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BACTERIOLOGY

INVASIVE INFECTIONS

Antimicrobial susceptibilities of these bacteria are reported in the Antibiotic Resistance section of this issue of Lablink.

Haemophilus influenzae

The introduction of Hib vaccine in 1994 has led to a 92% decline (95% CI=89-94%) in the hospitalisation rate of *Haemophilus influenzae* disease for those under 5 years of age (Wilson *et al.*, unpublished data). It is therefore important to identify serotypes of *H. influenzae* currently causing disease. Laboratory data and notification data are matched to ensure that all cases are represented in the notifiable disease dataset.

Isolates were received from 51 cases of *H. influenzae* invasive disease in 2001. Eight of these isolates were serotype b. One isolate was serotype c, one serotype e and three isolates serotype f. There were also 51 isolates received in 2000 of which 10 (19.6%) were *H. influenzae* serotype b. Isolates that were non-serotypable were tested by PCR for the presence of the serotype b specific *cap* gene and *bexA* gene necessary for capsular expression. One of the 10 serotype b isolates was autoagglutinating but had the gene for expression of the b serotype.

Neisseria meningitidis

Surveillance of meningococcal disease in New Zealand is based on a combination of notification and laboratory data. A total of 650 cases of meningococcal disease were recorded in 2001 giving a rate of disease of 17.4.per 100 000. This is the highest rate since the start of the epidemic and brings the total number of cases since its start in 1991 to 4195. Serogroup B meningococci with the PorA subtype P1.7b,4 continue to cause most disease. In 2001, 75.2% (489/650) of cases were laboratory-confirmed. This is the highest percentage of cases to be confirmed since 1994 when pre-hospital administration of antibiotics was actively promoted and lead to a reduced chance of obtaining culture-positive meningococcal disease cases.

Table 1 presents the basis of confirmation in a hierarchical system where each case is represented in the table only once, starting with the isolation of *N. meningitidis* from CSF, blood or other sterile site down to a positive result in the latex meningococcal antigen test. Recovery of meningococci from the throat provides presumptive evidence only and the case is therefore categorised as probable. In 2001, 159 cases (24.5%) of meningococcal disease, not confirmed by isolation of a meningococcus, were confirmed by detection of meningococcal DNA from sterile site specimens. This is the highest percentage of cases confirmed by PCR to date (Table 1). Of the cases given antibiotics prior to admission to hospital 38.3% were PCR positive compared with 13.7% culture positive. These results affirm the value of PCR testing in cases when antibiotics have been given prior to sampling because of the difficulty of obtaining a viable culture after antibiotic treatment. The percentage of cases confirmed by culture was relatively consistent across the whole country. However, a case of meningococcal disease of any age was least likely to be confirmed by PCR if it occurred in the Northern Health Region.

Table 1. Meningococcal disease, basis for diagnosis, 1996-2001[1]

	1996		1997		1998		1999		2000		2001	
Basis for diagnosis	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Isolation of N. meningitidis from blood and/or CSF or any other sterile site	266	56.2	315	51.5	221	50.2	243	48.2	256	53.3	319	49.1
PCR test	21	4.4	59	9.6	75	17.0	72	14.3	83	17.3	159	24.5
Gram-negative diplococci in CSF	28	5.9	40	6.5	6	1.4	17	3.4	8	1.7	11	1.7
Meningococcal antigen test	2	0.4	2	0.3	2	0.5	1	0.2	1	0.2	0	0.0
Confirmed - subtotal	**317**	**66.9**	**416**	**68.0**	**304**	**69.1**	**333**	**66.1**	**348**	**72.5**	**489**	**75.2**
Clinical criteria and a positive throat swab	6	1.3	9	1.3	6	1.4	7	1.4	2	0.4	4	0.6
Clinical criteria	150	31.7	188	30.7	130	29.5	164	32.5	130	27.1	157	24.2
Probable - subtotal	**156**	**33.0**	**197**	**32.0**	**139**	**30.9**	**171**	**33.9**	**132**	**27.5**	**161**	**24.8**
Total	**473**	**100**	**613**	**100**	**440**	**100**	**504**	**100**	**480**	**100**	**650**	**100**

[1] Each case is represented only once in the table.

