The aetiology and contribution of antimicrobial-resistant infections to illness and death among hospitalised adults living with HIV: observations from a retrospective cohort in South Africa

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Introduction

- People with HIV have increased risk of developing antimicrobial-resistant (AMR) infections.
- People with advanced HIV disease (AHD, CD4 count<200 cells/μL) may be more likely to develop AMR infections due to frequent antimicrobial prescriptions.
- However, the burden of AMR in this population remains unknown.

Aim

- To determine the **causes** and **contribution** of **severe & AMR infections** to **illness and death** for **hospitalised adults with HIV** in **Johannesburg, South Africa**.

Methods

- Design: Retrospective cohort,11 Nov 2024 - 11 Nov 2025
- Participants: Adults living with HIV admitted to medical units at 2 tertiary hospitals, Johannesburg
- Demographic/clinical variables were extracted from hospital records and compared between patients with AHD and without AHD (CD4 count>350 cells/μL).
- Categorical and continuous variables were compared using $\chi 2$ or Wilcoxon Rank Sum tests according to distribution.

In Johannesburg, in-patients with **advanced HIV disease** (AHD, CD4<200 cells/μL) frequently **presented with and died** due to **severe infections.** They often received **long antimicrobial courses** and a majority of their blood cultures were **contaminated.** Despite this, AMR pathogens were detected from 33% of their culture-positive samples. In-patients with AHD and AMR infections were **significantly more likely to die** than patients with AHD without AMR infections.

Figure 2: WHO bacterial priority pathogens identified in cultured samples from patients with AHD

