Outbreak of multi-resistant ESBL Klebsiella pneumoniae in a neonatology unit, Bangui, Central African Republic March–June 2017

Dr Julita Gil
On behalf of the Klebsiella team
MSF-OCB maternity in Bangui, CAR

- OCB supported maternity since 2014
- Most visited maternity in the capital
- Comprehensive Emergency Obstetric and Neonatal Care
  - 141 newborn admissions per month
ESBL Klebsiella outbreaks

• Extended-spectrum beta lactamase (ESBL)
  – Multi-resistant to antibiotics
• Leading cause for outbreaks in neonatal units
  – Average duration 6 months - 15 months in MSF Haiti
• Mortality: 31% - 76% in MSF Haiti
• Factors predisposing: suboptimal hygiene standards
  – Understaffing and overcrowding
Outbreak alert and study objective

• On 9 March 2017, 2 neonatal sepsis cases of ESBL *Klebsiella pneumoniae*
  – No haemoculture results in the previous year
  – Number of sepsis above the expected (as per the neonatal database)

• To describe the outbreak, the risk factors and to provide operational recommendations to avoid future outbreaks
Case definition of ESBL *Klebsiella pneumoniae* (KP)

- **Suspected case**: a newborn admitted in the neonatal unit with sepsis signs and symptoms from 9 March 2017
  - Haemocultures requested from each suspected case

- **Confirmed case**: ESBL *KP* isolated in haemoculture by Institut Pasteur, Bangui
Distribution of suspected ESBL KP cases by date of hemoculture

Pathogens isolated:
- Klebsiella ornitolytica
- Klebsiella oxitoca
- Staphylococcus xylosus
- Enterobacter aerogenes
- Pseudomonas aeruginosa
- Pseudomonas cepacia
19 confirmed ESBL *Klebsiella pneumoniae*, 2-29 March

- Male: 73%
- Low birth weight: 26%
- Resuscitated: 78%
- Early onset: 81%
- Case fatality rate: 21%

- Mean hospitalization: 16 days (0-26)
Antibiograms of ESBL KP

• 100% resistant to Ampicilline
• 100% resistant to Gentamicine

• 100% resistant or intermediate to Cefotaxime /Ceftriaxone
• 47% resistant to Chloramphenicol
• **100% sensitive to Imipenem and Amikacin**
# Clinical management – antimicrobial therapy

<table>
<thead>
<tr>
<th>Prophylaxis</th>
<th>Ampicilline + Gentamicine</th>
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<tbody>
<tr>
<td><strong>1st line</strong></td>
<td>Ampicilline + Gentamicine</td>
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<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; line</td>
<td>Ampicilline + Cefotaxime*</td>
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<td></td>
<td>Chloramphenicol + Amoxi-Clav (&lt;span style='color: red'&gt;mid March&lt;/span&gt;)**</td>
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<td></td>
<td>Amikacine + Imipenem/Meropenem (&lt;span style='color: red'&gt;end March&lt;/span&gt;)</td>
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<td></td>
<td>Ampicilline + Cefotaxime* (&lt;span style='color: red'&gt;third week May&lt;/span&gt;)</td>
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<td>3&lt;sup&gt;rd&lt;/sup&gt; line</td>
<td>None</td>
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*MSF neonatology guidelines

** No availability of Imipenem
## Risk factors for ESBL KP cases

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Adjusted Odds Ratio</th>
<th>OR</th>
<th>95% CI</th>
<th>p - value</th>
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</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td>1.8</td>
<td>0.5-6.9</td>
<td>0.337</td>
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<tr>
<td>Low birth weight</td>
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<td>3.3</td>
<td>0.9-11.4</td>
<td>0.052</td>
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<td>Prematurity</td>
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<td>4.3</td>
<td>0.8-23</td>
<td>0.084</td>
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<tr>
<td>Resuscitated*</td>
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<td>4.9</td>
<td>1.2-19.5</td>
<td>0.022</td>
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<tr>
<td>Mother's Infectious risk</td>
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<td>1.1</td>
<td>0.3-3.9</td>
<td>0.852</td>
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</table>

Logistic regression used to compare ESBL KP neonates (n=19) with rest of admitted neonates (n=141) over this period

* Resuscitation immediately after birth included use of Ambu and/or Oxygen cannula
Infection prevention and control (IPC)

Standard precautions

– Hand hygiene
– Cleaning and disinfection of the environment
– Reprocessing of reusable medical equipment
  • Ambu, Oxygen concentrator, suction device
Infection prevention and control (IPC)

- “Isolation”/reorganization of care

- Infection prevention in the care
  - IV access
  - Nursing care procedures
Challenges

• Reinforce the IPC standards and sustain them
• Nosocomial outbreak response
  – Laboratory capacity for haemocultures
  – Communication
Conclusions

• Nosocomial transmission of ESBL Klebsiella
  – Vigilant paediatrician needed to alert and manage
  – Association with resuscitation and inadequate IPC

• Peak of the outbreak controlled due to multidisciplinary response
  1. IPC
  2. systematic haemocultures
  3. access to antibiotics

• Detection of other pathogens: complexity to respond
Operational questions

• To what extent nosocomial outbreaks and antimicrobial resistance affect MSF maternal and neonatal units?

• Are we ready to tackle it?

1. IPC
2. Microbiology in the field
3. Antibiotic stewardship
"We only see what we look at"

John Berger
## Acknowledgements

Maternity patients  
Castors project staff  
CAR OCB mission  
Cell 1 OCB

<table>
<thead>
<tr>
<th>Special thanks to the Klebsiella team:</th>
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<tbody>
<tr>
<td>Monica Thallinger</td>
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<tr>
<td>Francesca Marin</td>
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<td>Félix Musung Tshibol</td>
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