As a proportion of the total isolates from cases of disease, serogroup B increased from the 1990 baseline level of 47.8% to 61.0% in 1991 at the start of the epidemic, and reached a peak of 94.1% (241/256) in 2000. Serogroup B isolates proportionately decreased in 2001 to 88.4% coincident with the increase that occurred in serogroup C disease. Thirty serogroup C isolates, representing 9.4% of the total isolates, were recovered in 2001 compared with only 10 (3.9%) in 2000. Fifty percent of the C isolates were from cases in the Southern Health Region and of these 15, nine were from the Otago Health District. Meningococci with the P1.4 PorA type were identified by serosubtyping only three times prior to 1991. Of the serogroup B isolates, those with the P1.4 PorA protein represented 92.9% (262/282) in 2001, which is an increase from 90.4% (217/240) recorded in 2000 (Figure 1).

PCR testing of patient specimens is used not only to confirm cases but also to identify the epitopes on the PorA protein, through sequence recognition. Of the 159 PCR positive cases, material was available to determine the PorA protein subtype of 143 (89.9%). Sequences encoding the P1.7b,4 PorA subtype were present in 76.2% (109/143) of specimens tested. In 2000, 52 out of 63 (82.5%) had DNA encoding the P1.7b,4 subtype. Combining the results for the serosubtyping of isolates (n=319) and for subtype definition

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VIROLOGY

Table 22 summarises viral identification and mycoplasma infections in New Zealand in 2001. The information is based on weekly data collated from the virology laboratories of Auckland Healthcare, Healthcare Waikato, Canterbury Health Laboratories, Health Otago, Capital Coast Health, and ESR.

Table 22. Summary of virus identification and mycoplasma infections, 2001

Year 2001	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Influenza A(not subtyped)	2	1	1	1	1	5	19	12	2	1	0	0	45
Influenza A H3N2	0	0	0	5	3	5	14	17	3	0	1	0	48
Influenza A H1N1	1	0	0	1	15	206	84	23	1	0	0	0	331
Influenza B	1	1	7	0	4	32	49	105	27	3	0	1	230
Parainflunza 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Parainflunza 2	0	0	0	0	0	0	0	0	1	0	1	0	2
Parainflunza 3	1	3	1	1	2	3	12	25	23	9	1	2	83
RSV	1	1	2	2	2	26	116	270	113	21	7	4	565
Rhino	1	4	4	2	2	6	7	7	0	12	5	0	50
Measles	4	0	0	1	1	1	0	2	4	3	5	4	25
Mumps	0	1	0	2	1	3	2	5	4	1	1	2	22
Rubella	0	0	0	0	0	0	0	0	0	1	0	2	3
HSV	6	27	23	10	15	17	20	19	13	18	33	19	220
HSV-1	134	142	123	64	69	143	124	121	85	112	139	98	1354
HSV-2	106	120	153	63	83	123	129	123	85	100	152	123	1360
Varicella Zoster	14	22	29	13	14	23	20	25	19	22	30	28	259
EBV	12	9	1	0	14	6	6	8	1	4	6	7	74
CMV	19	15	11	4	9	11	10	6	6	3	3	2	99
HHV6	0	2	0	0	0	0	0	0	0	0	0	0	2
Rotavirus	3	0	2	1	3	7	33	48	11	14	12	0	134
BK virus	1	0	0	0	0	0	0	0	0	0	0	0	1
Mycoplasma	19	11	7	15	18	40	39	42	41	29	40	48	349
Adenoviruses	30	11	10	11	20	15	10	17	13	27	29	23	216
Adeno type 1	0	2	5	0	0	0	1	2	1	2	1	2	16
Adeno type 2	3	1	1	0	0	0	4	1	2	1	0	0	13
Adeno type 3	0	6	2	0	0	0	0	3	2	0	4	4	21
Adeno type 4	0	2	0	0	0	0	0	0	0	1	1	1	5
Adeno type 5	0	0	0	0	0	0	0	0	0	1	0	0	1
Adeno type 6	0	0	0	0	0	0	0	0	0	0	1	0	1
Adeno type 7	0	0	0	0	0	0	0	4	0	1	1	4	10
Adeno type 8	1	0	0	0	0	0	0	0	2	0	1	0	4
Adeno type 11	0	0	0	0	0	0	0	1	1	0	1	1	4
Adeno type 13	0	0	0	0	0	0	0	2	1	0	0	0	3
Adeno type 19	0	18	5	0	0	0	0	0	0	0	1	0	24
Adeno type 21	0	0	0	0	0	0	1	1	2	6	11	4	25
Adeno type 22	1	0	1	0	0	0	0	5	2	0	0	0	9
untypable adeno	0	0	0	0	0	0	0	1	3	5	6	3	18
Enterovirus	29	16	42	25	10	18	12	10	14	29	94	82	381
Polio 1	0	3	4	0	0	0	0	1	2	0	5	1	16
Polio 2	0	1	2	0	0	0	0	2	3	0	2	1	11
Polio 3	0	1	1	0	0	0	0	2	3	0	1	2	10
Coxsackie B1	0	1	0	0	0	0	0	0	0	0	2	1	4
Coxsackie B3	0	0	0	0	0	0	0	0	0	0	0	1	1
Coxsackie B4	0	1	0	0	0	0	0	0	0	0	3	2	6
Coxsackie B5	4	4	6	0	0	0	0	0	0	0	1	0	15
Coxsackie A8	0	0	0	0	0	0	0	1	0	1	0	0	2
Coxsackie A9	0	0	0	0	0	0	0	1	0	0	1	4	6
Coxsackie A16	1	1	4	0	0	0	0	1	0	1	0	1	9
Coxsackie A17	0	1	0	0	0	0	0	0	0	0	0	0	1
Echo 3	0	0	0	0	0	0	0	0	0	0	0	1	1
Echo 7	0	6	4	0	0	0	0	1	0	1	1	1	14
Echo 11	0	0	0	0	0	0	0	1	0	1	0	0	2
Echo13	0	0	2	1	0	0	0	0	3	11	50	38	105
Echo14	0	1	0	0	0	0	0	0	0	0	0	0	1
Echo 15	0	0	0	0	0	0	1	0	0	0	0	0	1
Echo 22	0	0	0	0	0	0	1	0	0	0	0	0	1
Echo 27	0	0	0	0	0	0	0	2	0	0	0	0	2
Echo 30	2	0	2	0	0	0	0	0	0	0	6	22	32
entero 71	0	0	2	0	0	0	0	0	1	1	0	0	4
Untypable entero	0	0	0	0	0	0	4	3	1	0	4	1	13

