

Community Onset MRSA Infections in Australia: A Tale of Two Clones

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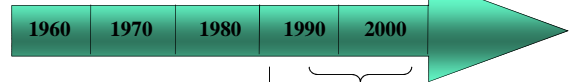
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25th February 2010

Community Associated MRSA

First isolated in the Kimberley region of WA (1989) in the aboriginal population. **ST8-MRSA-IV (WA MRSA 5) [PVL NEGATIVE]**



Udo EE *et al*
(1993) *J Hosp Infect* 25, 97-108
Genetic analysis of community strains of methicillin-resistant *Staphylococcus aureus* in Western Australia

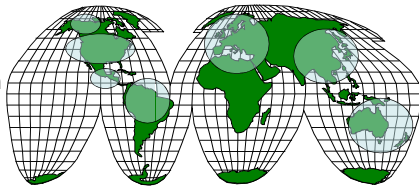


Auckland Region (via Western Samoa) (1992)
ST30-MRSA-IV (WSP) [PVL POSITIVE]

World-wide dissemination of community MRSA

Community Associated MRSA

- Papua New Guinea
- Asia
- Europe
- United Kingdom
- Ireland
- Canada
- United States of America
- Central America
- South America



Community Associated MRSA

- Lack risk factors associated with healthcare-associated MRSA
- Skin and soft tissue infections in young people
- Laboratory Findings
 - Susceptible to most non- β -lactam antimicrobials
 - Very rapid growth times
 - Clone types different from healthcare-associated MRSA
 - SCC*mec* IV (V, VII, VIII)
 - Pantone Valentine leukocidin (PVL) [*lukF* and *lukS* genes]
 - Greater clonal diversity

Community Associated MRSA – Western Australia

<p>Clonal Complex 1</p> <p>ST1-MRSA-IV (WA1) ST73-MRSA-V (WA110) *ST772-MRSA-V (WA60) ST932-MRSA-IV (WA45) ST106-MRSA-IV (WA57)</p> <p>Clonal Complex 5</p> <p>ST5-MRSA-IV (WA3) ST5-MRSA-IV (WA18) ST5-MRSA-IV (WA21) *ST5-MRSA-IV (WA64) ST5-MRSA-IV (WA71) ST5-MRSA-IV (WA74) ST5-MRSA-IV (WA82) ST5-MRSA-V (WA11) ST5-MRSA-V (WA14) ST5-MRSA-V (WA34) ST5-MRSA-V (WA35) ST5-MRSA-V (WA81) ST5-MRSA-V (WA85) ST5-MRSA-V (WA86) ST5-MRSA-V₁ (WA80) ST6-MRSA-IV (WA51) ST6-MRSA-IV (WA66) ST73-MRSA-IV (WA50) ST73-MRSA-IV (WA65) ST526-MRSA-IV (WA39) ST575-MRSA-V (WA25) ST577-MRSA-V (WA22) ST641-MRSA-V (WA41) ST835-MRSA-IV (WA48) ST835-MRSA-IV (WA46) ST835-MRSA-IV (WA87) ST835-MRSA-IV (WA87) ST835-MRSA-IV (WA24) ST835-MRSA-IV (WA76)</p> <p>Undefined Clonal Complex</p> <p>ST1303-MRSA-IV (WA76)</p>	<p>Clonal Complex 8</p> <p>ST8-MRSA-IV (WA5) *ST8-MRSA-IV (USA300) ST8-MRSA-IV (WA67) ST8-MRSA-IV (WA88) ST8-MRSA-IV (WA53) ST8-MRSA-V (WA77) ST8-MRSA-VIII (WA16) ST76-MRSA-IV (WA31) ST699-MRSA-IV (WA19) ST612-MRSA-IV (WA20) *ST923-MRSA-IV (WA62) ST1173-MRSA-IV (WA58)</p> <p>Clonal Complex 9</p> <p>ST834-MRSA-IV (WA13)</p> <p>Clonal Complex 12</p> <p>ST12-MRSA-IV (WA69) ST12-MRSA-IV (WA59)</p> <p>Clonal Complex 30</p> <p>*ST26-MRSA-IV (WSPF) ST39-MRSA-IV (WA68)</p> <p>Clonal Complex 45</p> <p>ST45-MRSA-IV (WA23) ST45-MRSA-IV (WA75) ST45-MRSA-IV (WA4) ST45-MRSA-V (WA84)</p> <p>Clonal Complex 59</p> <p>ST59-MRSA-IV (WA15) *ST59-MRSA-IV (WA55) *ST59-MRSA-IV (WA56) ST59-MRSA-IV (WA73) *ST59-MRSA-V₁ (Taiwan) *ST952-MRSA-V (WA52)</p>	<p>Clonal Complex 72</p> <p>*ST72-MRSA-IV (WA44)</p> <p>Clonal Complex 75</p> <p>ST75-MRSA-IV (WA8) ST75-MRSA-IV (WA79) ST1304-MRSA-IV (WA72)</p> <p>Clonal Complex 80</p> <p>*ST80-MRSA-IV (Euro) *ST80-MRSA-IV (WA17) ST728-MRSA-IV (WA30)</p> <p>Clonal Complex 88</p> <p>ST78-MRSA-IV (WA2) ST258-MRSA-IV</p> <p>Clonal Complex 97</p> <p>ST593-MRSA-IV (WA54) ST1174-MRSA-IV (WA63)</p> <p>Clonal Complex 121</p> <p>ST577-MRSA-V (WA22)</p> <p>Clonal Complex 188</p> <p>ST188-MRSA-IV (WA38) ST188-MRSA-IV (WA78)</p> <p>Clonal Complex 361</p> <p>ST361-MRSA-VIII (WA28)</p> <p>Clonal Complex 398</p> <p>ST398-MRSA-V</p> <p>Clonal Complex 672</p> <p>ST672-MRSA-IV (WA29) ST672-MRSA-IV (WA70)</p> <p>Singletons</p> <p>*ST93-MRSA-IV (06) ST883-MRSA-IV (WA47)</p>	<p>01/07/2003 to 30/06/2009</p> <p>81 clones 19 clonal clusters 2 singletons</p> <p>54 SCCmec IV clones 23 SCCmec V clones 2 SCCmec VIII clones 2 novel SCCmec clones</p> <p>13 *PVL positive clones</p>
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Five major global community-associated MRSA clones

