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ORIGINAL ARTICLE

Outcome of Hospital Admissions in HIV-infected Children at the Korle Bu Teaching Hospital, Accra, Ghana

Résultats des admissions hospitalières, chez les enfants infectés par le VIH à l'hôpital universitaire de Korle Bu, de Accra, Ghana

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ABSTRACT

BACKGROUND: **The burden of paediatric HIV infection remains high in resource-poor settings. Information on morbidity leading to hospitalisation as well as outcome is limited.**

OBJECTIVE: **The objective of this study was to determine the reasons for hospital admissions of HIV-infected paediatric patients to a tertiary teaching hospital and the outcome of these admissions.**

METHODS: **Retrospective chart review of inpatient records of all HIV-infected children aged 0 to 13 years admitted to the paediatric unit at Korle-Bu Teaching Hospital from 30 June 2007 to 30 June 2008 was performed. Abstracted data included age, gender, weight, presenting conditions, diagnosis, duration of hospitalisation, antiretroviral treatment, and outcome.**

RESULTS: **A total of 102 admissions occurred among 76 children. The mean age of the children was 4.5 ± 3.79 years and 42 (55%) were males. HIV diagnosis was made during hospitalisation in 23 (30%) of the 76 patients. Overall, 55 (64%) of the 76 patients had a weight for age of < 2nd percentile and 67% were not on antiretroviral therapy at time of admission. Of the 102 admissions, the predominant diagnosis included pneumonia (40%), gastroenteritis (24%), pulmonary tuberculosis (22%), and/or malaria (19%). Death occurred in 12 of the 102 admissions. Age, gender, and admitting diagnosis were not associated with death.**

CONCLUSIONS: **Failure to thrive and common prevalent infections were the predominant reasons for hospitalisation for paediatric HIV/AIDS patients in Accra. Hospitalisations with these conditions should prompt early HIV testing. Efforts should be intensified to prevent maternal to child transmission of HIV infection. WAJM 2010; 29(6): 379–383.**

Keywords: **Paediatrics HIV infection, hospitalisation, mortality, morbidity.**

RÉSUMÉ

CONTEXTE: *Le fardeau de l'infection HIV chez les enfants reste élevé dans les milieux défavorisés. Les informations sur la morbidité liée à l'infection à HIV conduisant à l'hospitalisation chez les patients de bas niveau socio-économique ; ainsi que les résultats qui en découlent restent limitées.*

OBJECTIFS: *L'objectif de cette étude était de déterminer les raisons, ainsi que les résultats des hospitalisations, chez les enfants infectés par le VIH dans un hôpital universitaire.*

MÉTHODES: *Une analyse rétrospective des dossiers de tous les enfants infectés par le VIH âgés de 0 à 13 ans, admis à l'unité pédiatrique de l'hôpital universitaire de Korle-Bu, du 30 Juin 2007 au 30 Juin 2008 a été effectuée. Les données recueillies étaient l'âge, le sexe, le poids, les motifs d'admissions, le diagnostic, la durée d'hospitalisation, le traitement antirétroviral, et les résultats.*

RÉSULTATS: *Un total de 102 admissions était noté chez 76 enfants au cours de la période d'étude. L'âge moyen des enfants était de 4,5 ± 3,79 années. Les garçons étaient au nombre de 42 (55%). Le diagnostic de l'infection à VIH était fait lors de l'hospitalisation chez 23 (30%) des 76 patients. Dans l'ensemble, 55 patients (64%) avaient un poids inférieur pour leur âge, au deuxième percentile et 67% des enfants n'étaient pas sous traitement antirétroviral au moment de l'admission. Sur les 102 admissions, le diagnostic le plus fréquent était par ordre décroissant les pneumonies (40%), les gastro-entérites (24%), la tuberculose pulmonaire (22%), et / ou le paludisme (19%). Un décès était survenu dans 12 cas (11,8%) des 102 admissions. L'âge, le sexe ainsi que le diagnostic d'admission n'étaient pas associés à un risque accru de décès.*

