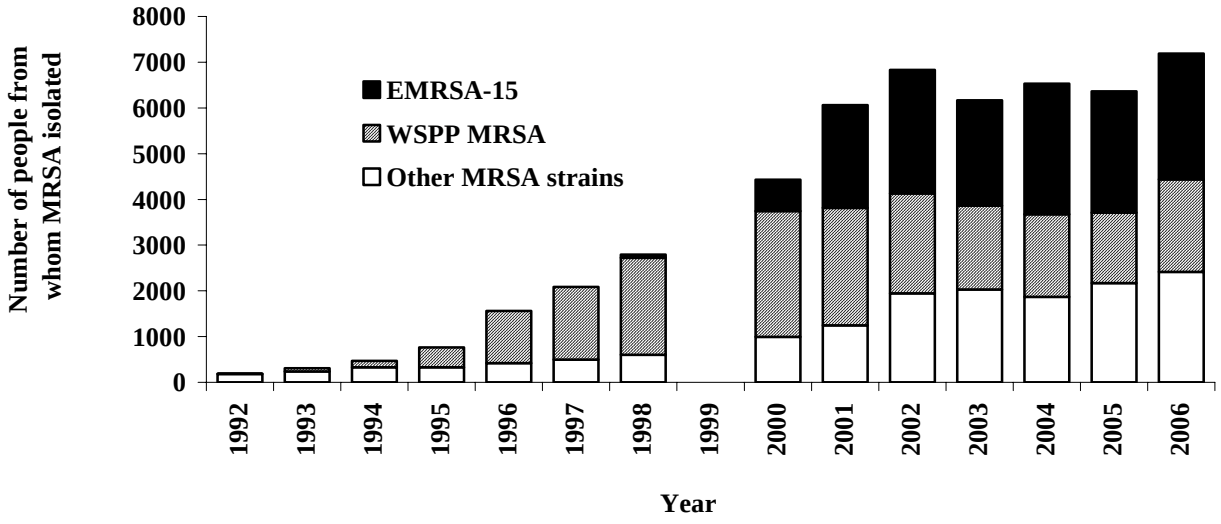
Annual survey of methicillin-resistant *Staphylococcus aureus* (MRSA), 2006

Each year ESR conducts a one-month survey of methicillin-resistant *Staphylococcus aureus* (MRSA) to provide ongoing information on the epidemiology of MRSA in New Zealand. Hospital and community microbiology laboratories are asked to refer all MRSA isolated during the month to ESR for typing and susceptibility testing.

The 2006 survey was conducted in August 2006, and during the month MRSA were referred from 593 people (579 patients and 14 staff). This number of referrals equates to an annualised incidence rate of 171.9 per 100 000 population; a 10.8% increase on the 2005 rate of 155.2 per 100 000 (Figure 1). This 2005 rate differs from that published in the 2005 survey report as a new population estimate, rather than the 2001 census population data, was used to re-calculate the rate. There has been no significant ($P < 0.05$) change in the national incidence of MRSA over the last 5 years since 2002.

MRSA was reported as causing infection in 85.7% of the 421 patients for whom this information was provided in 2006.

Figure 1. MRSA isolations, 1992-2006



Data for 1992 to 1998 are based on continuous surveillance of all MRSA isolations. Data for 2000 to 2006 are annualised and based on one-month surveys conducted in these years. No survey was undertaken in 1999.

As has been the situation for the last 6 years, the two most commonly identified MRSA strains were the EMRSA-15 strain, which represented 38.2% of all isolates, and the WSPP MRSA, which represented 28.3% of isolates (Figure 1). Together these two strains accounted for two-thirds of MRSA. The prevalence of other strains was: AK3 MRSA strain, 3.7%; WR/AK1 MRSA strain, 3.0%; DN1 MRSA strain, 2.7%; AKh4 MRSA strain, 2.2%; and EMRSA-16, 1.0%. AK3 MRSA and DN1 MRSA are relatively newly recognized strains, identified for the first time in 2005 and 2004, respectively. For a description of all these MRSA strains see http://www.esr.cri.nz/competencies/communicabledisease/MRSA+strains.htm.

Among the 579 patients with MRSA, 48.7% were categorised as hospital patients and 51.3% as community patients. Patients were classified as hospital patients if they were in a healthcare facility (including residential-care facility) when MRSA was isolated or had been in a healthcare facility in the previous three months. The majority of EMRSA-15 and AKh4 MRSA were isolated from hospital patients or staff, whereas most WSPP MRSA, AK3 MRSA, WR/AK1 MRSA and DN1 MRSA were isolated from people in the community (Table 1).

