

## **An empiric risk scoring tool for identifying high-risk heterosexual HIV-1 serodiscordant couples for targeted HIV-1 prevention**

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### **Abstract:**

Heterosexual HIV-1 serodiscordant couples are increasingly recognized as an important source of new HIV-1 infections in sub-Saharan Africa. A simple risk assessment tool could be useful for identifying couples at highest risk for HIV-1 transmission. Using data from three prospective studies of HIV-1 serodiscordant couples from seven African countries and standard methods for development of clinical prediction rules, we derived and validated a risk scoring tool developed from multivariate modeling and composed of key predictors for HIV-1 risk that could be measured in standard research and clinical settings. The final risk score included age of the HIV-1 uninfected partner, married and/or cohabiting partnership, number of children, unprotected sex, uncircumcised male HIV-1 uninfected partner, and plasma HIV-1 RNA in the HIV-1 infected partner. The maximum risk score was 12, scores  $\geq 5$  were associated with an annual HIV-1 incidence of  $>3\%$ , and couples with a score  $\geq 6$  accounted for only 28% of the population but 67% of HIV-1 transmissions. The area under the curve for predictive ability of the score was 0.74 (95% CI 0.70-0.78). Internal and external validation showed similar predictive ability of the risk score, even when plasma viral load was excluded from the risk score. A discrete combination of clinical and behavioral characteristics defines highest-risk HIV-1 serodiscordant couples. Discriminating highest-risk couples for HIV-1 prevention programs and clinical trials using a validated risk score could improve research efficiency and maximize the impact of prevention strategies for reducing HIV-1 transmission.