

Emergence of a novel strain of healthcare associated MRSA

Joanna Harris, Manager,

Beth Bint, Clinical Nurse Consultant,

ISLHD Infection Management and Control Service

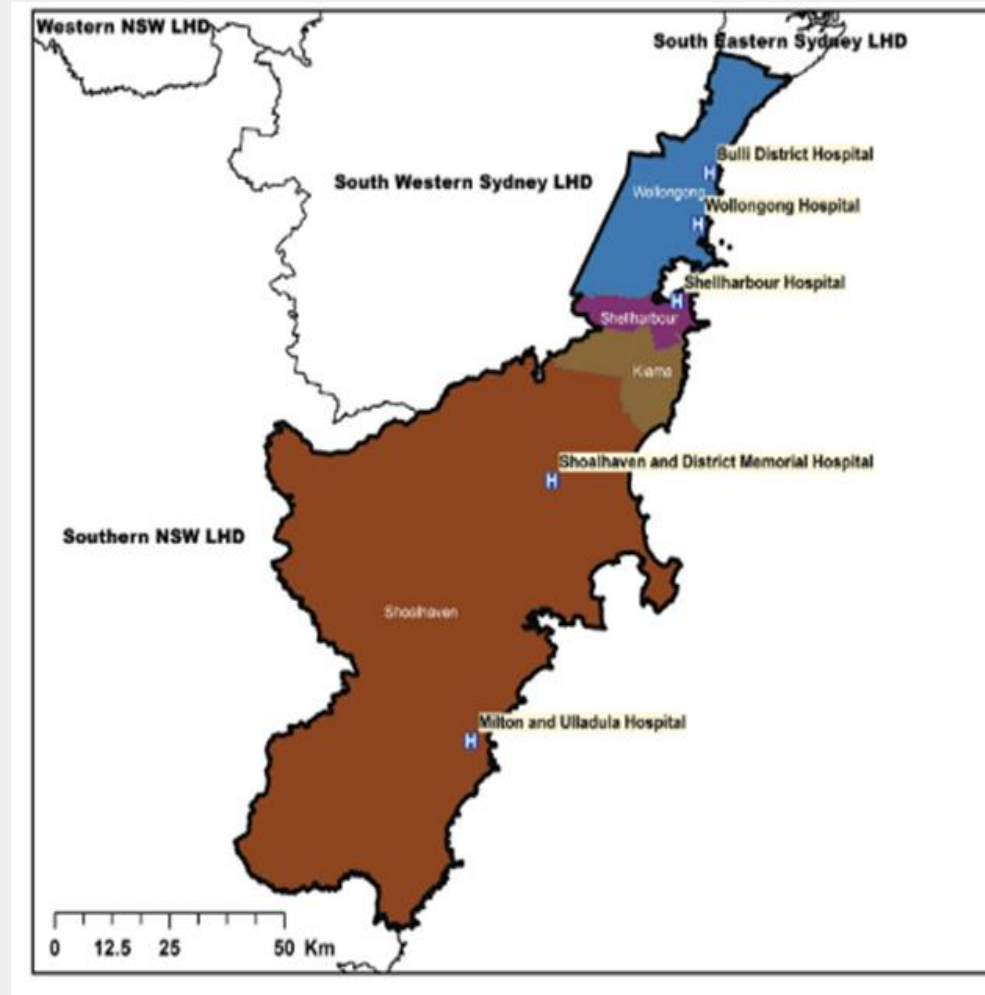


Health

Illawarra Shoalhaven
Local Health District

Illawarra Shoalhaven LHD

- Between the mountains and the sea
- Population of 368,822 is projected to reach over 425,000 by 2021
- 9 inpatient hospitals and numerous community-based services



IMACS' routine surveillance for multi-resistant organisms (MROs)

- Daily download from SEALS for all MROs
- IMACS CNC assesses MRSA antibiotic resistance pattern of each isolate to inform classification as H-MRSA, C-MRSA or UK-MRSA
- Attribution of likely acquisition (healthcare associated – hospital/unit, or community associated)
- Entry into local MRO database to allow analysis