Table 1. Distribution of EMRSA-15, AKh4 MRSA, WSPP MRSA, AK3 MRSA, WR/AK1 MRSA and DN1 MRSA among hospital patients/staff and people in the community, August 2006

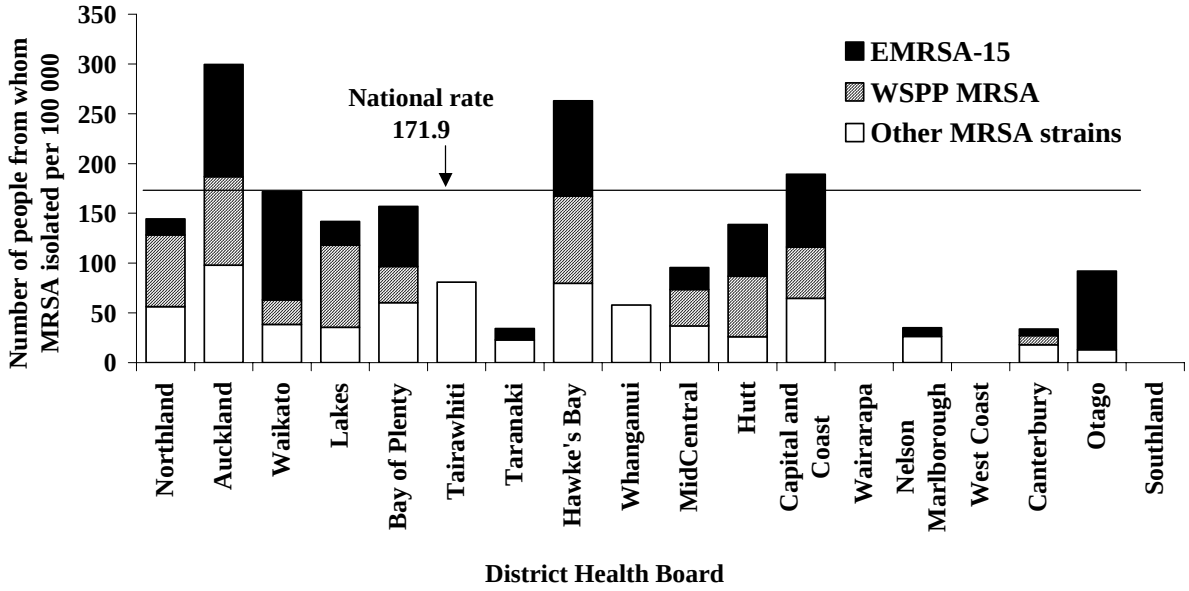
	Number (%[1]) of people with:					
	EMRSA-15	**AKh4**	**WSPP**	**AK3**	**WR/AK1**	**DN1**
Hospital patients or staff	149 (65.4)	11 (84.6)	46 (27.2)	8 (36.4)	4 (22.2)	5 (31.3)
People in the community[2]	79 (34.6)	2 (15.4)	123 (72.8)	14 (63.6)	14 (77.8)	11 (68.8)
Total	**228 (100)**	**13 (100)**	**169 (100)**	**22 (100)**	**18 (100)**	**16 (100)**

[1] proportion of all isolations of the strain

[2] includes healthcare workers either working in the community or being screened prior to employment

There continue to be marked geographic variations in the incidence of MRSA in New Zealand. In 2006 the highest annualised incidence rates were in the Waitemata/Auckland/Counties Manukau (299.6 per 100 000), Hawke's Bay (263.0), Capital and Coast (189.2), Waikato (171.7), Bay of Plenty (157.0), Northland (144.3), Lakes (141.7) and Hutt (138.7) District Health Boards (DHBs) (Figure 2). Differences in screening policies may contribute to some of the apparent differences in incidence.