CONCLUSIONS: *Le retard staturo-pondéral ainsi que les infections récidivantes étaient les principales raisons des hospitalisations d'enfants infectés par le VIH / SIDA à Accra. Ces motifs d'admissions devraient inciter au dépistage précoce de l'infection au VIH. Des efforts supplémentaires doivent être déployés pour prévenir la transmission mère-enfant du VIH.* ***WAJM 2010; 29 (6): 379–383.***

Mots-clés: *Infection pédiatrique par le VIH, hospitalisation, mortalité, morbidité.*

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Abbreviations: AIDS, Acquired immune deficiency syndrome; **ART,** Antiretroviral therapy; **ARV,** Antiretroviral; **HIV,** Human immunodeficiency virus; **KBTH,** Korle-Bu Teaching Hospital; **PCP,** Pneumocystis carinii pneumonia; **PMTCT,** Prevention of mother-to-child transmission.

INTRODUCTION

Morbidity and mortality in children infected with human immunodeficiency virus (HIV) remains a major problem in resource-limited countries. Estimates indicate that there are 22 million people living with HIV in sub-Saharan Africa. Of those, an estimated 1.8 million children are living with HIV with 240,000 estimated deaths.[1] Although programmes for the prevention of mother-to-child transmission of HIV are being scaled up at all levels of care, the need to improve HIV/AIDS care, treatment, and counselling for infected children remains critically important.[2] Challenges to optimal care and treatment in sub-Saharan Africa include limited resources, staff, and laboratory support.[3] The human professional capacity for delivering HIV/AIDS care is constrained across much of sub-Saharan Africa, where per capita numbers of physicians and nurses are only 1% to 2% of those of the United States.[4]

Unlike adults, children often experience a rapid progression of HIV disease soon after infection because of their immature immune system and persistently high level of plasma virus. Rapid progression to AIDS or death is common in infancy with most infants presenting with oral candidiasis, chronic parotitis, recurrent respiratory tract infections, diarrhoea, and failure to thrive.[5] Children usually are identified as having HIV infection only when they become ill; the majority die without a chance at therapy.[4] If undiagnosed or untreated, HIV and HIV-related diseases in infants and children can have severe developmental consequences such as growth retardation and neuro-development delay.[6] Knowledge of disease-specific HIV prevalence and of the patterns of HIV-related diseases is crucial for successful early case management, cost of care and treatment as well as for policy development and planning.

The provision of antiretroviral therapy in the public sector in Ghana began in 2003. Latest estimates show that approximately 260,000 people are living with HIV/AIDS, of whom 19,000 (7.3%) are children aged 0-14 years.[7] The Korle Bu Teaching Hospital (KBTH) in Accra, Ghana was one of the first pilot sites to provide therapy and treatment to HIV-infected paediatric patients. At the KBTH, paediatric patients receive free CD4+ testing, subsidized antiretroviral treatment, and treatment for opportunistic diseases. The national programme is currently being expanded to increase the number of sites throughout Ghana that provide testing and treatment for people living with HIV/ADS.

To our knowledge, no studies have examined the reason for hospitalisation of paediatric HIV-infected patients, the outcome of these admissions, and the factors associated with poor outcome (death or prolonged hospital stay) in Ghanaian children. Thus, the primary objective of this study was to determine the common reasons for hospital admissions of HIV-infected paediatric patients to a tertiary teaching hospital and the outcome of these hospital admissions.

SUBJECTS, MATERIALS, AND METHODS

A retrospective review of inpatient medical records of patients between the ages of 0 and 13 years with confirmed or presumptive HIV diagnosis admitted to KBTH from July 1, 2007 to June 31, 2008 was performed. The Institutional Review Boards of the University of Ghana Medical School and Brown University approved the study.

Demographic information, presenting conditions, clinical features, duration of illness, vital signs, antiretroviral therapy (ART), and outcome were abstracted using a standardized form. Death certificates were reviewed for causes of death. CD4 count information was gathered if such data were available within a 3-month window period from the date they were admitted to the hospital.

