Management of Infection Outbreaks in NICU

Experience in level 3 NICU over 10 years

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The 6th Annual Perinatal Conference
A collaboration of the Midlands and East Neonatal and Perinatal Networks
Friday 25th January 2013
Experience in level 3 NICU over 10 years

- Or
- This is what has happened to us.....
- How this will happen to you
- How I wished we done things differently
- How we can avoid “reinventing the wheel “ and make it easier for those who have to face the issue in the future
- .....
Aims

- Brief overview of history of L+D infection Outbreaks on NNU
- How we managed Infection Outbreaks
- Lessons from management of our outbreaks
- National Picture
- Clinical Governance /Network communication issues
Network image
Putting Infection in local context

- L+D NNU
- 37 cots
- 19 ITU/High dependency
- Regional NICU for Bedfordshire and Hertfordshire neonatal network
- Higher than average number of very tiny prems
- New build planned
Neonatal Infection
TB 2004

- 2004; TB exposure NNU mother and her premature baby died; 80 exposed babies needing screening and treating none infected
- Staff exposure needed reviewing
- All exposed babies and staff remained well
- Lots of extra clinics and clinicians time weekends and evenings
- Phone line set up for parents
First Neonatal Outbreak meeting
Learning experience for us all
Heavy input from public health HPA
Communication needed to be improved when HIV positive women unwell “Neonates do NOT cough”
Coughing women with HIV have TB until proved otherwise
TB recommendations

- ANNP and senior nursing roles vital
- Involvement of local TB services
- Early lessons in communication with parents; letters and directly
- Media interest
ESBL 2008

- 2008 ESBL E coli
- 13 infants infected 2 died 5 unwell and 6 carriers
- ESBL carriage was very long term and persisted after discharge. Babies with bowel carriage remained well.
ESBL Outcome

- **Media** Interest +
- **Litigation** several parents
- No evidence of contamination of any NICU surfaces including outside of incubators
- No direct evidence of staff to patient spread but in the absence of other evidence this was the presumed method of infection
- Good use of *communication* letters to parents and direct 1 to 1 meetings with CD and chief nurse for all affected babies
Parents sue over E.coli outbreak

Families are suing a hospital where two babies died following an E.coli outbreak after it emerged that staff may have spread the infection by not washing their hands.
Two babies die, three other E. coli cases in Swansea

Prof Hugh Pennington said something had clearly gone wrong at the hospital's neonatal unit following the deaths of two babies.

Two babies have died after an E. coli infection, health officials in
ESBL; Recommendations

- Stop all visitors including grandparents and siblings
- Gloves and gowns when handling all babies (this is not the regional neonatal network policy)
ESBL Recommendations 2

- Regular screening of inpatients stool sample since weekly (resulted in apparent increase incidence initially now stabilised)
- Second line antibiotics changed to include Merepenum for a period of time until outbreak confirmed closed approx 6 months
ESBL Recommendations 3

- Improved surveillance for bacterial infection to pick up outbreaks early
- Daily email to all nicu consultants and senior nurse very effective
- Staffing improvements with increased nursing time for infection control and increased senior nursing time /matron post
- Change all taps to sensor taps
- New sinks
- Earlier involvement of Trust executive team recommended
- Media Training needed
National surveillance study of extended spectrum β lactamase (ESBL) producing organism infection in neonatal units of England and Wales

S Mitra1,
P Sivakumar2,
J Oughton2,
I Ossuetta2


Questionnaire 133 units in UK responded (67%)
35 units (26%) had had ESBL isolated in the last 2 years
16 surface only
19 invasive infections
Only 10 declared an outbreak
11% units screen regularly for ESBL but
26% don’t isolate Baby if ESBL found
Lack of knowledge of outbreaks in other hospitals
Pseudomonas 2009

- Regular stool sampling with daily alerts to NNU team detected small increase in the number of patients on NNU with pseudomonas in stool
- Further investigation found pseudomonas in water in newly fitted sensor taps
- Reported via Datix risk event system
Pseudomonas recommendations