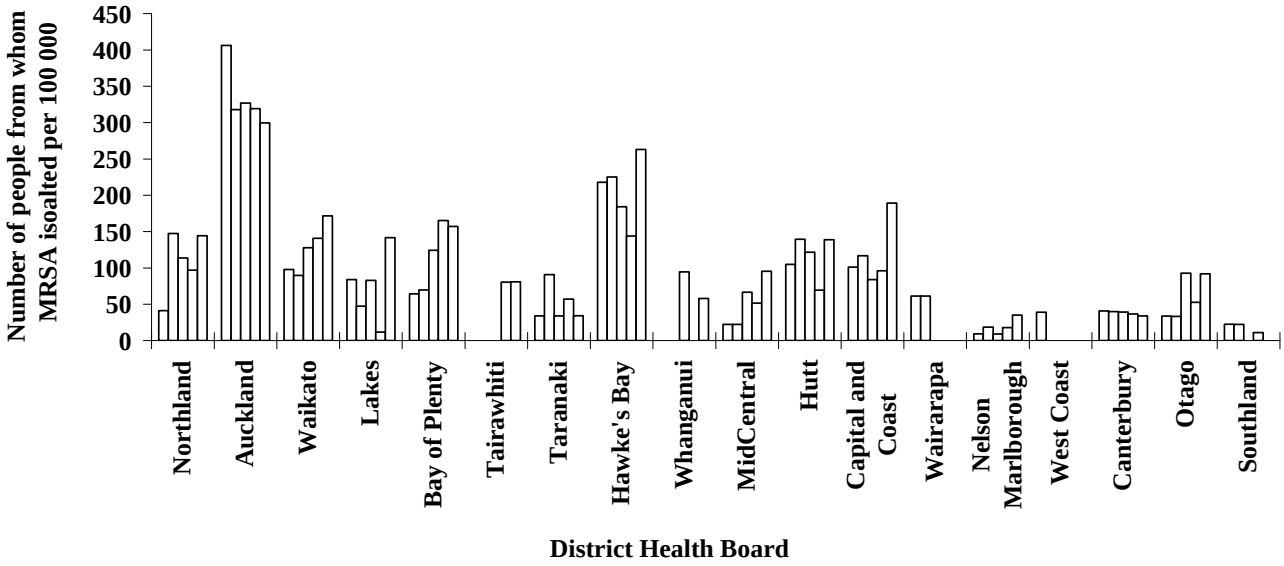
Figure 2. Annualised incidence of MRSA by district health board, 2006



Data for the three DHBs in the greater Auckland area (Waitemata/Auckland/Counties Manukau) are combined and similarly data for the Canterbury and South Canterbury DHBs are combined.

The incidence of MRSA in each DHB area over the last 5 years, 2002-2006, is shown in Figure 3. Poisson regression analysis indicated that there were significant ($P < 0.05$) increases in the incidence of MRSA in the Bay of Plenty, Tairawhiti and MidCentral DHBs and a decrease in the Wairarapa DHB. However, for Tairawhiti, MidCentral and Wairarapa DHBs this analysis was based on very small numbers of MRSA isolates. There was no significant change in MRSA incidence in any of the other areas.

Figure 3. Annualised incidence of MRSA by district health board, 2002-2006

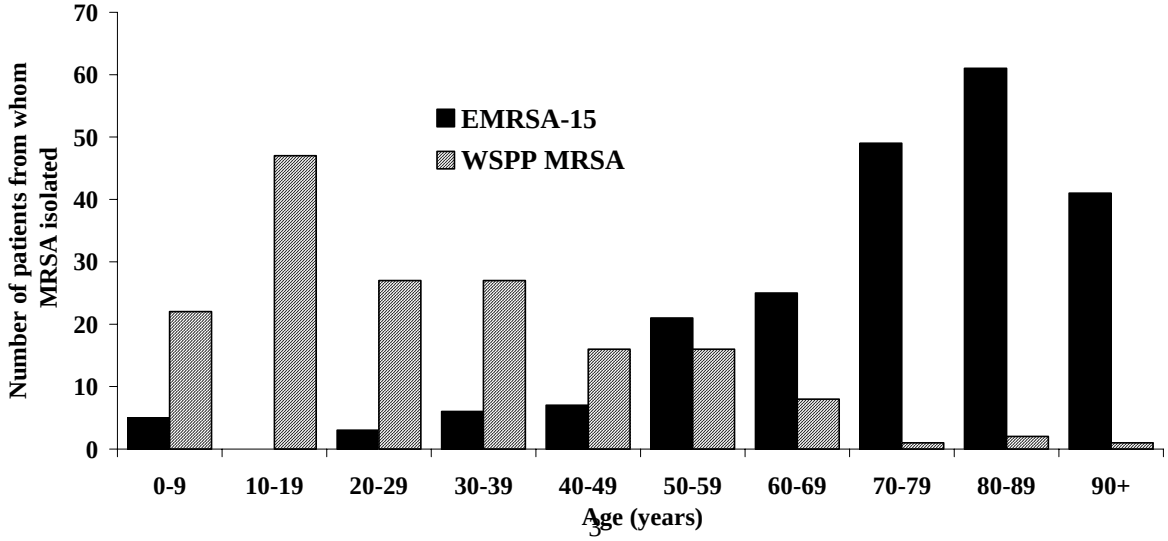


The series of bars for each district health board represent the individual years 2002 to 2006 from left to right.

