Risk profiles and vaccine uptake in children with invasive pneumococcal disease at a tertiary hospital in Tshwane:

A retrospective review

Xandré Dearden

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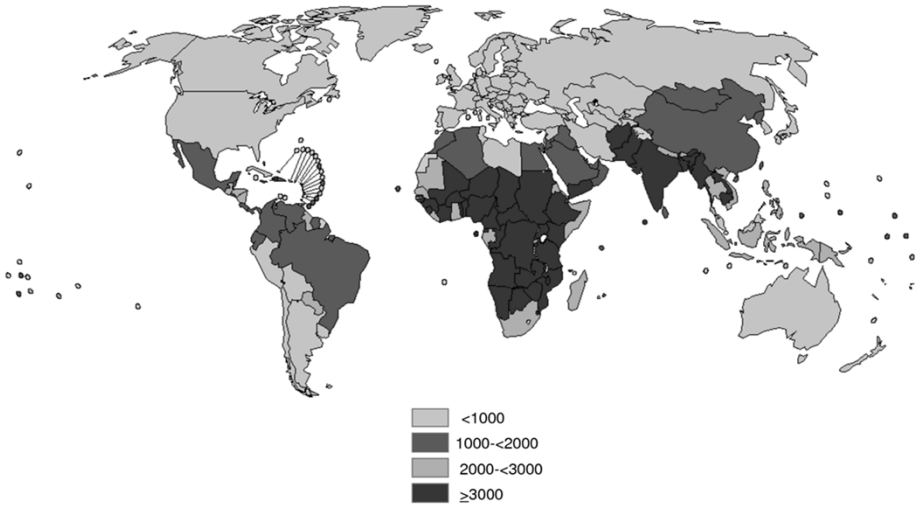
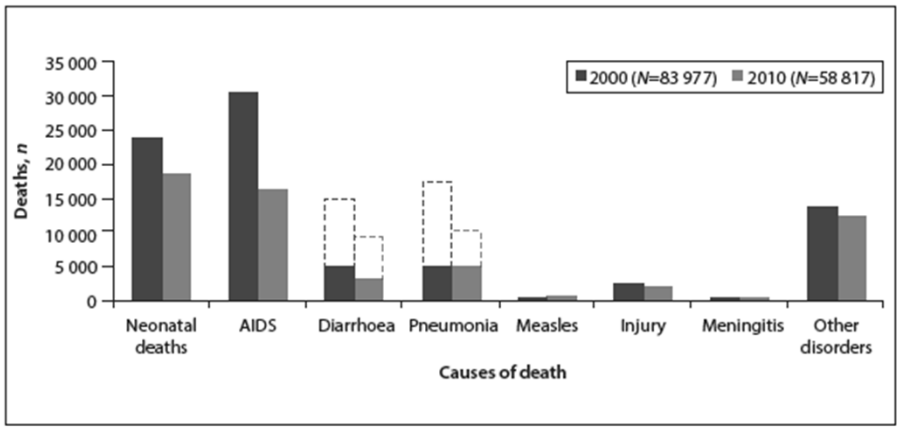
Streptococcus pneumoniae incidence rate per 100,000 children under five years of age, 2000



