

South Africa - An early-infant HIV-risk score for targeted HIV testing at birth

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Overview

Identification

ID NUMBER

VeryEarlyInfantDiagnosisofHIV

Overview

ABSTRACT

Background

Early HIV testing is needed to guarantee early HIV treatment success for very young infants, but universal testing is expensive. In this study, we examined the feasibility of using an early-infant HIV-risk score for targeted PCR testing and early diagnosis of HIV.

Methods and findings

We reviewed the maternal and infant characteristics of a cross-sectional sample of HIV exposed newborns at Kalafong Provincial Tertiary Hospital, Gauteng, South Africa. Infants were clinically evaluated and tested for HIV infection by PCR within 72 hours of birth. We quantified associations between HIV infection and individual parameters by fitting univariate and multivariate logistic regression models. We determined sensitivity and specificity for various cut-points of the derived risk scores.

From August 2014 to December 2016, of 15 175 live births, 3356 (22.12%) were born to HIV-infected mothers. We screened 1911 infants, and enrolled 1759 (92%) of these. Mothers who had no antenatal care visits (5.7% (97/1688)) were more likely to give birth to babies who tested PCR positive ($p=0.0005$). Most mothers (98.8%) knew their HIV status before delivery and were on cART (1626/1704, 95.4%). Virological control varied with HIV viral loads not detectable in 595 (60.15%) of mothers. One in five mothers (217/990, 21.9%) had viral loads greater than 1000 copies/ μL . More than a quarter of babies (432/1655, 26.1%) were born at a gestational age <38weeks. Low birth weight (<2.5kg) was documented in 398/1598 (24.55%) and 13/31(40.63%) of the PCR negative and positive infants, respectively ($p=0.0329$). Fewer than 15% of babies were clinically symptomatic at birth. Growth restriction or small for gestational age were documented in 204/1689 (12.08%) babies, of whom six (6/37, 16.22%) were PCR positive. Symptomatic newborns more frequently tested HIV positive ($p=0.0042$). The newborn HIV PCR positivity rate was 1.8% (31/1759).

The most significant risk factors for HIV infection in very young infants were detectable maternal HIV viral load, maternal cART duration of <1 month, and an infant that was symptomatic at birth. We included small-for-gestational-age with the above three characteristics in multivariate analyses and developed a two-, three-, and four-risk model, with a predictive probability score of a newborn PCR positive test at 0.28, 0.498, and 0.57 respectively. Sensitivities of the three- and four-risk scores as a probability of 0.02 and 0.04 are 80% and 76%, respectively.

Conclusion

Targeted PCR testing to diagnose HIV infection in very young infants requires access to maternal viral load testing. Even if risk models include other parameters such as maternal cART history, infant birthweight, gestation estimates and symptoms, one-in-five infected infants will not be targeted for testing. At present; we support universal PCR testing at birth within the South African PMTCT context.

Producers and Sponsors

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Sampling

No content available

Questionnaires

No content available

Data Collection

Data Collection Dates

Start	End	Cycle
2014-01-01	2017-12-31	N/A

Data Processing

No content available

Data Appraisal

No content available

File Description

Variable List

VEID birth data

Content	
Cases	1759
Variable(s)	77
Structure	Type: Keys: ()
Version	
Producer	
Missing Data	

Variables

ID	Name	Label	Type	Format	Question
V78	study_id	study_id	contin	numeric	
V79	redcap_event_name	redcap_event_name	discrete	character	
V80	enrol	enrol	discrete	numeric	
V81	sex	sex	discrete	numeric	
V82	date_time_birth	date_time_birth	discrete	character	
V83	mo_age	mo_age	contin	numeric	
V84	fed_choice	fed_choice	discrete	numeric	
V85	hiv_stat	hiv_stat	discrete	numeric	
V86	date_pos	date_pos	discrete	character	
V87	seroconv	seroconv	discrete	numeric	
V88	cart	cart	discrete	numeric	
V89	type_cart	type_cart	discrete	numeric	
V90	spec_other_cart	spec_other_cart	discrete	character	
V91	cart_strt	cart_strt	discrete	character	
V92	mo_med	mo_med	discrete	numeric	
V93	mo_miss_med	mo_miss_med	discrete	numeric	
V94	last_wk	last_wk	discrete	character	
V95	compl	compl	contin	numeric	
V96	gest_age_num	gest_age_num	discrete	numeric	
V97	gest_age_prem	gest_age_prem	discrete	numeric	
V98	birth_wt	birth_wt	contin	numeric	
V99	birth_wt_low	birth_wt_low	discrete	numeric	
V100	sympt	sympt	discrete	numeric	
V101	symptoms__1	symptoms__1	discrete	numeric	
V102	symptoms__2	symptoms__2	discrete	numeric	
V103	symptoms__3	symptoms__3	discrete	numeric	
V104	symptoms__4	symptoms__4	discrete	numeric	