RESPIRATORY VIRUSES

Influenza virus

Influenza activity during January to December 2001 was low to moderate (Figures 12 & 13). A total of 654 influenza isolates from sentinel and non-sentinel surveillance were identified in 2001 by 5 virology labs (Auckland, Christchurch, Waikato, Dunedin and ESR). As usual, most isolations (636) occurred during the period of May to September from the sentinel surveillance (313) and non-sentinel surveillance (323) (Lablink 2001; 8(4): 39).

Figure 12. Influenza isolates, 1997-2001

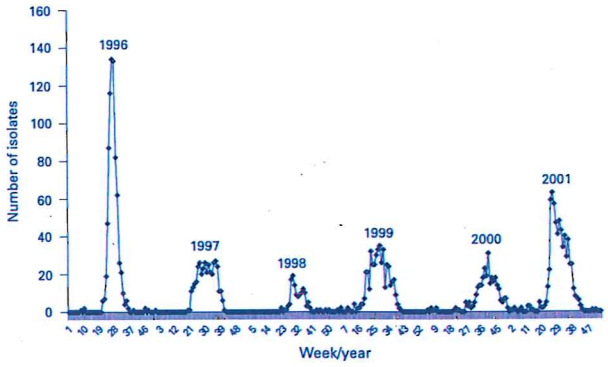
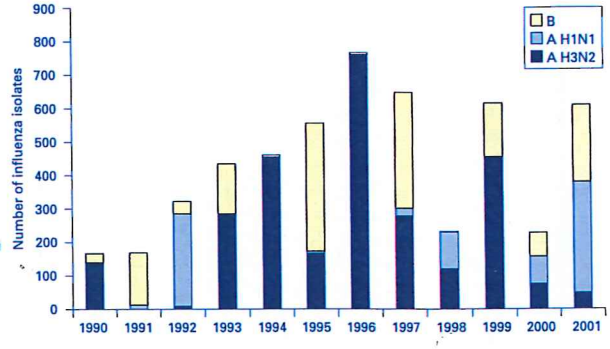


Figure 13. Influenza isolates by types, 1990-2001



Influenza A(H1N1)

In 2001, influenza A(H1N1) was the predominant strain. There were 331 A(H1N1) isolates which represents 54% of typed and subtyped isolates (609) and 51% of all influenza isolates (654). There are two antigenically distinct lines of influenza A(H1N1) circulating around the world in recent years and the current reference strains for these are A/New Caledonia/20/99 and A/Bayern/7/95. Influenza A(H1N1) viruses predominated in most regions world-wide during the previous 12 months. Viruses of the A/New Calendonia/20/99 lineage have continued to progressively replace A/Bayern/7/99-like strains.

