Healthcare Associated Infections in Intensive Care Units HIV Positive Patients

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Abstract: Problem statement: Healthcare Associated Infections (HAI) are frequent and important complications, most commonly affecting hospitalized patients in intensive care units. Hospital average length of stay is usually 5-10 days higher in these patients. In HIV positive/Aids patients HAI vary from 8,7 and 15% in prevalence. The aims of this study was to compare HAI data from HIV positive (HIV+) and HIV negative (HIV-) patients admitted to the adult Intensive Care Unit (ICU) of an Infectious Disease reference hospital located in the state of Ceara, Northeast Brazil. Approach: This was a retrospective study of all patients admitted to the Hospital Sao Jose ICU, from January 2006 to December 2007, which were diagnosed with a HAI. Results: During the study period, 144 cases of HAI were diagnosed in 106 patients. Sixty were HIV- and 46 HIV+. Eighty nine (62%) HAI occurred in the HIV-group. The use of invasive devices, such as mechanical ventilation, central-line catheter and vesicle catheter, was identified in 114 HAI. Pneumonia was the most prevalent HAI (83/144-80%), almost all of them related to mechanical ventilation (81/83-96%). Density of incidence of ventilator-associated pneumonia was higher in HIV+ (HIV-: 19.9 Vs. HIV+: 24.0-p = 0.38), while the density of incidence of catheter associated urinary tract infection was higher in HIV- (HIV-: 4.5 vs. HIV+: 1.6-p = 0.09), although without statistical significance. Conclusion/Recommendation: HAI were similar in both groups. Therefore our data suggest that, HAI prevention precautions should be intensively used in all patients, especially in ICU ones, in order to minimize HAI risks and serious consequences.

INTRODUCTION

Healthcare Associated Infections (HAI) are frequent and important complications, most commonly affecting hospitalized patients. Hospital average length of stay is usually 5-10 days higher in these patients (Rosenthal et al., 2010; Kubler, 2011).

In Brazil, approximately 5-15% of hospitalized patients are diagnosed with a nosocomial infection (Machado et al., 2001). Patients in Intensive Care Units (ICU) are at 5-10 higher risk of being affected by a nosocomial infection (Trilla, 1994). Data from the Brazilian Surveillance and Control of Pathogens of Epidemiological Importance (SCOPE) study showed that 49% of the nosocomial Blood Stream infections (BSI) occurred in ICU patients (Marra et al., 2011).

In HIV positive/Aids patients HAI vary from 8, 7 and 15% in prevalence. Aids related immunosuppressant, prolonged hospital stay, use of invasive device and routine administration of antibiotic prophylaxis for opportunistic infections probably increase these patients’ risk for presenting with HAI (Goetz et al., 1994; Frank et al., 1997; Stroud et al., 1997; Petrosillo et al., 1999).

Considering all settings, Urinary Tract Infections (UTI) is the most prevalent HAI. In the ICU setting, however, Ventilator-Associated Pneumonia (VAP) and BSI are the first and second more prevalent infections.
respectively (Wenzel, 1995; Pittet and Wenzel, 1995). In HIV/AIDS patients, catheter related BSI are increasing in frequency and correspond to 24-44% of all the HAI in this group (Goetz et al., 1994; Frank et al., 1997; Petrosillo et al., 1999; Padoveze et al., 2002; Petrosillo et al., 2003).

The presenting study was conducted to compare HAI data from HIV positive (HIV+) and HIV negative (HIV-) patients admitted to the adult ICU of an Infectious Disease reference hospital located in the state of Ceara, Northeast Brazil.

MATERIALS AND METHODS

This is a transversal, retrospective study. All patients admitted to St. Joseph Hospital ICU, from January 2006 to December 2007, which were diagnosed with a HAI, were included.

St Joseph Hospital is a public entity, located in the city of Fortaleza and is reference for infectious disease treatment in the state of Ceara. It is a 118 bed hospital with 7 of them in the ICU.

Data was collected from the Infection control team registers and from patients’ charts. For diagnosing HAI we used the National Nosocomial Infections Surveillance System/Centers for Disease Control (NNISS/CDC) definition criteria.

The following variables, regarding the patients’ history, were collected from the infection control team registers: gender, age and dates of admission, discharge and first HAI, number of HAI, use of invasive devices, infection site, HIV serology and clinical outcome. Data from the ICU were also collected: patient-days, central line-days, urinary catheter-days, ventilator-days.

The following variables were collected from patients’ charts: leukocyte count, neutrophil percentage, APACHE II score (Acute Physiology and Chronic Health Evaluation II). When the patient was HIV+, CD4 count was also collected: patient-days, central line-days, urinary catheter-days, ventilator-days.

For statistical analysis we used STATA 9.0 program. Chi-square, Exact Fischer and Man-Whitney tests were used for univariate and vicariate analysis. T-student test was used to compare HIV+ and HIV- groups.

