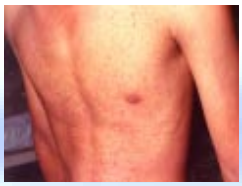


Airborne Diseases

V

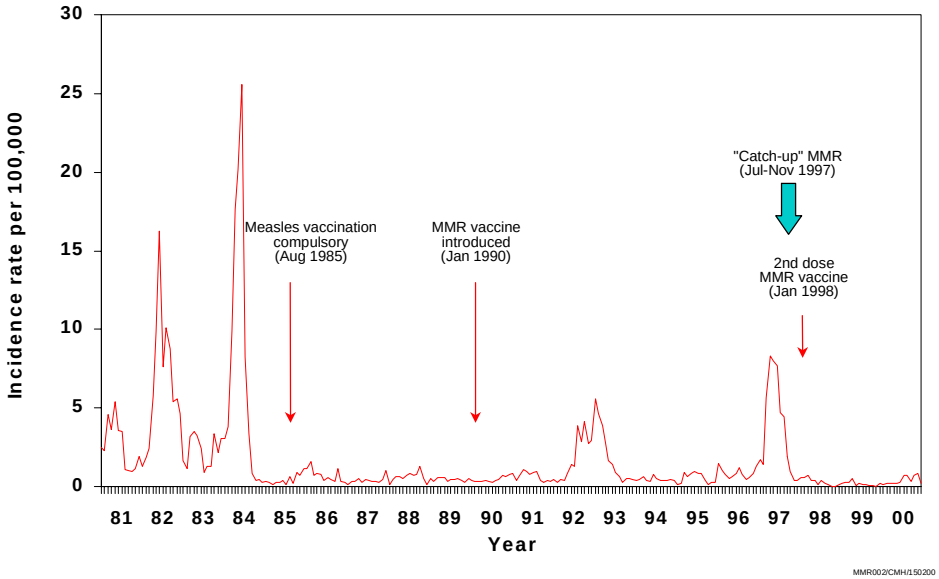
AIRBORNE DISEASES

MEASLES

The incidence of measles remained low although it showed an increase from 65 in 1999 to 141 in 2000 (*Fig. 5.1*). All the cases were laboratory confirmed by measles specific IgM antibody or antigen detection in nasal aspirate by immunoflourescence. There was no death.

The incidence rate was highest among children below 5 years of age (*Table 5.1*). The male to female ratio was 1.4:1. The proportion of cases involving children and adults above 15 years of age increased from 21.7% during the period 1987-1989 to 38.3% in 2000 (*Table 5.2*). Among the three major ethnic groups, Malays had the highest morbidity rate (*Table 5.3*).

Figure 5.1
Incidence rates of reported measles cases in Singapore
1981 - 2000



Of the reported cases, 8 had a past history of measles vaccination, giving a vaccine failure rate of 5.7% (*Table 5.4*). The interval between vaccination and onset of illness ranged from one month to eight years (*Table* 5.5). Of the 8 who experienced vaccine failure, six were children below 10 years of age (*Table 5.6*) and seven were vaccinated between 1990-1999 (*Table 5.7*).

Cases were reported throughout the year with two peaks, one in Jul/Aug and the other in Oct/Nov (*Fig. 5.2*).

No outbreak was reported.

Table 5.1

Age-gender distribution and age-specific incidence rates of reported measles cases, 2000

Age group	Male	Female	Total	Incidence rates per 100,000*
0 - 6 mths	3	0	3	53.4
7 – 11 mths	13	5	18	
1 - 4 yrs	26	17	43	26.9
5 - 9 yrs	7	10	17	6.7
10 - 14 yrs	2	4	6	2.5
15 - 24 yrs	16	14	30	7.1
25 - 34 yrs	11	8	19	3.4
35 - 44 yrs	3	1	4	0.6
45+ yrs	0	1	1	0.1
Total	81	60	141	4.3

*Rates are based on 2000 census population

(Source: Department of Statistics, Singapore)

Table 5.2

Age distribution and annual incidence rates of reported measles in Singapore, 1987-2000

Age group (years)	1987-89			1990-1992			1993-1995			1996-1998			1999			2000		
	No.	%	Mean annual rate*	No.	%	Mean annual rate*	No.	%	Mean annual rate*	No.	%	Mean annual rate*	No.	%	Mean annual rate*	No.	%	Mean annual rate*
< 1	110	23.9	84.7	95	9.9	62.3	115	11.4	76.7	263	14.3	181.1	13	20.0	31.1	21	14.8	53.4
1 - 4	155	33.6	31.1	335	35.0	60.8	304	30.1	52.0	378	20.6	64.7	20	30.8	10.4	43	30.5	26.9
5 - 9	71	15.4	11.8	162	16.9	26.3	162	16.1	24.2	162	8.8	21.4	7	10.8	2.8	17	12.1	6.7
10 - 14	25	5.4	4.1	150	15.7	24.9	140	13.9	22.6	240	13.1	38.4	3	4.6	1.3	6	4.3	2.5
15+	100	21.7	1.6	213	22.3	3.3	288	28.5	4.4	792	43.2	11.0	22	33.8	0.9	54	38.3	2.1
Unknown	-	-	-	1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	461	100	5.8	956	100	11.6	1,009	100	11.5	1,835	100	19.7	65	100	2.0	141	100	4.3

*per 100,000 population based on the estimated mid-year population of the corresponding period
(Source: Department of Statistics, Singapore)

Table 5.3

Ethnic-gender distribution and ethnic-specific incidence rates of reported measles cases, 2000

Ethnic group	Male	Female	Total (%)	Incidence rates per 100,000*
Chinese	39	33	72 (51.1)	2.9
Malays	19	9	28 (19.9)	6.2
Indians	7	6	13 (9.2)	5.0
Others	2	2	4 (2.8)	8.6
Foreigners	14	10	24 (17.0)	-
Total	81	60	141 (100.0)	4.3

*Rates are based on 2000 census population
(Source: Department of Statistics, Singapore)

Table 5.4

Vaccine failure rate among reported cases of measles, 1990-2000

Year	No. of cases	No. of cases with past history of measles vaccination	Vaccine failure rate (%)
1990-92	965	17	1.8
1993-95	1,009	58	5.7
1996	56#	6	10.7
1997	1,394#	110	7.9
1998	114	15	13.2
1999	65	4	6.2
2000	141	8	5.7
Total	3,744	218	5.8

#Cases interviewed

Table 5.5

Reported disease incidence among children with documented evidence of measles vaccination, 1990-2000

Year	No. of cases	No. of cases among vaccinees	Age of vaccinees	Interval between vaccination and onset of illness
1990	143	0	-	-
1991	216	3	Not stated	8 yrs - 12 yrs
1992	606	16 (2)	1 yr - 9 yrs	9 mths - 7 yrs
1993	665	40 (3)	11 mths - 11 yrs	2 mths - 13 yrs
1994	159	10	1 yr - 2 yrs	1 mth - 11 yrs
1995	185	11	1 yr - 12 yrs	17 days - 8 yrs
1996	56#	6	19 mths - 11 yrs	3 mths - 11 yrs
1997	1,394#	121 (11)	1 yr - 27 yrs	1 mth – 20 yrs
1998	114	15	1 yr - 21 yrs	4 mths - 16 yrs
1999	65	4	18 mths - 4 yrs	3 mths - 3 yrs
2000	141	8	1 yr - 21 yrs	1 mth - 8 yrs

