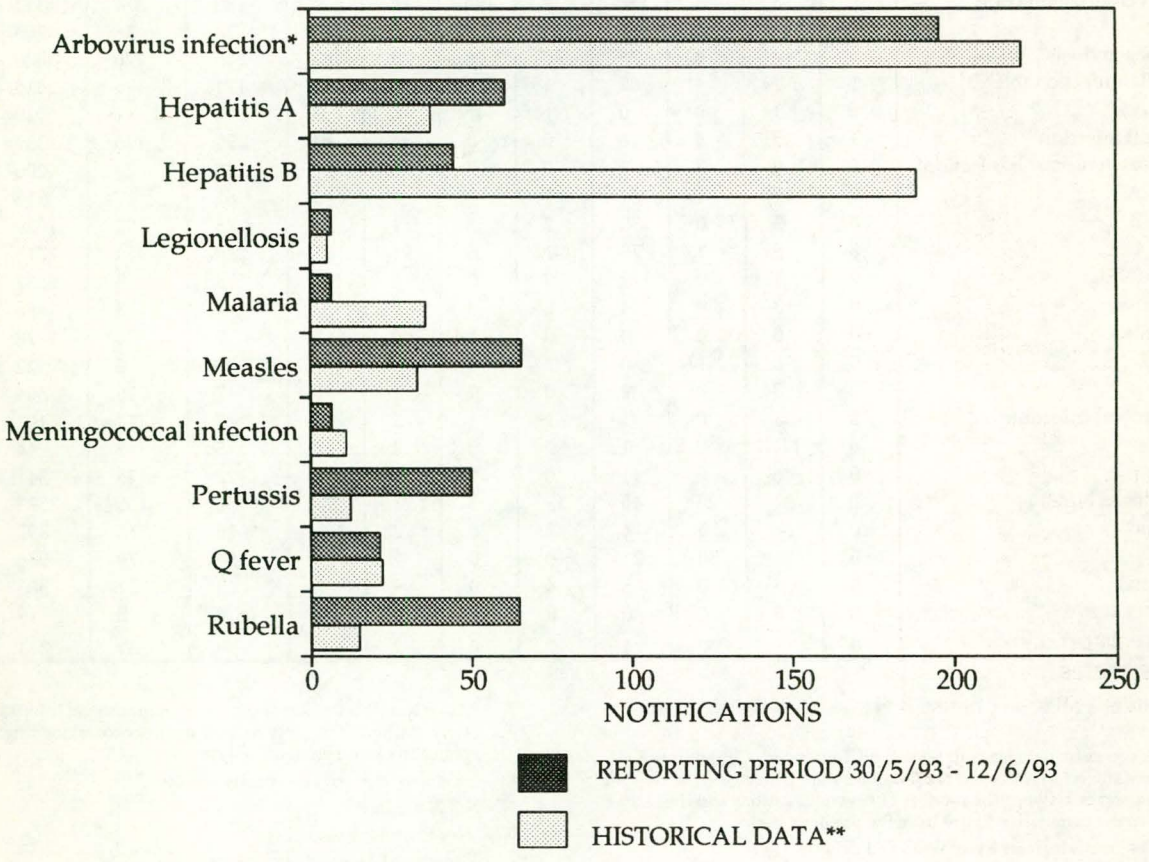


Figure 6. Selected National Notifiable Diseases Surveillance System reports, and historical data **



* Includes Ross River virus and Dengue

** The historical data are the averages of the number of notifications in 6 previous 2-week reporting periods: the corresponding periods of the last 2 years and the periods immediately preceding and following those.

Table 7. Notifiable Diseases preventable by vaccines recommended by the NHMRC for routine childhood immunisation for the reporting period 30 May to 12 June 1993

DISEASES	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	TOTALS FOR AUSTRALIA[1] This Period 1993	This Period 1992	Year to Date 1993	Year to Date 1992
Diphtheria	0	0	0	0	0	0	0	0	0	3	19	8
Measles	0	5	0	6	0	47	5	3	66	30	610	422
Mumps	0	0	NN	NN	NN	NN	0	0	0	2	1	14
Pertussis	0	7	0	10	11	0	16	6	50	7	688	197
Poliomyelitis	0	0	0	0	0	0	0	0	0	0	0	0
Rubella[2]	7	1	0	36	7	0	13	1	65	11	1353	200
Tetanus	0	0	0	NN	1	0	0	0	1	0	5	6

1. Totals comprise data from all States and Territories. Cumulative figures are subject to retrospective revision, so there may be discrepancies between the number of new notifications and the increment in the cumulative figure from the previous period.
2. NT, Tas: CRS only; ACT, NSW, Qld: rubella only.