Health

Illawarra Shoalhaven
Local Health District

MRSA classification by phenotype

Antimicrobial	C-MRSA	UK-MRSA	H-MRSA	novel
			R to 2 or more Gent, Erythromycin, Tetracycline	R to 2 or more Gent, Erythromycin, Tetracycline
Methicillin	R	R	R	R
Gentamicin	S	S	R	R
Co-trimoxazole	S	S	R	S
Ciprofloxacin	S	R		

Single occurrences August and September 2013 - ?anomaly

First cluster noticed affecting 6 patients from 4 different hospitals providing rehabilitation and aged care services in November 2013

Non-invasive infections / colonisation



Health

Illawarra Shoalhaven
Local Health District

Local control measures

- Continued passive surveillance
- March 2014 - Binary typing of all new MRSA isolates
 - Isolates described as binary type 1296
 - Reference lab confirm not previously seen in NSW
- Improved infection control precautions
 - Hand hygiene
 - Equipment cleaning
 - Environmental cleaning



Health
Illawarra Shoalhaven
Local Health District

May 2014

- First bloodstream infection caused by novel MRSA
- Monitoring indicated that bt1296 was adding to rather than replacing the usual H-MRSA, and numbers were increasing
- Informal networking revealed no other LHDs noticing this phenotype
- Outbreak management committee formed