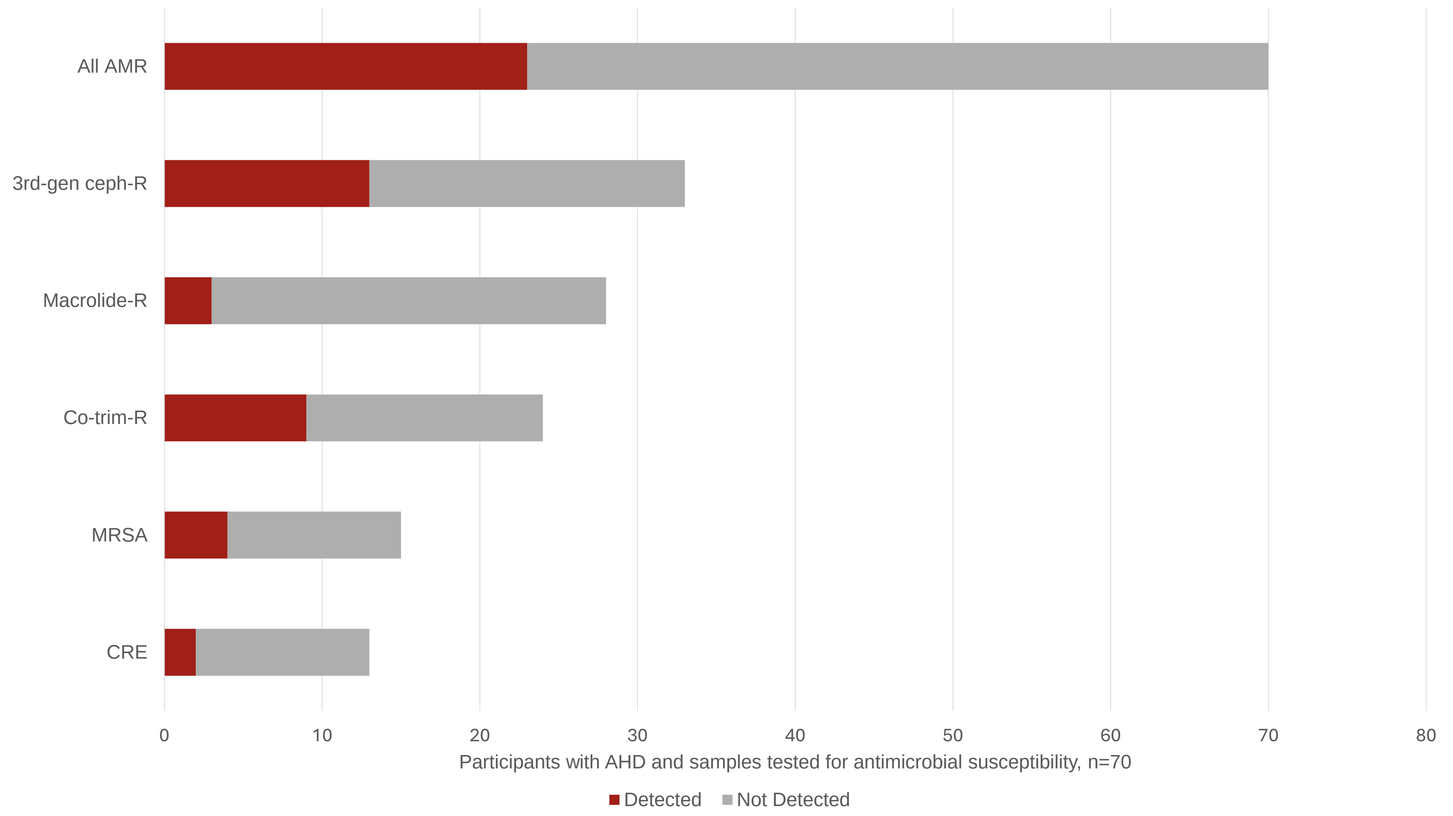


Figure 1: Positive blood cultures in in-patients with AHD (CD4<200 cells/μL), n=123

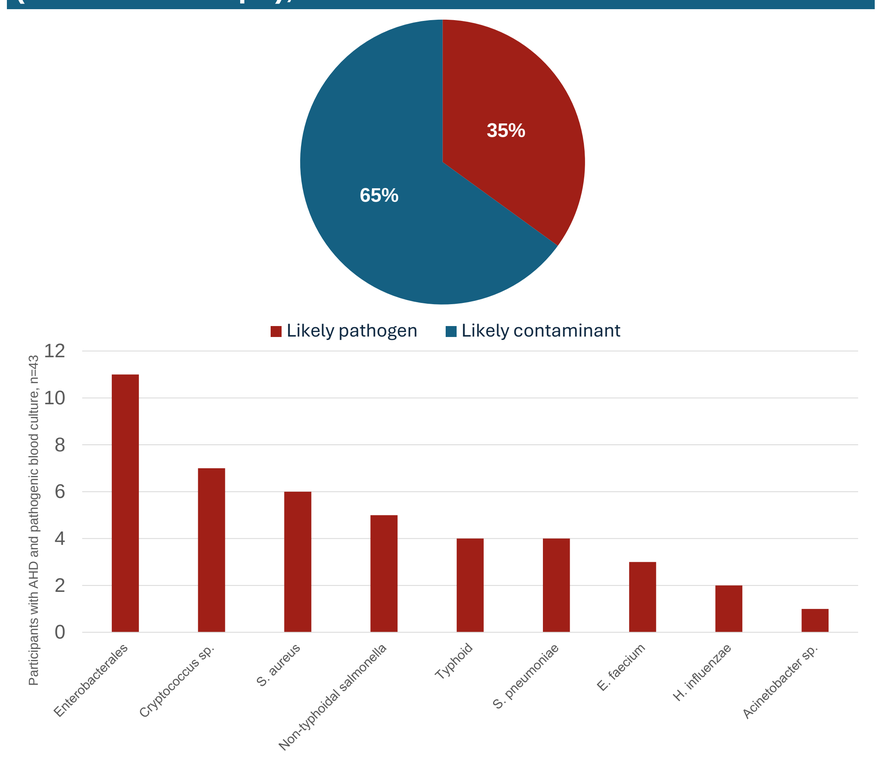
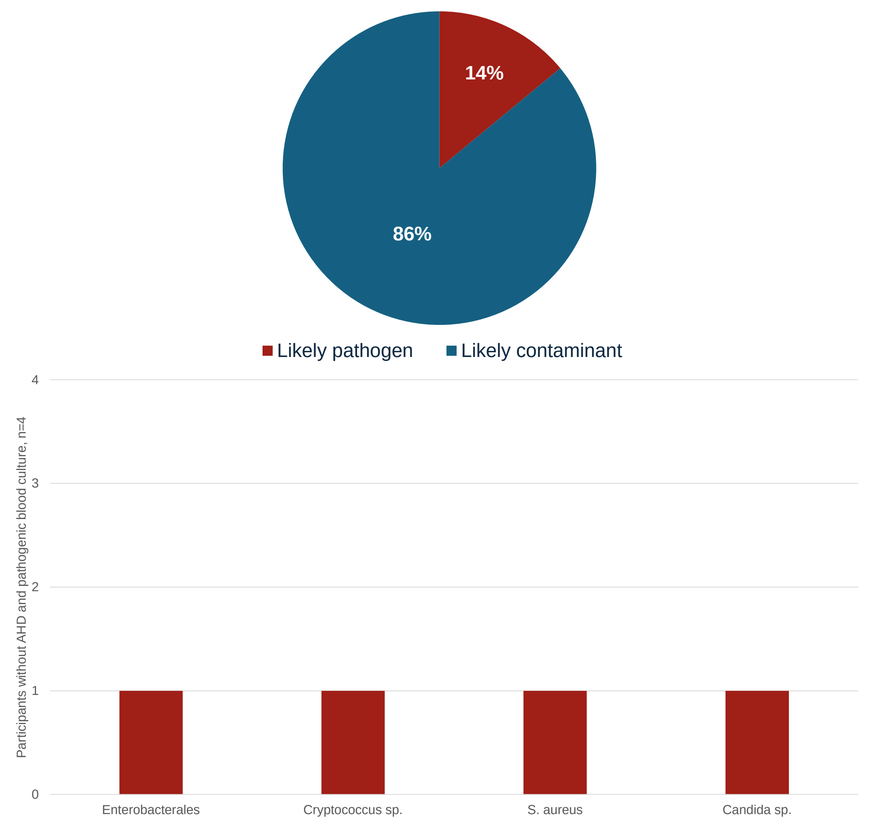