Panton-Valentine leucocidin (*lukF/lukS* genes) POSITIVE

The Australian Group on Antimicrobial Resistance (AGAR)

Biennial Community *Staphylococcus aureus* Awareness Programmes 2000 - 2008

2008
27 public teaching hospitals
4 private laboratories

Each institution collected 100 consecutive clinically significant *S aureus* isolates from 100 different outpatients (exclude dialysis and day surgery patients)

The Australian Group on Antimicrobial Resistance (AGAR)

Biennial Community *Staphylococcus aureus* Awareness Programmes

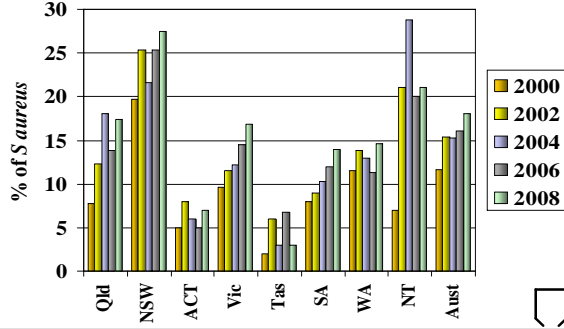
Percentage of *Staphylococcus aureus* Identified as MRSA

Significant increase from 2000 to 2008 ($p < 0.0001$)

The Australian Group on Antimicrobial Resistance (AGAR)

Biennial Community *Staphylococcus aureus* Awareness Programmes

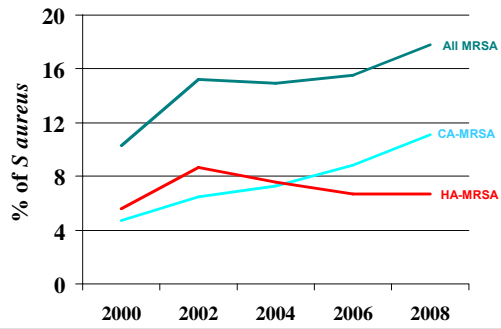
Percentage of *Staphylococcus aureus* Identified as MRSA by Region



