Characteristics and Outcomes of Patients with Pneumocystis Jirovecii Pneumonia Who Were Initiated on Antiretroviral Therapy While Hospitalized: A Preliminary Study

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INTRODUCTION

HIV is a growing epidemic in the United States where there are about 50,000 newly diagnosed HIV cases per year since the mid-1990s. HIV positive patients with a deficient immune system are prone to many infections, including a host of opportunistic infections. An example of one of these infections includes Pneumocystis jirovecii pneumonia (PJP), which is the most frequent and severe respiratory infection commonly found in HIV patients, and accounts for one quarter to one third of all ICU admissions (1). 15% of PJP cases present with manifestations of AIDS. In fact, a 20% mortality rate at 3 months occurs despite effective PJP prophylaxis and steroid use in patients with mild to severe hypoxemia (2). In the U.S., the incidence of PJP cases among hospitalized HIV/AIDS patients is around 9 percent. Approximately, 90 percent of cases involved in patients with CD4 count less than 200 cells/mm.

There have been conflicting data regarding when to start HAART therapy in patients with Pneumocystis jirovecii pneumonia. The recommendations are to initiate HAART within two weeks of PJP treatment. There have been reports stating that starting HAART early can help the outcome of patients with PJP and there have been data showing early initiation of HAART can worsen the outcome (3,4). Since there has been conflicting data, the goal of this study is to evaluate which group of HIV patients and Pneumocystis jirovecii pneumonia will benefit from early initiation of HAART.

MATERIALS & METHODS

This is a retrospective study of patients admitted with PJP pneumonia between between January 1, 2007, to December 31, 2015, at Vidant Medical Center, in Greenville, NC. Patients who were 18 or older with confirmed diagnosis of HIV based on laboratory test and either suspected or confirmed PJP were included in the analysis. We collected demographic, laboratory and clinical information.

RESULTS

Table 1. Unweighted Characteristics of Patients with Suspected and Confirmed Pneumocystis Jiroveci Pneumonia by Highly Active Anti-Retroviral Therapy (HAART) Use.

Characteristics	HAART use[a] (%) n = 25	No HAART Use (%) n = 39	*P*-value
Sociodemographic			
Age, years, mean (range)	45.3 (21 – 64)	42.8 (25 – 74)	*P*=0.789
Male biology	20 (80.0)	27 (67.2)	*P*=0.397
Race/ethnicity*			*P*=0.029
Black/African-American	17 (68)	36 (92)	
White	6 (24)	3 (8)	
Other	2 (8)	0 (0)	
History of Tobacco Use	14 (58)	26 (67)	*P*=0.593
Medical history			
HIV risk factor			
GBMSM/W	7 (30)	7 (19)	*P*=0.356
Intravenous drug use	4 (17)	2 (5)	*P*=0.190
Heterosexual sex*	13 (59)	32 (87)	*P*=0.026
New HIV diagnosis on admission	13 (54)	14 (37)	*P*=0.200
Vital Signs			
Temperature, mean (SD)	99.0 (1.9)	100.0 (1.8)	*P*=0.533
Heart rate, mean (SD)	97.3 (21.4)	104.9 (18.7)	*P*=0.812
Respiratory rate, mean (SD)	24.0 (6.6)	23.5 (5.7)	*P*=0.267
MAP, mean (SD)*	88.0 (12.5)	30.0 (17.4)	*P*=0.018
Clinical and laboratory			
CD4 (cells x 10^6/l), median (range)	14 (0 – 167)	30 (0 – 200)	*P*=0.549
HIV viral load (log copies/ml), median (range) *(n=59)*	5.4 (2.6 – 6.7)	5.2 (2.9 – 6.4)	*P*=1.000
Albumin, mean, (SD)*	3.2 (0.8)	2.79 (1.3)	*P*=0.043
WBC, mean (SD)	7.8 (5.1)	6.9 (3.2)	*P*=0.501
Hematocrit, mean (SD)	33.1 (5.4)	33.4 (7.2)	*P*=0.999
LDH (U/l), median (range) *(n=55)*	572 (0 – 2092)	386 (0 – 910)	*P*=0.164
Pa02 (mmHg), median (range)*	85 (43 – 323)	83 (47 – 206)	*P*=0.044
Day of ICU admission, median (range)	4 (0 – 16)	0.5 (0 – 3)	*P*=1.000
APACHE II score, mean, (SD)	15.2 (5.4)	10.7 (4.7)	*P*=0.169
ICU Admission* **			*P*=0.000
Yes	15 (60.0)	4 (10.3)	
No	10 (40.0)	35 (89.7)	
COPD *(n=63)*			*P*=0.086
Yes	7 (29.2)	4 (10.3)	
No	17 (70.8)	35 (89.7)	
Complications			
Mechanical ventilation***	12 (48.0)	4 (10.5)	*P*=0.001
No mechanical ventilation	13 (52.0)	34 (89.5)	
Therapy/Medication			
Steroids administered*	24 (96.0)	28 (71.8)	*P*=0.020
No steroids administered	1 (4.0)	11 (28.2)	
Survival			*P*=0.137
Died in hospital	6 (24.0)	3 (7.7)	
Survived to hospital discharge	19 (76.0)	36 (92.3)	

[a] Use of HAART started upon admission to the hospital. GBMSM/W, gay, bisexual, or other men who have sex with other men and women; APACHE II, Acute Physiology and Chronic Health Evaluation; LDH, lactate dehydrogenase; Pa02, partial pressure of oxygen in arterial blood; MAP, mean arterial pressure; WBC, white blood cell count; COPD, chronic obstructive pulmonary disease.

