

HIV in acute care: a review of the burden of HIV-associated presentations to an Emergency Department

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Objective: To determine the burden of human immunodeficiency virus (HIV) disease and co-infection on a district-level Emergency Department (ED) in KwaZulu-Natal.

Methods: A retrospective chart review was conducted of the case notes of adult medical patients who presented to the ED over a three-month period. Patients presenting with HIV disease and its complications were identified. Patient demographics, disease presentation and severity, investigations and procedures undertaken, and disposition of patients in the HIV-positive cohort were assessed.

Results: 428 of the 861 (49.7%) medical patients presenting to the ED were HIV positive. Some 37% of patients did not know their HIV status. In the HIV-positive cohort, the median age of presentation was 37 years, with almost equal male-to-female distribution. Of the patients seen, 57.5% were referred and 68% of patients presented after hours. In total, 80% of patients were triaged as yellow code. The predominant systems involved were the respiratory and central nervous systems, with pulmonary tuberculosis, community-acquired pneumonia and meningitis being the most common diagnoses. X-rays and laboratory testing were the most common investigations requested. Lumbar punctures, pleural paracentesis and pericardiocentesis were common emergency procedures performed. The majority (89.3%) of patients were admitted to the medical ward. Of the HIV-positive patients, 33% were on anti-retroviral therapy. ED mortality was 1.9%.

Conclusion: In South Africa, very little is known about the ED's ability to cope with the HIV epidemic. This study highlights the significant impact HIV places on the resources of an ED. Strengthening of the primary health care system with a more aggressive approach to HIV testing and ARV initiation may contribute positively to reducing the burden of HIV emergencies and co-morbidities presenting to the ED.

MeSH: Human Immunodeficiency virus (HIV); Emergency Department, South Africa, opportunistic infections; HIV testing

Keywords: Emergency Department, HIV testing, human immunodeficiency virus (HIV), opportunistic infections, presentations, South Africa

Introduction

Human immunodeficiency virus (HIV) is a leading cause of morbidity and mortality in sub-Saharan Africa. More than 33 million adults are living with this pandemic globally.¹ Sub-Saharan Africa accounts for more than 22.5 million people infected with HIV, accounting for 68% of the global total. Southern Africa, which includes several countries, has amongst the highest prevalence of HIV and mortality as a result of HIV and its co-infections.¹

South Africa has a generalised HIV epidemic driven largely by sexual transmission. The spectrum model indicates the prevalence in the adult population of HIV (aged 15–49 years) to be 17.9%.² Estimates in 2012 show there are at least 6.1 million people, predominantly female, from the age of 15 and older living with the disease. HIV is consistently in the top 10 causes of mortality since 2008 and accounts for 3.9% of the total mortality in South Africa.^{1,2}

Of the South African provinces, KwaZulu-Natal has the highest number of HIV-related deaths. Tuberculosis accounts for the largest number of these deaths (15.7%), while HIV directly accounts for 4.4%. HIV-related mortality may well be considerably higher than recorded, as mortality data are extracted from death certificates and HIV as a subsidiary cause of death is not well documented.³

It is postulated that the burden of HIV-related medical emergencies, although currently unknown, is dictated by HIV prevalence, the availability of anti-retrovirals, and the expertise of the primary health system. Despite the widespread introduction of highly active antiretroviral therapy (HAART), patients continue to present with the disease and its complications.

In South Africa, very little is known about the ability of emergency departments (ED) to cope with such a pandemic. There are no major studies evaluating the burden of HIV and HIV-associated emergencies in South Africa. A few studies relevant to HIV and its acute presentations have been conducted in other African countries.^{4–6} These studies documented the demographic profile, symptomology, common anatomical systems affected and hospital length of stay. Only one of the studies was conducted in an emergency department.⁵ Our study aimed to assess the demographic and disease profile of HIV-positive patients presenting to the ED and ED resource utilisation in treating HIV disease and its complications.

Methods

A retrospective chart review was conducted on all adult medical patients presenting to the emergency department of an urban district-level hospital in KwaZulu-Natal from March 2014 to May 2014. A simple descriptive analysis of the data was undertaken.

