Community Acquired Bacteremia in Nigerian Children: A Preliminary Report

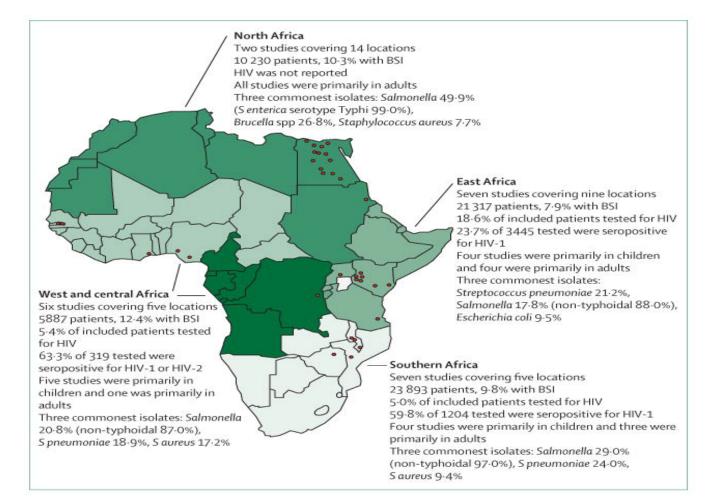
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Overview



- Background
- Community Acquired Bacteremic
 Syndromes in
 Nigerian Children- A
 pilot study
- Epidemiologic surveillance

Epidemiology of Bacteremia in Africa



Crump et al. Lancet 2011

Risk Factors that Modify Epidemiology of Childhood Bacteremia in Africa

- Malaria
- Hemoglobinopathies
- HIV
- Malnutrition
- Antibiotic use
- ? Other

Background

- Most populated country in sub-Saharan Africa
- High infant mortality
- High under 5yr mortality
- Poorly defined burden of vaccine preventable bacterial diseases
- Poor immunization coverage

Previous Studies

Limitations of previous studies

- Sub optimal laboratory Methods
- Culture media
- Agar preparation- suboptimal blood agar source
- Identification of isolatesmisidentification
- Incomplete characterization



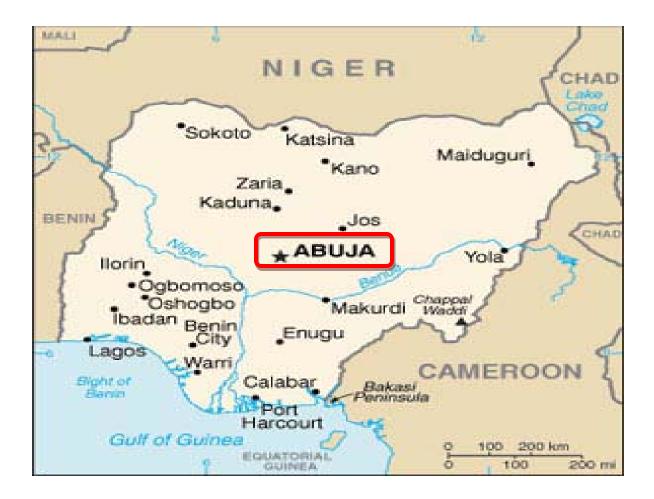
Community Acquired Bacteremic Syndrome in Young Nigerian Children (CABSYNC)

> A COLLABORATIVE STUDY National Hospital Abuja Zankli Medical Center MRC Laboratories, The Gambia Michigan State University CDC, ATLANTA

Community-Acquired Bacteremia in Young Nigerian Children- A pilot Study Objectives

- To introduce automated blood culture system to pediatric clinical care
- Pilot study of the etiologic agents of bacteremia in young children in central Nigeria
- Define invasive pneumococcal disease burden

