MRSA in a neonatal intensive care unit

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Outline

• Background
• Outbreak description
• Infection prevention and control
• Laboratory diagnosis
• Lessons learned
Background

- 1.5 million population
- 5500 deliveries annually
- 39 bed NICU:
  - 19 level III ventilator cots
  - 20 special care cots
- Nurse/bed ratio 1:1 to 1:4
- Busiest in NSW:
  - 1635 admissions/yr
Case 1

- 26 week old
- 730g birth weight, LSCS
- HMD, PDA, IUGR, XXX anomaly, Grade 1 IVH
- Lines- UVC, CVC, ICC, TPN
- Septic shock
- Rx penicillin, gentamicin --> vancomycin, cefotaxime, meropenem
Case 1

- Rapidly progressing necrotising pneumonia
- Day 9: MRSA isolated from ETT
- Day 14: RIP
Case 2

26 week old
830g birth weight
PROM, vaginal breech
HMD, PDA, Grade 1 IVH
Lines: UVC, UAC, CVC, ICC
Pneumothorax and sepsis
Rx penicillin, gentamicin --> meropenem,
Case 2

- Pneumothorax
- Day 17: MRSA isolated from Blood cultures
- Day 18: RIP
Response

Recognition of outbreak:
cases occurred within days
co-shared a room

Rapid molecular typing using
novel method within 2 days
of deaths
Cohorting
Enhanced PPE
HH education
HCW and contact
Screening
Environmental cleaning
Cohorting
Enhanced PPE
HH education
HCW screening
Cleaning

Repeat HCW screening
HH auditing
Environmental screening
Patient zones

outbreak strain
Non outbreak
Delivery suite

- 12/15 babies with outbreak strain C section
- 3 had MRSA+ screens within 24 hours of birth
- 3 mothers (Cases 6 and 7) had non-outbreak strains
Screening population

Staff: swabs from anterior nares

Neonates: anterior nares, umbilicus, perineum

Mothers: nose, throat, perineum and low vaginal swabs

Environmental: selected surfaces (door handles, trolleys, machines, devices)
Screening methods

- Swabs pooled into MAMSA broth 18-24 hrs
- Culture based Chromogenic MRSA selective media
- Molecular MRSA detection
Staff screening

138 NICU HCW screened: 2 MRSA+

146 NICU HCW screened: 2 MRSA+

20 doctors

107 nurses

19 patient support assistants

83 delivery suite staff screened: 2 MRSA+

26 obstetricians

33 midwives

23 anesthetic staff
Typing

- Novel binary typing system (O’Sullivan et al)
- 19 gene targets, high discriminatory power
- 19 primer pair multiplex PCR
- Reverse line blot hybridization assay
- Performed weekly, TAT 12 hours
- $US 2 per isolate, high throughput (80/run)
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Role of typing

- Rapid recognition of outbreak
- Demonstration of sustained nosocomial transmission
- Exclusion of non-outbreak cases
- Allowed targeted infection control interventions: eg cleaning of ABG
- Rare strain of virulent MRSA PVL
Lessons learned

- cMRSA emerging pathogen in NICU: can cause outbreaks with high mortality
- No source found, presumed HCW or fomite transmission
- Good working relationships between unit, infection control and laboratory
- Rapid typing allowed recognition of rare strain (not the usual nosocomial clones)
Acknowledgements

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