Causes of under 5 childhood mortality in South Africa in 2000 and 2010

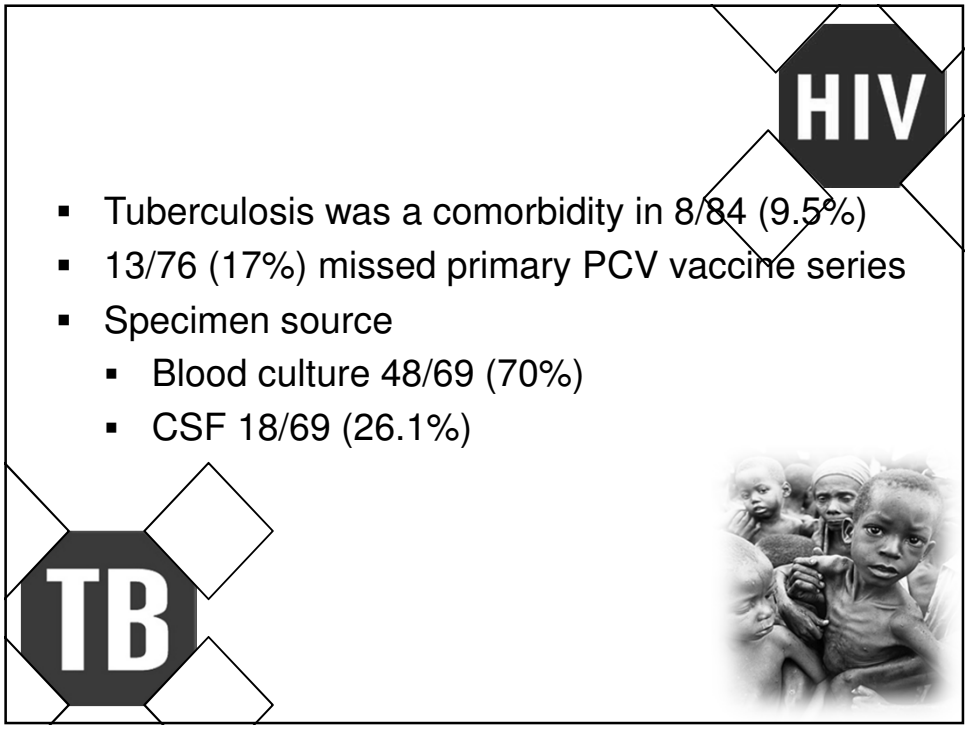


Method

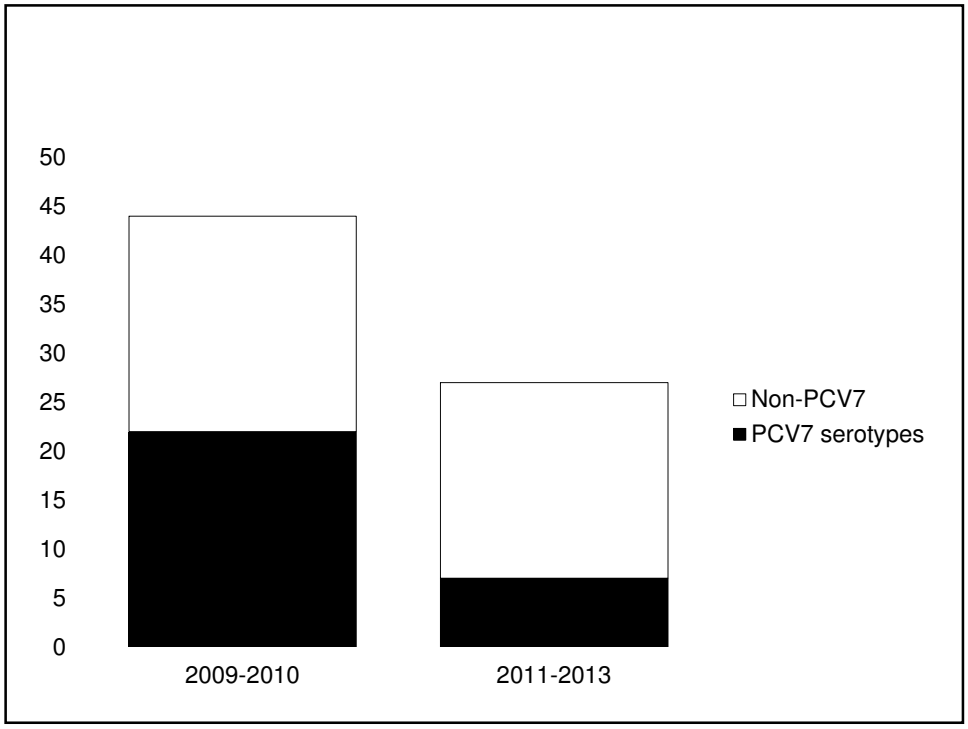
- Retrospective descriptive analysis
- Pediatric wards of Kalafong Hospital in Tshwane.
- Younger than 13 years
- February 2009 until February 2013
- Positive culture for *S. pneumoniae* from a sterile site.