( ) Vaccination inadvertently given during the incubation period of the disease

based on cases investigated

Table 5.6

Distribution of interval between vaccination and onset of measles, 2000

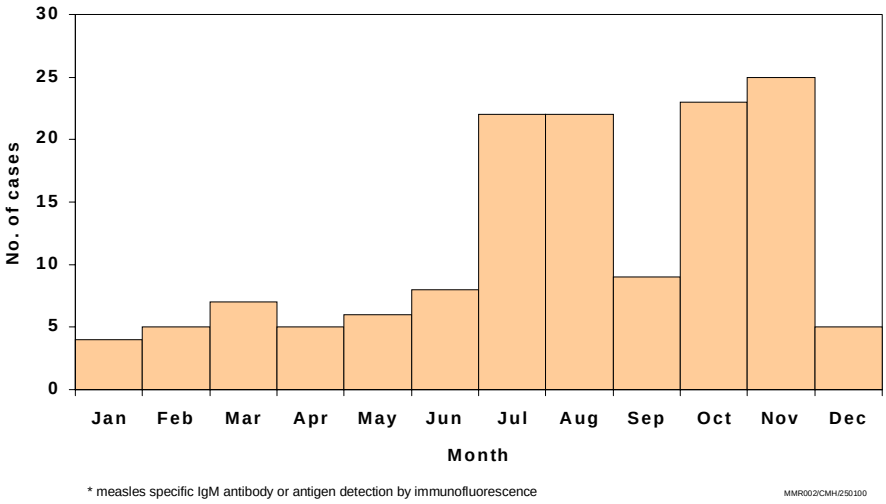
Interval between vaccination and onset of illness (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
<1	0	0	0	0	0	0
1 - 4	1	12.5	2	25.0	3	37.5
5 - 9	0	0	3	37.5	3	37.5
10 - 14	0	0	0	0	0	0
15+	1	12.5	1	12.5	2	25.0
Total	2	25.0	6	75.0	8	100

Table 5.7

Distribution of reported cases of measles by year of vaccination, 2000

Year of vaccination	Male		Female		Total	
	No.	%	No.	%	No.	%
1980-1984	0	0	1	12.5	1	12.5
1985-1989	0	0	0	0	0	0
1990-1994	1	12.5	2	25.0	3	37.5
1995-1999	1	12.5	3	37.5	4	50.0
2000	0	0	0	0	0	0
Total	2	25.0	6	75.0	8	100

Figure 5.2
Monthly distribution of laboratory confirmed* measles cases in Singapore, 2000



MUMPS

The incidence of mumps decreased by 6.3% from 6384 in 1999 to 5981 cases in 2000 (*Fig 5.3*). There was no death.

The age-specific morbidity rate was highest in the 5 - 14 year age group with a male to female ratio of 1.3:1 (*Table 5.8*). There has been a gradual shift in the age distribution of cases. The proportion of children aged <5 years increased from 6.8% during the period 1993-94 to 13.4% in 2000 and that for person aged 25 years and above has also increased correspondingly from 19.3% to 28.2%. However, the proportion of children and adolescents aged 5-14 years has decreased slightly from 57.5% to 48% (*Table 5.9*). The morbidity rate of Malays was 1.8 times that of Chinese and 2.5 times that of Indians (*Table 5.10*).

Of the 5981 cases investigated for vaccination history, 2641 (44.2%) had a history of immunization with the MMR vaccine. All the vaccinated cases received one dose, majority (42.9%) at government polyclinics (*Table 5.11*).

The interval between vaccination and onset of illness ranged from less than one year to more than 15 years with more than 90% developing mumps 1-9 years after vaccination (*Table 5.12*). Of the 1594 cases where the year of vaccination was known, 39.6% were vaccinated during the period 1994 - 1997 (*Table 5.13*).

Figure 5.3
Incidence rates of reported mumps cases in Singapore, 1991 - 2000

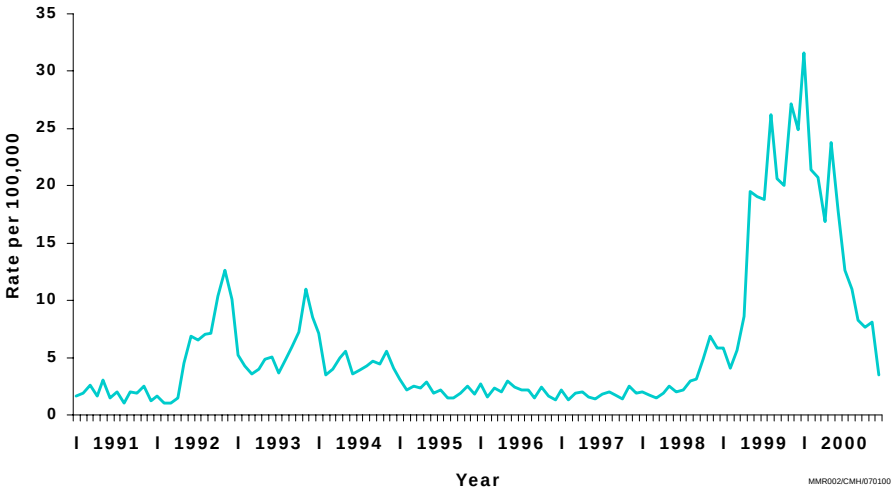


Table 5.8

Age-gender distribution and age-specific incidence rates of reported mumps cases, 2000

Age group (years)	Male	Female	Total	Incidence rates per 100,000*
0 - 4	492	342	834	391.0
5 - 14	1,745	1,128	2,873	589.3
15 - 24	262	326	588	138.7
25 - 34	383	477	860	154.0
35 - 44	344	270	614	96.5
45 - 54	83	77	160	34.1
55+	23	29	52	11.0
Total	3,332	2,649	5,981	183.3

*Rates are based on 2000 census population.

(Source: Department of Statistics, Singapore).

Table 5.9

Age distribution and age-specific annual incidence rates of reported mumps in Singapore, 1993-2000

Age group (years)	1993-94			1995-96			1997-98			1999			2000		
	No.	%	Mean annual rate per 100,000*	No.	%	Mean annual rate per 100,000*	No.	%	Mean annual rate per 100,000*	No.	%	Mean annual rate per 100,000*	No.	%	Mean annual rate per 100,000*
0 - 4	243	6.8	49.6	130	8.4	26.6	327	17.6	68.0	1,217	19.1	520.5	834	13.4	391.0
5 - 14	2,069	57.5	240.6	688	44.4	76.4	757	40.8	80.3	3,404	53.3	704.0	2,873	48.0	589.3
15 - 24	590	16.4	67.4	303	19.5	34.8	225	12.1	26.3	395	6.2	93.1	588	9.8	138.7
25 - 34	399	11.1	35.1	236	15.2	21.0	306	16.5	27.0	742	11.6	131.8	860	14.4	154.0
35 - 44	219	6.1	20.2	130	8.4	11.3	166	8.9	13.7	470	6.4	76.1	614	10.3	96.5
45+	78	2.2	5.5	64	4.1	4.1	76	4.1	4.5	156	2.4	17.4	212	3.5	45.1
Total	3,598	100.0	63.8	1,551	100.0	25.5	1,857	100.0	29.4	6,384	100.0	198.4	5,981	100.0	183.3