Bacteremia Surveillance in Young Children



Abuja City



Satellite Settlements Around Abuja









Satellite Settlements Around Abuja







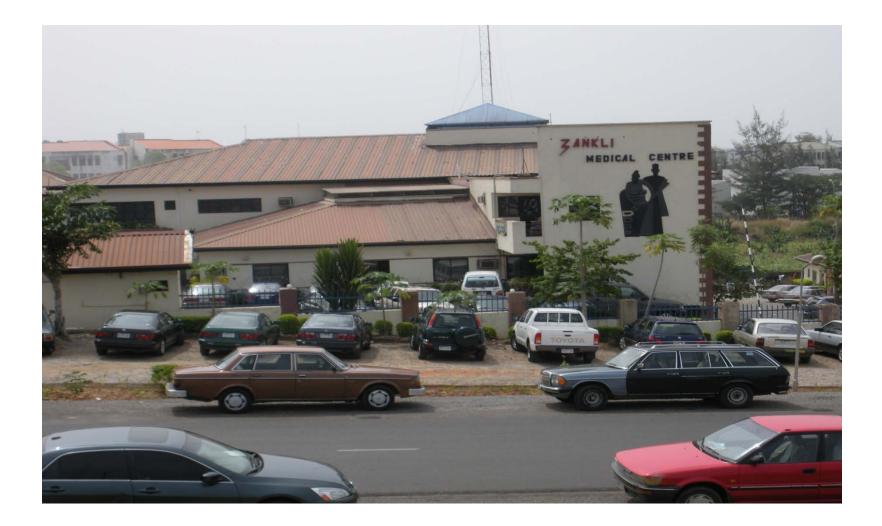
Equipping the Laboratory













Laboratory Personnel Training



Methods I

- Enrolment from Sept 2008-
- All children aged 2months-5years
- Fever or hypothermia (temp greater or equal to 38.5°C or less than 34.5°C plus prostration, respiratory distress, convulsion or diarrhea
- Informed consent

Methods II

- Blood drawn aseptically into culture bottle with other clinically indicated tests
- Culture bottles incubated for 5 days (max)
- Positive cultures Gram stained and sub cultured on appropriate agar plates
- Identification by standard biochemical method (API)

Methods-III

- Secondary ID confirmation of bacterial isolates identity an International Reference laboratory (Medical Council Laboratories, The Gambia or Sparrow Regional Laboratories, Lansing USA).
- Antimicrobial activity in serum was determined by inhibition of *Micrococcus luteus* assay.

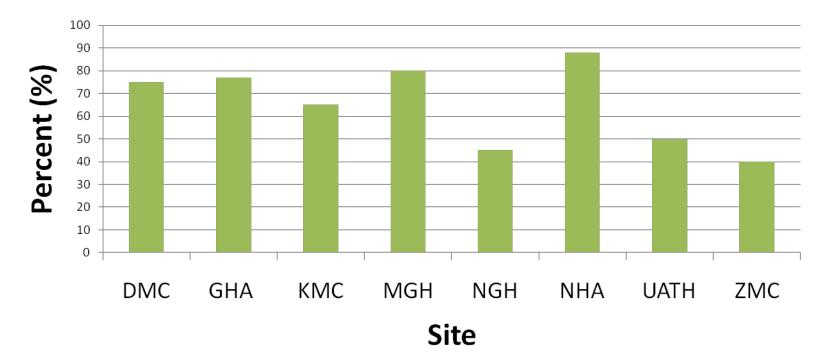
Methods IV

- Salmonella isolates were tested for susceptibility to a panel of 15 antimicrobials used by the NARMS program.
- Antimicrobial MICs of Salmonella isolates were determined via the Sensititre automated antimicrobial susceptibility system