The Australian WHO Collaborating Centre showed that most A(H1N1) isolates from the Southern Hemisphere in 2001, including New Zealand, were A/New Caledonia/20/99. Based on the global data, the WHO Consultative Group concluded that there was no need to change the vaccine strain from an A/New Caledonia/20/99-like virus. Two factors still remain true for the recommendation of A/New Caledonia/20/99-like virus for the year 2002 vaccine formulation:

- Increasing incidence of viruses of this type, and
- The demonstration that, in humans, vaccines containing viruses of this lineage induce similar antibody responses against both the homologous virus and A/Bayern-like strains whereas the converse was not true.

Influenza A(H3N2)

A total of 48 influenza A(H3N2) isolations (8% of typed and subtyped isolates and 7% of all isolates) were obtained in 2001. Influenza A(H3N2) has been frequently associated with severe disease and excess mortality in high-risk groups. This subtype has also shown the greatest tendency for antigenic drift as illustrated by the frequency of vaccine formulation changes recommended by the WHO and the AIVC. Influenza A(H3N2) viruses around the world were less prominent than influenza A(H1N1) or influenza B during the previous 12 months. The circulating viruses in this subtype fall into a single lineage, however, a degree of antigenic heterogeneity is often observed.

The Australian WHO Collaborating Centre showed that most A(H3N2) isolates from the Southern Hemisphere including New Zealand remain closely related to the A/Moscow/10/99 reference strain and A/Panama/2007/99 vaccine virus. There is evidence of antigenic heterogeneity among the isolates with no single evolutionary lineage at this time. Based on the global data, the WHO Consultative Group concluded that there was currently no pressing need to change from a recommendation for an A/Moscow/10/99-like virus as the A(H3N2) vaccine component for 2002 and there is no obvious new candidate reference strain.

Influenza B

There were 230 isolations of influenza B (38% of typed and sub-typed isolates and 35% of all isolates) in 2001. There were two distinct lines of influenza B circulating in recent years. This dates back to 1990 when the B/Panama/45/90 variant of influenza B arose whilst strains of the previous B/Victoria /2/87-like viruses continued to circulate in Asia. Further variation of the B/Panama/45/90 line gave rise to the B/Beijing/184/93-like viruses. Meanwhile in Asia, independent antigenic evolution of the B/Victoria/2/87-like virus continued and gave rise to the B/Shangdong/7/97-like strains that were prominent in a number of parts of Asia during 1998-9. During the previous 12 months, influenza B viruses co-circulated with influenza A in most parts of the world although levels have been variable. Viruses of the B/Sichuan/379/99 lineage have predominated with only small numbers of isolates from the B/Shangdong/7/97 lineage. For the first time, however, B/Shangdong/7/97 lineage viruses have spread beyond Asia with a number of isolates in Hawaii.

The Australian WHO Collaborating Centre showed that all viruses from the Southern Hemisphere in 2001 including New Zealand were B/Sichuan/379/99 lineage viruses, with the exception of a single B/Shangdong/7/97 lineage virus received from Taiwan. Based on the global data, the WHO consultation group concluded that vaccines containing a B/Sichuan/379/99-like strain remained appropriate. These vaccines would be expected to offer little protection against current viruses of the B/Shangdong lineage, however, these are neither sufficiently numerous nor widespread at the moment to consider inclusion of a strain of this type in the vaccine.