ID	Name	Label	Type	Format	Question
V105	symptoms__5	symptoms__5	discrete	numeric	
V106	symptoms__6	symptoms__6	discrete	numeric	
V107	symptoms__7	symptoms__7	discrete	numeric	
V108	symptoms__8	symptoms__8	discrete	numeric	
V109	inf_pmtct__1	inf_pmtct__1	discrete	numeric	
V110	inf_pmtct__2	inf_pmtct__2	discrete	numeric	
V111	inf_pmtct__3	inf_pmtct__3	discrete	numeric	
V112	inf_pmtct__4	inf_pmtct__4	discrete	numeric	
V113	strt_date_time	strt_date_time	discrete	character	
V114	pmtct_dose	pmtct_dose	contin	numeric	
V115	pmtct2_dose	pmtct2_dose	discrete	character	
V116	visit_lab	visit_lab	discrete	numeric	
V117	spec_oth_age	spec_oth_age	discrete	character	
V118	test_req	test_req	discrete	numeric	
V119	blood_coll	blood_coll	discrete	numeric	
V120	reason_blood_not_coll	reason_blood_not_coll	discrete	numeric	
V121	date_time_bld_coll	date_time_bld_coll	discrete	character	
V122	test_result	test_result	discrete	numeric	
V123	test_result_date_time	test_result_date_time	discrete	character	
V124	tat	tat	contin	numeric	
V125	mat_vl	mat_vl	discrete	character	
V126	mat_vl_date	mat_vl_date	discrete	character	
V127	mat_cd4	mat_cd4	discrete	character	
V128	mat_cd4_date	mat_cd4_date	discrete	character	
V129	anc	anc	discrete	character	
V130	final_indtm	final_indtm	discrete	numeric	
V131	hloe	hloe	contin	numeric	
V132	msoi__1	msoi__1	discrete	numeric	
V133	msoi__2	msoi__2	discrete	numeric	
V134	msoi__3	msoi__3	discrete	numeric	
V135	msoi__4	msoi__4	discrete	numeric	
V136	msoi__5	msoi__5	discrete	numeric	
V137	msoi__6	msoi__6	discrete	numeric	
V138	mar_stat	mar_stat	discrete	numeric	
V139	hha__0	hha__0	discrete	numeric	
V140	hha__1	hha__1	discrete	numeric	
V141	hha__2	hha__2	discrete	numeric	
V142	hha__3	hha__3	discrete	numeric	

ID	Name	Label	Type	Format	Question
V143	hha__4	hha__4	discrete	numeric	
V144	hha__5	hha__5	discrete	numeric	
V145	hha__6	hha__6	discrete	numeric	
V146	prom	prom	discrete	numeric	
V147	pyr	pyr	discrete	numeric	
V148	ht_pet_pre_ecl	ht_pet_pre_ecl	discrete	numeric	
V149	uti	uti	discrete	numeric	
V150	vag_discharge	vag_discharge	discrete	numeric	
V151	mat_vl_grp	mat_vl_grp	discrete	numeric	
V152	tb_mo	tb_mo	discrete	numeric	
V153	tb_rx_comp	tb_rx_comp	discrete	numeric	
V154	mat_vl_bar	mat_vl_bar	discrete	character	

study_id (study_id)