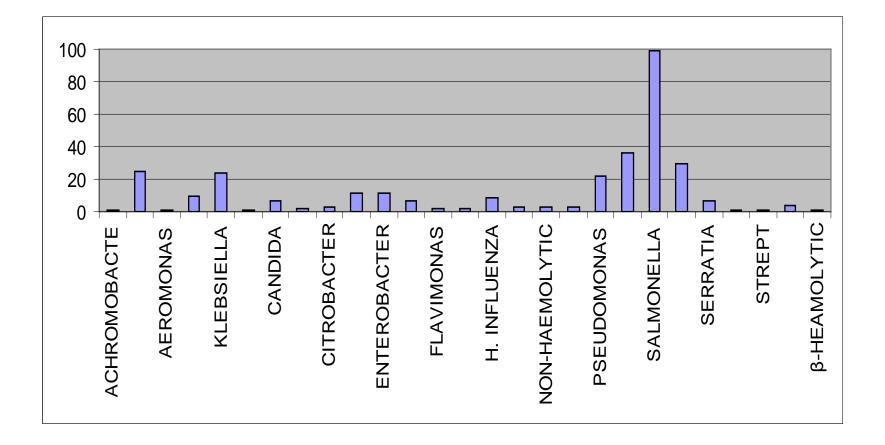
RESULTS

Pre-Consultation

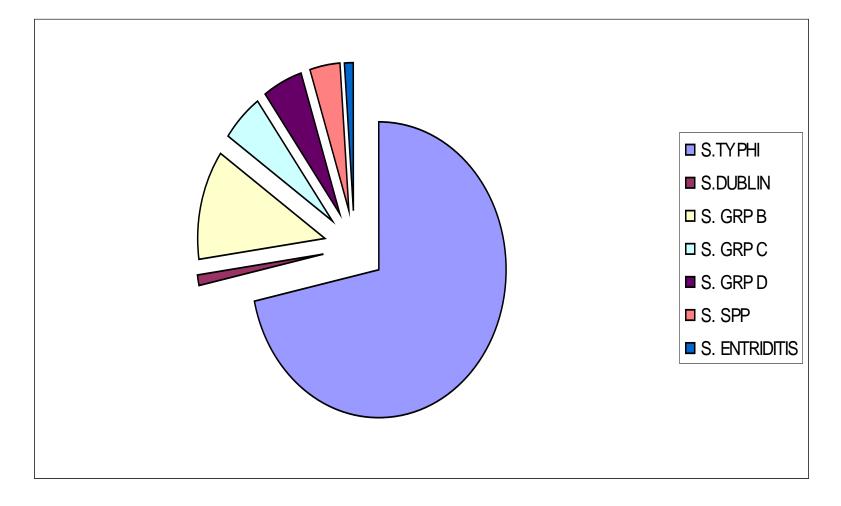
Fig 2. Serum Antimicrobial Activity in Sub-Population by Site