L+D

- Enhanced infection control measures continued
- **Use of alcohol gel** after washing hands with hand wash
- Stop using tap water to wash babies and with nappy change
- Nappy change water not to be disposed in sinks
- Taps changed back to **elbow operated**
- Bacterial filters placed on the outflow of each tap
- Infection control transfer letter for discharges out to other hospitals
NPSA subsequently issued Alert Sept 2010 on sensor taps
and Aug 2011 on flexible water supply hoses
PVL Staphylococcus 2011

- 27 week twins Emergency Caesarean section for foetal bradycardia
- Initial minimal respiratory distress
- Week 2 unwell respiratory and septic deterioration
- Cystic lung changes
- One baby had skin abcess
PVL Staphylococcus areus detected

- Possibility of PVL Staphylococcus raised
- Samples from both babies sent to reference laboratory
- Antibiotic management changed
  Clindamycin and Linesolid
- Babies received intravenous Immunoglobulin 2 doses in 48 hours
- Cultures confirmed PVL strain Staphylococcus Areus in Both babies
Unit full closed to outside admissions

Parents informed; Mother discharging caesarean wound for 10 days not responded to flucloxacillin. GP has just changed her to another antibiotic

Wound swab grew PVL

Both babies had previously had kangaroo care
PVL investigation

- Twins parents nose and groin swab
- All NNU staff and labour ward staff who had had contact with mum swabbed
- All babies who were on the unit since time of twins positive results swabbed
Initial Results

- Mother of twins positive PVL
- 2 other babies born on the same day also PVL positive on nose and groin swab. Bed space close to the index twins. Both babies remained well
- NICU; 104 staff screened 26 staph carriers 3 PVL (all carriers were different type than twins)
- Maternity Staff; 55 staff screened 5 staph positive no PVL
Staff Carriers of PVL

- Treated at home as per MRSA
- Stay off clinical duties until repeat swab negative
- Long time off sick leave as proved very resistant to treatment
Baby carriers

- Decontamination as per MRSA
PVL recommendations

- Restricted visiting; parents only
- Limited admissions to luton booked
- Enhanced hand hygiene
- Isolated and barrier nursed infected
- PVL added temporarily to nnu screening on admission and for existing babies
- New parental health questionnaire introduced
- Letters to all parents of babies on the unit
- Press report released
Other infection incidents

- Staff /Family member with chicken pox
- Norovirus
- Seasonal and pandromic influenza
- MRSA
- RSV
Infection in NNU; putting outbreaks into context

Significant positive blood cultures Dec 2008-Dec 2009 inclusive

- 67% Staph Epi
- 2% ESBL E Coli
- 2% E COLI
- 2% Group B Streptococcus
- 2% Streptococcus sanguis
- 4% Acinetobacter lowoffii
- 2% Enterobacter cloacae
- 2% strep faecalis
- 2% Pseudomonas. aeruginosa
- 2% Acinetobacter lowoffii
- 2% Streptococcus agalactiae
- 2% Candida tropicalis
- 2% hemophilus Influenza
- 2% Enterobacter aerogenes
- 2% staphylococcus areus

- 2% Staph Epi
Largely not clear
Limited awareness between units of issues even very locally
All neonatal units have infection outbreaks but not all are formally reported
When it does get into the paper the reporting can be unpleasant and adversarial
PVL Neonatal outbreak

Neonatal unit outbreak

- Norfolk & Norwich University Hospital NHS Trust – December 2006

- Preterm (27/40) baby died
  - Five neonates affected
  - 80 contacts screened

- MSSA PVL
  - Pen Gent Trim resistant strain
Northern Ireland
2011

Independent review of the incidents of Pseudomonas Infection in Neonatal Units in Northern Ireland; The regulation and quality improvement authority report March 2012

- Northern Ireland; 5 NICU providing ITU care and 2 only providing scbu care
- Nov 2011 3 babies in 1 unit unwell pseudomonas infection in blood; 2 died
- Unit screening confirmed 2 further babies colonised
- Taps confirmed colonised pseudomonas
Dec 2011 one of original babies known to have skin colonisation transferred to another NI unit
One other baby found to have different strain. No evidence spread
Jan 2012 baby died from pseudomons sepsis
4 babies colonised
Enviromental screening shows 3 taps positive pseudomomonas
NI 3 and 4