Statistical Analysis

Descriptive statistics were performed using Microsoft Excel and comparative analysis by Stigma software (Systat, San Jose, CA). The factors associated with outcome of hospitalisation were assessed by t-test (continuous data) or Chi-square test (categorical data). A p-value < 0.05 is considered to be significant.

RESULTS

Study Population

During the one-year study period, 102 hospitalisations occurred among 76 HIV-infected children. Of the 76 HIV-infected children, the mean age was 4.7 ± 3.7 years, 42 (55%) of the patients were males and the mean body weight at admission was 13.59 ± 8.19 kilograms, (Table 1). HIV diagnosis was made during hospitalisation in 23 (30%) of the 76 patients. The majority of the children in our study had advanced HIV disease with 79% of them presenting with WHO stage 3 or 4 disease. Sixty-seven (66%) of the 102 admissions were not on ART at the time of hospital admission.

Clinical Characteristics at Admission

The median number of admissions per child was one (range, 1–4), with 19

Table 1: Baseline characteristics of HIV-infected children at the time of first admission

Characteristic	Result
Mean (SD) age (years)	4.7 (3.7)
Gender N(%)	
Male	42 (55.3)
Female	34 (44.7)
Mean (SD) body weight (kg)	13.0 (6.9)
Mean (SD) height (cm)	97.7 (23.1)
HIV diagnosed after admission N(%)	
No	23 (30.3)
Yes	53 (69.7)
Weight for age N(%)	
<2nd	46 (60.5)
2^{nd}–25^{th}	24 (31.6)
25^{th}–50^{th}	5 (6.6)
50^{th}–75^{th}	1 (1.3)
WHO stage N(%)	
1	5 (6.6)
2	11 (14.5)
3	36 (47.4)
4	24 (31.6)
Antiretroviral therapy N(%)	
No	48 (63.2)
Yes	28 (36.8)
Mean (SD) white cell count (x 10^3 cells/μL)	12.0 (7.4)
Mean (SD) PCV (%)	28.0 (7.0)
Mean (SD) lymphocyte count (x 10^3 cells/μL)	5.7 (6.3)
Mean (SD) platelet count (x 10^3 cells/μL)	361 (286)
Mean (SD) CD4+ T-lympocyte count (cells/μL)	649 (532)

Table 2: Clinical characteristics at admission of HIV-infected children hospitalized at Korle-Bu Teaching Hospital over a one-year period (N = 102)

Characteristic	Number (%)
Admitting Diagnosis	
Pneumonia	41 (40.2)
Gastroenteritis	24 (23.5)
Pulmonary Tuberculosis	22 (21.5)
Malnutrition	21 (20.6)
Malaria	19 (18.6)
Other	32 (31.4)
Symptom	
Fever	70 (68.6)
Cough	55 (53.9)
Vomiting	51 (50.0)
Diarrhea	35 (34.3)
Shortness of Breath	16 (15.7)
Weight for Age By Percentile	
<2nd	65 (63.7)
2nd–25th	28 (27.5)
25th–50th	5 (4.9)
50th–75th	3 (2.9)
>75th	0 (0.0)
Antiretroviral therapy	
None on Admission	67 (65.6)
AZT, 3TC, NVP	10 (9.8)
AZT, 3TC, EFV	15 (14.7)
d4T, 3TC, EFV	2 (2.0)
ABC, 3TC, AZT	6 (5.9)
ABC, DDI, NVF	2 (2.0)

AZT, zidovudine; 3TC, lamivudine; NVP, nevirapine; EFV, Efavirenz; ABC, abacavir; DDI, didanosine

Table 3: Characteristics at Admission among HIV-infected Children by Outcome Status