File: VEID birth data

Overview

Type: Continuous
 Format: numeric
 Decimals: 0
 Range: 3-1904

Valid cases: 1759
 Invalid: 0
 Minimum: 3
 Maximum: 1904
 Mean: 956.5
 Standard deviation: 546.6

redcap_event_name (redcap_event_name)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 23

Valid cases: 1759
 Invalid: 0

enrol (enrol)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-1

Valid cases: 1759
 Invalid: 0

sex (sex)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1757
 Invalid: 2

date_time_birth (date_time_birth)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 16

Valid cases: 1755
 Invalid: 0

mo_age (mo_age)

File: VEID birth data

Overview

mo_age (mo_age)

File: VEID birth data

Type: Continuous
 Format: numeric
 Decimals: 0
 Range: 2-54

Valid cases: 1734
 Invalid: 25
 Minimum: 2
 Maximum: 54
 Mean: 30.4
 Standard deviation: 6

fed_choice (fed_choice)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-2

Valid cases: 1715
 Invalid: 44

hiv_stat (hiv_stat)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1697
 Invalid: 62

date_pos (date_pos)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 10

Valid cases: 1680
 Invalid: 0

seroconv (seroconv)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1687
 Invalid: 72

cart (cart)

File: VEID birth data

Overview

cart (cart)

File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1704
 Invalid: 55

type_cart (type_cart)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-2

Valid cases: 1602
 Invalid: 157

spec_other_cart (spec_other_cart)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 36

Valid cases: 44
 Invalid: 0

cart_strt (cart_strt)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 10

Valid cases: 1551
 Invalid: 0

mo_med (mo_med)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1596
 Invalid: 163

mo_miss_med (mo_miss_med)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1589
 Invalid: 170

last_wk (last_wk)

File: VEID birth data

Overview

Type: Discrete	Valid cases: 1511
Format: character	Invalid: 0
Width: 53	

compl (compl)

File: VEID birth data

Overview

Type: Continuous	Valid cases: 1344
Format: numeric	Invalid: 415
Decimals: 0	Minimum: 0
Range: 0-100	Maximum: 100
	Mean: 87.4
	Standard deviation: 24.1

gest_age_num (gest_age_num)

File: VEID birth data

Overview

Type: Discrete	Valid cases: 1655
Format: numeric	Invalid: 104
Decimals: 0	
Range: 22-42	

gest_age_prem (gest_age_prem)

File: VEID birth data

Overview

Type: Discrete	Valid cases: 1655
Format: numeric	Invalid: 104
Decimals: 0	
Range: 0-1	

birth_wt (birth_wt)

File: VEID birth data

Overview

Type: Continuous	Valid cases: 1690
Format: numeric	Invalid: 69
Decimals: 2	Minimum: 0.6
Range: 0.58-4.7	Maximum: 4.7
	Mean: 2.8
	Standard deviation: 0.7

birth_wt_low (birth_wt_low)

File: VEID birth data

birth_wt_low (birth_wt_low)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1690
 Invalid: 69

sympt (sympt)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1709
 Invalid: 50

symptoms__1 (symptoms__1)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

symptoms__2 (symptoms__2)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

symptoms__3 (symptoms__3)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

symptoms__4 (symptoms__4)

File: VEID birth data

Overview

symptoms__4 (symptoms__4)

File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

symptoms__5 (symptoms__5)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

symptoms__6 (symptoms__6)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

symptoms__7 (symptoms__7)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-0

Valid cases: 1759
 Invalid: 0

symptoms__8 (symptoms__8)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-0

Valid cases: 1759
 Invalid: 0

inf_pmtct__1 (inf_pmtct__1)

File: VEID birth data

Overview

inf_pmtct__1 (inf_pmtct__1)

File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

inf_pmtct__2 (inf_pmtct__2)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

inf_pmtct__3 (inf_pmtct__3)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

inf_pmtct__4 (inf_pmtct__4)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

strt_date_time (strt_date_time)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 16

Valid cases: 1624
 Invalid: 0

pmtct_dose (pmtct_dose)

File: VEID birth data

Overview

pmtct_dose (pmtct_dose)