- Jan 2012 3rd unit 3 colonised babies
- Jan 2012 4th unit 2 colonised
Recommendations NI

- Sterile water to wash all babies in neonatal care
- No tap water to defrost human milk
- Advice re water testing protocols
- Sink cleaning guidance
- No water for cleaning incubators; wipes
- Hand hygiene audits
- Pseudomonas should be an alert organism in NICU. 1 case should prompt water check in areas baby has been nursed
- Surveillance arrangements need improving
DOH guidance

Water sources and potential Pseudomonas Aeruginosa contamination of taps and water systems March 2012

- Water safety plans;
  - includes advice on water sampling how, when and how to interpret results
- What to do in the event of a pseudomonas in water contamination problem in units with at risk patients:
  - Filter water or use from a safe source
  - Use of alcohol hand rub
  - Sterile water for baby top and tail
  - Cleaning equipment use single use if possible and use detergent wipes rather than water for incubator cleaning
Outbreak management

1. Confirm an outbreak
2. Arrange and infection control / outbreak meeting
3. Decide who needs to be there
4. Decide on immediate clinical management for affected babies
5. Are there any implications for staff?
Outbreak Management Team; NICU Infection

- Clinical Director/Consultant
- Chief nurse
- Microbiology consultant
- Infection control nurse
- Trust executive Board member
- Trust Media team
- Trust Risk Management team
- (Public Health England)
- Minute taker
Immediate management

- Isolation / cohort nursing
- Changes to visiting policy
- Any enhanced infection control measures needed; protective masks / gloves / gowns
- Immediate antibiotic treatment needed for infected babies
- ? Screen the rest of babies ? Screen staff
Epidemiology

- Define patient group
- Define organism is further subgrouping needed?
- Confirm outbreak
- Is this a Serious Incident? (SI previously SUI)
Route Cause analysis

- Time frames
- Patient movement and adjacencies
- Staff movement and staffing levels
- Shared equipment
- Environmental issues
Local investigation

- Takes time
- May need staff to work extra hours; how is this paid for?
- Effect on morale of staff on unit
- Parental support
Communication strategy

- Immediate to parents of affected babies; face to face clinical team on duty
- Parents of other children on unit letters
- Keep a record of which parents have been told
- Inform Staff members in NNU and wider hospital
- Keep electronic file of letters from previous incidents saves time
- Local GPs
- Public; reactive v proactive press statement
Communication 2

- Phone advice line for large outbreaks
- Use your hospital media service
- Consider formal **media training**. The press can be difficult to manage, papers, radio, TV. It helps to be prewarned.
- Neonatal network
- Transport team
- Any hospital baby may be transferred to subsequently
- BAPM ??
SI procedure

- Trust to inform SHA in writing at 7 and 45 days
- Final report needed
- Time frame very tight as will need checking by trust board before sending
- SI report should be shared with the Neonatal Network /BAPM
Litigation

- Sadly increasing
- Accurate legible contemporaneous notes needed
- Good communication can help prevent
Ongoing surveillance

- Regular screening samples eg Esbl/pseudomonas stool once a week
- Admission swabs for MRSA
- Reactive response
- Keep on your toes
- Remember you are not alone and all NNU have infections
Key Learning points for me

- Involve trust executive team early
- Use your hospital media department
- Get Public Health input early
- Early good communication with parents
- Keep copies of old infection related letters you will need them again and will kick yourself if you have to rewrite
- Support your staff, an infection in your prized neonatal unit is very upsetting to us all
Network Clinical Governance

- How can neonatal units better communicate at the time of infections?
- How we can prevent “reinventing the wheel”?
- How can we learn from our incidents and those in other neonatal units?
- Standardised feeding regime /breast milk
- Pseudomonas action plan
1. Infection prevention
   - Standardised antibiotic regime
   - Standardised infection control measures /glove and apron policy
   - Standardised feeding regime
   - Work on increasing breast feeding
Response to NI pseudomonas