Data for the three DHBs in the greater Auckland area (Waitemata/Auckland/Counties Manukau) are combined and similarly data for the Canterbury and South Canterbury DHBs are combined

The age distribution of patients with the two most common strains was quite different, with EMRSA-15 being more frequently isolated from older patients and WSPP MRSA being more common in younger patients (Figure 4).

Figure 4. EMRSA-15 and WSPP MRSA isolations by patient age, August 2006



The antimicrobial susceptibility of the MRSA isolates referred during August 2006 is shown in Table 2. Overall, 34.3% of the isolates were multiresistant, that is, resistant to ≥2 classes of antibiotics in addition to β-lactams. All MRSA tested were susceptible to linezolid and vancomycin.

The EMRSA-15 strain is invariably resistant to ciprofloxacin and often (61.6% in 2006) resistant to erythromycin, with inducible clindamycin resistance. The WSPP MRSA remain predominantly non-multiresistant, with only infrequent resistance to any antibiotics other than β-lactams. The WR/AK1 strain is resistant to fusidic acid and high-level mupirocin, and sometimes also erythromycin. The AKh4 MRSA is typically multiresistant to ciprofloxacin, clindamycin (constitutive resistance), co-trimoxazole, erythromycin, gentamicin and tetracycline.

Table 2 also shows the susceptibility of the two more newly identified MRSA strains, AK3 and DN1. AK3 MRSA is not multiresistant and usually only resistant to fusidic acid. DN1 MRSA is typically resistant to ciprofloxacin and erythromycin and therefore may be confused with EMRSA-15 on the basis of its susceptibility pattern. However, DN1 MRSA differs from EMRSA-15 in that it does not have inducible clindamycin resistance. It is notable that two of the community MRSA strains are distinguished by their resistance to widely used topical antibiotics: WR/AK1 is resistant to fusidic acid and mupirocin, and AK3 is resistant to fusidic acid.

Table 2. Resistance among MRSA referred during August 2006

Antimicrobial agent (resistance breakpoint, mg/L)[1]	Percent resistance						
	All isolates (n = 597)[2]	EMRSA-15 (n = 138)[3]	WSPP (n = 94)[4]	AK3 (n = 22)	WR/AK1 (n = 18)	DN1 (n = 16)	AKh4 (n = 13)
Chloramphenicol (MIC ≥32)	0.5	0	0	0	0	0	0
Ciprofloxacin (MIC ≥4)	44.2	100	0	0	0	87.5	100
Clindamycin (MIC ≥4)[5]	7.2	8.0	0	0	0	0	100
Constitutive + inducible clindamycin[6]	33.0	61.6	2.1	0	11.1	0	100
Co-trimoxazole (MIC ≥4/76)	2.5	0	0	0	0	0	100
Erythromycin (MIC ≥8)	37.7	61.6	4.3	0	11.1	93.8	100
Fusidic acid (MIC ≥2)	9.7	1.5	2.1	100	100	6.3	0
Gentamicin (MIC ≥16)	2.3	0	0	0	0	0	92.3
Mupirocin (MIC ≥8)[7]	7.0	0.7	4.3	4.6	100	6.3	23.1
High-level mupirocin (MIC ≥512)	5.0	0.7	1.1	0	88.9	0	23.1
Rifampicin (MIC ≥4)	0.8	0.7	0	0	0	0	0
Tetracycline (MIC ≥16)	3.9	2.2	0	0	0	0	100
Multiresistant[8]	34.3	62.3	2.1	4.6	100	87.5	100

[1] All isolates tested were susceptible to linezolid and vancomycin

[2] These data have been adjusted to allow for the full numbers of EMRSA-15 and WSPP MRSA isolated, even though the susceptibility of only a sample of isolates of both these strains was tested – see footnotes 3 and 4

[3] A sample of 138 of the total 228 EMRSA-15 isolates was tested

[4] A sample of 94 of the total 169 WSPP MRSA isolates was tested

[5] Constitutive clindamycin resistance

[6] Constitutive and inducible clindamycin resistance. Erythromycin-resistant, clindamycin-susceptible isolates were tested for inducible clindamycin resistance by the D-zone test. However, only 8 of the 85 erythromycin-resistant, clindamycin-susceptible EMRSA-15 isolates were tested, as this strain is known to have inducible clindamycin resistance. All 8 EMRSA-15 isolates tested demonstrated inducible clindamycin resistance. For the constitutive + inducible clindamycin resistance percentages given for all isolates and EMRSA-15, all erythromycin-resistant, clindamycin-susceptible EMRSA-15 isolates were assumed to have inducible clindamycin resistance.

[7] Includes low-level (MIC 8-256 mg/L) and high-level (MIC ≥512 mg/L) mupirocin resistance

[8] Resistant ≥2 classes of antibiotics in addition to β-lactams