File: VEID birth data

Type: Continuous
 Format: numeric
 Decimals: 2
 Range: 0.02-19082016

Valid cases: 1621
 Invalid: 138
 Minimum: 0
 Maximum: 19082016
 Mean: 23544.9
 Standard deviation: 670059.9

pmtct2_dose (pmtct2_dose)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 4

Valid cases: 23
 Invalid: 0

visit_lab (visit_lab)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-7

Valid cases: 1758
 Invalid: 1

spec_oth_age (spec_oth_age)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 8

Valid cases: 5
 Invalid: 0

test_req (test_req)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-3

Valid cases: 1753
 Invalid: 6

blood_coll (blood_coll)

File: VEID birth data

Overview

blood_coll (blood_coll)

File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

reason_blood_not_coll (reason_blood_not_coll)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0

Valid cases: 0
 Invalid: 1759

date_time_bld_coll (date_time_bld_coll)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 16

Valid cases: 1753
 Invalid: 0

test_result (test_result)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-4

Valid cases: 1759
 Invalid: 0

test_result_date_time (test_result_date_time)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 16

Valid cases: 1678
 Invalid: 0

tat (tat)

File: VEID birth data

Overview

Type: Continuous
 Format: numeric
 Decimals: 2
 Range: 2.6-8746.7

Valid cases: 1678
 Invalid: 81
 Minimum: 2.6
 Maximum: 8746.7
 Mean: 92.1
 Standard deviation: 343.4

mat_vl (mat_vl)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 7

Valid cases: 997
 Invalid: 0

mat_vl_date (mat_vl_date)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 10

Valid cases: 1122
 Invalid: 0

mat_cd4 (mat_cd4)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 4

Valid cases: 1257
 Invalid: 0

mat_cd4_date (mat_cd4_date)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 10

Valid cases: 1220
 Invalid: 0

anc (anc)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 2

Valid cases: 1682
 Invalid: 0

final_indtm (final_indtm)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-2

Valid cases: 14
 Invalid: 1745

hloe (hloe)

File: VEID birth data

Overview

Type: Continuous
 Format: numeric
 Decimals: 0
 Range: 0-42

Valid cases: 1707
 Invalid: 52
 Minimum: 0
 Maximum: 42
 Mean: 10.6
 Standard deviation: 2.3

msoi__1 (msoi__1)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

msoi__2 (msoi__2)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

msoi__3 (msoi__3)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

msoi__4 (msoi__4)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

msoi__5 (msoi__5)

File: VEID birth data

Overview

msoi__5 (msoi__5)
 File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

msoi__6 (msoi__6)
 File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

mar_stat (mar_stat)
 File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-4

Valid cases: 1706
 Invalid: 53

hha__0 (hha__0)
 File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

hha__1 (hha__1)
 File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

hha__2 (hha__2)
 File: VEID birth data

Overview

hha__2 (hha__2)

File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

hha__3 (hha__3)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

hha__4 (hha__4)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

hha__5 (hha__5)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

hha__6 (hha__6)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1759
 Invalid: 0

prom (prom)

File: VEID birth data

Overview

prom (prom)

File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1733
 Invalid: 26

pyr (pyr)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1730
 Invalid: 29

ht_pet_pre_ecl (ht_pet_pre_ecl)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1721
 Invalid: 38

uti (uti)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1721
 Invalid: 38

vag_discharge (vag_discharge)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1704
 Invalid: 55

mat_vl_grp (mat_vl_grp)

File: VEID birth data

Overview

mat_vl_grp (mat_vl_grp)

File: VEID birth data

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 1-3

Valid cases: 990
 Invalid: 769

tb_mo (tb_mo)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 1730
 Invalid: 29

tb_rx_comp (tb_rx_comp)

File: VEID birth data

Overview

Type: Discrete
 Format: numeric
 Decimals: 0
 Range: 0-1

Valid cases: 12
 Invalid: 1747

mat_vl_bar (mat_vl_bar)

File: VEID birth data

Overview

Type: Discrete
 Format: character
 Width: 25

Valid cases: 1050
 Invalid: 0