Inclusion criteria

All adult medical patients who presented to the Emergency Department over the stipulated three-month period.

Patients excluded

Patients presenting with trauma and surgical conditions were excluded. Medical patients below the age of 11 were also excluded, as these patients were not seen in the Emergency Department.

Data collection

Eligible patients were identified from the ED registry and doctors' ward-round books. The required data were then extracted onto a standardised data-collection tool form. The quality of data collected was dependent on the availability and accuracy of case notes. Incomplete documentation and illegible notes were identified.

The following data were collated and analysed: number of HIV-positive patients, HIV-negative patients and patients with unknown status. In the HIV-positive cohort: patient demographics, referral from clinics or ED walk-ins, time of day of presentation (working hours were defined as 08h00 to 16h00 on weekdays), triage acuity, anti-retroviral (ARV) usage, resource utilisation and patient disposition were assessed.

All data were collected and transferred onto an Excel spreadsheet. Statistical analysis was undertaken using Microsoft Excel (Microsoft, Richmond, USA) and STATA Version 13 (Stata Corp, College Station, TX, USA).

Ethics

Ethics approval was granted by the University of KwaZulu-Natal, Ethics committee (Ref. BE018/14) and KwaZulu-Natal, Department of Health (Ref. HRKM 96/14).

Results

From the ED registry, 428 patients with a confirmed diagnosis of HIV were included in the study. The consort diagram is shown as Figure 1.

Table 1 lists the demographic variables studied. The respiratory and central nervous systems were most commonly involved in disease presentation. Figure 2 depicts a comprehensive review of the various systems involved. Table 2 compares the final diagnoses per system in the HIV-positive and HIV-negative cohorts. Some patients presented with multisystem pathology.

ED resource utilisation and emergency procedures performed are depicted in Table 3. Final disposition from the ED is depicted in Table 4.

The causes of mortality were secondary to:

- tuberculosis;
- community-acquired pneumonia;
- meningitis;

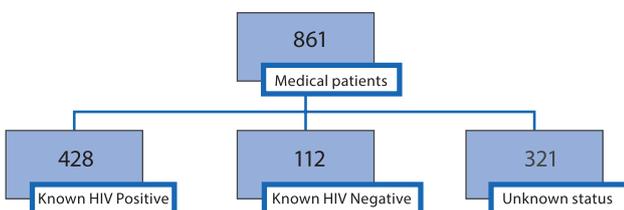


Figure 1: Patient profile.

Table 1: Demographic profile of HIV-positive patients

Demographic variables	HIV positive n (%)	95% CI
Age (years)		
Median (range)	38 (13-89)	
11- ≤ 30	146 (34.1)	29-39
31- ≤ 45	157 (36.6)	32-41
46- ≤ 65	111 (26)	22-30
> 65	14 (3.2)	1.5-4.9
Gender		
M	210 (49)	44-54
F	218 (51)	46-56
Mode of presentation		
Referred	242 (56.1)	51-61
Walk in	186 (43.5)	39-49
Time of arrival		
Working hours	137 (32)	27-36
After hours	291 (68)	63-72
Triage acuity		
Red	7 (1.64)	0.4-2.8
Orange	63 (14.7)	11-18
Yellow	344 (80.4)	77-84
Green	14 (3.3)	1.6-5
No. of patients on ARVs	142 (33.1)	28-38

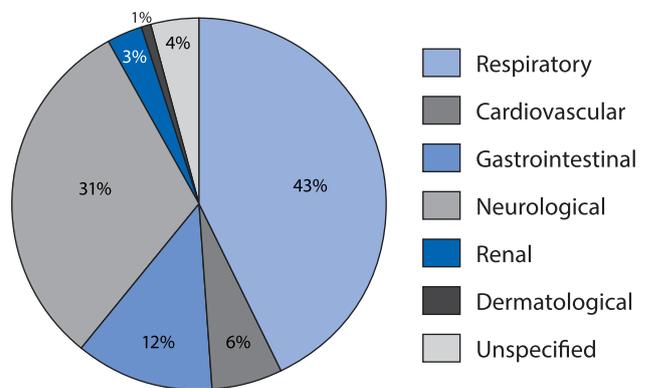


Figure 2: Disease aetiology per system.