*Rates are based on census population of the corresponding period(s)

(Source: Department of Statistics, Singapore)

Table 5.10

Ethnic-gender distribution and ethnic-specific incidence rates of reported mumps cases, 2000

Ethnic group	Male	Female	Total (%)	Incidence rates per 100,000*
Chinese	2,229	1,704	3,933 (65.8)	157.0
Malays	694	575	1,269 (21.2)	279.8
Indians	163	126	289 (4.8)	112.1
Others	94	52	146 (2.4)	314.7
Foreigners	152	192	344 (5.7)	-
Total	3,332	2,649	5,981 (100.0)	183.3

*Rates are based on 2000 census population
(Source: Department of Statistics, Singapore)

Table 5.11

Details of vaccination history of 5,981 reported cases of mumps, 2000

	No.	%
History of vaccination against mumps (n = 5,981)		
Yes	2,641	44.2
No	2,627	43.9
Don't know/not sure	713	11.9
Place of vaccination (n = 2,641)		
Hospital	6	0.2
Government polyclinic	1,133	42.9
General practitioner	151	5.7
School Health Service	11	0.4
Unknown	1,340	50.7

Table 5.12

Distribution of the interval between vaccination and onset of mumps, 2000

Interval between vaccination and onset of illness (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
<1	19	1.2	19	1.2	38	2.4
1 - 4	368	23.1	271	17.0	639	40.1
5 - 9	519	32.6	321	20.1	840	52.7
10 - 14	43	2.7	30	1.9	73	4.6
>15	4	0.2	0	0	4	0.2
Total	953	59.8	641	40.2	1,594	100

Table 5.13

Distribution of reported cases of mumps by year of vaccination, 2000

Year of vaccination	Male		Female		Total	
	No.	%	No.	%	No.	%
Unknown	605	22.9	442	16.7	1,047	39.6
1988-89	15	0.6	10	0.4	25	1.0
1990-91	76	2.9	50	1.9	126	4.8
1992-93	154	5.8	89	3.4	243	9.2
1994-95	324	12.3	205	7.8	529	20.1
1996-97	302	11.4	215	8.1	517	19.5
1998-99	64	2.4	54	2.0	118	4.4
2000	18	0.7	18	0.7	36	1.4
Total	1,558	59.0	1,083	41.0	2,641	100

Cases gradually declined from January to December (*Fig 5.4*). A total of 20 clusters involving 2 or more cases in childcare centres, kindergartens and primary schools were investigated during the year (*Table 5.14*). One of the outbreaks is described below:

Outbreak of mumps in a school at Hougang

Investigation was carried out into an outbreak of mumps in a primary school at Hougang.

The first case was a primary one student who developed illness on 24 Dec 1999. Further investigations revealed that a total of 28 children and a teaching staff in the school were infected giving an overall attack rate of 1.4% (*Table 5.15*). Transmission occurred in all the classes and the outbreak finally ended on 22 May 2000 (*Fig. 5.5*).

Of the 28 infected children, 20 had a history of mumps vaccination.

Figure 5.4
Monthly distribution of reported mumps cases in Singapore, 2000

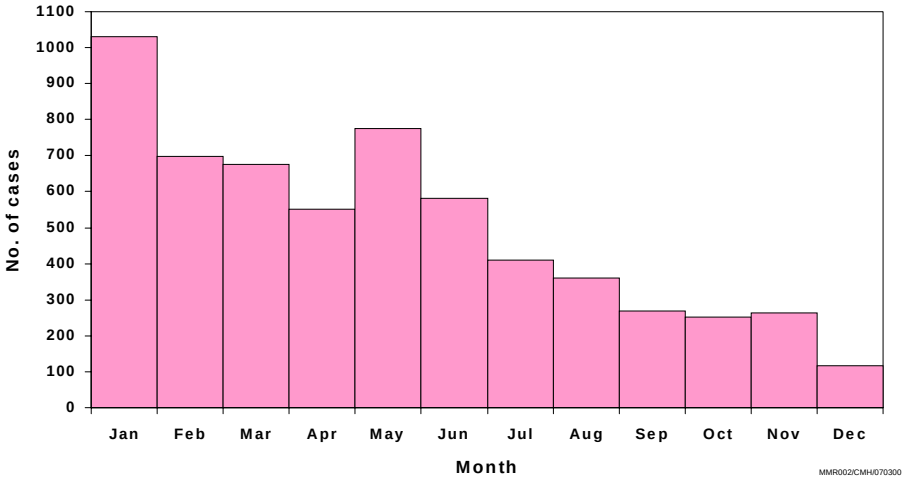


Table 5.14

Epidemiological data of clusters of mumps cases in child education centres, childcare and development centres and schools, 2000

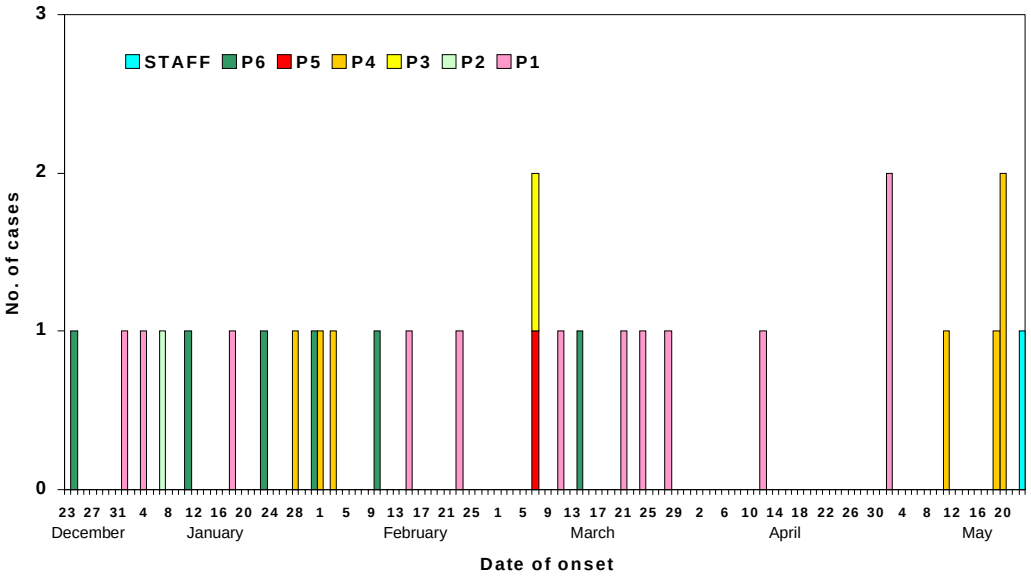
S/ No	Location	No. of children affected/ enrolment	Attack rate (%)	Age group (years)	Period
1	Kent Ridge Road	32/148	21.6	2 - 6	08 Oct 99 - 05 Jan 00
2	Adam Road	9/127	7.1	2 - 6	21 Dec 99 - 24 Feb 00
3	Hougang	10/69	14.5	2 - 6	04 Jan - 17 Feb
4	Newton Road	27/108	25.0	2 - 43	19 Jan - 24 Mar
5	Holland Drive	5/97	5.2	2 - 60	19 Feb - 27 Mar
6	Pasir Ris	12/71	16.9	2 - 51	17 Feb - 11 Apr
7	Bukit Batok West	11/68	16.2	1 - 11	12 Feb - 02 May
8	New Upper Changi Road	4/1756	0.2	7 - 12	11 Jan - 15 Feb
9	Simei	4/63	6.3	1 - 12	25 Apr - 06 May
10	Maude Road	6/63	9.5	2 - 12	12 Apr - 09 May
11	Toa Payoh	11/1887	0.6	7 - 12	06 Mar - 19 May
12	Clementi Road	5/90	5.6	1 - 6	21 May - 11 Jun
13	Hougang	29/1949	1.5	7 - 24	24 Dec 99 - 22 May 00
14	Ang Mo Kio	16/93	17.2	2 - 6	03 Apr - 13 Jul
15	Sin Ming Avenue	5/62	8.1	2 - 6	24 Jun - 12 Jul
16	Holland Drive	4/101	4.0	2 - 12	24 Jul - 25 Jul
17	Scotts Road	3/69	4.3	2 - 7	16 Aug - 17 Aug
18	Bedok North	19/60	31.7	2 - 6	19 Jun - 28 Aug
19	Yishun	7/65	10.8	2 - 7	15 Sep - 20 Sep
20	Tampines	5/62	8.1	2 -6	11 Sep - 18 Sep