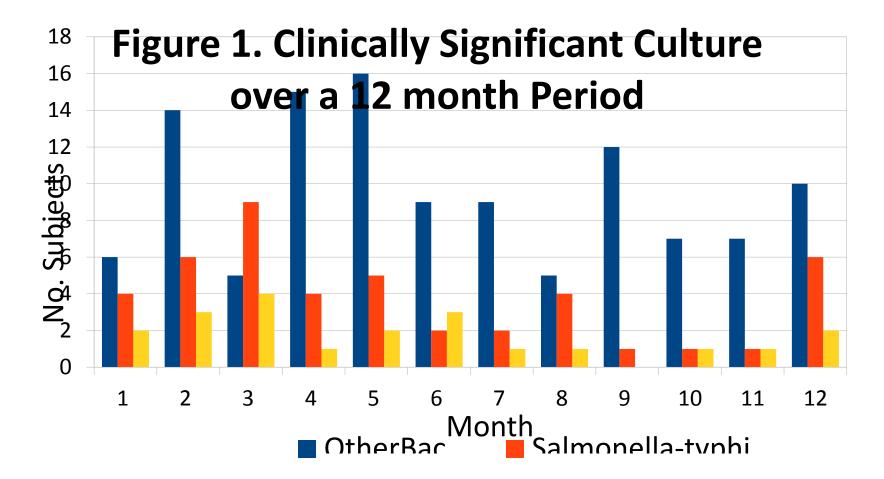
Distribution of Bacterial Isolates



Distribution of Salmonellae Isolates

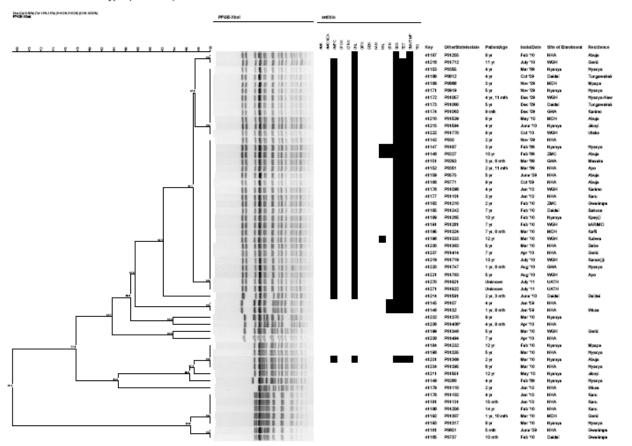


Seasonal Distribution of Etiologic Agents of Bacteremia



S. Typhi

404.04 WHO-GFN Sal Typhi (55 entries)



NTS

404.04 WHO-GFN nonTyphi (29 entries)

| Dise (Opt0.50%) (Tol 1.5%-1.5%) (H-0.0% S-0.0%) (0) PFGE-Xbal | PFGE-Xbal | antibio | | | | | | | |
|--|--|--|-------|-------------------|--------------|------------|------------------------|-------------------|-----------|
| . e e e e | | AMIC AMIC/CA AMIC/C C/C/C/C C/C/C/C C/C/C/C C/C/C/C C/C/C/C C/C/C/C C/C/C/C/C C/ | Key | OtherStateIsolate | PatientAge | IsolatDate | Serotype | Site of Enrolment | Residence |
| | | | 41180 | P01124 | 3 yr | Jan '10 | Typhimurium | WGH | Obakoko |
| | | | 41190 | P01276 | 9 mth | Feb '10 | Typhimurium | MDH | Kado |
| 100 | | | 41203 | P01383 | 6 mth | Mar '10 | l 4,[5],12:i:- | WGH | Mpape |
| 903 I | | | 41213 | P01584 | 1 yr + | May '10 | Typhimurium | Nyanya | Nyanya |
| - E2.8 | | | 41167 | P0772 | 6 mth | Oct '09 | Typhimurium | NHA | Wuse |
| *** L | 0 00 00 000 | | 41217 | P01676 | Unknown | June '10 | Typhimurium | MDH | Lugbe |
| 67.5 | | | 41162 | P0609 | 2 yr, 6 mth | June '09 | Typhimurium | NHA | Maitama |
| 60.9 | | | 41194 | P01323 | 3 yr | Mar '10 | Typhimurium | MDH | Kubwa |
| 65.1 | | | 41223 | P01780 | Unknown | Aug '10 | Virchow | NHA | |
| 75 | | | 41209 | P01523 | 4 mth | May '10 | Identification Pending | WGH | Karu |
| age | 111 10 101 | | 41160 | P0579 | 1 yr, 9 mth | June '09 | Saintpaul | NHA | Garki |
| | 11 11 11 11 | | 41156 | P0418 | 3 yr, 6 mth | Apr '09 | Identification Pending | NHA | Lugbe |
| 100 | | | 41158 | P0530 | 4 yr | June '09 | Identification Pending | NHA | Lugbe |
| | 1111111 | | 41163 | P0628 | 1 yr | July '09 | Identification Pending | Deidei | Suleja |
| | | | 41150 | P0288 | 5 mth | Mar '09 | Dublin | UATH | Gwa |
| | | | 41157 | P0527 | 1 yr, 11 mth | June '09 | Dublin | UATH | Gwa |
| 100 | 11 11 11 1 11 | | 41164 | P0709 | 9 mth | Aug '09 | Dublin | NHA | Maraba |
| 65.7 | | | 41170 | P0902 | 2 уг | Nov '09 | Dublin | NHA | Аро |
| 55.0 74.5 | II- I I II I I I I I I I I I I I I I I | | 41154 | P0400 | 4 yr, 10 mth | Apr '09 | Dublin | ZMC | Dutse |
| | | | 41212 | P01563 | 3 wk | May '10 | Identification Pending | NHA | |
| | | | 41183 | P01213 | 4 уг | Feb '10 | Enteritidis | Nyanya | Abuja |
| 69.3 | 10 0011 011 | | 41143 | P089 | 4 уг | Jan '09 | Enteritidis | NHA | Maitama |
| 100 | 1 1 11 1 1 | | 41144 | P091 | 4 yr | Jan '09 | Enteritidis | NHA | Maitama |
| 62.7 | | | 41186 | P01245 | 2 yr, 2 mth | Feb '10 | Enteritidis | UATH | Gwa |
| | | | 41216 | P01625 | 4 yr, 9 mth | June '10 | Enteritidis | WGH | Kubwa |
| 403 | 1 8 181 1 11 | | 41197 | P01334 | 2 mth | Mar '10 | Enteritidis | NHA | Garki |
| | | — | 41205 | P01401 | 2 уг | Apr '10 | Identification Pending | NHA | Garki |
| e1.6 | 1 10 01 1 | | 41175 | P01094 | 5 yr | Jan '10 | Baltimore | NHA | Karu |
| | | | 41155 | P0409 | 2 yr, 6 mth | Apr '09 | Agama | NHA | Maraba |