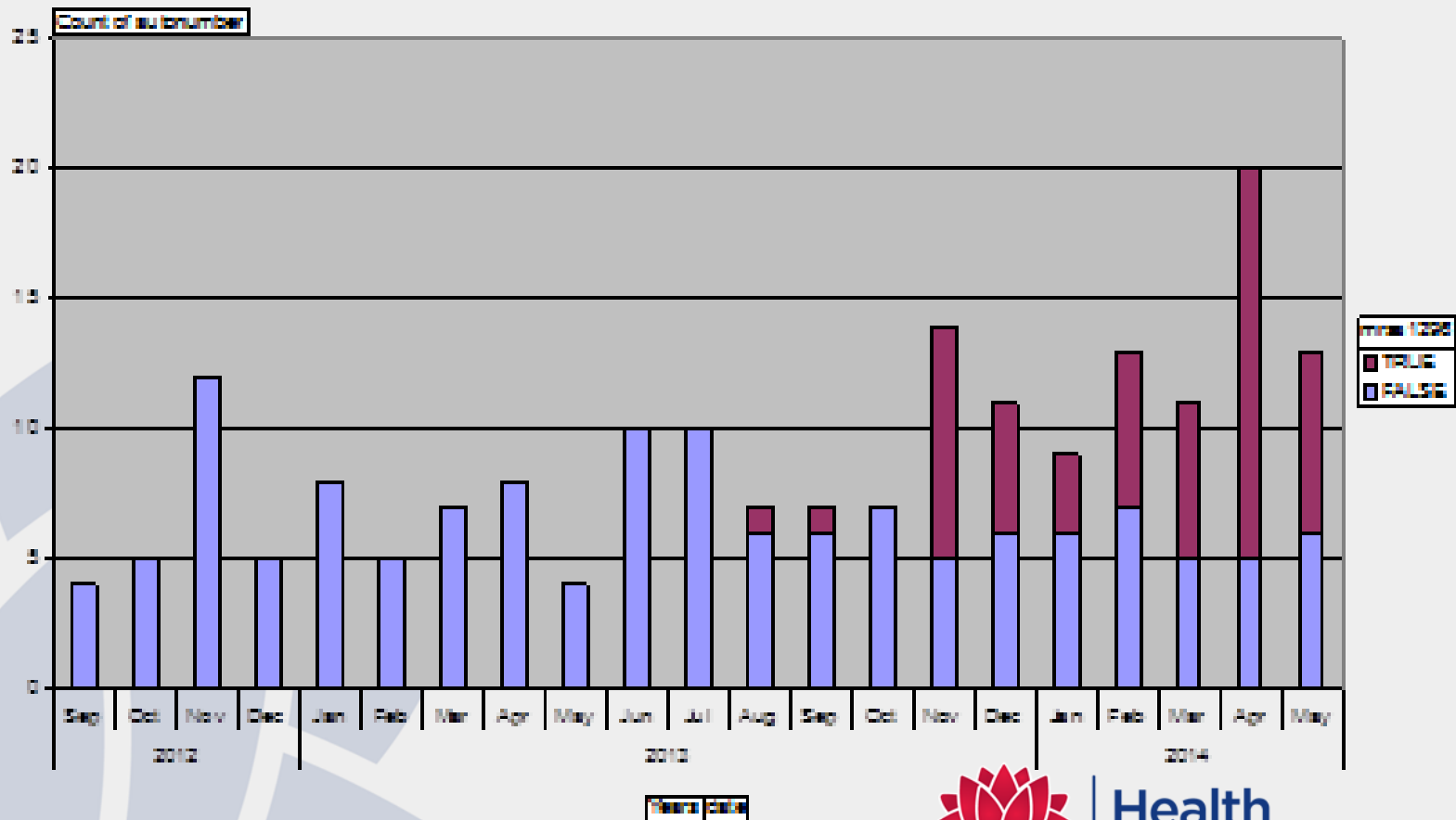


Health

Illawarra Shoalhaven
Local Health District

Graph May 2014

outbreak [All] not [ICA] species [MRSAHA]



Health
Illawarra Shoalhaven
Local Health District

Outbreak management

- Case definition
 - S. aureus, resistant to 2 or more of Gentamicin, Erythromycin, Tetracycline plus sensitive to Co-trimoxazole
- Risk Register
 - Patient outcomes
 - Increased burden of MRSA within NSW Health system
- Escalation to NSW Health and CEC
 - Expert Advisory Group established
 - Support to epidemiological study



Health
Illawarra Shoalhaven
Local Health District

NSW Health

- Notification to all LHDs and private hospitals with request for similar isolates to be binary typed
- Admission screening of patients transferred from ISLHD advised
- Close monitoring of situation through regular teleconferences between LHD, CEC and NSW Health



Health

Illawarra Shoalhaven
Local Health District

Local actions

- Presentation to executive management teams and lead clinicians for affected services
- Grand Round presentations
- Active surveillance - MRSA admission and discharge screening
- Investigation of hypothesis that patient transit vehicles implicated in transmission
- Reinforcement of ISLHD 'Bare Below Elbows' policy
- Continue to ensure ABHR "6 inches from the patient's right foot"
- Successful project to improve hand hygiene - led by junior doctors
- Improved access to detergent wipes
- Approval for detailed genotyping of first isolates

