

EVALUATION OF THE USE OF BINAX NOW S.
PNEUMONIAE IN CHILDREN WITH MENINGITIS
IN ANGAU MEMORIAL GENERAL HOSPITAL



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INTRODUCTION

- Meningitis is one of the common causes of childhood mortality and morbidity.
- Predominant bacterial causes of meningitis are *S. pneumoniae*, *H. Influenza* & *N. Meningitidis*
- *Streptococcus pneumoniae* is the leading cause of childhood pneumonia and meningitis worldwide (O'Brien et al., 2009)
- In PNG, meningitis is in the top 10 causes of hospital admissions with high CFR (PNG Department of Health. Childhood Morbidity and Mortality. Annual Report 2013)
- From 2010 to 2013, only less than 20% cases of meningitis had organisms identified - > 50% being *S. Pneumoniae* (PNG Department of Health. Childhood Morbidity and Mortality. Annual Report 2013)




INTRODUCTION

- Diagnosis of meningitis using CSF culture, GS & latex has limitations.
- Culture – gold standard but compromised in pt with empiric treatment
- Gram stain – only 75% recognised can be cultured and sensitivity ↓50% in pre-treatment
- Bacterial antigen – sensitivity varies from 50% to 100% depends commercial assay and organism studied
- Latex kit has short shelf life particularly in the tropical climate



LITERATURE REVIEW

- Binax NOW S. Pneumoniae Urinary Test – new immuno - chromatographic membrane assay. Detects C- polysaccharide in cell wall common all serotypes.
 - Studies were done using Binax to detect S. pneumoniae in urine for pts with PNA, nasopharyngeal secretions, middle ear effusions, pleural fluids & CSF.
 - This test has demonstrated high sensitivity and specificity in CSF in pts with culture confirmed meningitis [\(Samra et al., 2003\)](#)
 - In PNG, NDoH embarked on introducing pneumococcal vaccine
 - Binax NOW was used to diagnose pneumococcal meningitis in children with meningitis in AMGH
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AIM

- To assess the usefulness of *Binax NOW Streptococcal Pneumoniae Test* in detecting pneumococcal meningitis in children with meningitis in Angau Memorial General Hospital
- To determine the diagnostic yield or sensitivity of Binax Now test in the diagnosis of pneumococcal meningitis.



METHODOLOGY

- *Type of study:* Prospective descriptive study
 - Angau Memorial General Hospital
 - November 2012 to January 2014.

- *Study population:*
 - Children > 1/12 with a clinical suspicion of acute bacterial meningitis who were having lumbar puncture.



METHOD CONT

Clinical procedures

- CSF collected using sterile technique after verbal consent from parents.
- Children aged ≥ 18 months had a fundoscopy prior to LP.

Laboratory procedures

- The CSF specimens sent to laboratory for MCS, latex and Binax NOW tests.



METHODS CONT ..

1



Swab is dipped into the CSF

2



The swab is inserted into the test device. *S. pneumoniae* antigens present in the CSF sample react to bind anti-*S. pneumoniae* conjugated antibodies

3



Migration buffer is added and the device is closed.

4



In absence of pneumococcal antigens, the antibodies conjugated in excess are captured by immobilised goat anti-rabbit IgG, forming the control line.

OR

5



The resulting antigens-antibodies conjugated complexes are captured by immobilised anti-*S. pneumoniae* antibodies, forming the sample line

Data entry and analysis

- Data collected using a prepared questionnaire.
- Analysis done using SPSS programme version 20.0 and Open Epi version 2.3.

Ethical issues

- A informed verbal consent from parents or guardians.
- Approved by ethical committee SMHS. Hospital approval thru DMS office.



