1400

# Treatment of HIV and use of HAART in HIV positive patients with acute septic shock

Christopher Polk, MD, Sam Webb, MD, Nigel Rozario, MS, Charity G. Moore, PhD, and Michael Leonard, MD

Carolinas HealthCare System

Carolinas Medical Center
4539 Hedgemore Dr.
Charlotte, NC 28209
(704)331-9669
Fax (704) 688-0035
Christopher.Polk@carolinas.org

## Abstract

**Background.** For HIV patients admitted with sepsis, ARVs are often stopped or held due to myriad concerns including drug interactions, acute renal failure, gastrointestinal dysfunction, or inability to administer crushed medications down feeding tubes. We seek to examine prescription patterns of HAART for HIV positive patients admitted for sepsis in our healthcare system and the impact of HAART prescription on patient outcomes.

**Methods.** We identified HIV positive patients from an institutional database of patients admitted for sepsis within our multi-hospital healthcare system and retrospectively extracted further clinical patient and laboratory information as well as information on HAART prescription by chart review. The impact of HAART prescription and immunologic and virologic parameters of HIV infection on mortality was examined.

**Results.** Inpatient mortality was 35% in HIV patients admitted for sepsis, compared to 17% for all patients with sepsis in our healthcare system. Opportunistic infections were identified in only 25% of patients while 56% had other infections identified. Only 55% of patients had HAART prescribed while inpatient. CD4 count, virologic suppression, APACHE score, presence of an opportunistic infection, admission to a tertiary care hospital, and inpatient prescription of HAART were all predictors of survival.

Table: Factors impacting mortality in HIV patients with sepsis in univariate analysis.

| | Survivors (n=50) | Deaths (n=28) | Odds ratio of survival |
|---|---|---|---|
| Mean baseline CD4 count | 309 cells/mm$^3$ | 64 cells/mm$^3$ | (p<0.01) |
| Virologic suppression (VL<200) | 48% (n=21 of 44) | 22% (n=5 of 23) | 3.3 (p<0.05) |
| Mean APACHE score | 67 (n=32) | 110 (n=17) | (p<0.01) |
| Presence of Opportunistic infection | 18% (n=9) | 39% (n=11) | 0.34 (p<0.05) |
| Tertiary hospital admission | 50% (n=25) | 21% (n=6) | 3.7 (p<0.05) |
| Inpatient HAART prescription | 68% (n=34) | 32% (n=9) | 4.5 (p<0.01) |

In a multivariable analysis both CD4 count and inpatient HAART prescription predicted survival in our cohort with an odds ratio of survival of 3.3 for patients prescribed HAART inpatient compared to their untreated peers.

**Conclusion.** Immunologic and virologic status at time of admission predicted survival in HIV patients admitted for sepsis but prescription of HAART to HIV patients admitted for sepsis may increase survival.

## Background

People living with HIV who are hospitalized with sepsis often have worse outcomes than their peers[1,2,3] due to their HIV-related immune deficit with immune dysregulation.[4]

- HAART is often not given inpatient and ongoing viral replication drives immune activation which is increased at baseline in HIV positive patients.[5,6]
- Activated T cells are known to worsen outcomes in laboratory models of sepsis.[7]
- HAART decreases immune activation and helps normalize inflammation.[6] Thus treatment with HAART in sepsis might be postulated to diminish immune dysregulation and inflammation and improve patient outcomes and has been associated with improved outcomes in some studies.[2,8,9,10,11,12]

## Methods

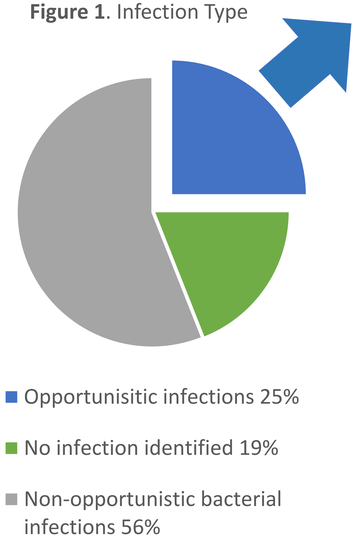
- Retrospective chart review study of HIV positive patients in an institutional database of patients admitted with sepsis
- Univariable and multivariable statistical analysis examined the impact of immunologic and virologic status and HAART prescription on mortality.