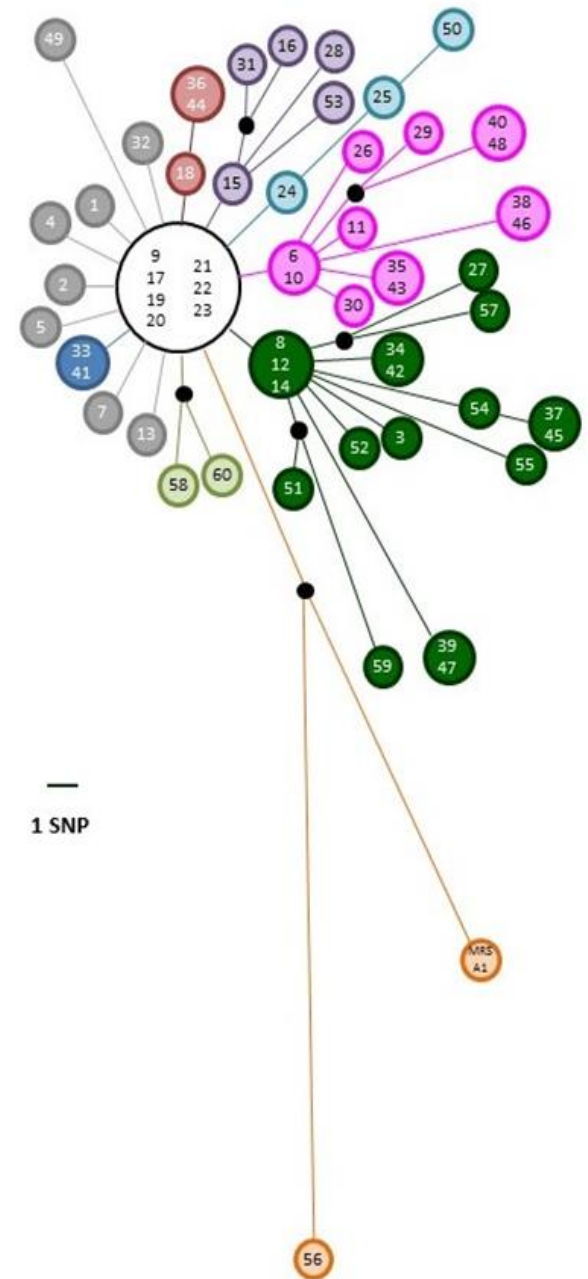


Health

Illawarra Shoalhaven
Local Health District

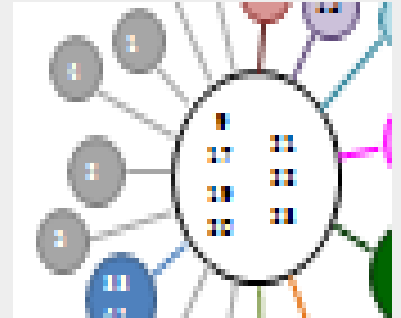
Whole genome sequencing

- 60 isolates
- Eight different clades
- Isolates in each clade have no more than 12 single nucleotide polymorphism (SNP) differences between them
- Isolates within a single circle of a clade had indistinguishable SNP profiles



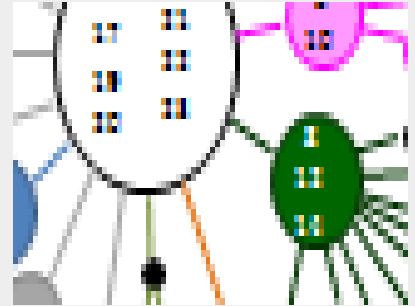
White clade

- December 2013 – April 2014
- Seven patients
- Two different hospitals, three different wards, five different teams, three different specialties
- Two patients shared the same medical officer (isolates 20 and 22)
- No obvious links between other patients



Green clade

- 3 patients
- Same hospital, three different wards
- All geriatrics, three different consultants



Health

Illawarra Shoalhaven
Local Health District

Case control comparison (67 cases;112 controls)

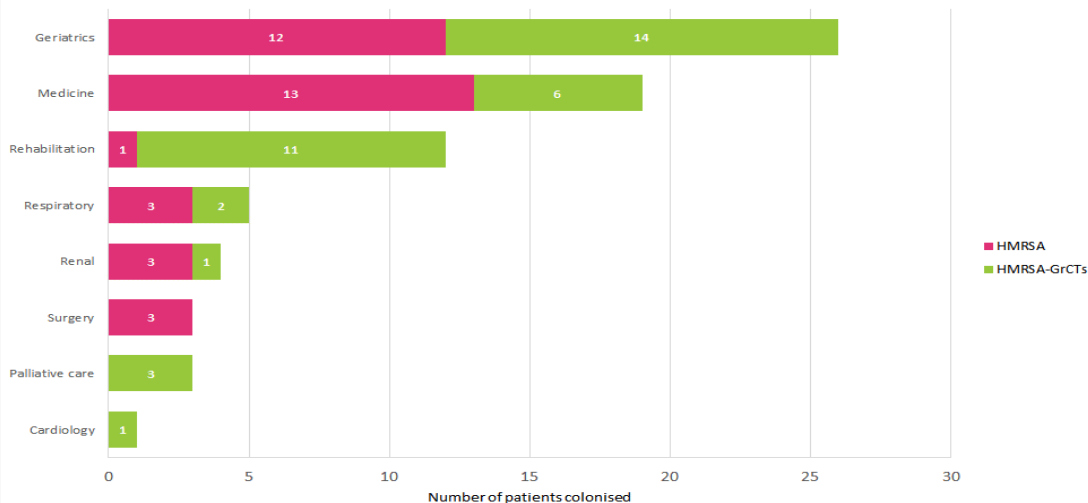
- Controls = patients consecutively listed on the LHD MRO database with isolates of non-novel H-MRSA strains over the same time period.
- Rate of colonisation and infection comparable
- MRSA bt1296 more likely to affect people admitted to more than one hospital in previous 90 days
- People admitted to a geriatric ward were 1.86 (1-3.43) times more likely to have bt1296 ($p=0.05$)
- 7 of the 11 deaths in people with MRSA bt1296 were in colonised people, and due to co-morbidities rather than bt1296.