- cardiac failure;
- cerebrovascular accident.

Discussion

South Africa currently faces a quadruple burden of disease. HIV and HIV-associated co-infection contributes significantly to this burden of disease.⁷ In this study, approximately 50% of patients were HIV positive. This is above the national and provincial average.⁷ The majority of patients were between 11 and 45 years, in keeping with national statistics.^{1,2} HIV transmission in SA is predominantly via the sexual route, confirming the high rates in the reproductive age group in our study.^{1,2,8} Of note, over 3% of

Table 2: Comparison of disease profile in the HIV-positive and negative groups

Final diagnosis by system involved	HIV positive		HIV negative		p-value
	n	%	n	%	
Respiratory	230	43.1	21	19.1	0.002
Pulmonary tuberculosis	116	21.7	3	2.7	
Pneumocystis Jiroveci pneumonia	13	2.4	0	0	
Community-acquired pneumonia	74	13.9	12	10.9	
Pneumonia (unspecified)	27	5.1	6	5.5	
Neurological	166	31.1	33	30.0	< 0.001
Meningitis*	85	15.9	8	7.3	
Tuberculous meningitis	31	5.8	2	1.8	
Cryptococcal meningitis	23	4.3	0	0	
Acute bacterial meningitis	27	5.1	6	5.5	
Unspecified	4	0.7	0	0	
Seizures	26	4.9	16	14.5	
Psychosis	50	9.4	6	5.5	
Space-occupying lesions	5	0.9	3	2.7	
Gastrointestinal	66	12.4	21	19.1	0.427
Gastroenteritis	44	8.2	12	10.9	
Abdominal pain unspecified	22	4.1	9	8.2	
Cardiovascular	34	6.4	17	15.5	0.026
Cardiac failure	15	2.8	5	4.5	
Cardiomyopathy	2	0.4	0	0	
Pericardial effusion	10	1.9	2	1.8	
Acute coronary syndrome	2	0.4	7	6.4	
Venous thromboembolism	5	0.9	3	2.7	
Dermatological	6	1.1	1	0.9	0.429
ARV induced	4	0.7	–	–	
Other	2	0.4	1	0.9	
Renal	18	3.4	12	10.9	0.281
Renal impairment	16	3.0	5	4.5	
Urinary tract infection	2	0.4	3	2.7	
Other	–	–	4	3.6	
Infections (sepsis unspecified source)	14	2.6	5	4.5	

Note: *Meningitis subdivided into specific aetiology.

patients over the age of 65 were HIV positive. This could be attributed to the use of ARVs, which prolongs life span and slow progress of the HIV disease itself, and possibly due to increased sexual risk behaviour in this age group.^{8,9}

We found an almost equal distribution of HIV disease between males and females. This is in contrast to previous studies that indicated a higher prevalence in females.^{1,2} This may be attributed to more extensive HIV campaigns, de-stigmatisation of HIV, targeted school education programmes and an expanded ARV programme.¹⁰

Most patients were referred from primary and community health centres to the ED. However, a significant number of HIV-positive patients presented directly to the ED. The severity of illness, primary healthcare centres (PHCs) being closed after hours, and patients demanding access to a doctor could have contributed to patients accessing the ED directly in this study.

More than two-thirds of patients presented after hours. This has significant logistical, human resource and financial implications for an emergency department. ED staffing is often reduced after hours; senior staff such as emergency medicine consultants and senior nurses are often not physically present after hours. Ancillary services such as CT scans and laboratory testing are also not readily available after hours. This prolongs ED length of stay and can result in ED overcrowding.

In this study, the following factors could have contributed to increased after-hours ED visits: delays in ambulance transport of patients accepted from clinics; most PHC clinics in the catchment area are closed after hours; patients' perception that there is a shorter ED waiting time after hours.