This protocol was evaluated and approved by the hospital’s Ethic in Research Commission and it is in conformity with the Brazilian National Health Council Resolution 196/96.

RESULTS

During the study period, 144 cases of HAI were diagnosed in 106 patients. Sixty were HIV- and 46 HIV+. Eighty nine (62%) HAI occurred in the HIV- group.

The most prevalent admission diagnosis in the HIV- group was Tetanus (24/60 patients-40%), while in the HIV+ group, respiratory infection was the most frequent one (33/46-72%). Table 1 shows the clinical, epidemiological and laboratorial characteristics of the studied patients.

The use of invasive devices, such as mechanical ventilation, central-line catheter and vesical catheter, was identified in 114 HAI. Pneumonia was the most prevalent HAI (83/144-80%), almost all of them related to mechanical ventilation (81/83-96%). Table 2 shows the distribution of HAI associated with invasive Devices Utilization (DU) in both groups.

HAI rates, per 1000 patient-days, were equivalent in both groups (31 HIV+ Vs 30, 8 HIV-; p = 0, 69). Table 3 and 4 describe HAI rates associated with DU and DU rates in each group.

Only 8 patients had the CD4 count registered on chart. Average CD4 count was 158 cels mm$^{-3}$ (min-max: 9-254). Only 11 patients could be classified using the CDC HIV infection staging criteria then: 8 were C3 and 3 were B1.

Table 1: Clinical, epidemiological and laboratorial characteristics of patients admitted to St Joseph Hospital ICU $^a$, from January 2006 to December 2007

| Characteristics | HIV negative (n = 60) | HIV positive (n = 46) | p |
|-----------------|----------------------|----------------------|---|
| Gender: Male (%) | 44 (73.3) | 38 (82.6) | 0.25 |
| Female (%) | 16 (26.7) | 8 (17.4) |
| Age (average-years) | 51.000 | 41.0 | 0.00 |
| Apache (average) | 17.600 | 18.0 | 0.87 |
| ALOS$^b$ in ICU (average-days) | 26.800 | 20.4 | 0.02 |
| Time to 1st HAI diagnose (Average-days) | 11.800 | 10.7 | 0.72 |
| Leukocyte count (average-cels/dl) | 9.483 | 5.961 | 0.00 |
| Neutrophil (average-%) | 64.8000 | 64.9 | 0.73 |
| Number of HAIs: | 40 (66.7) | 41 (89.1) | 0.01 |
| Clinical outcome: Discharge (%) | 24 (40.0) | 13 (28.9) | 0.09 |
| Death (%) | 32 (55.2) | 32 (71.1) |

$^a$ICU = Intensive Care Unit; $^b$ALOS = average length of stay; HAI = healthcare associated infection

Table 2: Distribution of HAI associated with invasive devices utilization in patients admitted to St Joseph Hospital ICU $^a$, from January 2006 to December 2007

| HAI | HIV negative (n = 60) | HIV positive (n = 46) | Prevalence ratio | 95% CI | p |
|-----|----------------------|----------------------|-----------------|-------|---|
| VAP$^c$ | 47 (58%) | 34 (42%) | 0.85 (0.36-2.09) | 0.70 |
| CLAB$^c$ | 13 (62%) | 08 (28%) | 0.77 (0.25-2.24) | 0.60 |
| CAUTI$^c$ | 10 (77%) | 02 (23%) | 0.23 (0.02-1.18) | 0.06 |

$^a$ICU = Intensive Care Unit; $^c$VAP = Ventilator Associated Pneumonia; $^c$CLAB = Central-Line Associated Primary Bloodstream infection; $^c$CAUTI = Catheter Associated Urinary Tract Infection

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 Unfortunately, our study had an important limitation associated with the development and fewer HAI. In our study VAP was the most frequent HAI in both studied groups. The fact that the majority of HIV+ patients were admitted to the ICU with respiratory infections could explain this finding.

The transversal design and the difficulty in collecting CD4 count data from HIV+ patients’ chart were the principal study limitations and made it impossible to evaluate the CD4 level impact on HAI. Nevertheless, we believe that this study was very important because it demonstrated that HAI are frequent in severely ill patients, in spite of their HIV status.

**DISCUSSION**

ICU patients’ higher risk of HAI has been well demonstrated in many studies (Weinstein, 1991; Esen and Leblebicioglu, 2004). Others show that HIV positive patients are at increased risk for HAI (Stroud et al., 1997). However our data showed no difference between HIV positive and HIV negative patients nosocomial infection rates. Indeed, HIV+ patients had a shorter ICU stay (ALOS) and a tendency to have a smaller number of HAI. Believe that this study was very important because it demonstrated that HAI are frequent in severely ill patients, in spite of their HIV status.

**CONCLUSION**

In conclusion, our data show that HAI occurs in ICU patients, independently of their HIV status. It also suggests that HAI prevention precautions should be intensively used, especially in ICU patients, in order to minimize HAI risks and serious consequences.

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