

Development of a rule to predict HIV positive status in a cervical cancer prevention program

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Background

- Cervical cancer is an AIDS-defining illness. Histologically-proven invasive cervical cancer (ICC) should prompt provider-initiated HIV testing and counseling (PITC).
- In Zambia the prevalence of HIV is 16.5% and two-thirds of those infected are women.¹
- HIV positive women are at higher risk of developing cervical neoplasia than their HIV negative counterparts.
- Of 25,000 women screened for cervical cancer in a newly established "see and treat" cervical cancer prevention program in Zambia, one-third have never been tested for HIV. When offered VCT (voluntary counseling and testing), the majority refused.
- Women attending cervical cancer screening clinics are a captive audience who may be motivated to undergo HIV testing using unconventional methods.²

Setting

- When screening women for cervical cancer, Zambian nurses take digital photographs of the cervix (cervigrams) to aid them in visualization of cervical lesions and to educate patients. (Fig 1)



Fig 1

Methods

- During routine review of cervigrams we hypothesized that certain morphologic features of cervical lesions may be predictive of HIV status.
- Based on our programmatic experience, we delineated 10 morphologic criteria of cervical lesions that predict HIV positive status. (Fig 2)
- We demonstrated high inter-rater agreement (kappa >0.8) in identification of these characteristics, based on a validation study conducted by two senior gynecologists on the team (MM and GP).
- Using cervigrams of HIV positive and negative women, we determined the association between each criterion and HIV status in crude logistic regression models. (Table 1)
- A prediction rule was created using the criteria that were significant predictors of HIV status.
- Using the rule, 5 nurses who were blinded to the HIV status of the patient reviewed cervigrams of HIV positive and negative women.
- Sensitivity, specificity, and positive and negative predictive values (PPV and NPV) for the morphologic criteria were calculated. (Table 2)

Results

Table 1: Univariate logistic regression model predicting HIV positive status

Morphologic criteria	HIV+ (%) N = 54	HIV- (%) N = 44	OR	95% CI
occupies 3/4 of transformation zone	23 (41.8)	4 (8.9)	7.4	(2.3, 23.4)
extends onto 1/3 of ectocervix	29 (52.7)	8 (17.8)	5.2	(2.0, 13.0)
densely opaque	34 (61.8)	11 (24.4)	4.6	(2.0, 11.0)
cervicitis	17 (30.9)	5 (11.1)	3.6	(1.2, 10.7)
abnormal vasculature	4 (7.3)	1 (2.2)	3.5	(0.4, 32.0)
satellite lesions	15 (27.3)	5 (11.1)	3	(0.1, 9.0)
bleeding	17 (30.9)	15 (33.3)	0.9	(0.4, 2.1)
suspicious for cancer	1 (1.8)	1 (2.2)	0.8	(0.1, 13.4)
vaginal warts	2 (3.63)	0	n/a	n/a

The rule: "The presence of one or more of the following morphologic criteria predicts HIV positive status."

- occupies 3/4 of the transformation zone
- extends onto 1/3 of the ectocervix
- densely opaque
- cervicitis

Table 2: Performance of the newly developed rule when 5 nurses reviewed 100 cervigrams of HIV positive and negative women

HIV prevalence	Sensitivity	Specificity	PPV	NPV
1%	0.75	0.43	0.01	0.99
16%	0.75	0.43	0.20	0.90
33%	0.75	0.43	0.39	0.78
44%	0.75	0.43	0.51	0.69
66%	0.75	0.43	0.72	0.47

Conclusions

In high HIV prevalent settings like Zambia, visual-based cervical cancer screening programs utilizing digital cervigrams may be able to identify morphologic criteria that predict HIV-positive status.

All patients receiving care should be encouraged to undergo HIV testing. These findings, however, may help providers convince women who undergo cervical screening to also undergo HIV testing when they are reluctant to do so.

Morphologic Criteria

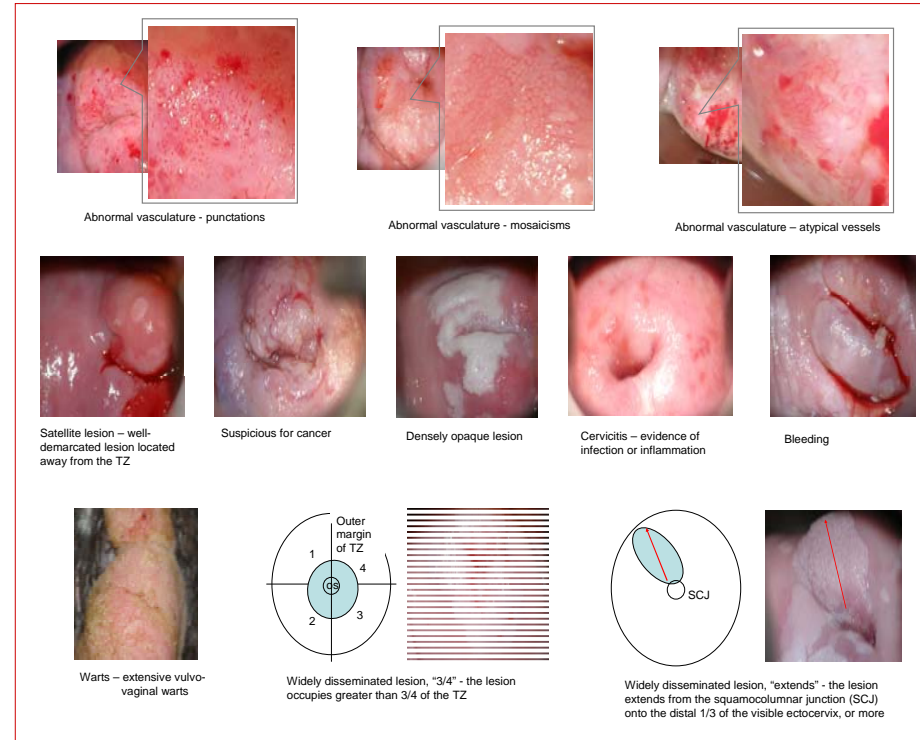


Fig 2

- Central Intelligence Agency, The World Factbook, Zambia, <https://www.cia.gov/library/publications/the-world-factbook/geos/za.html>. Accessed November 14, 2007.
- Kim JJ, Salomon JA, Weinstein MC, Goldie SJ. Packaging health services when resources are limited: the example of a cervical cancer screening visit. PLoS 2006;3:2031-2038.

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