The ED uses a nurse-driven South African Triage Scale (SATS) as an objective tool to determine severity of illness. The SATS uses physiological and clinical discriminators to assess disease acuity.¹¹

Table 3: HIV-positive cohort: investigations and procedures performed in the ED

Investigations	n = 428 (%)
Blood sample testing	428 (100)
X-ray	405 (94.5)
ECG	85 (19.9)
Ultrasound	75 (17.5)
Lumbar Puncture	86 (20)
Sputum testing	69 (16)
CT scans	44 (10.3)
Pleural paracentesis	20 (4.7)
Pericardiocentesis	5 (1.2)

Table 4: Disposition of patients from the ED

Disposition	n = 428 (%)	95% CI
Discharge	22 (5.14)	3–7.2
Admitted to medical ward	382 (89.3)	86–92
Referred to regional centre	16 (3.8)	2–5.6
Died	8 (1.9)	0.6–3.1

More than 95% of patients were triaged as moderate and high-acuity presentations, indicating the severity of illness presenting to the ED. Respiratory and neurological pathology were the most common systems affected in the HIV-positive cohort.

Opportunistic infections accounted for most of the disease presentations. This compares to other studies, which found that respiratory complaints and opportunistic infections were amongst the most common causes for hospital presentation.^{4–6} In the HIV-negative cohort, the neurological, respiratory and gastrointestinal tract systems were the most commonly involved and more disease presentations were of a non-infective aetiology.

A total of 1 217 investigations and procedures were performed on the HIV-positive cohort. Almost all patients had laboratory and radiological investigations. Lumbar puncture, pleural paracentesis and pericardiocentesis were the common emergency procedures performed in the ED. The need for extensive testing is an indicator of the severity and complexity of disease in HIV-positive patients presenting to the ED.

Our study revealed a higher admission rate (89%) to the general medical wards than previous studies.^{5,6} Furthermore, 3.8% of patients were also transferred to the regional level of care directly from the ED. This further reinforces the severity and complexity of pathology in the HIV-positive population. Over the stipulated period, the ED mortality in the HIV-positive group was 1.9%, slightly higher than the overall ED mortality rate of 1%.

The introduction of HAART in 2004 in the public sector has improved survival rates and quality of life in HIV-positive patients.¹² Previous guidelines recommend HAART be commenced when CD4 counts are less than 350 cells/ μ L, or when a clinical criterion for AIDS-defining diseases is present.¹³ Recent revision of the guidelines recommend initiation of HAART treatment in patients with CD4 less than 500 cells/ μ L¹⁴ and in HIV-positive partners in sero-discordant relationships.¹³ Emphasis is also placed on safe-

sex practices. Despite these extensive roll-out campaigns by local and national health authorities, only a third of patients in this study were on HAART. Analysis of the disease profile in our cohort indicates that more of these patients should have been on ARVs.

Furthermore, 37% of patients who presented to the Emergency Department were not aware of their HIV status. Fear of the test result, risky sexual behaviour and stigmatisation still remain core barriers to HIV testing.¹⁵ With decentralisation of the ARV programme, primary health care clinics and community health care workers are often the first point of contact for HIV testing and education. The primary health care system in the catchment area will have to be reviewed and a more aggressive approach to testing and ARV initiation will need to be instituted. More aggressive testing would identify more patients with HIV-associated diseases and may paradoxically increase the burden of patients presenting to the ED.

In high-prevalence areas, emergency departments may present with an opportunity for HIV testing. For those patients with undiagnosed HIV, and those who are not yet infected, the impact of HIV testing offers immediate clinical benefit as well as educational intervention for preventative measures.¹⁶ In general, whilst routine rapid HIV testing is not considered a key component of emergency care, a targeted, practical framework for EDs is required to integrate HIV testing as one of its core functions.

Limitations

This was a retrospective chart review and relied on the accuracy of the data recorded. Missing patients' records from the ED and hospital registry could have influenced our results, as missing information was not included in the data analysis. The study was performed over a short period in a single centre and was limited to the public sector.

Conclusion

In South Africa, very little is known about the burden of HIV on emergency departments and its ability to cope with the HIV epidemic. HIV-related emergencies place a significant impact on the resources and burden of disease of an ED. Strengthening of the primary health care system with a more aggressive approach to HIV testing and ARV initiation may contribute positively to reducing the burden of HIV-associated emergencies and comorbidities presenting to the ED.

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