NN Not Notifiable.

Table 8. Other Notifiable Diseases[1], for the reporting period 30 May to 12 June 1993

DISEASES	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	TOTALS FOR AUSTRALIA[2] This Period 1993	This Period 1992	Year to Date 1993	Year to Date 1992
Arbovirus infection (NEC)[3]	0	0	2	20	0	1	2	0	25	23	345	171
Ross River virus infection	0	8	3	114	2	NN	4	2	133	374	4313	4597
Dengue	0	-	0	38	-	NN	0	NN	38	36	200	53
Campylobacteriosis[4]	2	-	8	75	35	8	88	29	245	276	3620	3636
Chlamydial infection (NEC)[5]	5	NN	4	82	1	1	33	45	171	198	2818	3159
Donovanosis	0	NN	0	0	NN	NN	0	0	0	1	19	30
Gonococcal infection[6]	1	15	4	16	0	0	4	30	70	106	1332	1316
Haemophilus influenzae b infection[7]	0	2	3	2	0	2	6	1	16	25	206	196
Hepatitis A	0	19	1	31	1	0	9	0	61	77	915	961
Hepatitis B	0	3	0	30	2	2	1	7	45	192	1029	2237
Hepatitis C	8	0	1	70	NN	6	91	44	220	459	2715	3668
Hepatitis (NEC)	0	1	0	2	0	0	0	NN	3	5	37	29
Legionellosis	0	3	0	4	0	0	0	0	7	3	86	101
Leptospirosis	0	0	0	0	0	1	0	1	2	4	78	49
Listeriosis	0	0	NN	0	NN	0	0	0	0	2	22	19
Malaria	0	3	0	2	0	0	1	1	7	19	304	333
Meningococcal infection	1	1	0	1	1	1	2	0	7	14	101	84
Ornithosis	0	NN	0	1	0	0	3	1	5	5	44	45
Q fever	0	6	0	11	0	0	2	3	22	15	341	200
Salmonellosis (NEC)	0	32	20	40	13	3	21	27	156	158	2593	2732
Shigellosis[4]	0	-	5	4	3	0	2	2	16	16	397	280
Syphilis	0	9	30	21	0	0	1	3	64	79	986	1160
Tuberculosis	0	4	0	5	4	0	9	1	23	21	363	318
Typhoid[8]	0	0	0	0	0	0	0	0	0	3	19	29
Yersiniosis (NEC)[4]	0	-	0	4	2	0	2	0	8	31	211	341

1. For HIV and AIDS, see *CDI* 1993;17:244. For rarely notified diseases, see Table 9.
2. Totals comprise data from all States and Territories. Cumulative figures are subject to retrospective revision so there may be discrepancies between the number of new notifications and the increment in the cumulative figure from the previous period.
3. SA, Tas: includes Ross River virus and dengue.
   WA: includes dengue.
4. NSW: only as 'foodborne disease' or 'gastroenteritis in an institution'.
5. WA: genital only.
6. NT, Qld, SA and Vic: includes gonococcal neonatal ophthalmia.
7. SA: only as 'bacterial meningitis'; meningococcal infection is separately notified; Tas: only as 'non-meningococcal meningitis'; Vic: epiglottitis and meningitis only.
8. NSW and Vic: includes paratyphoid.

NN Not Notifiable.

NEC Not Elsewhere Classified.

\- Elsewhere Classified.

Table 9. Rarely Notified Diseases[1] for the reporting period 30 May to 12 June 1993

DISEASES	Total This Period	Reporting States or Territories	Year to Date 1993
Botulism	0		0
Brucellosis	0		10
Chancroid	0		1
Cholera	0		2
Hydatid infection	1	Tas	15
Leprosy	0		5
Lymphogranuloma venereum	0		0
Plague	0		0
Rabies	0		0
Yellow fever	0		0
Other viral haemorrhagic fevers	0		0

1. Fewer than 50 cases of each of these diseases were notified each year during the period 1987 to 1992.

Table 10. Laboratory reports by State or Territory of reporting laboratory for the reporting period 3 to 16 June 1993, historical data[1], and total reports for the year