In summary, Australia Influenza Vaccine Committee, with representatives from New Zealand, Australia and South Africa, agreed to adopt the recommendations made by the WHO consultation group. The recommended composition was:

- A(H1N1) an A/New Caledonia/20/99-like strain
- A(H3N2) an A/Moscow/10/99-like strain
- B a B/Sichuan/379/99-like strain

Respiratory Syncytial Virus (RSV)

The 2001 RSV activity was at the moderate level (565 cases) based on laboratory-confirmed RSV cases reported to ESR during 1990 to 2001 (Figure 14 & 15). The highest RSV activity occurred in 1999 with 858 cases reported. RSV activity peaked in August, 5 weeks later than the peak in 2000. It remained at the high level till early September. Since then, the number of reported RSV cases has rapidly declined.

Figure 14. Annual Laboratory-confirmed RSV cases, 1990-2001

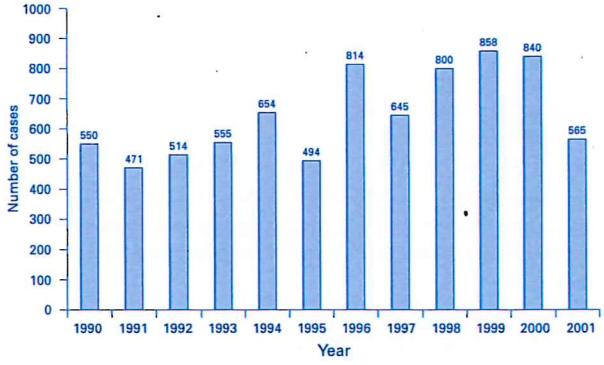
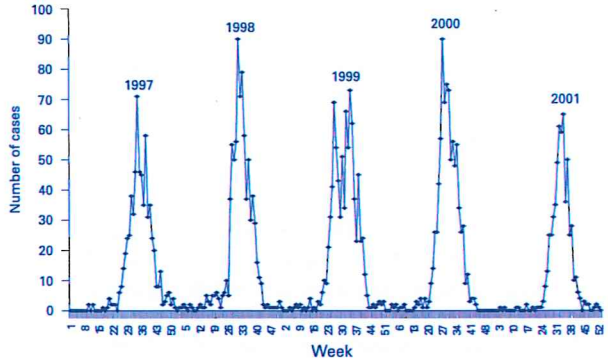


Figure 15. RSV laboratory-confirmed cases by week, 1997-2001



ENTEROVIRUSES

The New Zealand enterovirus laboratory network comprises five laboratories: one public health virology laboratory (ESR, Wellington) and four hospital virology laboratories in Auckland, Christchurch, Waikato and Dunedin. These five virology laboratories cover 100% of the population and all geographical areas of the country. The enterovirus surveillance is a year-round routine diagnostic surveillance for hospital in-patients and outpatients. Hospital laboratories report all enterovirus isolations and/or typing results weekly to ESR and this data is then available nationally. Untyped or untypable enteroviruses are referred to ESR for identification.

There were a total of 381 enterovirus isolations in 2001, compared with 203 in 2000. Echovirus type 13 was the most predominant serotype (105 isolates, 27.6%). There were 32 isolations of Echovirus type 30 (8.4%), compared with 11 in 2000 (5.4%). A total of 15 Coxsackie B type 5 isolations were reported in 2001, compared with nil reported in 2000.

Echovirus type 13

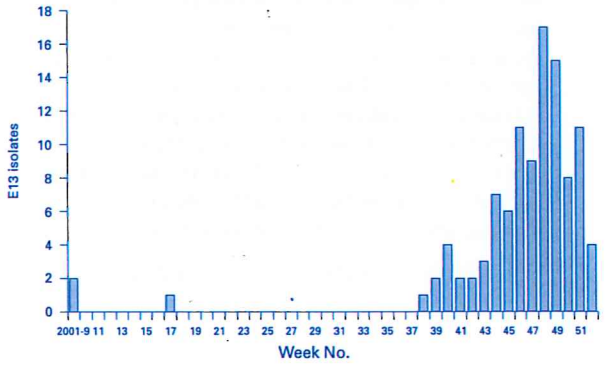
Echovirus type 13 (E13) is an enterovirus that rarely has been detected world-wide. An historical review of echovirus isolations by ESR revealed no E13 isolations during the period between1975 and 2000. However, an outbreak of E13 occurred in 2001, during which time a total of 105 isolations were obtained. Symptoms included rash, fever, photophobia and viral meningitis. The index case was a two-month old boy from Waikato presenting with meningitis, whose specimen was taken in February 2001. The E13 isolates (105) were identified from Waikato (59), Auckland (17), and Wellington (19), Christchurch (4), Dunedin (2), Manawatu (2), Taranaki (1) and Wairarapa (1). Patients ranged in age from 10 days to 39 years (average 8.6 years). Male (64) to female (41) ratio was 1.6:1. Symptoms included rash, fever, photophobia and viral meningitis.