*P <0.05; ** P < 0.01; *** P < 0.001

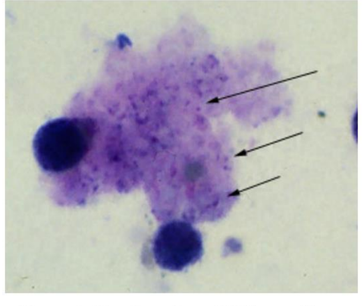


Figure A: Trophozoites of *P. jirovecii* in a bronchoalveolar lavage (BAL) specimen from an AIDS patient, stained with Giemsa.

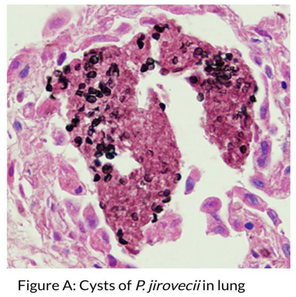


Figure A: Cysts of *P. jirovecii* in lung tissue, stained with methenamine silver and hematoxylin and eosin (H&E). The walls of the cysts are stained black; the intracystic bodies are not visible with this stain.

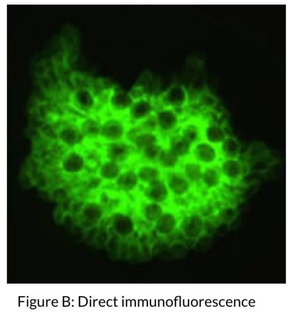
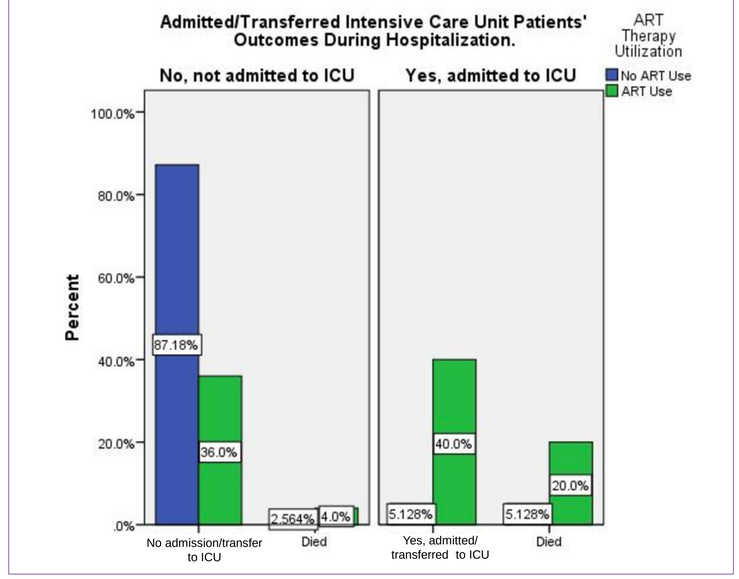


Figure B: Direct immunofluorescence antibody stain using monoclonal antibodies that target *Pneumocystis jirovecii.* This image is from a bronchoalveolar lavage (BAL) specimen from a patient with a malignancy. Image

Photos courtesy of CDC website

RESULTS



DISCUSSION and CONCLUSION

PJP is a serious infection that is seen in HIV patients. Among the 64 patients included in this study, 25 [39%] were in the ART group, 19 total patients [27%] required intensive care unit (ICU), and 16 [25%] required mechanical ventilation (MV). There were no differences in age, gender, race/ethnicity, and smoking between the ART and No ART groups. A higher percentage of patients in the ART group received corticosteroids (96% vs 72%; p=0.020), required MV (48% vs.10%; p=0.001), and ICU admission (60% vs. 10%; p<0.001) than in the No ART group respectively. There were no differences in survival among the ART and No ART groups and no differences in regards to ICU stay (4 vs 0.5 days; P = 1.000) and APACHE II scores (15.2 vs 10.7; P = 0.17). A total of 9 (14%) patients died while in the hospital 6 (24%) in ART vs. 3 (8%) in No ART (p=0.137)

Patients with PJP pneumonia who were initiated on ART while inpatient were more likely to require ICU admission, corticosteroids, and mechanical ventilation. There were no differences in APACHE II scores, CD4 count and mortality between those who initiated ART while inpatients vs. those who did not. Further studies with larger sample size are needed to evaluate the association between inpatient initiation of ART and survival.

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