Variable	Number (%) Discharged (n = 90)	Died (n = 12)	*P* value
Median age (IQR)	3.0 (1.5 – 8.0) years	4.0 (0.8 – 7.8) years	0.938
Gender			0.841
Male	51 (87.9)	7 (12.1)	
Female	39 ((88.6)	5 (11.4)	
Median body weight (IQR)	11.3 (7.2 – 18.0) kg	10.5 (4.4 – 16.3) kg	0.304
Weight for age			0.323
<2nd	55 (84.6)	10 (15.4)	
2nd-25th	28 (96.6)	1 (3.4)	
25th-50th	3 (100.0)	0 (0.0)	
50th-75th	4 (80.0)	1 (20.0)	
Median CD4 count (IQR)	697 (156 – 1066) cells/μL	204 (17 – 1217) cells/μL	0.518
Pneumonia			0.839
Yes	36 (87.8)	5 (12.2)	
No	54 (88.5)	7 (11.5)	
Pulmonary TB			0.947
Yes	70 (87.5)	10 (12.5)	
No	20 (90.1)	2 (9.1)	
Malaria			0.562
Yes	72 (86.7)	11 (13.3)	
No	18 (94.7)	1 (5.3)	
Gastroenteritis			0.225
Yes	71 (91.0)	7 (9.0)	
No	19 (79.2)	5 (20.8)	
Malnutrition			0.123
Yes	74 (91.4)	7 (8.6)	
No	16 (76.2)	5 (23.8)	
WHO stage			0.187
1	7 (100)	0 (0)	
2	11 (100)	0 (0)	
3	44 (89.8)	5 (10.2)	
4	28 (80.0)	7 (20)	
Antiretroviral therapy			0.685
Yes	62 (89.9)	7 (10.1)	
No	28 (84.8)	5 (15.2)	

IQR, inter quartile range; TB, tuberculosis; WHO, World Health Organization.

(25%) children hospitalised at least twice during the year. The most common admitting diagnose were pneumonia 41 (40.2%), gastroenteritis 24 (23.5%), pulmonary tuberculosis 22 (21.6%), malnutrition 21 (20.6%) and/or malaria 19 (18.6%). Majority of the children were malnourished with age for weight falling below the second percentile in 65 (64%) of the 102 admissions. The most common presenting condition was fever 70(69%), followed by cough, vomiting, diarrhoea, and shortness of breath (Table 2). Half of the patients were hospitalised for greater than seven days and the other half were discharged or died within seven days of admission.

Outcome of Hospitalisation

Of the admissions, 12 (11.8%) resulted in death. Three of the deaths occurred during a re-admission. All patients who died had confounding morbidity with five (41.6%) of the 12 deaths attributed to pneumonia and/or malnutrition. The mean duration of hospital stay was 10.3 ± 8.3 days for patients discharged and 4.8 ± 6.5 days for patients who died on admission. Although 10 of the 12 (83.3%) deaths compared to 36 (of the 64 (66.6%) survivors were below the 2nd centile weight for age and all of the deaths were severely immunocompromised (WHO stages 3, 4), with median CD4 counts of 204 cells compared to 697 cells, there were no statistically significant differences in age, gender, the common admitting diagnosis, weight for age and WHO disease stage between admissions that resulted in discharge versus those that resulted in death (Table 3).

DISCUSSION

Despite implementation of a strategy to prevent mother to child transmission of HIV, there continues to be significant morbidity and mortality amongst the paediatric population that consequently places a burden on health services and patients alike. In this study, we sought to determine the reasons for and outcome of hospitalisation of HIV-infected children who mostly acquired infection perinatally. We found that common endemic infections and malnutrition were the predominant reasons for hospitalisation for paediatric HIV/AIDS patients in this tertiary hospital. The majority of admissions in our study were for pneumonia, gastroenteritis, pulmonary TB, malnutrition, and malaria as is the case for many admissions in this setting.

These admission diagnoses were similar to other studies conducted in urban, tertiary hospitals in South Africa and Uganda where pneumonia, gastro-enteritis, and pulmonary TB comprised the majority of paediatric HIV-positive admissions. [8,9] Although comparisons with HIV seronegative or untested children were not made in this study, previous studies in other countries have indicated that HIV-positive children are admitted with these diagnoses at a higher proportion than negative or untested children.[8,9]