	STATE OR TERRITORY OF REPORTING LABORATORY						Total this fortnight	Historical data [1]	Total reported this year
	ACT	NSW	Qld	SA	Vic	WA			
MEASLES, MUMPS, RUBELLA									
Measles virus		3	3				6	6.0	172
Mumps virus			3		2		5	1.7	33
Rubella virus			28	2			30	5.2	552
HEPATITIS VIRUSES									
Hepatitis A virus		3	20	4	1		28	14.0	324
Hepatitis B virus		29	32	1	18	10	90	93.7	1,319
Hepatitis C virus	2	9	39	95		39	184	48.3	1,946
Hepatitis D virus			4	2	1		7	3.5	34
ARBOVIRUSES									
Ross River virus			88		3	4	95	64.2	1,384
Barmah Forest virus			11			4	15	5.2	132
Dengue type 2			48				48	5.3	118
Dengue not typed			8			1	9	3.0	36
Flavivirus (unspecified)			7		1		8	.3	49
ADENOVIRUSES									
Adenovirus type 1					1		1	2.3	38
Adenovirus type 2					3		3	2.5	49
Adenovirus type 3		1			4		5	2.5	109
Adenovirus type 4		1					1	.7	56
Adenovirus type 8					1		1	.8	12
Adenovirus not typed/pending		3	14	12	15	7	51	39.2	613
HERPES VIRUSES									
Herpes simplex virus type 1			31	29	59	22	141	103.3	2,129
Herpes simplex virus type 2		1	52	19	30	40	142	150.7	2,473
Herpes simplex not typed/pending	7	4		1	4	5	21	32.8	313
Cytomegalovirus	1	6	16	5	11	10	49	74.3	792
Varicella-zoster virus		3	13	4	7	8	35	20.2	495
Epstein-Barr virus		5	59	2	5	3	74	48.7	958
Herpes virus group - not typed				1			1	4.0	14

Table 10. Laboratory reports by State or Territory of reporting laboratory for the reporting period 3 to 16 June 1993, historical data[1], and total reports for the year, continued

	STATE OR TERRITORY OF REPORTING LABORATORY						Total this fortnight	Historical data [1]	Total reported this year
	ACT	NSW	Qld	SA	Vic	WA			
OTHER DNA VIRUSES									
Molluscum contagiosum						1	1	.5	3
Parvovirus					1		1	2.5	62
PICORNA VIRUS FAMILY									
Coxsackievirus B1						2	2	.2	59
Coxsackievirus B2		1					1	.5	2
Coxsackievirus B3					1		1	.3	7
Coxsackievirus B4					1		1	2.2	4
Echovirus type 7	1						1	.3	86
Echovirus type 11		1			2	1	4	.3	29
Echovirus type 30					3		3	.0	13
Rhinovirus (all types)		1	2	3	15	7	28	31.2	375
Enterovirus not typed/pending			26		6	3	35	31.0	367
ORTHO/PARAMYXOVIRUSES									
Influenza A virus			3	1	1		5	35.0	83
Influenza B virus			3	1		3	7	5.3	48
Parainfluenza virus type 1				1	2		3	7.8	15
Parainfluenza virus type 2		1	2	1	8		12	9.7	52
Parainfluenza virus type 3		1	1	6	8		16	17.2	245
Parainfluenza virus typing pending	1				1		2	4.8	18
Respiratory syncytial virus	13	99	54	10	50	21	247	206.5	718
OTHER RNA VIRUSES									
HIV-1			1			1	2	2.3	40
HTLV-1						1	1	.7	9
Rotavirus	13	14	7	6	51	20	111	68.8	529
Norwalk agent		1			1		2	.8	11
Small virus (like) particle						1	1	2.5	26
OTHER									
Chlamydia trachomatis not typed	2	16	40	12	15	42	127	83.2	1,572
Chlamydia psittaci					1		1	4.3	47
Chlamydia species typing pending				1			1	.3	5
Chlamydia species	1		1				2	.0	9
Mycoplasma pneumoniae		9	23	1	28		61	20.8	1,010
Coxiella burnetii (Q fever)		9	13			4	26	7.0	242
Rickettsia spp - other			1				1	.0	1
Streptococcus group A			5				5	.0	135
Bordetella pertussis			3		27		30	.0	93
Bordetella species			8				8	.0	108
Legionella species			2				2	.0	4
Treponema pallidum		4	30				34	.2	355
Toxoplasma gondii			4		2		6	.5	35
TOTAL	41	225	706	220	390	260	1,842	1,279.2	20,568

1. The historical data are the averages of the numbers of reports in 6 previous 2 week reporting periods: the corresponding periods of the last 2 years and the periods immediately preceding and following those.