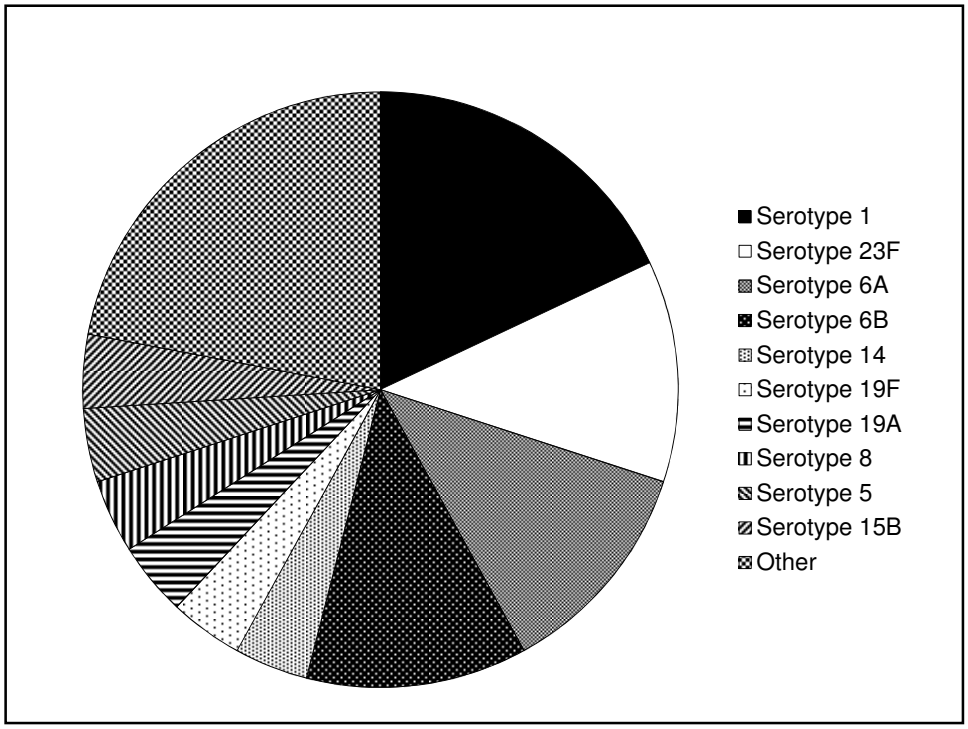
Results

Patient characteristics	**N = 84** **N(%)**
Median age	36 months (6-4207)
Male:Female ratio	1.18:1
HIV positive CD4 count % HIV status unknown	33 (51%) 13.8% (0.8-35.6) 19 (23%)
Anthropometry done (admission) Underweight (<-2 z-score weight for age)	58 (69%) 25 (43%)



- Tuberculosis was a comorbidity in 8/84 (9.5%)
- 13/76 (17%) missed primary PCV vaccine series
- Specimen source
  - Blood culture 48/69 (70%)
  - CSF 18/69 (26.1%)


50
45
40
35
30
25
20
15
10
5
0
2009-2010
2011-2013
Non-PCV7
PCV7 serotypes


Serotype 1
Serotype 23F
Serotype 6A
Serotype 6B
Serotype 14
Serotype 19F
Serotype 19A
Serotype 8
Serotype 5
Serotype 15B
Other

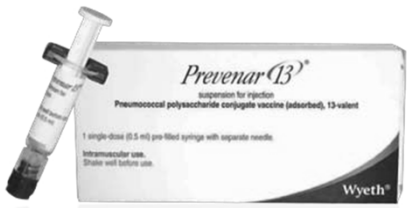
Susceptibility by age group n/N(%)			
Penicillin susceptibility	< 1 year	1 – 5 years	> 5 years
Susceptible NON-susceptible	13/35 (37%) 14/28 (50%)	8/35 (23%) 13/28 (46%)	14/35 (40%) 2/28 (7%)

Discussion

- Bacteraemia was the most common form of IPD identified at Kalafong hospital.
- HIV infection and malnutrition were two comorbid conditions found in up to half of cases.
- There was a decrease in the absolute number of IPD cases with PCV7 serotypes.
- Serotypes contained in the current 13-valent pneumococcal conjugate vaccine will protect against the most prevalent serotypes found.
- Ongoing surveillance of the antimicrobial resistance pattern will advise future policy on the recommended antibiotic strategy for pneumococcal infections

Take Home Message

- *Streptococcus pneumoniae* is still a major cause of death in children.
- HIV infection, TB and malnutrition are frequent co morbid conditions.
- Serotypes contained in the available 13-valent PCV will protect against the most prevalent serotypes found, thus emphasizing continued vaccine advocacy.



Recommendations

- Complete vaccine schedule
- Promote vaccination
- Catch up vaccines
- Investigate for TB and HIV
- Correct dose of antibiotics

	Serotypes
Pneumovax	1, 2, 3, 4, 5, 6B, 7F, 8, 9N, 9V, 10A,11A, 12F, 14, 15B, 17F, 18C, 19A, 19F, 20, 22F, 23F, 33F
Prevnar	4, 6B, 9V, 14, 18C, 19F, 23F
Prevnar-13	1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F

- In private, the vaccine strains are decreasing
- 13 valent now covers strains most commonly found during 7 valent era.
- Serotype 1: shown to have distinct features such as prone to cause outbreaks(article in press)
- 3:1 more effective than 2:1
- Strains now in prevenar 13 use to be the strains previously resistant to ab.
- In practise, a fully vaccinated, uncomplicated patient, should not need broad spectrum or any ab when presenting with AOM.

