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Viral load monitoring in pregnancy to predict peripartum viraemia in South Africa

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BACKGROUND

- World Health Organization guidance recommends viral load (VL) monitoring in pregnant women on antiretroviral therapy (ART) to help identify high-risk infants for enhanced prophylaxis[1] but there are few data evaluating this approach in routine care.

METHODS

- Data come from the screening and enrolment procedures of a randomized controlled trial of postpartum maternal care strategies at a large primary care clinic in Cape Town, South Africa.[2]
- In the routine care setting VL monitoring takes place at the earlier of 12 weeks on ART or 34 weeks' gestation.
- In this context we identified consecutive HIV-infected women who initiated ART (TDF+XTC+EFV) and underwent VL testing during pregnancy, and for women with VL<400 copies/mL documented during pregnancy, repeated a VL within 10 weeks postpartum.
- VL testing was done by the National Health Laboratory Services using Abbott Molecular RealTime HIV-1 assay, Abbott Molecular, Illinois, USA.
- We calculated sensitivity (SE), specificity (SP) and positive and negative likelihood ratios (LR+ and LR-) for antenatal VL<100 copies/ml in predicting peripartum VL<100 and <400 copies/mL.
- Sensitivity analyses examined subgroups of timing of antenatal VL and prior ART exposure (either lifelong ART or prevention of mother to child transmission [PMTCT] prophylaxis).

RESULTS

- Among 322 women, median age was 28.6 years and 43.8% had a history of previous ART use (table 1).
- Antenatal VL was taken at a median gestation of 33 weeks (IQR 30-36)
  - 89.1% of women had a VL<100 copies/mL
  - 10.9% had a VL 100-400 copies/mL.

Table 1: Description of the cohort at time of antenatal VL (n=322)

Age, years (median, IQR)	28.6 (25.6-32.6)
Completed secondary or any tertiary education (n, %)	85 (26.4)
Primiparous (n, %)	85 (26.4)
History of previous ART use (n, %)	141 (43.8)
Gestation at antenatal VL, weeks (median, IQR) Missing	33 (30-36) 45 (14%)
Antenatal VL <100 copies/mL (n, %)	287 (89.1%)
Antenatal VL 100-400 copies/mL (n, %)	35 (10.9)

ART: antiretroviral therapy; IQR: interquartile range; VL: viral load.

Most women who are virologically suppressed during the third trimester remain suppressed throughout the peripartum period.

RESULTS

- Peripartum VL was taken at a median of 9 days (IQR 6-17) postpartum, at which point women were on ART for a median duration of 23 weeks (IQR 18-28).
- At that time 97.2%, 1.7% and 1.1% had VL<100, 100-400 and >400 copies/mL, respectively (table 2).
- The SE of antenatal VL<100 copies/mL in predicting peripartum VL<100 copies/mL was 0.95 (95% CI 0.92-0.97; table 3) and the corresponding SP was 0.71 (95% CI 0.51-0.87; LR+3.32, LR- 0.07).
- The ability of antenatal VL to predict peripartum VL was similar across strata of gestation at antenatal VL testing and history of ART use.
- Predictive performance was slightly weaker at thresholds of <400 copies/mL (LR+ 1.80, LR- 0.17).

Table 2: Peripartum VL results stratified by antenatal VL results

	Antenatal VL <100 copies/mL (n=287)	Antenatal VL 100-400 copies/mL (n=35)
Peripartum VL <100 copies/mL (n, %)	279 (97.2)	15 (42.9)
Peripartum VL 100-400 copies/mL (n, %)	5 (1.7)	17 (48.6)
Peripartum VL >400 copies/mL (n, %)	3 (1.1)	3 (8.6)

VL: viral load.

Table 3: Performance characteristics of antenatal VL testing to predict peripartum viraemia in a routine care setting

	Sensitivity (95% CI)	Specificity (95% CI)	Positive likelihood ratio	Negative likelihood ratio
To detect peripartum VL <100 copies/mL				
All women	0.95 (0.92-0.97)	0.71 (0.51-0.87)	3.32	0.07
Antenatal VL ≤32 weeks (n=129)	0.94 (0.88-0.98)	0.70 (0.35-0.93)	3.14	0.08
Antenatal VL >32 weeks (n=148)	0.95 (0.91-0.98)	0.72 (0.47-0.90)	3.43	0.06
History of previous ART use	0.98 (0.93-0.995)	0.80 (0.44-0.97)	4.89	0.03
No history of previous ART use	0.93 (0.87-0.96)	0.67 (0.41-0.87)	2.78	0.11
To detect peripartum VL <400 copies/mL				
All women	0.90 (0.86-0.93)	0.50 (0.12-0.88)	1.80	0.17
Antenatal VL ≤32 weeks (n=129)	0.90 (0.83-0.94)	0.33 (0.01-0.91)	1.35	0.31
Antenatal VL >32 weeks	0.90 (0.85-0.94)	0.67 (0.09-0.99)	2.70	0.15
History of previous ART use	0.93 (0.88-0.97)	0.50 (0.07-0.93)	1.87	0.13
No history of previous ART use	0.87 (0.81-0.92)	0.50 (0.01-0.99)	1.74	0.26

ART: antiretroviral therapy; CI: confidence interval; VL: viral load.

CONCLUSIONS

- These novel data suggest that antenatal VL<100 copies/mL is a useful predictor of peripartum viraemia that may be used to target enhanced PMTCT interventions in this setting.
- The high SE and low LR- suggest that few women who are virologically suppressed during antenatal care subsequently become viraemic peripartum.

Acknowledgements: This work was supported by the Medical Research Council [grant number MR/M007464/1].We thank all participating mothers and the study and service staff at Gugulethu MOU for their commitment to this work.

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