- 2. Standardised audit tool /RAG rating the NI
<table>
<thead>
<tr>
<th><strong>Number</strong></th>
<th><strong>Recommendation</strong></th>
<th><strong>Local plan</strong></th>
<th><strong>Action needed</strong></th>
<th><strong>Time frame</strong></th>
<th><strong>RAG Rating</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sterile water should be used when washing all babies in neonatal care</td>
<td>All babies in HDU and ITU will be washed in sterile water and this will be used for all nappy changes. no dirty water to be disposed of in sinks. Babies in Scbu who are being bathed will be bathed in water from a source known never to have been colonised with pseudomonas ( delivery suite). Bath water will be disposed of in the sluice</td>
<td>none</td>
<td>current</td>
<td>green</td>
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<td>2</td>
<td>Tap water should not be used during the process of defrosting frozen breast milk</td>
<td>Defrost milk in milk fridge. If milk is needed more quickly use sterile water boiled in a dedicated kettle in the milk kitchen</td>
<td>Buy kettle Consider purchase of milk warmer</td>
<td>Aug 2012</td>
<td>amber</td>
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<td>3</td>
<td>Follow water testing guidance as per DOH march 2012 guidance</td>
<td>Estates water action group</td>
<td></td>
<td>Aug 2012</td>
<td>amber</td>
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<td>4</td>
<td>Presentation of water test results should be standardised across the laboratories that undertake this</td>
<td>follow testing protocol</td>
<td>estates to coordinate</td>
<td>End 2012</td>
<td>amber</td>
</tr>
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<td>5</td>
<td>Guidance on cleaning sinks should be reviewed and the process standardised across all clinical areas</td>
<td>standard cleaning regime for sinks in high risk clinical areas such as NNU</td>
<td>develop standardised cleaning procedure</td>
<td>End 2012</td>
<td>green</td>
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<td>6</td>
<td>Regional guidance on the cleaning of incubators and other specialist equipment for neonatal care should be introduced</td>
<td>use of cleaning wipes in the place of soap and water to clean incubators</td>
<td>to trial wipes as advised by infection control develop a process map for cleaning incubators</td>
<td>End 2012</td>
<td>green</td>
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<td>End 2012</td>
<td>green</td>
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<td>7</td>
<td>Independent hand hygiene audits should be carried out in a regular basis</td>
<td>continue</td>
<td></td>
<td>End 2012</td>
<td>green</td>
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<td>8</td>
<td>expansion of the neonatal unit to allow more circulation space around cots</td>
<td>New build</td>
<td></td>
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<td>red</td>
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<td>9  Pseudomonas should be identified as an alert organism for neonatal intensive and high dependency care. When identified from a sample from a baby, taps and sinks should be tested in rooms which have been occupied by that baby since birth.</td>
<td>Daily alert system in place for all positive swab and culture results. All NNU taps tested with monthly water samples and all babies are screened with stool samples weekly therefore we only need to test taps in the areas that the baby has been in since the last negative stool sample.</td>
<td></td>
<td>End 2012</td>
<td>green</td>
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<td>10 Surveillance arrangements should be established for Pseudomonas aeruginosa for augmented care settings including neonatal care.</td>
<td>Existing daily alert to all NNU consultants and senior nurses of positive swabs and cultures on NNU. Weekly stool sample screening for Pseudomonas on all babies on NNU.</td>
<td></td>
<td>End 2012</td>
<td>green</td>
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<td>11</td>
<td>All regional organisations should work to an agreed regional protocol for the declaration of outbreaks</td>
<td></td>
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<td></td>
<td>amber</td>
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<tr>
<td>12</td>
<td>Arrangements for typing of Psuedomonas aeruginosa should be established</td>
<td>available</td>
<td></td>
<td>End 2012</td>
<td>green</td>
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<tr>
<td>13</td>
<td>Improve accommodation for the purposes of isolation and for cleaning of equipment in NNU. Improve space around each cot</td>
<td>New build</td>
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Summary

- Infection outbreaks are universal
- Pre-planning can help
- Communication within and between networks vital
- Reinventing the wheel is a pointless and demoralising experience; why are we so good at it in the NHS?
- Neonatal Networks have a vital role in preventing wheel reinvention