The Australian Group on Antimicrobial Resistance (AGAR)

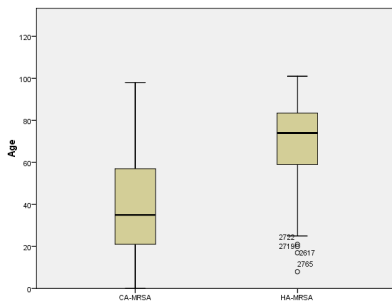
Biennial Community *Staphylococcus aureus* Awareness Programmes

HA-MRSA and CA-MRSA as a Percentage of *S aureus*



AGAR 2008 Community *S aureus* Surveillance Programme

Box Plot of Age of Patients Infected with CA-MRSA and HA-MRSA

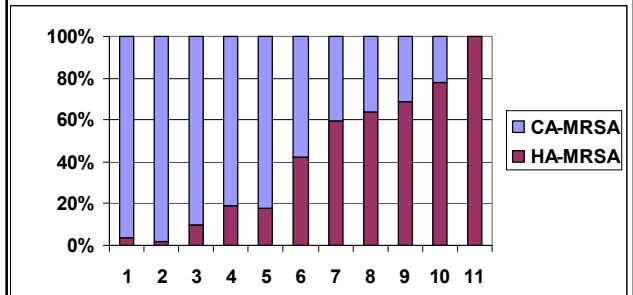


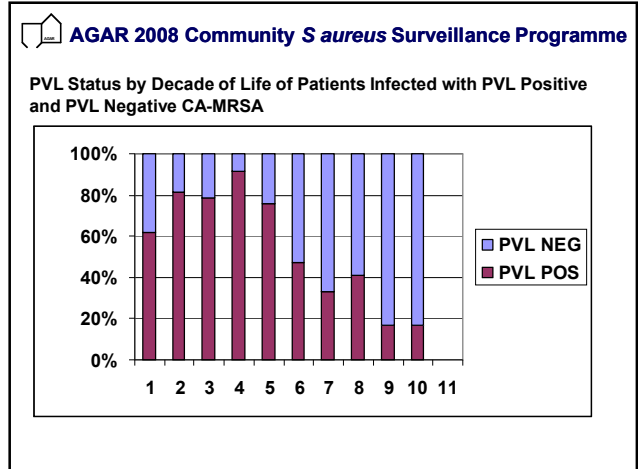
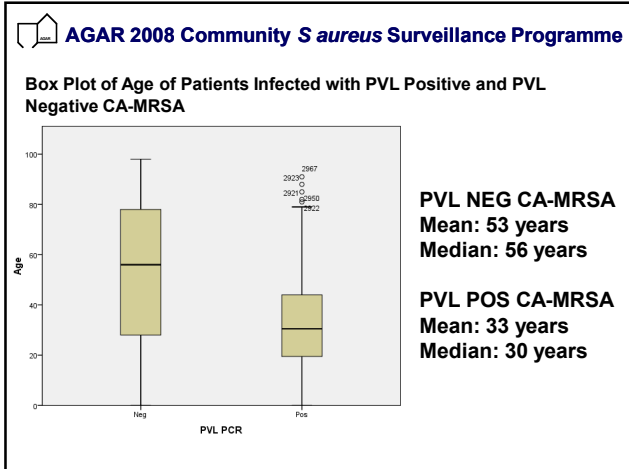
CA-MRSA
 Mean: 40 years
 Median: 35 years

