Community- and Hospital-acquired Methicillin-resistant *Staphylococcus aureus* Infections in Beijing China

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The frequencies of both community-acquired and hospital-acquired staphylococcal infections have increased steadily, with little change in overall mortality. Treatment of these infections has become more difficult because of the emergence of multidrug-resistant strains which is methicillin-resistant *Staphylococcus aureus* (MRSA).

The antimicrobial susceptibility and molecular characterization of methicillin-resistant *Staphylococcus aureus* in Beijing were studied. All MRSA isolates were typed with phenotypic and genotypic methods. To detect the susceptibility to 10 antibiotics of 471 SA strains isolated in Beijing with agar dilution method (422 isolates obtained from outpatients with impetigo from 1993 to 2000, 49 from inpatients with burn infection in 2000). We compared the difference of susceptibility for those strains, detected the resistance gene (*mecA*) of MRSA by polymerase chain reaction, did typing by pulse-field gel electrophoresis (PFGE). The result of this study was indicative of increasing antimicrobial resistance of *S. aureus*. There was possibility of nosocomial outbreaks and clonal spread of MRSA in Beijing.

Table. Results of susceptibility tests to 10 antibiotics of 422 isolates from outpatients with impetigo in Beijing from1993 to 2000 (%)

year	No	PEN	OXA	CLI	ERY	CHL	CIP	TET	VAN	GEN	FA
1993	41	100	12.2	51.2	80.5	48.8	2.4	68.3	0	0	0
1994	46	100	18.8	56.3	79.7	53.1	4.7	68.8	0	0	0
1995	30	100	20.0	60.0	83.3	53.3	6.7	73.3	0	0	0
1996	135	100	23.0	65.2	85.9	51.1	13.3	70.4	0	0	0
1998	51	100	29.4	72.5	90.3	51.0	17.6	70.6	0	0	0
1999	54	100	29.6	72.2	90.7	51.8	18.5	70.4	0	0	0
2000	47	100	29.8	72.3	91.5	53.2	21.3	71.0	0	0	0
X^2			4.003	4.168	2.250	0.171	7.104	0.038			
P			0.039	0.034	0.117	0.421	0.007	0.514			

Note: X^2 3.847=0.05 , X^2 6.635=0.01

In nosocomal staphylococcal isolates from burn infection, MRSA accounted for 63.3% (31/49). Of them, 29 showed a high level resistance (MIC value was higher than 256ug/mL).

Using the PCR-based amplification, *mecA* gene was detected in 29 of the isolates from nosocomial strains with MIC >256 ug/mL. Two isolates with MIC <=4 ug/mL were negative for *mecA* gene.

For 29 MRSA isolates from patients with burn infection, in which mecA gene was positive, were identified by PFGE. It clearly showed different restriction patterns of these strains. A total of 5 different strains were observed. On the basis of lambda ladders run together each time with an ATCC strain, the separation size range of the different bands observed for each strain is from 50 kb to 500 kb. According to the guidelines of interpreting DNA fingerprints of PFGE, the 29 MRSA strains can be divided into 3 types. PFGE type A contained 26 strains, which could be further classified into 3 subtypes (A1 to A3), of which subtype A1 represented the predominant (17 isolates). The remaining PFGE patterns had no subtypes. PFGE type B contained 2 isolates and PFGE type C was found only in single isolate. Some of these PFGE patterns were shown in Figure.

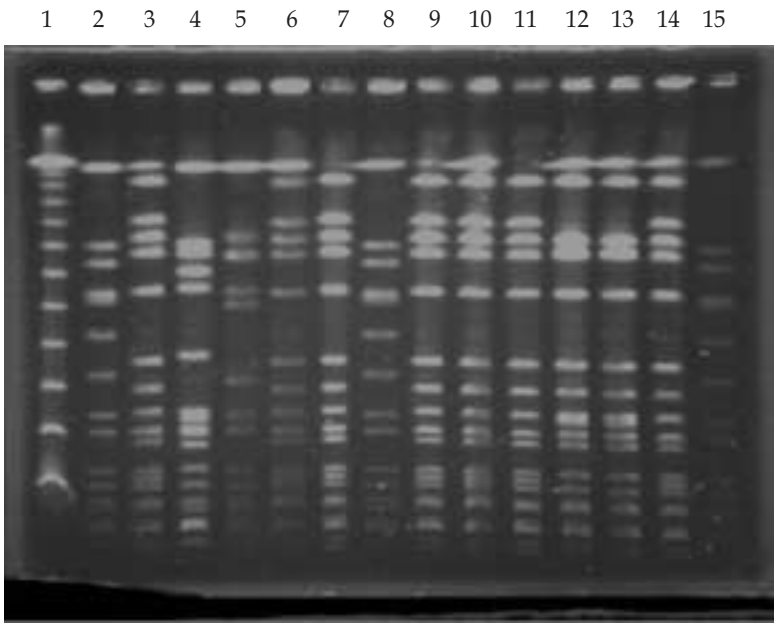

Figure. PFGE pattern : 1:λ-ladder ; 2, 8, 15 : NCTC8325; 3-7, 9-14: MRSA