In our study, 25% of the patients were admitted more than once within the year, which might be a sign of poor prognosis. In a study of HIV-infected children in Zambia, it was noted that prior admission to the hospital for severe bacterial or respiratory infections increased the risk of mortality by 42%, with a further hospitalisation doubling the risk again.[10] These data would suggest that hospitalised children will require aggressive case management to address their underlying HIV disease as well as the reasons for hospitalisation such as malnutrition. In addition, programmes to prevent mother-to-child HIV transmission should use all the opportunities to link infants born to HIV-infected mothers to early treatment of HIV infection to reduce HIV related complications.[3] It is important to note that 67 (66%) admissions were not on ARV therapy at the time of admission. Hospital admissions provide the opportunity for CD4 count and treatment initiation for those patients with the appropriate indications. Although perinatally transmitted infection should be detected early, a majority of patients in our study were presenting with WHO Stage 3 or 4 disease, indicating missed opportunities for primary prevention of maternal to child transmission and for early diagnosis of infected children. According to national statistics in Ghana, only approximately 15 % of children with advanced HIV are currently on ART.[11] In Ghana, the regional capitals were the first to begin providing ART and now ART is available in almost all districts. It will, however, take some time before all infected children who need ART are identified early enough and put on therapy.

While ART has been shown to be highly successful in reducing mortality in infected children in the developed world, there is limited information from areas where resource limitations are combined with additional health problems such as malnutrition and tropical disease, as noted by many of the hospital admissions in this study. Many studies suggest that the provision of ART is not enough; in an area where malnutrition is common in both infected and uninfected children, nutritional support may also be important. More than half of the admissions in our study were children falling below the 2nd percentile in weight for age. This represents a higher proportion of malnutrition amongst HIV-infected children than seen in other studies of the past in which 17-24% were malnourished.[9] These data suggest that nutritional and growth needs are not being met properly in many of these patients either from repeated illness or inadequate nutritional intake. For HIV infected children, nutrition is particularly important as anorexia and resulting malnutrition exacerbate immune dysfunction and predispose the child to acquiring infections. [12]

There were 12 deaths in our study; the majority due to pneumonia, pulmonary TB, and malnutrition. We did not find any significant predictors of in-hospital mortality or prolonged duration likely because of the small size of the study. As indicated in this study, the clinical features of HIV infection in children are often non-specific to enable health care workers to reliably diagnose HIV infection on clinical grounds alone.[13] Opportunities for testing for and diagnosing HIV infection in children attending immunization programmes, TB services, or in- and outpatient paediatric services, as well as in children of adults attending voluntary counselling and testing services are often missed.[14] Nearly a third of those hospitalised were diagnosed with HIV at their presenting admission. Consequently, it is important that clinicians caring for HIV-infected children should be cognizant of these infections and take appropriate early diagnostic and treatment measures. Because the hospital is an important entry into the health care system for all patients, it is vital that hospitalised children with these conditions should be tested for HIV infection if their status is unknown.

In interpreting this study's results, some limitations should be noted. First, the study was retrospective and the size was small. Thus, failure to detect any differences in demographics and clinical presentation between hospitalisations that resulted in death and discharge should be interpreted with caution. Second, the results were based on hospital records compiled for purposes other than research, the appropriateness and the quality of the data cannot always be guaranteed. Third, the accuracy of the diagnosis cannot always be guaranteed as in some cases laboratory results were not available and autopsies were not always requested. It was not possible to identify the causative organisms for pneumonia as most blood culture results were negative and nasopharyngeal aspirates or broncho-alveolar lavage for *Pneumocystis carinii* pneumonia (PCP) are not done. The diagnosis of tuberculosis was also based mainly on clinical and radiological features, as this was not confirmed by finding AFBs in sputum. Finally, some of the admissions could have been missed because approximately 50 patient folders out of the 750 registered HIV clinic cohort could not be retrieved.

Conclusion

Despite the above limitations, our study presents important data on the reasons for hospitalisation of HIV-infected children in a tertiary hospital in Ghana. Our findings suggest that there is delayed diagnosis of HIV among a large proportion of the children who were hospitalised with a majority presenting with advanced HIV disease despite the availability of prevention of mother-to-child transmission (PMTCT) services as well as ART in our region.

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Duality of Interest

All authors declare no conflict on interest in relation to this publication.

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