HA-MRSA
 Mean: 69 years
 Median: 74 years

AGAR 2008 Community *S aureus* Surveillance Programme

CA-MRSA and HA-MRSA Acquisition by Decade of Life



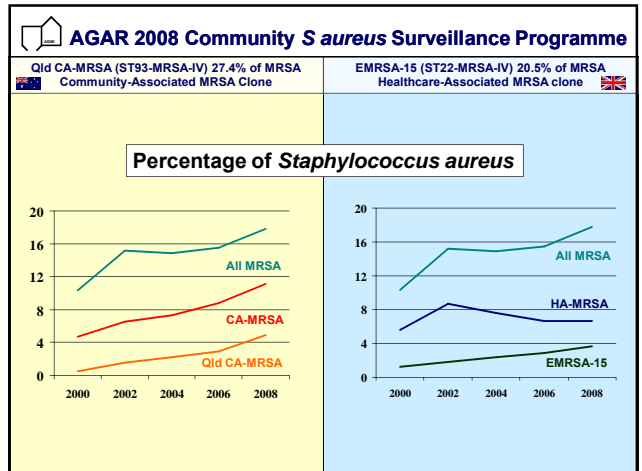
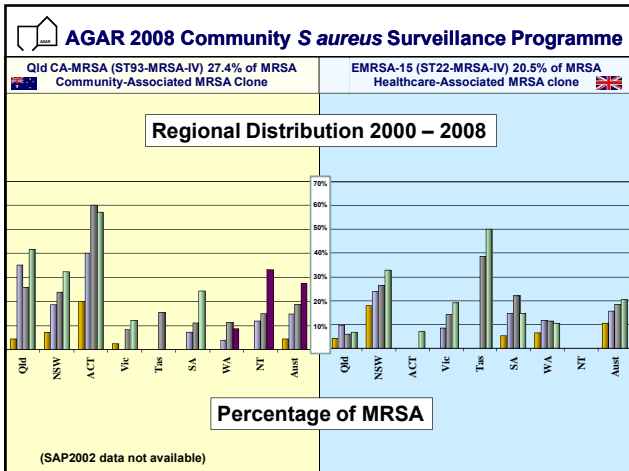
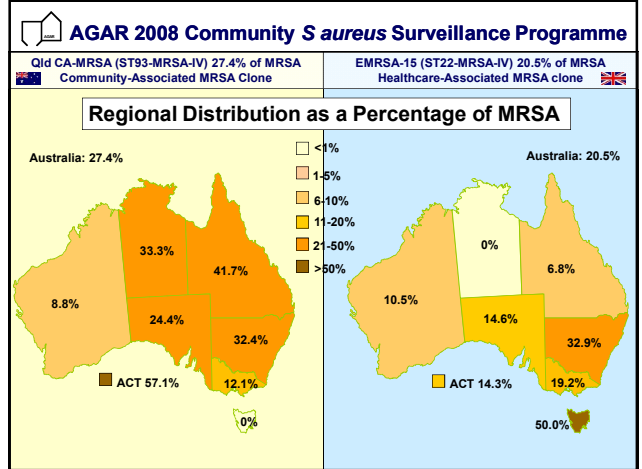
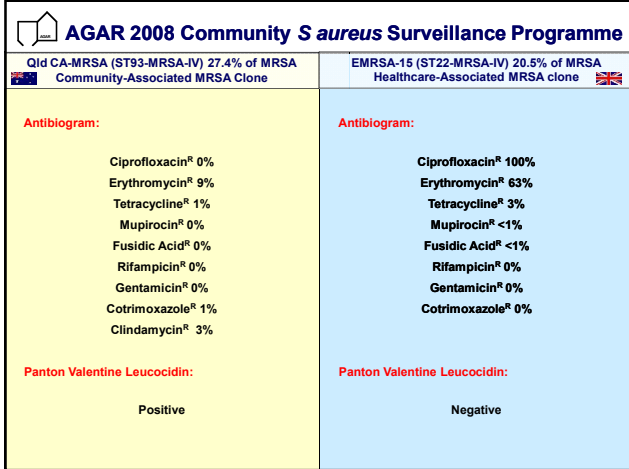