Table 5.15

Attack rates of mumps in a male primary school at Hougang, 2000

Age group (years)	Class	No. of children	No. infected	Attack rate (%)
6- <7	Primary 1	320	12	3.8
7- <8	Primary 2	318	1	0.3
8- <9	Primary 3	305	1	0.3
9- <10	Primary 4	276	7	2.5
10- <11	Primary 5	311	1	0.3
11- <12	Primary 6	419	6	1.4
Total		1949	28	1.4

Figure 5.5
Time distribution of an outbreak of mumps in a primary school, 23 Dec 1999 to 21 May 2000



RUBELLA

A total of 312 cases were notified in 2000, a decrease of 27.8% from 1999 (*Fig. 5.6*). No death was reported.

The morbidity rate was high in the age group 10 – 34 years (*Table 5.16*). There was no significant difference by gender. Among the three major ethnic groups, Malays had the highest morbidity rate, followed by Chinese and Indians (*Table 5.17*).

Cases were reported throughout the year with peaks in the months of January, May and July (*Fig. 5.7*). A total of 8 outbreaks involving two or more epidemiologically related cases were investigated during the year (*Table 5.18*). One of the outbreaks is described below.

Outbreak of rubella in a Japanese School at West Coast Road.

Investigation was carried out into an outbreak of rubella which occurred between June and July 2000 among 21 students in a Japanese school at West Coast Road (*Fig 5.8*). The school has a student population of 520. Nine of the cases were notified by a general practitioner (GP) and the rest by the school. Three cases serologically tested by the GP were positive for IgM antibody to rubella. All the cases were of Japanese nationality and they had no rubella vaccination history. Rubella immunisation was recommended for all susceptible students in the school.

Transmission could have occurred in the classroom, canteen and hostel. The delay in recognition and isolation of the cases contributed to the prolonged transmission in the school.

Figure 5.6
Incidence rates of reported rubella cases in Singapore, 1991 - 2000

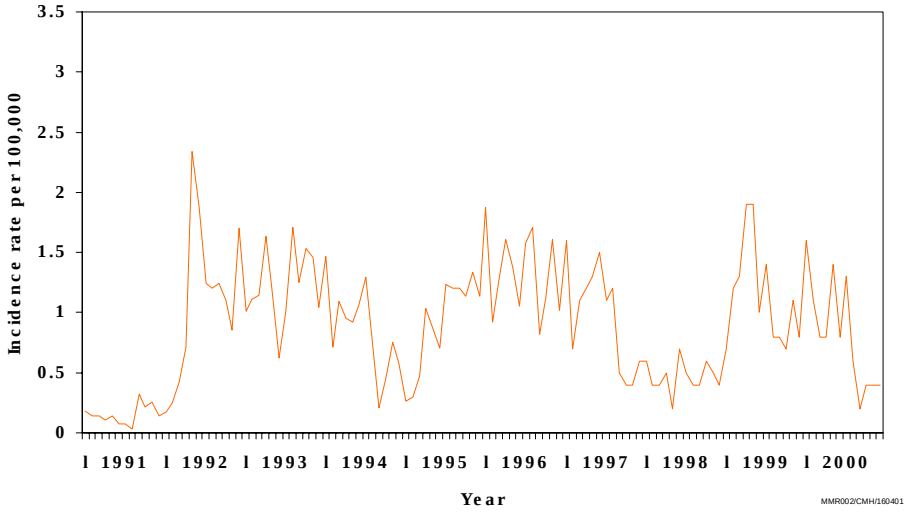


Table 5.16

Age-gender distribution and age-specific incidence rates of reported rubella cases, 2000

Age group (years)	Male	Female	Total	Incidence rates per 100,000*
0 - 4	4	2	6	2.8
5 - 9	8	10	18	3.7
10 - 14	40	23	63	14.9
15 - 24	55	27	82	14.7
25 - 34	39	60	99	15.6
35 - 44	10	25	35	7.5
45+	4	5	9	1.9
Total	160	152	312	9.6

*Rates are based on 2000 census population.
(Source: Department of Statistics, Singapore).

Table 5.17

Ethnic-gender distribution and ethnic-specific incidence rates of reported rubella cases, 2000

Ethnic group	Male	Female	Total (%)	Incidence rates per 100,000*
Chinese	64	90	154 (49.3)	6.2
Malays	10	28	38 (12.2)	8.4
Indians	5	1	6 (1.9)	2.4
Others	2	2	4 (1.3)	8.7
Foreigners	79	31	110 (35.2)	-
Total	160	152	312 (100.0)	9.6

*Rates are based on 2000 census population.
(Source: Department of Statistics, Singapore).

