INTRODUCTION

South Africa has the largest paediatric HIV epidemic and the largest paediatric anti-retroviral treatment (ART) programme in the world. At the end of 2007, more than 300 000 South African children were living with HIV infection, of whom more than 30 000 were receiving ART. Despite the rapid scale-up of ART programs however, marked inequities remain in access to ART between and within provinces in the country.

Previous South African studies describing the outcome of paediatric ART have demonstrated favourable short-term responses. These studies have concentrated on urban-based programmes.

RESULTS

2,332 ART-naive children from 7 rural and 37 urban sites in four provinces were included, 53.3% of whom were female. There were 1727 (74.1%), 228 (9.8%) and 377 (16.2%) children in groups 1, 2 and 3 respectively (Table 1). At ART initiation, children accessing care at rural sites (group 2) were older, had a lower median age, had a lower percentage of females and had lower CD4% and lower percentage of children in the lowest BMI-Z category. At baseline their nutritional status was more impaired than urban children, and differences persisted throughout the study. Although a lower percentage of children in rural areas compared to urban children had advanced immunodeficiency was defined according to World Health Organisation (WHO) criteria, and severe clinical status was defined as a WAZ score <-3 or WHO clinical stage IV.

A significant proportion of South African children who require ART however live in rural areas, and there is currently limited information on the outcomes of children managed in rural ART programmes.

A retrospective analysis of routine cohort data of children (<16 years), enrolled for ART between November 2003 and March 2008 in three settings, namely urban residence and ART facility attended (Group 1), rural residence and rural facility attended (Group 2) and rural resident attending urban facilities (Group 3). Children were categorised according to the Global Rural-Urban Mapping Project definitions. Children were followed until August 2008 or until ART exit from a site.

Outcome measures were: death, loss to follow-up (LTFU), virological suppression, changes in CD4% and weight-for-age-Z-scores (WAZ). LTFU was defined as no patient visit for three months after the last scheduled appointment was missed and viral load suppression as a viral load < 400 copies/ml.

Baseline characteristics between groups were compared using the ANOVA, Kruskal-Wallis, Pearson’s χ² and Bonferroni tests as appropriate. Kaplan-Meier curves were fitted to estimate mortality and LTFU from the program. The logrank test was used to compare groups. Multivariable Cox regression was used to assess group effect associated with death and LTFU, adjusting for baseline demographic and clinical characteristics. When group differences were not significant the group with the lowest Kaplan-Meier estimates of each outcome was selected as the comparative group. For regression analyses, severe immunodeficiency was defined according to World Health Organisation (WHO) criteria, and severe clinical status was defined as a WAZ score <-3 or WHO clinical stage IV.

A multivariate generalized estimating equation population-averaged model of WAZ scores up to 24 months of treatment was used to compare group effect adjusted for baseline variables.

CONCLUSIONS

These results show that HIV-infected children on ART in rural settings constitute a vulnerable patient group. At baseline their nutritional status was more impaired than urban children, and differences persisted throughout the study. Although a lower percentage of children at rural clinics had advanced HIV infection at baseline, they experienced significantly higher mortality throughout the study period. LTFU was significantly increased in rural children managed at urban clinics. When children were successfully established on ART at rural clinics they experienced similar rates of virological suppression and immune restoration as their urban counterparts.

These findings suggest that the quality of ambulatory ART care is similar in rural and urban clinics, and the increased vulnerability of rural-based HIV-infected children is due in part to nutritional, socio-economic and other health system factors. Future research should explore the mechanisms underpinning the observed vulnerability, and determine whether HIV-infected children and their families in rural settings require increased social support.