In 2001, the United States experienced a viral meningitis outbreak caused by E13. Echovirus type 13 has rarely been detected in the United States, accounting for only 65 of approximately 45,000 enterovirus isolates reported to CDC during the period 1970 to 2000, and no associated outbreaks have been reported. As of 14 Aug 2001, E13 has been isolated in specimens from 76 patients in 13 states, most associated with aseptic meningitis (1). Increased E13 activity was also reported in Europe during 2000, when E13 was, for the first time, associated with outbreaks of aseptic meningitis in England, Wales, and Germany (2,3). Increased E13 activity has also been reported in Western Australia (4) and Singapore (personal communications). Because E13 has rarely been isolated, the spectrum of disease symptoms associated with the virus has not been well established. Conditions previously associated with E13 are typical of enterovirus infections and include asymptomatic carriage, mild febrile illness, aseptic meningitis, respiratory diseases (e.g., coryza, pharyngitis, bronchitis, and bronchiolitis), poliomyelitis-like illness, diarrhoea with fever, rash, encephalitis, and enteroviral sepsis. Aseptic meningitis is the predominant illness associated with the current E13 activity in the United States and with echovirus activity reported in Europe in 2000.

Although the New Zealand E13 outbreak appears to have peaked in November 2001, it is still ongoing, with specimens continuing to be forwarded to the ESR Virology Lab during 2002.

Figure 16 shows the number of isolations of E13 each week during 2001.

Figure 16. The laboratory-confirmed isolations of echovirus type 13 in 2001



1. The Morbidity and Mortality Weekly Report, Fri 14 Sep 2001, 50(36);777-780
2. Communicable Disease Surveillance Centre. Viral meningitis associated with increase in echovirus type 13. *Commun Dis Rep CDR Wkly 2000;10:277,280.*
3. Twisselmann B. Cluster of cases of viral meningitis caused by echovirus type 13 in Germany. *Eurosurveillance Weekly 2000;4.*
4. Peter McInns. Meningitis, echovirus 13 & 30 Australia *Promed 20010914.2219*

MEASLES, MUMPS AND RUBELLA

Measles

A total of 25 laboratory-confirmed measles cases were reported from Auckland (3), Christchurch (11), Otago (3), Hawkes Bay (1), Tauranga (1), Waikato (1), Tanaraki (1), Southland (1) and Wellington (3). Patients ranged in age from 19 days to 33 years (average 16 years). Measles IgM was positive in 24 cases and measles virus was isolated by tissue culture from a 19-day old boy with extensive pneumonic changes.

Mumps

A total of 22 laboratory-confirmed mumps cases were reported from Auckland (1), Christchurch (8), Otago (5), Hawkes Bay (5), Rotorua (1), Waikato (1) and Wellington (1). Patients ranged in age from 0 day to 84 years (average 22 years). Mumps IgM was positive in 21 cases and mumps virus was isolated by tissue culture from one case with intrauterine death.

Rubella

A total of 3 laboratory-confirmed rubella cases were reported in 2001. A 17-month boy from Hawkes Bay was positive for rubella IgM due to the recent vaccination. A 15-month boy from Christchurch was positive for rubella IgM, possibly due to the recent vaccination. A 32-year man from Wellington was positive with rubella IgM. His clinical presentation included rash, arthritis and conjunctivitis. Neither recent overseas travel nor recent rubella vaccination was reported for this patient. There had been no laboratory-confirmed rubella cases reported in New Zealand in the period 1999-2000.