## Results

We identified 67 patient over 33 months between January 2014 and September 2016 with available data for study inclusion.

- 35% inpatient mortality rate in patients living with HIV compared to overall 17% inpatient mortality rate for all patients admitted with sepsis in our healthcare system
- Only 25% of patients had opportunistic infections.
- 55% of patients received inpatient HAART

**Figure 1**. Infection Type




| Opportunistic infection | Number of patients (n) |
|---|---|
| Disseminated MAC | 6 |
| CMV disease | 3 |
| Pneumocystis pneumonia | 3 |
| TB | 3 |
| Cryptococcal meningitis | 1 |
| Histoplasmosis | 1 |
| Kaposi's sarcoma | 1 |
| Mycobacterium kansasii | 1 |
| PML | 1 |
| Toxoplasmosis | 1 |
| VZV meningoencephalitis | 1 |

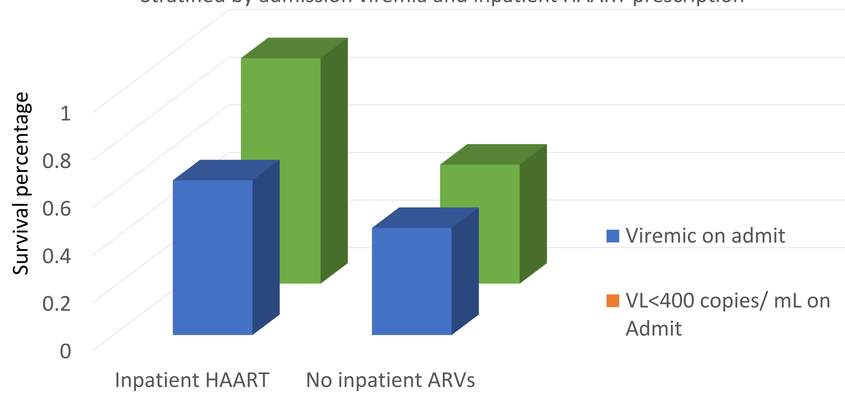
Factors predictive of survival in univariate analysis were:

- Mean baseline CD4 count
- APACHE score
- Admission to a tertiary care hospital
- Virologic suppression at admission
- Presence of an opportunistic infection
- Inpatient prescription of HAART

(see Table in Abstract)

## Results

Figure 2. Survival by group:
Stratified by admission viremia and inpatient HAART prescription




In two separate multivariable analysis:

- **Patients NOT on inpatient HAART had 4 times odds of in hospital mortality controlling for impact of viremia on admission (p=0.01)**
- **Examining impact of immunologic status by CD4 count and inpatient prescription of HAART, patients prescribed HAART had 3.3 times greater odds of survival at discharge (p=0.04)**

## Conclusions

While many variables impacted survival in HIV patients admitted with sepsis including baseline immunologic and virologic status, type of infection, and admission to a tertiary care hospital, prescription of HAART inpatient was predictive of survival at discharge.

- As nearly half of patients did not have HAART prescribed inpatient, insuring more HIV positive patients admitted with sepsis are prescribed HAART may provide an opportunity for improving outcomes.
- Our small population size limited the extent of multivariable analysis in our population, but further studies examining impact of inpatient HAART prescription should be pursued.

## References

1. Silva *et al.* Journal of International AIDS Society 2013; 16: 17344.
2. Kwizera, A *et al.,* Crit Care Research and Practice 2016; Article ID 2610873, 7 pages
3. Moreira J *et al.* Clin Res in HIV/ AIDS 2 (2): 1021
4. Moreira J. Brazil J of Infect Dis 2015; 19 (1) 77-81.
5. Meybeck *et al.* AIDS Research and Therapy 2012; 9:27.
6. Wada N. I. *et al.* AIDS 2015; 29(4) 463-71.
7. Kasten KR *et al.* Shock 2010; 34(4): 327-36.
8. Amancio EF *et al.* Int J STD AIDS 2012; 23: 692-97.
9. Morquin D *et al.* Ann Intensive Care 2012; 2:25.
10. Adlakha A *et al.* Int J STD AIDS 2011; 22: 498-504.
11. Vargas-Infante YA *et al.* Arch Med Res 2007; 38: 827-833.
12. Casalino E *et al.* AIDS 2004; 18: 1429-33.