Figure 5.7
Monthly distribution of reported rubella cases in Singapore, 2000

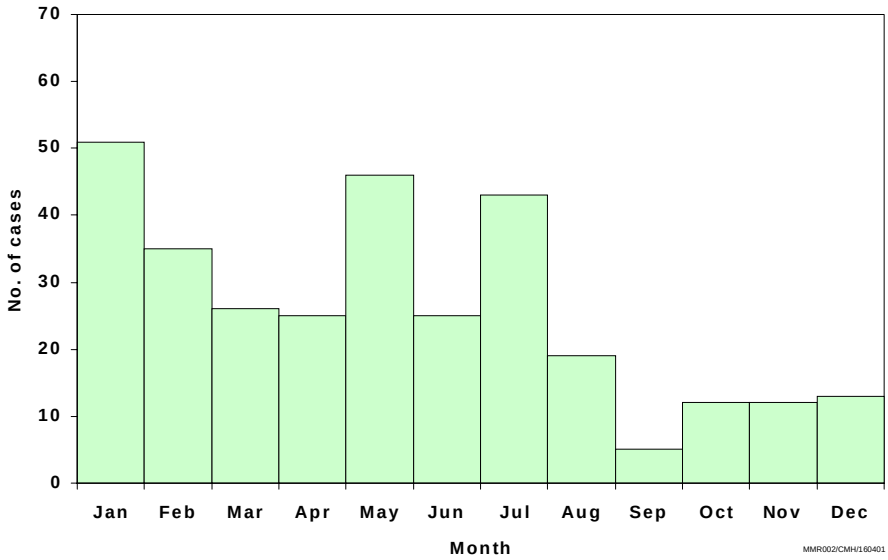
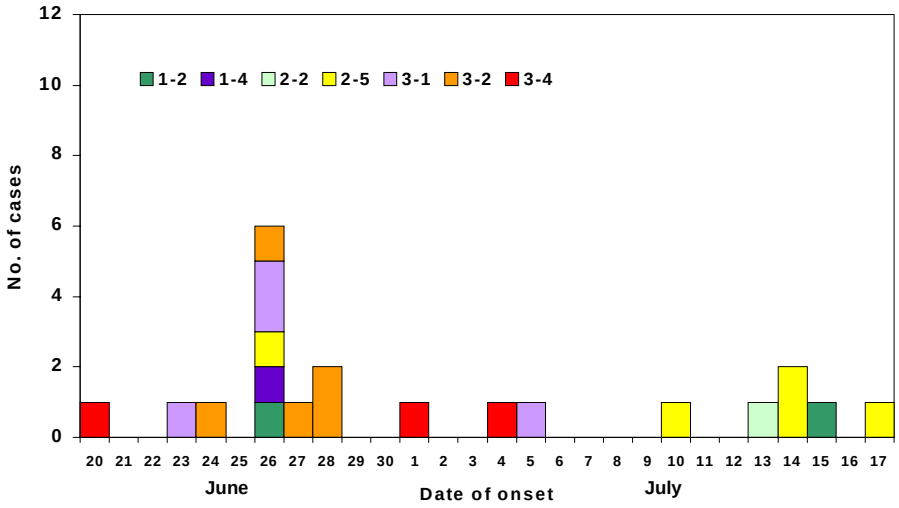


Table 5.18

Epidemiological details of 8 outbreaks of rubella, 2000

Location	No. infected	Age group (years)	Period	Remarks
Gul Way	3	30-55	16-21 Jan	Colleagues
Jalan Buroh	2	23-25	23-24 Jan	Colleagues
Orchard Road	2	26-27	14-20 Feb	Colleagues
Pioneer Sector	4	29-43	12-24 Apr	Colleagues
Keppel Road	3	43-48	19 May - 8 Jun	Colleagues
Robinson Road	2	40-48	23 May - 9 Jun	Colleagues
West Coast Road	7	17-18	7 Jun - 15 Jul	Students
West Coast Road	21	13-15	20 Jun - 17 Jul	Students

Figure 5.8
Time distribution of an outbreak of rubella in a Japanese school, 20 Jun - 17 Jul 2000



CHICKENPOX

A total of 24,074 cases of chickenpox were reported in 2000, compared with 31,592 cases in 1999, a decrease of 23.8% (*Fig. 5.9*). The overall incidence rate was 737.7 per 100,000 population.

One death was reported. The deceased was a 60-year-old immuno-compromised Chinese male on chemotherapy for cancer. He travelled to Johor, Malaysia from 19 to 23 July 2000. He developed purpuric spots on 1 June 2000. Dengue IgM antibody was also found to be positive. His condition deteriorated rapidly upon admission to hospital on 7 August 2000. He developed disseminated intravascular coagulation secondary to chickenpox infection and died on 28 August 2000.

The age-specific incidence rate was highest in the 0-4 year age group, which was 3.2 times that of the overall rate. The male to female ratio was 1.4:1 (*Table 5.19*). The highest age-specific rate had shifted from 5-14 years during the period 1991-93 to less than 5 years of age in 2000 (*Table 5.20*). Among the three major ethnic groups, Malays had the highest incidence rate (*Table 5.21*).

Cases were notified throughout the year with a peak in May (*Fig. 5.10*).

A total of 30 outbreaks involving two or more cases were reported in 2000 (*Table 5.22*). Two of the outbreaks are described below.

Figure 5.9
Annual incidence rates of reported chickenpox cases in Singapore, 1954 - 2000

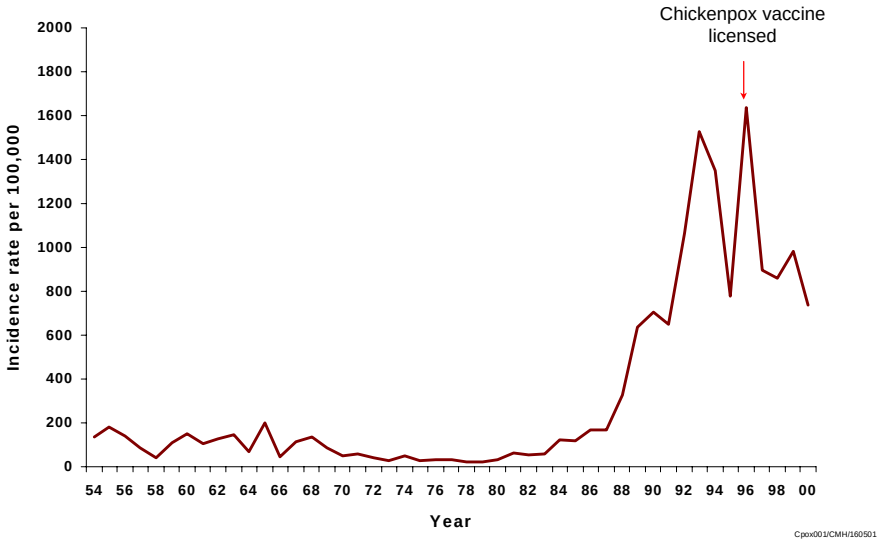


Table 5.19

Age-gender distribution and age-specific incidence rates of reported chickenpox cases, 2000

Age group (years)	Male	Female	Total	Incidence rates per 100,000*
0 - 4	2,882	2,082	4,964	2,327.2
5 - 14	4,544	3,443	7,987	1,638.4
15 – 24	2,360	1,750	4,110	969.6
25 - 34	2,830	1,795	4,625	828.1
35 - 44	1,171	646	1,817	285.6
45 - 54	237	149	386	82.2
55+	106	79	185	39.0
Total	14,130	9,944	24,074	737.7

*Based on 2000 census population

(Source: Department of Statistics, Singapore).