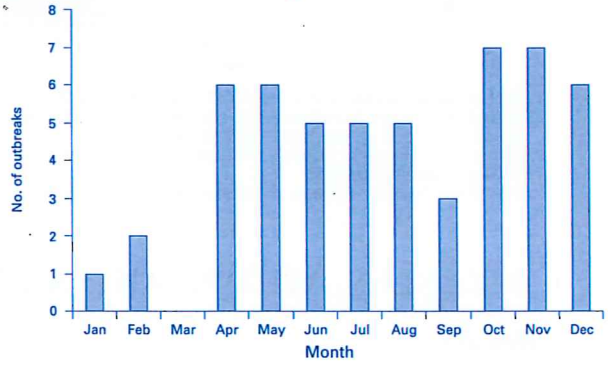
ADENOVIRUSES

There were a total of 216 adenovirus isolations in 2001, compared with 153 in 2000. The predominant serotypes in 2001 were adenovirus type 21 (25 isolates, 11.6%), adenovirus type 19 (24 isolates, 11.1%), adenovirus type 3 (21 isolates, 9.7%), adenovirus type 1 (16 isolates, 7.4%), adenovirus type 2 (13 isolates, 6.0%) and adenovirus type 7 (10 isolates, 4.6%). By comparison, in 2000 there were 5 isolations of adenovirus type 21 (3.3%), 5 of adenovirus type 19 (3.3%), 17 of adenovirus type 3 (11.1%), 18 of adenovirus type 1 (11.8%), 11 of adenovirus type 2 (7.2%) and 1 isolation of adenovirus type 7 (0.7%).

NORWALK-LIKE VIRUS

Fifty-three laboratory-confirmed Norwalk-like virus (NLV) outbreaks were recorded by health authorities during 2001. Most of these outbreaks were associated with person-to-person transmission or food-borne disease and occurred in restaurants, takeaway outlets or catered event settings. There were seven reported outbreaks in hospitals and rest homes. Three outbreaks at commercial children's party / play centres were reported. The seasonal distribution of NLV outbreaks was different from previous years (Figure 17). Unlike previous years, outbreaks occurred throughout the year rather than mainly between October and March. This may be due to either a higher reporting level or a change in seasonality of the disease.

Figure 17. Seasonal distribution of New Zealand NLV outbreaks in 2001



In 2001, both Genogroup I and II strains were prevalent throughout the country. The predominant NLV genotypes were GII/1,4 (17/56, 30%), the 'global strain' cluster, GII/6,7,9 (12/56, 21%), and GI/3 (11/56, 20%) (Table 23). Strains belonging to Genogroups I/1 (Norwalk virus) and II/5 (1c) have been identified for the first time in New Zealand. In one food-associated outbreak, a food-handler and several cases were all infected with identical NLV GI/3 strains, indicating a common source of infection. Oysters again were associated with several outbreaks, and a major Northland growing area has been closed indefinitely because of the risk from NLV contamination. For one oyster-associated outbreak, four distinct NLV strains have been identified in faecal samples from family members. No NLV was detected in oyster samples from this outbreak, although NLV was identified in oysters linked to another outbreak. Strains identified in oyster-related outbreaks belonged to genotypes GI/4, GI/3, GII/6,7,9 and GII/5 (1c), a

new strain in New Zealand. Seven NLV strains have not been definitively identified as yet although five of these appear to belong to Genogroup II.

Table 23. NLV Genotypes occurring in 2001.

NLV Strain	Genotype	Number (%)
Norwalk virus	GI/1	1 (2)
Desert Shield virus	GI/3	11 (20)
Chiba virus & 'cruise ship' virus	GI/4,5	7 (12.5)
Lordsdale virus 'Global strain' cluster	GII/1,4,8	17 (30)
Florida/Gwynedd/Idaho Falls virus cluster & Napier virus	GII/6,7,9	12 (21)
	GII/5 (1c)	1 (2)
Not identified		7 (12.5)
Total		**56 (100)**

ARBOVIRUS SCREENING

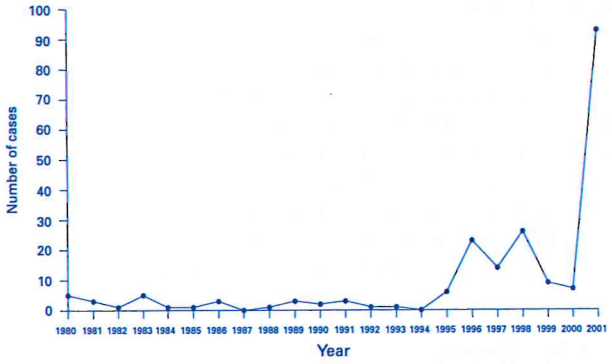
Dengue fever

Ninety-three cases of dengue fever were notified in 2001. This is the highest number of notifications reported in any single year since dengue fever was listed as a notifiable disease in 1980. The 2001 rate of 2.5 per 100,000 was significantly higher than the 2000 rate of 0.2.