Figure 2: Positive blood cultures in in-patients with HIV but without AHD (i.e. CD4>350 cells/μL), n=28



Results

- In-patients with AHD (versus those without AHD) were more likely to be younger men who presented with and died from infection, received antimicrobial treatment within 72 hours and for over 10 days, and died during hospital admission (Table 1).
- Although 104/151 (69%) of positive blood cultures yielded probable contaminants, pathogenic organisms were identified in a greater proportion of patients with AHD than those without AHD (Figures 1 and 2, 43/598 [7%] vs. 4/365 [1%]).
- World Health Organization (WHO) bacterial priority pathogens were identified in 23/70 (33%) samples tested for antimicrobial susceptibility from patients with AHD:
  - 13/33 (39%) 3rd-generation cephalosporin-resistant organisms, 3/28 (11%) macrolide-resistant organisms, 9/24 (38%) co-trimoxazole-resistant organisms, 4/15 (27%) methicillin-resistant *Staphylococcus aureus*, and 2/13 (15%) carbapenem-resistant Enterobacterales (Figure 2).
- 8/21 (38%) patients with AHD and identified AMR organisms died vs. 84/531 (16%) patients with AHD without identified AMR organisms, p=0.014.

Table 1: Clinical and demographic variables of patients with and without AHD

Total cohort of in-patients with HIV (n=1205)			
Variable	**AHD (CD4<200), n=598**	**Non-AHD (CD4>350), n=365**	**p-value**
Age (median, IQR)	42 (35-50) yrs	47 (39-55) yrs	*<0.001*
Male	324 (54%)	118 (32%)	*<0.001*
CD4 (cells/μL, median, IQR)	65 (23-121)	575 (448-774)	*<0.001*
WHO danger signs*	318 (54%)	120 (33%)	*<0.001*
Admission CRP (mg/dL)	113 (41-208)	37 (6-141)	*<0.001*
Pathogenic blood cultures	43 (7%)	4 (1%)	*<0.001*
Positive CSF cultures	19 (3%)	1 (0.3%)	*<0.001*
Admission days (median)	9 (6-17)	8 (4-13)	*<0.001*
In-hospital death	92 (17%, 95% CIs 14-20%)	18 (5%, 95% CIs 3-8%)	*<0.001*
In-patients with a completed clinical record review (n=572)			
Variable	**AHD (CD4<200), n=341**	**Non-AHD (CD4>350), n=231**	**p-value**
Severe infection deemed to cause admission	259 (76%)	83 (36%)	*<0.001*
Antimicrobial use in first 72h	271 (79%)	107 (46%)	*<0.001*
Antimicrobial use >10 days	81 (29%)	23 (20%)	*<0.001*
Hospital-onset infection	24 (7%)	11 (5%)	0.33
Infection-associated death	54 (16%)	6 (3%)	*<0.001*

*Heart rate>120 beats/minute, temperature>39°C, acute inability to walk, respiratory rate>30 breaths/minute.

Conclusions

- WHO bacterial priority pathogens were common causes of illness among in-patients with AHD in South Africa and those with an AMR infection were more likely to die during admission than those without an AMR infection.
- In-patients with AHD were significantly more likely to receive antibiotics within 72 hours of admission and for longer durations than in-patients without AHD, which could increase their risk of developing AMR. Identification of AMR pathogens among in-patients was limited by high culture contamination rates.
- Antimicrobial stewardship and infection control are essential to improve AMR-associated morbidity among hospitalised people with AHD.

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