Table 5.20

Age distribution and annual incidence rates of reported chickenpox in Singapore, 1991-2000

Age group (years)	1991-1993			1994-96			1997-1999			2000		
	No.	%	Mean annual rate*	No.	%	Mean annual rate*	No.	%	Mean annual rate*	No.	%	Mean annual rate*
0 – 4	10,687	11.6	1455.8	20,607	18.3	2787.7	19,248	22.3	2698.6	4,964	20.6	2327.2
5 – 14	28,635	31.2	2352.7	34,283	30.5	2603.1	25,729	29.7	1814.5	7,987	33.2	1638.4
15 – 24	31,257	34.1	2351.4	29,917	26.6	2278.9	17,583	20.3	1368.7	4,110	17.1	969.6
25 – 34	15,101	16.5	870.3	19,577	17.4	1159.5	16,915	19.6	999.9	4,625	19.2	828.1
35 – 44	4,410	4.8	291.3	5,895	5.2	351.5	5,048	5.8	277.7	1,817	7.5	285.6
45+	1,692	1.8	87.9	2,079	1.8	93.4	1,706	2.0	66.3	571	2.4	60.5
Unknown	-	-	-	187	0.2	-	269	0.3	-	-	-	-
Total	91,782	100.0	1085.6	112,545	100.0	1256.2	86,498	100.0	911.5	24,074	100.0	737.7

*Per 100,000 population based on the estimated mid-year population of the corresponding period or year.
(Source: Department of Statistics, Singapore)

Table 5.21

Ethnic-gender distribution and ethnic-specific incidence rates of reported chickenpox cases, 2000

Ethnic group	Male	Female	Total	Incidence rates per 100,000*
Chinese	8,983	6,804	15,787	630.1
Malays	2,740	1,929	4,669	1029.3
Indians	839	484	1,323	513.2
Others	313	295	608	1310.3
Foreigners	1,255	432	1,687	-
Total	14,130	9,944	24,074	737.7

*Rates are based on 2000 census population
(Source: Department of Statistics, Singapore).

Figure 5.10

Monthly distribution of reported chickenpox cases in Singapore, 2000

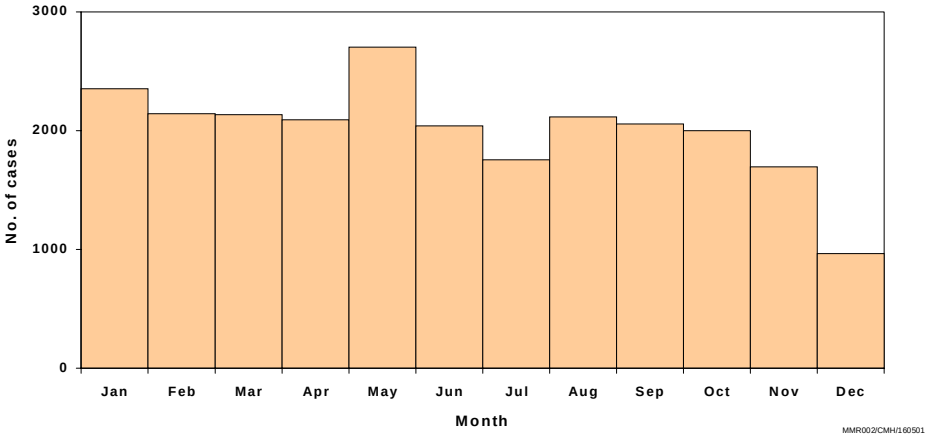


Table 5.22
Epidemiological details of outbreaks of chickenpox, 2000

Location	Licensing authority	No. of children affected/ enrolment	Attack rate (%)	Age group (years)	Period
Child care centres					
Orchard Road	MCD	5/160	3.1	2 - 6	18 Jan - 14 Mar
Jalan Loyang Besar	MCD	4/62	6.5	2 - 10	29 Jan - 14 Mar
Kent Ridge Road	MOE	4/150	2.7	2 - 6	27 Mar - 2 May
Bedok	MCD	3/55	5.5	4 - 14	29 Mar - 27 Apr
Tampines	MCD	2/809	2.6	2- 6	24 Apr - 12 May
Clementi	MCD	14/98	14.3	2 - 6	14 Jul - 31 Jul
Choa Chu Kang	MCD	5/90	5.6	2 - 6	17 Jul - 19 Jul
Science Park	MCD	6/68	8.8	2 - 6	8 Jul - 21 Jul
Clementi	MCD	31/67	46.3	3 - 6	14 Jul - 15 Aug
Spottiswoode Park	MCD	17/58	29.3	2 - 4	15 Jul - 16 Sep
Outram Road	MCD	15/111	13.5	2 - 4	1 Sep - 3 Oct
Bedok	MCD	8/55	14.5	4 - 6	1 Oct - 5 Dec
Choa Chu Kang	MCD	5/120	4.2	3 - 6	2 Oct - 4 Dec
International Central	MCD	23/95	24.2	3 - 6	11 Sep - 7 Nov
Hougang	MCD	9/67	13.4	1 - 6	11 Sep - 27 Sep
Holland Road	MCD	18/99	18.2	3 - 6	17 Aug - 16Oct
Adam Road	MCD	25/112	2.3	1 - 6	21 Nov - 25 Dec
Pasir Ris	MCD	11/88	12.5	3 - 6	25Oct - 29 Dec
Child development centres					
Ang Mo Kio	MCD	7/72	9.7	2 - 6	6 Apr - 19 May
Ang Mo Kio	MCD	1/176	7.4	2 - 6	19 May - 13 Jun
Poh Huat Road	MCD	13/61	21.3	2 - 10	13 Jun - 16 Jun
Outram Road	MCD	5/160	3.1	2 - 6	1 Jun - 20 Jun
Pemimpin Road	MCD	28/50	56.0	2 - 6	16 Jun - 6 Sep
Bedok	MCD	5/48	10.43	3 - 5	7 Sep - 17 Oct
Woodlands Road	MCD	3/67	4.5	4 - 5	18 Dec - 20 Dec
Childcare & development centres					
Hougang	MCD	18/105	17.1	2 - 6	1 Jan - 25 Jan
Kaki Bukit	MCD	5/82	6.1	2 - 6	18 Dec - 20 Dec
Education centres					
Boon Lay	MOE	18/538	3.4	4 - 6	6 Mar - 24 Mar
Boon Lay	MOE	22/388	5.7	4 - 6	1 May - 14 May
Pasir Ris	MCD	2/62	3.2	2 - 7	30 May - 19 Jun

Outbreak of chickenpox in a child care centre at Clementi

An outbreak of chickenpox involving 31 children aged 2-6 years was reported in a childcare centre at Clementi. The centre had a staff strength of 13 and a total enrolment of 67 children divided into 4 classes. The overall attack rate was 46.3% with the highest rate among children less than 3 years old (*Table 5.23*).

The index case was a four-year-old boy from the nursery class (*Fig 5.11*). He had onset of fever and rash on 14 Jul 2000. Two clusters of cases occurred at 2 weekly intervals with the last case reported on 15 Aug 00.