Health

Illawarra Shoalhaven
Local Health District

Proportion HMRSA-GrCTs (bt1296) vs HMRSA by Unit
HAI-IP Clinical Specimens
July 2013 to May 2014

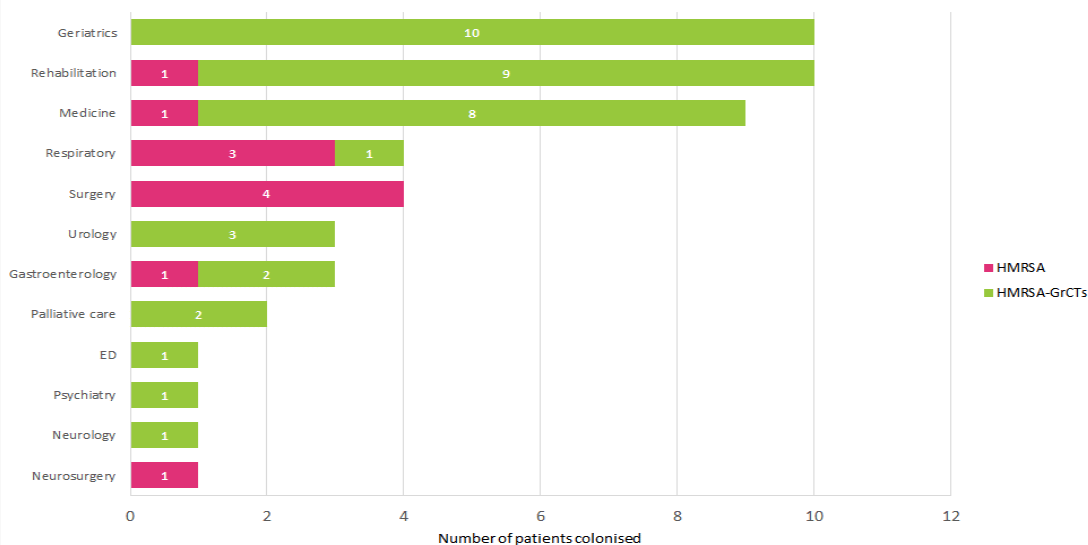


Healthcare associated inpatient acquisitions

Proportion of bt1296 by Specialty

July 2013 to May 2104

Proportion HMRSA-GrCTs (bt1296) vs HMRSA by Unit
HAI-IP Clinical Specimens
May 2014 to December 2014