Hospitalisation status was recorded for 84 cases and of these, 25.0% (21/84) were hospitalised. Forty-one cases (44.1%) were male and fifty-two (55.9%) were female. Ethnicity was recorded for 83 cases: forty-eight were European, twenty-nine Pacific Island, four of 'Other' ethnicity and two were Maori.

The following graph shows dengue fever notifications by year since 1980.

Figure 18. Dengue fever notifications by year, 1980 -2001



The reason for travel was recorded for 92.5% (86/93) of the cases. Of these, 78 cases were New Zealanders travelling overseas on business or holiday[3], and eight were overseas visitors to New Zealand. Travel information was recorded for seven of the eight overseas visitors. Four had been in Samoa, two reported travel to French Polynesia, and one to Thailand.

The following table shows rates of dengue among New Zealanders travelling overseas on business or holiday, and the country/region where the disease was most probably acquired.

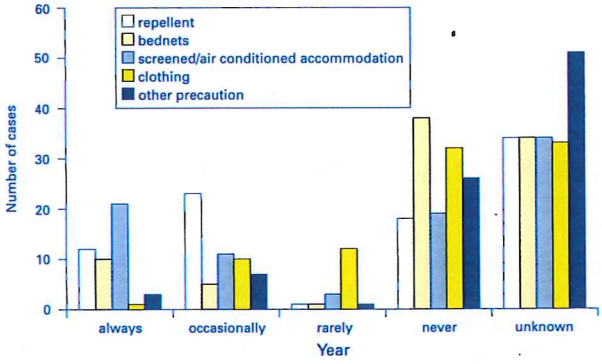
[3] Three of the 78 cases had been overseas for more than a year.

Table 24. Rates of dengue and country/region where infection probably acquired: New Zealanders travelling overseas on holiday and business, 2001

Country / region	Cases	Travellers	Rate (per 100 000 visits)
Pacific Islands			
Cook Islands	1	19909	5.0
French Polynesia	6	4075	147.2
Fiji	1	63078	1.6
Samoa	52	14866	349.8
Tokelau	3	194	1546.4
South East Asia			
East Timor	3	928	323.3
Indonesia	5	16740	29.9
India	1	8959	11.2
Philippines	2	4068	49.2
Sri Lanka	1	1928	51.9
Thailand	3	18046	16.6
Total	**78**	152791	51.1

Information on precautionary measures (including use of insect repellent, bed nets, screened or air conditioned accommodation, wearing of long sleeved shirts and trousers) was recorded for 58.1% (54/93) of cases. The following graph shows the use of precautionary measures among dengue fever cases notified during 2001.

Figure 19. Reported use of protective measures among dengue fever cases notified in 2001



HEPATITIS LABORATORY

Three thousand, eight hundred and eighty-seven samples for HBV, HCV and HDV testing were processed in the ESR Hepatitis Laboratory during 2001.

Hepatitis B DNA Testing

There were 748 samples tested for HBV DNA. A qualitative in-house nested PCR assay was performed on 320 clinical samples of which 145 (45%) showed the presence of HBV DNA. With the increased availability of Lamivudine for treating hepatitis B, the need for the use of a quantitative assay to aid in monitoring treatment has increased significantly. A total of 428 samples were tested using the Roche quantitative assay kit. With the introduction of Roche Cobas machine in October 2001, all HBV DNA samples submitted to the laboratory are now tested using the quantitative assay.

Hepatitis C RNA Testing

A qualitative HCV RNA assay is used to detect HCV virus. A total of 1,832 samples were tested for HCV, of which 1,461 were from clinical patients. Eight hundred and thirty-eight (57%) of these showed the presence of HCV RNA. Three hundred and sixty-two blood donor samples were examined, and 43 (12%) showed the presence of HCV RNA.

HCV genotyping was performed on 385 samples (Table 25). Genotyping is important as it is linked to the efficacy of anti viral treatment.

Table 25. Range of genotypes detected during 2001

Genotype/Sub type	Number
1a	61
1b	37
1a/1b	30
1 non subtypable	55
2a/2c	9
2b	13
2 non subtypable	1
1 + 2	1
3a	120
4a	1
4 non typable	5
Samples unable to be typed	52