Hospitalization Incidence Among Young Children Living with HIV in the Western Cape, South Africa

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BACKGROUND

- Studies of hospitalization among young children with HIV in resource-limited settings, in the context of early infant diagnosis and antiretroviral therapy (ART), are limited

METHODS

- We analyzed routinely collected data on hospitalizations among children living with HIV (age ≤5 years), in the Western Cape, South Africa (born 2018-2022, followed until mid-2023)
- We used logistic regression to examine factors associated with hospitalization pre-ART start, and mixed-effects Poisson models to assess overall hospitalization rates (excluding birth admissions) and hospitalizations post-ART start

Figure 1: Among 1487 hospitalized young children living with HIV, proportion of children with hospitalizations (A) at birth vs later, and (B) before vs after ART initiation

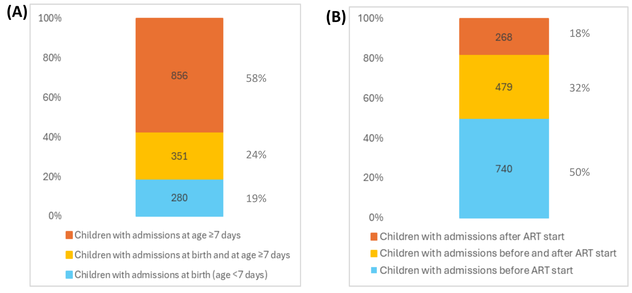
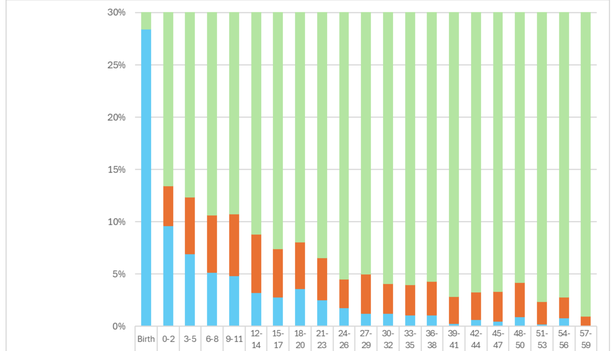


Figure 2: Proportion of children with hospitalizations before vs after ART initiation, by age at hospitalization (in months), among 2219 young children living with HIV



	Birth	0-2	3-5	6-8	9-11	12-14	15-17	18-20	21-23	24-26	27-29	30-32	33-35	36-38	39-41	42-44	45-47	48-50	51-53	54-56	57-59
No admissions	1588	1913	1924	1946	1894	1869	1828	1746	1677	1603	1481	1374	1245	1129	1025	885	749	620	494	349	207
Post-ART start admissions	0	84	120	119	125	115	92	84	73	46	59	41	38	38	27	24	22	21	11	7	2
Pre-ART start admissions	631	213	152	113	103	66	55	69	45	30	19	18	14	13	3	6	4	6	1	3	0

Note: apart from the first and second age categories depicted above (<7 days; and 1 week to <3 months), subsequent age categories were calculated as 3-month intervals. If there was more than one admission per interval, pre-ART start admissions were prioritized for display

27% of children starting ART were hospitalized at the time of ART start (excluding ART starts during birth admissions)

31% of children were hospitalized within a year of ART start

Earlier HIV diagnosis (at birth), enabling earlier ART initiation, is associated with lower hospitalization rates

= real-world evidence of the benefits of birth HIV testing

RESULTS

- We included 2219 children: 30% were diagnosed with HIV at birth (≤7 days), an additional 41% before age 1 year, and 29% at age ≥1 year
- 90% of children started ART (n=1990), at median age of 5 months (IQR 1-16)
- Median follow-up from birth: 38 months (IQR 24-50) and from ART start: 26 months (IQR 14-40)
- Overall, 67% of children were hospitalized (n=1487) of whom 50% had >1 hospitalization (Fig 1 & 2)
- Compared to those diagnosed with HIV at birth, overall hospitalization rates (excluding birth admissions) increased by 67%, 74% and 29% among those diagnosed at age 1 week to 3 months, >3 to 9 months, and >9 months, respectively (see Table)
- Excluding birth admissions, 35% of children were hospitalized pre-ART start (n=781/2219) and 27% of children who started ART were hospitalized at the time of ART start
- Compared to children who started ART before 1 month of age (but not at birth or during a birth admission), those who started at older ages 1-3, >3 to 6, and >6 to 12 months had progressively increased odds of any pre-ART admissions: aOR 6.5 (95% CI:3.6-11.5), 10.7 (95% CI:6.0-19.0) and 14.7 (95% CI:8.2-26.1), respectively
- Additionally, children who started ART at an older age were more likely to have been hospitalized within the month before ART start (see Table)
- Among children who received ART (96% protease inhibitor-based regimens), 38% had admissions post-ART start (n=747/1990)
- At 4 and 12 months after ART start, 49% and 47% of children with available results had unsuppressed viral load (VL≥1,000 copies/ml), respectively
- Hospitalization rates post-ART start were twice as high among children who had unsuppressed VL at 4 or 12 months after ART start (see Table)

Table: Associations with child hospitalizations

(A) Any admissions (excluding birth admissions)		**aIRR (95% CI), n=2205**	**p**
Age category at HIV diagnosis	<1 week	Ref	
	≥1 week to 3 months	1.67 (1.39-2.01)	<0.001
	>3 months to 9 months	1.74 (1.45-2.09)	<0.001
	>9 months	1.29 (1.09-1.51)	0.002
(B) Admissions in the month before ART start (excluding birth admissions)		**aOR (95% CI), n=1705**	**p**
Age category at ART start	≥1 week to <6 weeks	Ref	
	≥6 weeks to 3 months	4.13 (2.52-6.76)	<0.001
	>3 months to 6 months	6.71 (4.17-10.82)	<0.001
	>6 months to <12 months	7.32 (4.52-11.80)	<0.001
	≥12 months	5.17 (3.30-8.12)	<0.001
(C) Any admissions after ART start		**aIRR (95% CI), n=1304**	**p**
Age category at ART start	<1 month	Ref	
	≥1 month to 3 months	1.04 (0.78-1.38)	0.79
	>3 months to 6 months	1.15 (0.86-1.53)	0.35
	>6 months to <12 months	1.51 (1.12-2.02)	0.01
	≥12 months	1.24 (0.94-1.62)	0.13
Unsuppressed child VL at 4 or 12 months after child ART start (≥1,000 copies/ml)		2.03 (1.68-2.46)	<0.001

Abbreviations: aIRR adjusted incident rate ratios, aOR adjusted odds ratios. Note: All models were adjusted for child sex, year of birth and whether the child had a prior admission at birth. Adjusted IRRs were obtained from mixed-effects Poisson regression models (log link function; normally distributed random effect by child; observation time as an offset).

CONCLUSIONS

- High hospitalization rates occur among young children living with HIV
- Earlier HIV diagnosis, enabling earlier ART initiation, is associated with lower overall hospitalization rates
- Unsuppressed viral load is associated with higher post-ART hospitalization rates
- Our study provides real-world evidence of the benefits of HIV testing at birth, a practice that has not yet been adopted globally, and highlights that morbidity among young children with HIV is only partially mitigated by early ART initiation

ADDITIONAL KEY INFORMATION

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Acknowledgements: We acknowledge the children included in the study, their mothers, clinicians, and service providers
Funding: ViiV Healthcare; Grant U01AI069924 (NIH); Grant R01HD080465 (NIH)