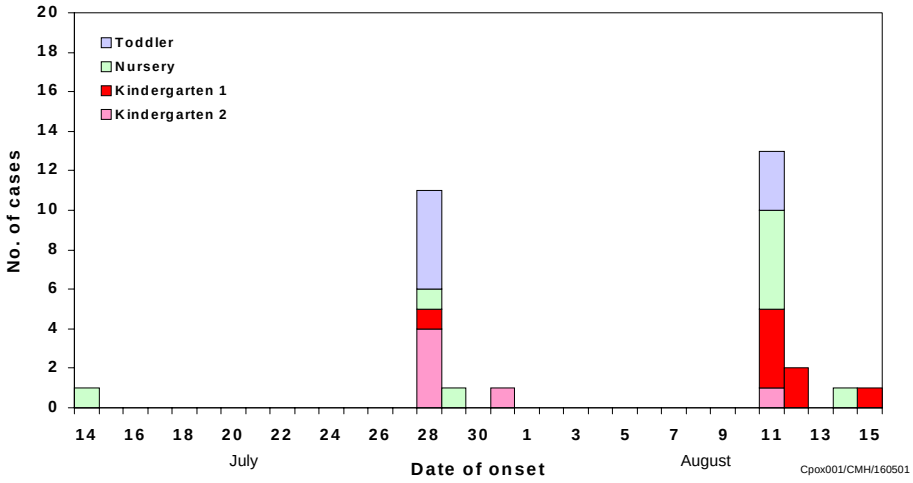
Table 5.23

Attack rates of chickenpox cases in a child care centre at Clementi, 2000

Age group (years)	Class	No. susceptible*			No. infected			Attack rate (%)
		Male	Female	Total	Male	Female	Total	
2 - <3	Toddler	3	7	10	2	6	8	80.0
3 - <4	Nursery	8	10	18	4	5	9	50.0
4 - <5	Kindergarten 1	9	11	20	5	3	8	40.0
5 - <6	Kindergarten 2	11	8	19	4	2	6	31.6
	Total	31	36	67	15	16	31	46.3

*No past history of chickenpox.

Figure 5.11
Outbreak of 31 cases of chickenpox in a child care centre at Clementi, 14 July - 15 August 2000



Outbreak of chickenpox in a childcare centre at Adam Road

Another outbreak of chickenpox in a childcare centre was notified on 13 Dec 2000. A total of 25 children aged 2-6 years were infected between Nov and Dec 2000. The centre had an enrolment of 112 children divided into four classes, N1, N2, K1 and K2. The overall attack rate was 22.3% and ranged from 7.3% to 37.5% (*Table 5.24*).

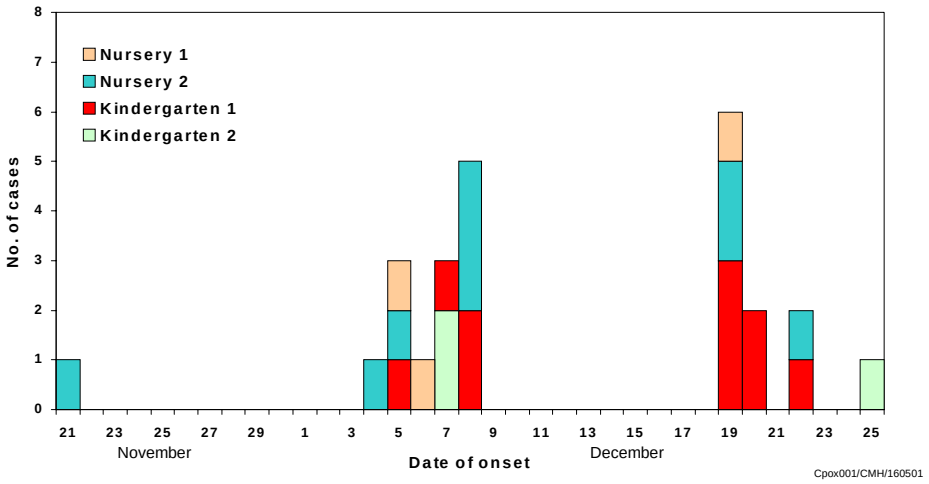
The first case was a three-year-old boy from N2 with onset of fever and rash on 21 Nov 2000. The infection spread to other susceptible contacts in the same centre after an incubation period of 13-17 days. The last case was reported on 25 Dec 2000 (*Fig. 5.12*).

Table 5.24
Attack rates of chickenpox cases in a child care centre at Adam Road, 2000

Age group (years)	Class	No. susceptible*			No. infected			Attack rate (%)
		Male	Female	Total	Male	Female	Total	
2 - <3	Nursery 1	3	5	8	1	2	3	37.5
3 - <4	Nursery 2	18	13	31	6	4	10	32.3
4 - <5	Kindergarten 1	20	12	32	5	4	9	28.1
5 - <6	Kindergarten 2	24	17	41	2	1	3	7.3
	Total	65	47	112	14	11	25	22.3

*No past history of chickenpox.

Figure 5.12
Outbreak of 25 cases of chickenpox in a child care centre at Adam Road, 21 November - 25 December 2000

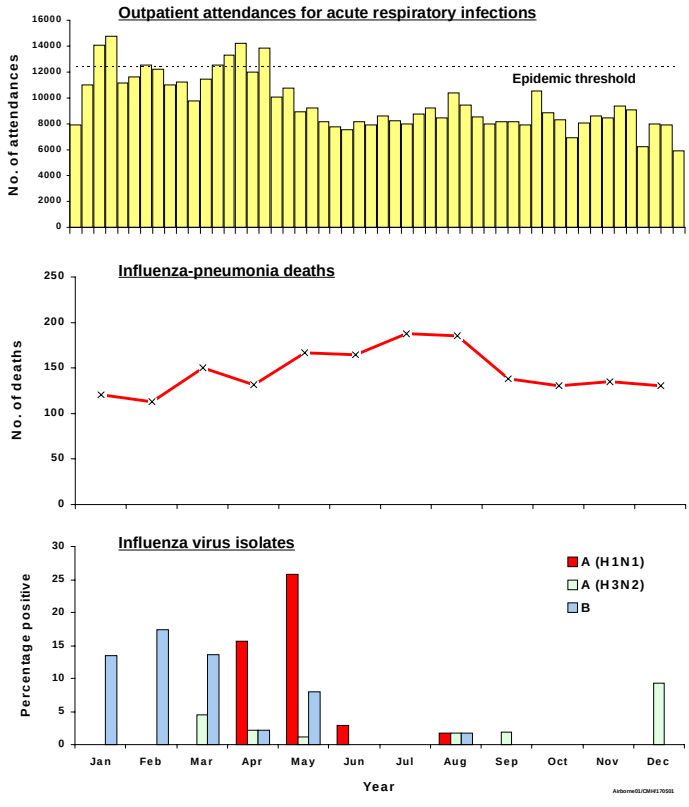


INFLUENZA

During the year, the incidence of influenza was monitored through the weekly attendances for acute respiratory infections (ARI) at government polyclinics, and the number of respiratory specimens positive for influenza virus at the Department of Pathology, Singapore General Hospital. Random throat swabs were taken weekly from patients with influenza-like symptoms attending three polyclinics, viz Clementi, Bedok and Ang Mo Kio. Influenza viruses were detected by isolation and/or immunofluorescence. An influenza epidemic would be confirmed when an increase in outpatient attendences for ARI coincided with an increase in the percentage of positive influenza isolates. The severity of the epidemic was measured by the number of influenza-pneumonia deaths reported to the Registrar of Births and Deaths.

Influenza A and B viruses were detected throughout the year, with 42 influenza A and 23 influenza B virus isolated (*Fig 5.13*). Of the influenza A virus isolated, 33 were H1N1 and 9 were H3N2.