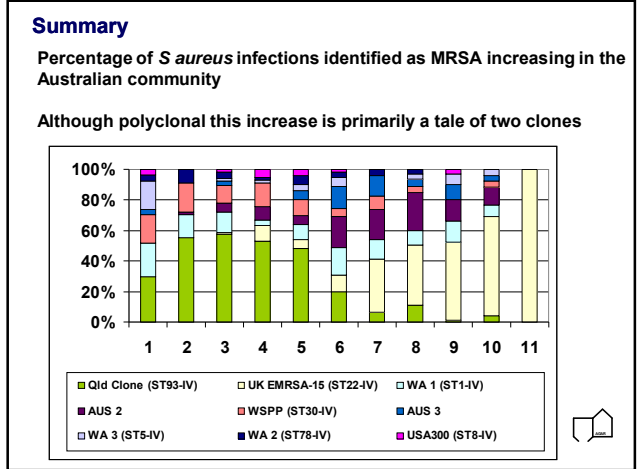
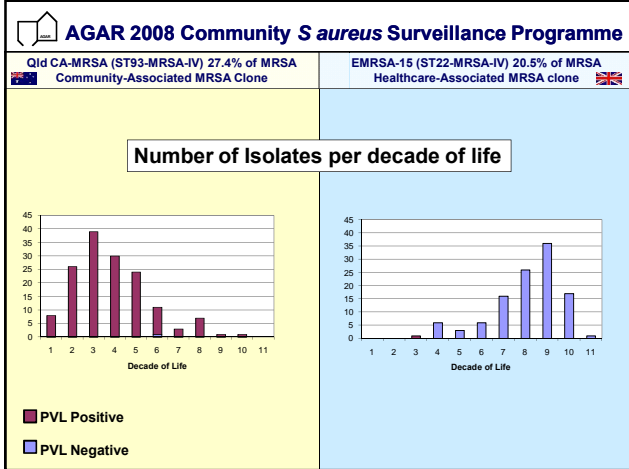
AGAR 2008 Community *S aureus* Surveillance Programme

Community-Associated MRSA Clones [340 isolates consisting of 22 clones, 62% of MRSA]	Healthcare-Associated MRSA clones [207 isolates consisting of 4 clones, 38% of MRSA]
<ul style="list-style-type: none"> ST93-MRSA-IV (Old MRSA) [150] ST1-MRSA-IV (WA MRSA-1) [63] ST1-MRSA-V [1] ST5-MRSA-IV (WA MRSA-3) [20] ST73-MRSA-IV (WA MRSA-65) [5] ST5-MRSA-IV [1] ST5-MRSA-V [2] ST8-MRSA-IV (WA MRSA-6) ST8-MRSA-IV (USA300) [10] ST834-MRSA-IV (WA MRSA-13) [1] ST39-MRSA-IV (NSPPT) 47] ST45-MRSA-V (WA MRSA-4) [2] ST45-MRSA-V (WA MRSA-84) [7] ST45-MRSA-IV (WA MRSA-23) [2] ST99-MRSA-IV (WA MRSA-16) [2] ST59-MRSA-V (Taiwan CA-MRSA) [1] ST72-MRSA-IV (WA MRSA-44) [2] ST1304-MRSA-IV (WA MRSA-72) [1] ST78-MRSA-V (WA MRSA-2) [18] ST80-MRSA-IV (European CA-MRSA) [2] ST88-MRSA-V [1] ST207-MRSA-V [1] 	<ul style="list-style-type: none"> ST22-MRSA-IV (EMRSA-15) [112] ST239-MRSA-II (Aus2 and Aus3 EMRSA) [93] ST5-MRSA-II (New York Japan MRSA or USA100) [1] ST36-MRSA-II (EMRSA-16 or USA200) [1]

AGAR 2008 Community *S aureus* Surveillance Programme

Old CA-MRSA (ST93-MRSA-IV) 27.4% of MRSA Community-Associated MRSA Clone	EMRSA-15 (ST22-MRSA-IV) 20.5% of MRSA Healthcare-Associated MRSA clone
<p>First identified in Caucasian patients in Ipswich Queensland (<i>Munckhof et al 2003</i>)</p> <ul style="list-style-type: none"> - boils, bacteraemia, pneumonia <p>Epidemic potential</p> <p>Substantial outbreaks (causing boils) in aboriginals living in rural NSW (<i>Gosbell et al 2004</i>)</p> <p>Multiple reports of severe infections including necrotising pneumonia (including fatal cases), deep abscesses, osteomyelitis, septic arthritis and bacteraemia</p>	<p>First identified in the Midlands and South-East England in the early 1990s</p> <p>Major HA-MRSA clone in United Kingdom, Ireland, several European countries, New Zealand, Singapore and Australia</p> <p>First reported in Australia in 1997 (<i>Pearman et al 1998</i>)</p> <p>In Western Australia frequently isolated from patients in long term care facilities and pre-employment screening of healthcare workers from Ireland and the United Kingdom</p>





Acknowledgments

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