Anti-bacterial Resistance Patterns and Trends among Scepticaemic Patients, Kampala 2010-2015

Christine Kihembo, MBChB, MIPH Fellow, Cohort 2015
ABR strains health system and economy

- Anti-bacterial resistance (ABR): organism not responsive to anti-bacterial drug previously effective
- ABR implications: Longer hospital stay, high cost, more toxic agents, poorer patient outcomes
- ABR is a priority area on GHSA
Limited non-mycobacterial ABR info: Fragmented surveillance in Uganda

- No national active surveillance for ABR
- Bacterial infections:
  - 20% of all hospital deaths
  - 25% of deaths among children <5 years
- Published ABR info is a decade old
- ABR data from private sector not utilized
Objectives

- Describe bacterial (non-mycobacterial) etiologies for blood sepsis in Kampala
- Characterize ABR patterns among most identified bacteria
Data source

- Reviewed all blood culture records: 9 labs (Public and Private) in Kampala
- ABR testing according to Clinical and Laboratory Standards Institute (CLSI) standards
- Standardized data abstraction form
- Collected demographics, organism isolated
- Data analyzed over 6 year period
Case definitions

- **Species resistant to a drug annually**
  - High ABR ≥50%; Moderate ABR 10-49%; Low ABR <10%

- **Multi-drug resistant (MDR) salmonella:** resistant to Cotrimaxazole (COTRIM), Chloramphenicol (CAF) and Amipicillin (AMP)

- **MRSA:** Staph species resistant to Oxacillin or Cefoxitin
2998 Positive Blood Cultures Abstracted

23990 Blood Culture Records

2998 Culture Positives (12.5%)

Fungi N=10 (0.3%)

Gram Positive N=1794 (60%)

Gram Negative N=1193 (39.7%)
Staphylococcus predominant gram positive

- **Staphylococcus**: 85.9%
- **Streptococcus**: 7.9%
- **Enterococcus**: 3.6%
- **Corynmbacteria**: 1.2%
- **Bacillus**: 0.7%
- **Others**: 0.6%
- **Non specified**: 0.1%
Staph aureus most predominant among Staph species

Staphylococcus species

- Staph saprophyticus: 1%
- Others: 1.1%
- Staph hominis: 2.5%
- Staph spp: 3.5%
- Staph haemolyticus: 4.8%
- Staph epidermidis: 5.3%
- Coagulase negative Staph: 11.2%
- Staph Aureus: 70.7%

Frequency (%)
Children <5 and elderly more affected by Staph infections

Incidence of Staph spp by Age-group

Incidence /100,000
Salmonella predominant gram neg

Gram Neg

- Others: 3.04%
- Non Specified: 2.97%
- Citrobacter: 3.1%
- Enterobacter: 4.3%
- Pseudomonas: 4.8%
- Acinetobacter: 6.1%
- E. coli: 12.5%
- Klebsiella: 12.7%
- Salmonella: 20.6%
- Coliforms: 28.4%

Frequency (%)

ABR patterns in Kampala, 2010-2015
Typhoidal species predominant among Salmonella organism

Salmonella specie

- Salmonella choleraesuis: 0.4%
- Salmonella B: 1.2%
- Salmonella enterica: 2%
- Salmonella D: 4.5%
- Salmonella paratyphi: 5.3%
- Salmonella spp: 35.2%
- Salmonella typhi: 51.4%
- Non-specified: 0%

ABR patterns in Kampala, 2010-2015
Children 0-5, young adults and elderly more affected by Salmonella
Staph: Moderate to high ABR to common drugs

ABR patterns in Kampala, 2010-2015
Increasing trend of Methicillin Resistant Staphylococcus

% Resistance

Year

2010 2011 2012 2013 2014 2015

ABR patterns in Kampala, 2010-2015
Reduction in 1st line drug ABR for Salmonella

% Resistance

Year

2010 2011 2012 2013 2014 2015

AMP
CAF
COTRIM
MDR

ABR patterns in Kampala, 2010-2015
Rapidly increasing intermediate resistance to Ciprofloxacin

% Resistance

2010 2011 2012 2013 2014 2015

Year

$X^2 = 21$
$p < 0.001$

ABR patterns in Kampala, 2010-2015
Increasing Resistance to Ceftriaxone

$X^2 = 6.5$
$p = 0.01$
No Ciprofloxacin, Ceftriaxone susceptibility testing in >20% Salmonella isolates

<table>
<thead>
<tr>
<th>% Tested</th>
<th>Ciprofloxacin (Fluroquinolone)</th>
<th>Ceftriaxone (Cephalosporin)</th>
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<tr>
<td></td>
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<td>79</td>
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Limitations and Strengths

Strength
- Relatively large sample for ABR studies
- Routine data collected from registered health units

Limitations
- Incomplete and missing data
Conclusion

- Salmonella and Staphylococcus most common cause of scepticaemia
- High level Methicillin Resistant Staph
- Rapid increase in ABR to Ciprofloxacin among Salmonella spp.
- Susceptibility to traditional first line antibiotics for Salmonella has gradually returned
Recommendations

- Adherence to ABR testing standards
- Rational use of antibiotics guided by ABR patterns to address the changing ABR picture.
Acknowledgment

- Mulago, Mengo, Rubaga, Nsambya Hospitals, Nakasero, Ebenezer Makerere University Medical Microbiology Lab, LMK, ABI
- PHFP Secretariat
- Epidemiology & Surveillance Division, MOH
- CDC
ABR patterns in Kampala, 2010-2015

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<th>2011</th>
<th>2012</th>
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<th>2015</th>
<th>$X^2$</th>
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<td>95</td>
<td>86</td>
<td>89</td>
<td>88</td>
<td>90</td>
<td>92</td>
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more common among the hospitalised
## Significant Trend Change in ABR

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<th>2011</th>
<th>2012</th>
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## Significant Trend Change in ABR among 1<sup>st</sup> Line Drugs

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Proportions of CIP and CEFT tested over time

Year

% tested

Proportions of CIP and CEFT tested over time

2010 2011 2012 2013 2014 2015

CIP

CEFT

ABR patterns in Kampala, 2010-2015
ABR patterns in Kampala, 2010-2015