RESULTS - DEMOGRAPHIC STATISTICS

- Total cases: 132
- Included: 129
- 3 had insufficient CSF for Binax Now
- 69% (91) are males and 31% (38) are female



RESULTS

Figure 1 Showing the age distribution



	Mean	Median	IQR
Age (months)	14.9	6	3 - 12

RESULTS

Total CSF: 129

30 had normal CSF; 2 had positive Binax NOW

	Mean	Median	IQR
CSF Polymorphs	214	2.7	1-32
CSF Lymphocytes	45.5	9	4-33



RESULTS

Table 1

Tests	Number of CSF specimens tested	No. & type of organisms identified
Binax NOW	129	n = 19 (15%) All S. Pneumoniae
Latex Agglutination	84	n = 20 (24%) 11 = S. Pneumonia (55%) (13%) 8 = H. Influenza (40%) 1 = N. Meningitides (5%)
Culture	129	n = 5 (4%) All S. Pneumoniae
Gram stain	129	n = 13 (10%) 7 = gram positives organisms 6 = gram negatives organisms

27 CSF had organisms identified by conventional tests (13 pneumococcal, 8 Hib, 1 N. Meningitides). Include Binax, 32 CSF had organisms identified.

RESULTS

Table 2 Binax Now Test versus Latex Agglutinations Tests

	Latex Agglutination test for <i>S. pneumoniae</i>			Total
Binax		Positive for <i>S. pneumoniae</i>	Negative for <i>S. pneumoniae</i>	
	Positive	11	4	15
	Negative	0	69	69
Total		11	73	84

Latex detected 11 cases of pneumococcal meningitis while Binax NOW detected all 11 positive latex for pneumococcal meningitis + extra 4 cases

Sensitivity: 100% (11/11)

Specificity: 94.5% (69/73)



RESULTS

Table 3 Binax Now Test versus Gram Stain

	Gram Staining			Total
Binax		Gram Positive	No bacteria seen (or Gram Negatives)	
	Positive	7	12	19
	Negative	0	110	110
Total		7	122	129

Gram staining identified 7 gram positive organisms. Binax NOW confirmed all 7 to be positive for *S. pneumoniae*.



RESULTS

Table 4 Binax Now Test versus Culture

	CSF Culture			Total
Binax		Positive for S. pneumoniae	Negative for S. Pneumoniae or NG	
	Positive	5	14	19
	Negative	0	110	110
Total		5	124	129

Only 5 CSF cultures grew S. Pneumoniae compared with Binax 19 including all culture positives.

Sensitivity: 100% (5/5)

Specificity: 88% (110/124)



RESULTS

Table 5 Binax Now Test versus Three conventional tests

	Conventional tests			Total
Binax NOW		Positive for S. pneumoniae	Negative for S. pneumoniae	
	Positive	14	5	19
	Negative	0	110	110
Total		14	115	129


14 children were dx with pneumococcal meningitis using the conventional tests. Using Binax NOW 19 cases of S. Pneumoniae including the 14 diagnosed by conventional tests.

Sensitivity: 100% (14/14)

Specificity: 95% (110/115)



DISCUSSION

- The 3 main causative organisms – H. Influenza, S. Pneumonia and Meningococcal.
 - Binax NOW detected 26% more S. Pneumoniae cases than conventional test.
 - Saha et al (2005) showed Binax NOW detected 30% extra pneumococcal meningitis
 - Similar studies done by Marcos et al (2001) and Samra et al (2003) also showed Binax Now to have high sensitivity and specificity.
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DISCUSSION

- Other studies done: a multi – site study by Moisi et al (2009) Binax NOW provided a substantial benefits in Asian sites but not in African sites.
- Another study done in Fiji also did not identify additional cases of *S. Pneumoniae* using Binax.
- Regardless of the differences, Binax NOW increased the efficiency of conventional methods



CONCLUSION

- Binax NOW increases the diagnostic yield for pneumococcal meningitis.
- However, we still need to diagnose and do surveillance of other meningitis pathogens.



RECOMMENDATIONS

1. Binax NOW test be integrated into routine CSF microbiological testing throughout PNG – for the surveillance PCV
2. This study identified the need to improve our CSF culture services in our hospital microbiology lab nation wide
3. Further study needed including serotype testing



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THANKYOU