Table 11. Laboratory reports by clinical information for the reporting period 3 to 16 June 1993

	Encephalitis	Meningitis	Other CNS	Congenital	Respiratory	Gastrointestinal	Hepatic	Skin	Eye	Muscle/joint	Genital	Other/unknown	Total
MEASLES, MUMPS, RUBELLA													
Measles virus								5				1	6
Mumps virus												5	5
Rubella virus								4		1		25	30
HEPATITIS VIRUSES													
Hepatitis A virus						1	19					8	28
Hepatitis B virus							38					52	90
Hepatitis C virus							29	2				153	184
Hepatitis D virus							6					1	7
ARBOVIRUSES													
Ross River virus			1					11	1	29		53	95
Barmah Forest virus								1		7		7	15
Dengue type 2			1		1		1	3		2		40	48
Dengue not typed										3		6	9
Flavivirus (unspecified)										1		7	8
ADENOVIRUSES													
Adenovirus type 1								1					1
Adenovirus type 2					2							1	3
Adenovirus type 3					1				4				5
Adenovirus type 4					1								1
Adenovirus type 8									1				1
Adenovirus not typed/pending		2			23	16			2		1	7	51
HERPES VIRUSES													
Herpes simplex virus type 1		2			7			82	5		30	15	141
Herpes simplex virus type 2								52	1		82	7	142
Herpes simplex not typed/pending	1							11			5	4	21
Cytomegalovirus		1		3	15							30	49
Varicella-zoster virus			1		1			17			1	15	35
Epstein-Barr virus					3		2	1				68	74
Herpes virus group - not typed												1	1
OTHER DNA VIRUSES													
Molluscum contagiosum								1					1
Parvovirus										1			1
PICORNA VIRUS FAMILY													
Coxsackievirus B1												2	2
Coxsackievirus B2		1											1
Coxsackievirus B3		1											1
Coxsackievirus B4		1											1
Echovirus type 7												1	1
Echovirus type 11		1			3								4
Echovirus type 30		3											3
Rhinovirus (all types)					26			1				1	28
Enterovirus not typed/pending		2	1	1	17	6		1	1			6	35
ORTHO/PARAMYXOVIRUSES													
Influenza A virus					3							2	5
Influenza B virus					4							3	7

Table 11. Laboratory reports by clinical information for the reporting period 3 to 16 June 1993, continued

	Encephalitis	Meningitis	Other CNS	Congenital	Respiratory	Gastrointestinal	Hepatic	Skin	Eye	Muscle/joint	Genital	Other/unknown	Total
Parainfluenza virus type 1					3								3
Parainfluenza virus type 2					11							1	12
Parainfluenza virus type 3					15							1	16
Parainfluenza virus typing pending					2								2
Respiratory syncytial virus			1		243							3	247
OTHER RNA VIRUSES													
HIV-1												2	2
HTLV-1												1	1
Rotavirus		1			2	100						8	111
Norwalk agent						2							2
Small virus (like) particle						1							1
OTHER													
Chlamydia trachomatis not typed					1				1		101	24	127
Chlamydia psittaci					1								1
Chlamydia species typing pending											1		1
Chlamydia species											2		2
Mycoplasma pneumoniae					45			1	1			14	61
Coxiella burnetii (Q fever)					1		3			2		20	26
Rickettsia spp - other												1	1
Streptococcus group A												5	5
Bordetella pertussis					30								30
Bordetella species					3							5	8
Legionella species					2								2
Treponema pallidum				1							2	31	34
Toxoplasma gondii												6	6
TOTAL	1	15	5	5	467	126	98	194	17	46	225	643	1842

Table 12. Laboratory reports by contributing laboratories for the reporting period 3 to 16 June 1993

STATE OR TERRITORY	LABORATORY	REPORTS
Australian Capital Territory	Woden Valley Hospital, Canberra	41
New South Wales	Institute of Clinical Pathology & Medical Research, Westmead	102
	Prince Henry/Prince of Wales Hospitals, Sydney	6
	Royal Alexandra Hospital for Children, Camperdown	54
	South West Area Pathology Service, Liverpool	63
Queensland	Dr TB Lynch, Pathologist, Rockhampton	127
	Queensland Medical Laboratory, West End	217
	State Health Laboratory, Brisbane	362
South Australia	Institute of Medical & Veterinary Science, Adelaide	220
Victoria	Fairfield Hospital, Melbourne	189
	Microbiological Diagnostic Unit, University of Melbourne	13
	Royal Children's Hospital, Melbourne	188
Western Australia	Princess Margaret Hospital, Perth	53
	State Health Laboratory Services, Perth	207
TOTAL		1842