

Staphylococcus aureus nasal colonisation in HIV-infected individuals in Botswana



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Background

- Staphylococcus aureus*, an opportunistic pathogen, is a major cause of morbidity & mortality worldwide, including Africa & a leading cause of bacteremia in southern Botswana.
- Individuals with HIV are: at high risk of staphylococcal infection; more likely to suffer severe clinical disease forms, i.e. pneumonia & bacteremia; their diseases are often life-threatening & they may fail to respond to treatment.
- S. aureus* nasal colonisation is a primary risk factor for disease. Determining those at highest risk of colonisation is critical for identifying those at greatest risk of disease.
- Despite the huge burden of HIV disease in southern Africa, data describing the prevalence of *S. aureus* nasal carriage in this part of the world, especially in HIV-infected individuals is sparse.

Objectives

To describe the following in healthy HIV-infected individuals in & around Gaborone:

- The prevalence of asymptomatic *S. aureus* nasal carriage
- The proportion of colonizing *S. aureus* that is resistant to methicillin
- Risk factors for *S. aureus* carriage.

Methods

- In this cross-sectional study *S. aureus* carriage was investigated by collecting 2 nasal swabs, 4 weeks apart, from 418 HIV-positive outpatients attending Princess Marina Hospital (PMH) & Bamalette Lutheran Hospital (BLH) from March to June, 2013.
- Carriers were individuals with at least one swab that tested positive for *S. aureus* by standard microbiologic culture techniques*. Oxacillin E-test was used to determine methicillin resistance (MRSA) & susceptibility (MSSA).

*Microbiologic testing was conducted at the National Health Laboratory in Gaborone & the UT School of Public Health in Houston, Texas.

Results

- S. aureus* was detected in **37.8%** of study participants, of whom 49% were intermittently & 51% were persistently colonised (*S. aureus* identified in either one or both swabs, respectively).
- Carriage was highest in younger participants & females: sharing of personal hygiene (i.e. bath towels, soap & deodorant) was the leading risk factor for carriage.
- Younger individuals, particularly children (<18 yrs) (PR 2.43, p=0.003) & those who accessed care at BLH (PR 2.19, p=0.005), in households with children (PR 1.36, p=0.06) or had elevated viral load (>399 copies/ml) (PR 1.88, P=0.019) were more likely to be persistent carriers.
- All children with <36% CD4 carried *S. aureus* (p=0.048) whereas % CD4 was higher in children who were non-carriers (p= 0.017)
- Carriage of MRSA was identified in **3.11%**, but there was no 'persistent' MRSA carriage.
- MRSA carriers were more likely to be younger, especially <18 yrs (PR 1.88, p<0.001), have eczema (PR 5.72, p=0.001), asthma (PR 3.75, p=0.037), or a history of tuberculosis (PR 3.08, p=0.045).
- MRSA was more common than MSSA in patients who had a history of tuberculosis (PR 3.26, p=0.030) or pneumonia (PR 3.60, p=0.029).
- MRSA was not significantly associated with viral load or CD4 count but was more prevalent in participants on 3rd line antiretrovirals (PR 4.52, p=0.08) or with detectable viremia (PR 1.67, p=0.052).

Conclusions

- Younger individuals & women with HIV, as well as those attending healthcare at BLH or who live in larger households, constitute high-risk groups for *S. aureus* nasal carriage.
- Individuals with persistent viremia or who live with children are most likely to be persistent carriers.
- Children with HIV, especially those with a lower %CD4 cells are at a significantly increased risk of carriage.
- Children & patients with comorbid diseases or a history of respiratory disease constitute major risk groups for MRSA colonisation.
- Being a patient at BLH compared to PMH was a risk factor for *S. aureus* colonisation which requires further investigation.

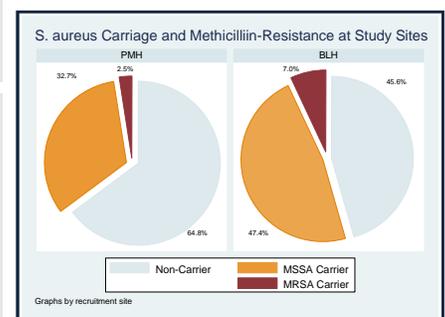
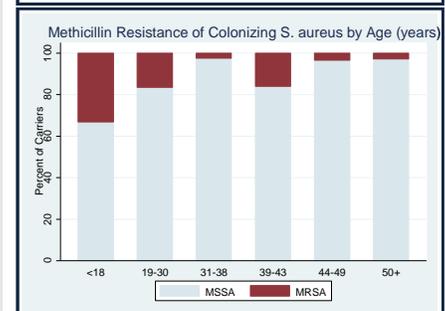
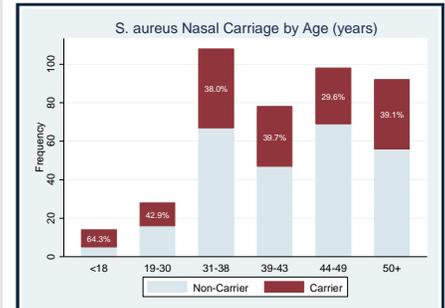


Table 1. Characteristics of Study Population

Characteristic	Count	Percentage (%)
Gender	Male	116 (27.75%)
	Female	302 (72.25%)
Viral Load (copies/ml)	<=399	378 (91.97%)
	>399	33 (8.03%)
CD4 Cell Count (cells/ml)	>=500	205 (49.88%)
	200-499	181 (44.04%)
	<200	25 (6.08%)
	Not on HAART	8 (1.94%)
HAART	1st Line	309 (74.82%)
	2nd Line	80 (19.37%)
	3rd Line	13 (3.15%)
	Custom Line	3 (0.73%)
	Not on HAART	8 (1.94%)

Table 2. Risk Factors for S. aureus Nasal Carriage

Risk Factor	Prevalence Ratio [†] (95% CI)	p-value
Shares Personal Hygiene Item(s)	1.80 (1.15, 2.83)	0.010
Female	1.79 (1.02, 3.16)	0.043
Attends Care at BLH	1.69 (1.19, 2.40)	0.004
Household Size ≥4	1.46 (1.01, 2.11)	0.043
Months since Last Clinical Visit [‡]	1.02 (1.004, 1.03)	0.014
On ARV Line 1, 2 or 3	0.56 (0.32, 1.005)	0.052*
Use of Asthma Inhaler	6.53 (3.34, 12.80)	<0.001*

[†]Each Prevalence Ratio (PR) is adjusted for all other variables in this table and age and years living with HIV; [‡]Contains a cell value ≤ 5 individuals; [‡]Continuous variable: PR should be interpreted as the increase in prevalence per month since last clinical visit

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