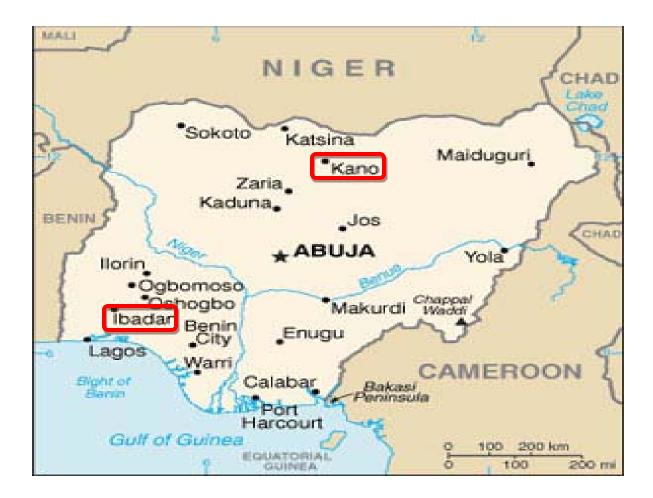
Molecular Pattern of Salmonella Isolates

- Certain PFGE pattern clusters correlated well with their antimicrobial resistance profiles.
- All 8 *S. Typhimurium* isolates, showed the ACSSuT resistance profile, and all five Dublin isolates were completely susceptible to all antimicrobials tested.
- One major clone of Typhi contains 34 isolates, all were resistant to 3 to 7 antimicrobials and majority of them were resistant to AMPC- CHL-SSS-TET- SMX/TMP

Conclusions

- In central Nigeria, Salmonellae spp are the leading cause of CAB in young children
- There is high prevalence of MDR Salmonella infection
- Use of culture-based surveillance alone may underestimate disease burden
- Expanded surveillance is required at other locations
- Epidemiologic studies to identify host and environmental risk factors will inform optimal preventive strategies

Bacteremia Surveillance in Young Children



Future Studies

- Community-Acquired Pneumonia and Invasive Bacterial Disease in Young Children
 - Etiologic agents of community acquired pneumonia, bacteremia, meningitis
 - Identification of host risk factors
 - Incidence estimates
- ?Epidemiology of Invasive Salmonellosis