Figure 5.13
Influenza surveillance in Singapore, 2000

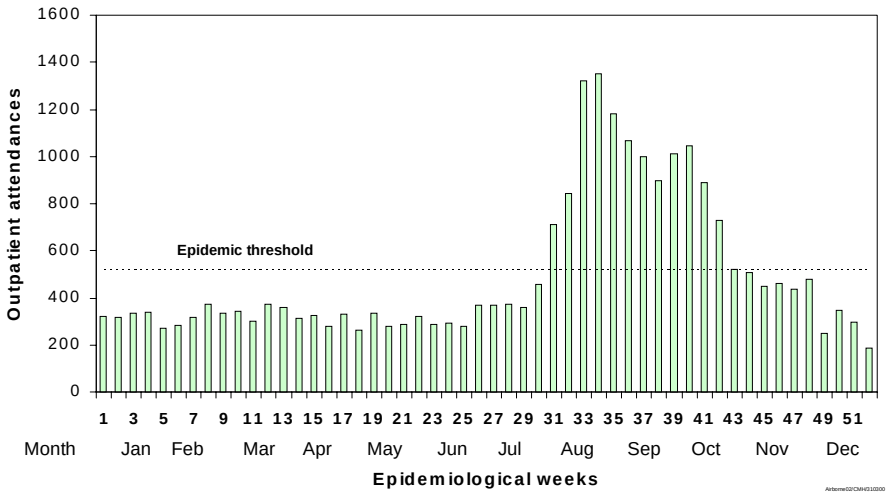


Representative influenza isolates were sent to the WHO Collaborating Centre for Influenza in the CSL in Melbourne which in turn sent a representative number of Singapore isolates to the other Influenza Collaborating Centres. Influenza this year caused mild illness and prevailing strains were B/Beijing/184/93 and A/Moscow/10/99 (H3N2) in the beginning of the year, which was replaced by A/New Caledonia/20/99 (H1N1) in the March-June season. From May onwards, all B influenza strains were typed as B/Sichuan/379/99. The last quarter was dominated by the A/Moscow/10/99 (H3N2) strain.

VIRAL CONJUNCTIVITIS

A total of 26,077 attendances for conjunctivitis were reported by the government polyclinics (*Fig 5.14*). The mean weekly attendance was 501 (range 188-1349). An outbreak of conjunctivitis was reported from August to October 2000 with the highest incidence of 1349 cases reported in the 34th week. No virus study was carried out.

Figure 5.14
Surveillance for conjunctivitis at government polyclinics in Singapore, 2000



PARVOVIRUS B19 INFECTION

A nosocomial outbreak of parvovirus infection in a medical institution

In Nov 2000, an outbreak of measles among staff members of a medical institution was reported to the Quarantine and Epidemiology Department, Ministry of the Environment.

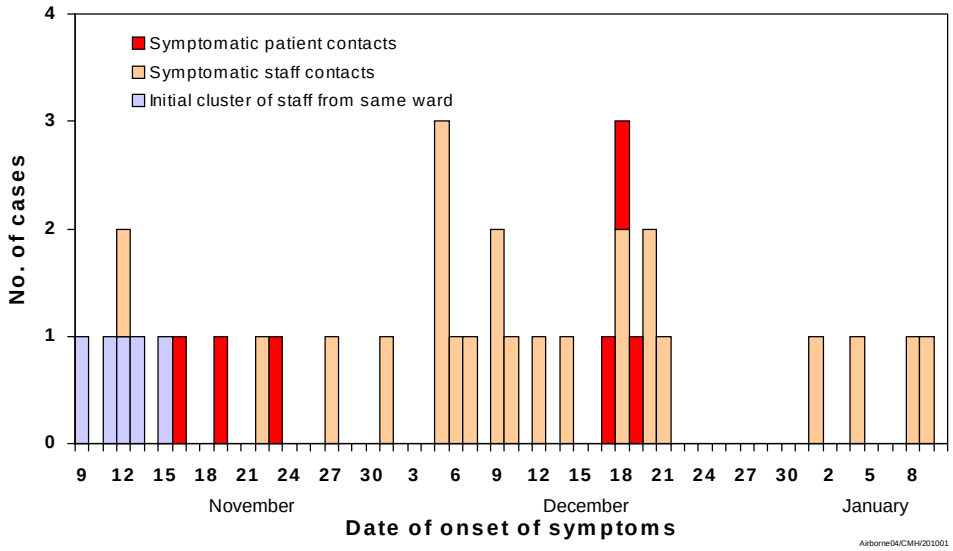
Active search for other unreported cases was carried out and control measures to present further transmission of infection were concurrently implemented.

The institution is a 957-bed facility that employed over 2000 staff, including medical doctors, nurses, medical aides and other administrative and support personnel. Epidemiological investigation revealed that 5 patients with laboratory confirmed community acquired measles were hospitalised between August and September 2000. 3 secondary cases were also recorded among staff members. Subsequently, between 9 and 15 November 2000, 5 nurses from the same ward presented with an acute febrile illness associated with a rash on the face and trunk and arthropathy mainly of the wrists and knees. All the 5 cases were positive for measles IgM antibody by enzyme-linked immunosorbent assay (ELISA - Wiesbaden, Germany).

The control measures taken included a mass immunization programme for all non-immune staff and contact tracing of all patients in contact with staff potentially incubating measles. In addition, strict infection control procedures were reinforced for all patients, staff and visitors with fever and rashes.

Contact tracing revealed that a total of 23 staff members and 9 patients also had symptoms of fever and rash with onset between 19 Nov 2000 and 9 Jan 2001 (*Fig 5.15*). Of the 17 symptomatic contacts tested for IgM measles, 6 were positive, 9 were negative and 2 with equivocal results.

Figure 5.15
No. of cases among staff and patients of a medical institution by date of symptom onset



Because of the atypical features of this illness, including a marked arthropathy and a recrudescence of fever and arthralgias in 2 nurses, as well as the knowledge of the low herd immunity level of the general population against parvovirus B19 infection in Singapore, sera obtained from the cases were subsequently tested for antibodies to this virus (by ELISA). The initial cluster of 5 nurses who had laboratory evidence of acute measles infection also had a specific IgM antibody response to parvovirus B19. In addition, 3 of the 32 symptomatic contacts were found to be positive for both measles and parvovirus B19 IgM antibodies, and 3 of the measles IgM antibody negative symptomatic contacts had evidence of acute parvovirus infection. Another 3 with laboratory evidence of acute measles infection was negative for parvovirus IgM antibody. Unfortunately, no viruses could be successfully cultured from either staff or patients.

Based on the clinical picture, the low herd immunity of the population to parvovirus infection and previously reported false positive measles IgM antibody results, it was concluded that this could be a parvovirus outbreak. Consequently, infection control measures were extended to obstetric outpatients, but no cases of parvovirus B19 - related hydrops were detected by active surveillance.

The findings of this report suggest that the clinicians in areas with a high susceptibility to measles and parvovirus infections need to be aware of potential serological cross-reactivity even for these two unrelated viruses using assays with high specificity. In addition to serology, confirmation should be sought based on clinical and culture evidence of parvovirus B19 infection.