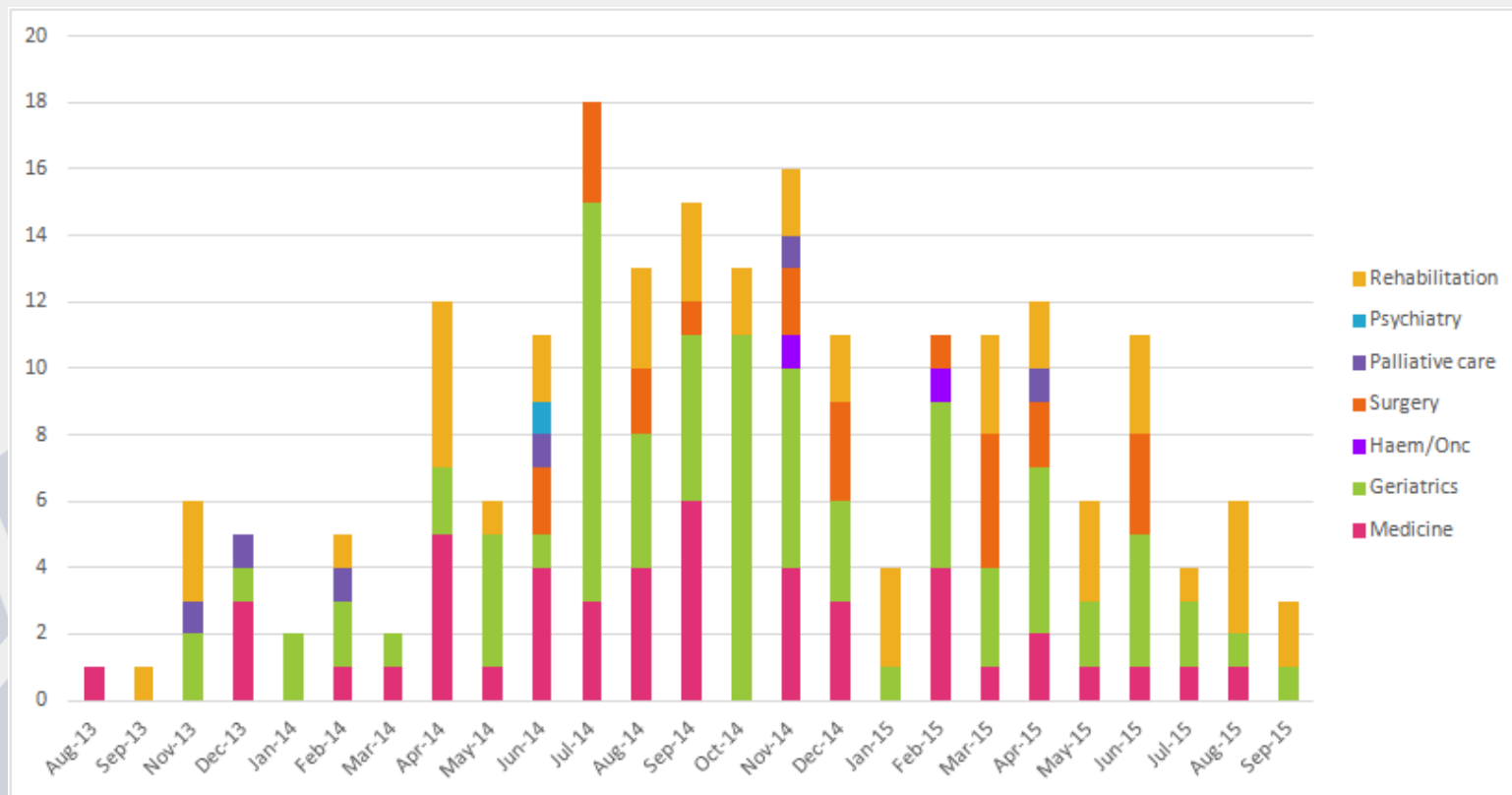


June 2014 to
December 2014

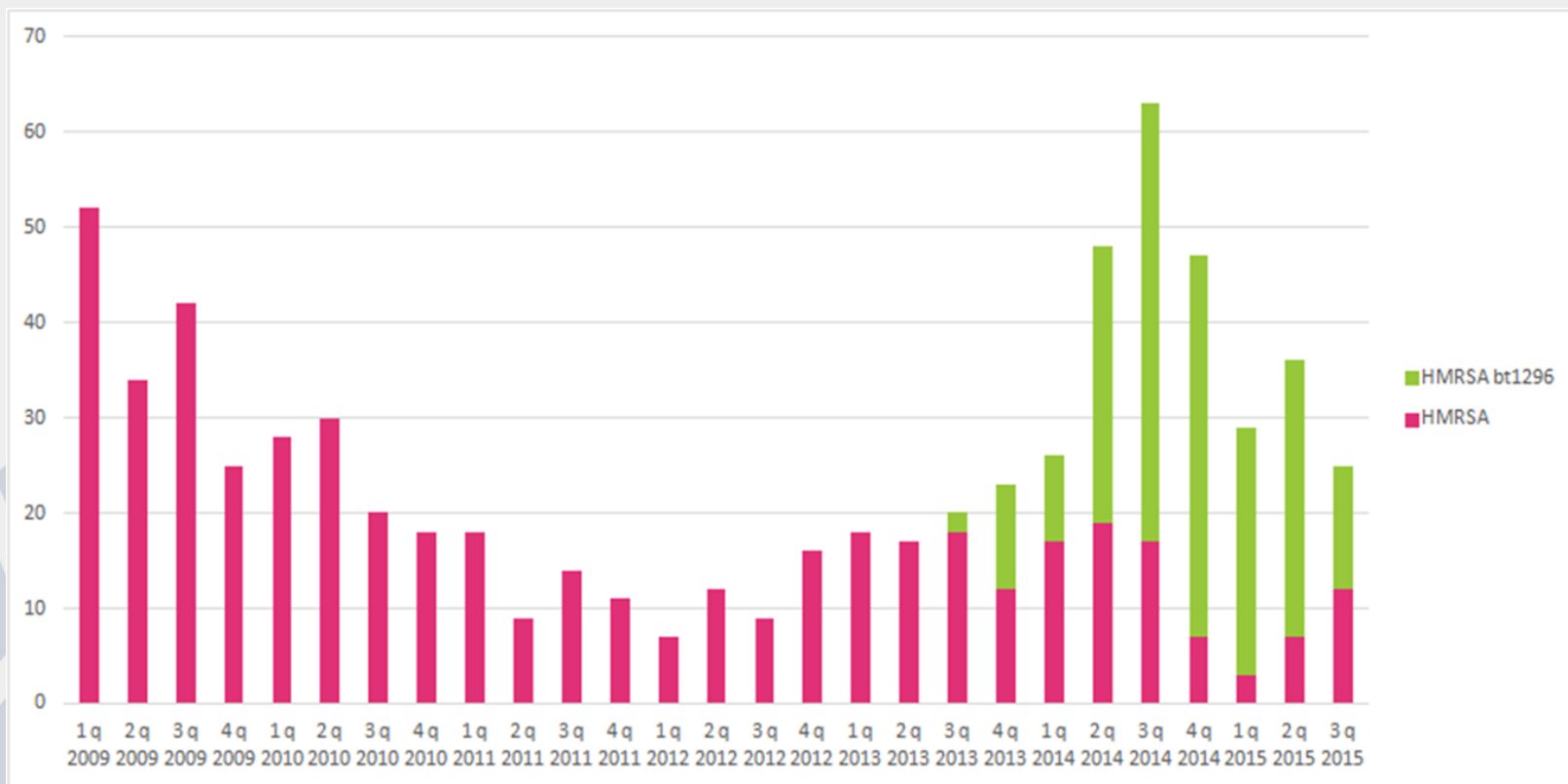


Health
Illawarra Shoalhaven
Local Health District

HCA-IP HMRSA bt1296 by Speciality



HCA-IP All Specimens January 2013 to September 2015



Health
Illawarra Shoalhaven
Local Health District

Conclusions

- Antibigram review identified the emergence of a novel strain of MRSA
- Antibigram correlated well with binary typing results
- Whole genome sequencing may be beneficial if results are available soon after the onset of the outbreak
- Outbreak control is extremely challenging when more than one clinical area is implicated
- Make it easy for staff to 'do the right thing'
- Effective communication can inspire others to act



Health

Illawarra Shoalhaven
Local Health District

Acknowledgements

- ISLHD Infection Management and Control CNCs
- Dr Craig Boutlis
- Dr Peter Newton and other SEALS staff
- Dr Paul Curtis (NSW CEC) and Dr Jeremy McAnulty (NSW Health CDB)
- Prof. Lyn Gilbert's team at ICPMR for their support in binary typing and whole genome sequencing



Health

Illawarra Shoalhaven
Local Health District