Invasive Pneumococcal Disease in Children at a Tertiary Hospital in Tshwane, 2009 through 2013

CX Dearden[1], NM du Plessis[1], A von Gottberg[2], T Avenant[1]

Introduction

- *Streptococcus pneumoniae* disease still accounts for up to 1 million deaths in children <5 years.
- It remains an important cause of pneumonia, bacteraemia and meningitis worldwide.
- Vaccination is the main preventative strategy in young children.
- A pneumococcal conjugate vaccine is included in the Expanded Programme on Immunisation in South Africa.

Methods

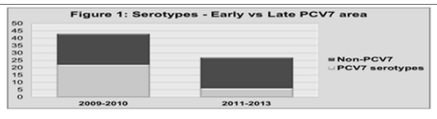
- Retrospective chart-based analysis
  - Laboratory confirmed IPD
  - Children <13 years
  - Kalafong Hospital
  - February 2009 - February 2013
- Serotyping was done using Quellung method
- Resistance data were collected.
- Outcomes were documented

Results

- Eighty-four patients
- Table 1 illustrates demographics and comorbidities

Table 1: Patient characteristics	N = 84 n(%)
Age (days) (median; IQR)	1097 days (6-4207)
Male:Female ratio	1.18:1
HIV positive	33 (51%)
CD4 cell count (%) (median; IQR)	13.8% (0.8-35.6)
HIV status unknown	19 (23%)
Anthropometry done *(admission)*	29 (31%)
Underweight *(< -2 z-score weight-for-age)*	13 (50%)

- Tuberculosis was a comorbidity in only 6/84 (7%)
- 13/76 (17%) missed primary PCV vaccine series
- Specimen source
  - Blood culture 48/69 (70%)
  - CSF 18/69 (26.1%)
- Figure 1 shows serotype distribution for two periods since PCV7 introduction
- Serotypes 1(12/71, 16.9%), 23F (9/71, 12.7%), 6A (8/71, 11.3%) and 6B (7/71, 9.9%) were the most prevalent.

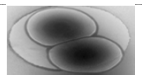


- MIC by broth microdilution was interpreted by 2008 CLSI values
- 63/65 isolates had susceptibility results and patient data (*table 3*)
- 29/65(45.3%) were penicillin non-susceptible and 5/65 (7.7%) cephalosporin resistant
- 6 deaths from 49 known outcomes (12%)

Table 3: Susceptibility by age group n/N (%)			
Penicillin susceptibility	< 1 year	1 – 5 years	> 5 years
Susceptible	13/35 (37%)	8/35 (23%)	14/35 (40%)
Non-susceptible	14/28 (50%)	13/28 (46%)	2/28 (7%)

Discussion

Bacteraemia due to *Streptococcus pneumoniae* was the most common form of IPD identified at Kalafong hospital. HIV infection and malnutrition were two comorbid conditions found in up to half of cases. There was a decrease in the absolute number of IPD cases with PCV7 serotypes. Serotypes contained in the current 13-valent pneumococcal conjugate vaccine will protect against the most prevalent serotypes found, emphasising the need for continued vaccine advocacy. Ongoing surveillance of the antimicrobial resistance pattern will advise future policy on the recommended antibiotic strategy for pneumococcal infections



Important message...

- ***IPD remains an important disease in this setting***
- ***HIV and malnutrition are significant cofactors***
- ***Vaccination strategies should be supported***

References

- Jeena PM. The burden of pneumococcal disease in children– advances in the fight of this epidemic. *SA Fam Pract* 2006;48(4): 26-30.
- Mehr S, Wood N. Streptococcus pneumoniae – a review of carriage, infection, serotype replacement and vaccination. *Paediatric Respiratory Reviews* 2012; (13)258–264.
- Von Gottberg A, Cohen C, De Gouveia L, et al. Epidemiology of invasive pneumococcal disease in the pre-conjugate vaccine era:South Africa, 2003–2008. *Vaccine* 2013; 31:4200– 4208.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Health Sciences

Paediatric Infectious Diseases Division
University of Pretoria and Kalafong Hospital
Gauteng, South Africa
Pr. Dr. Xandre Dearden (xandredh@gmail.com)
Supervisor: Dr. Nicolette du Plessis (nicolette.duplessis@up.ac.za)