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Quantifying the Incremental Contribution of Colposcopy to CIN2+ Risk Estimation Using Bayesian Latent Class Analysis

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Introduction

Risk-based management relies on colposcopy to refine the risk of CIN2+ generated by HPV testing and cytology. Conventional risk estimates are affected by **verification bias** resulting from **selective histological sampling**. We used **Bayesian latent class analysis (LCA) to quantify how colposcopy modifies individual CIN2+ risk** beyond that predicted by HPV testing and cytology.

Methods

Retrospective cross-sectional study of diagnostic accuracy conduced at the Gynecologic Section, Department of Odontostomatologic and Specialized Clinical Sciences, UNIVPM, Ancona, Italy.

1093
Patients included

Bayesian two-class latent class model

HPV test | Cytology | Colposcopic impression

Posterior CIN2+ probability

Results

Histological sampling was not performed in 40.9% of cases (verification bias).

Bayesian LCA estimation posterior CIN2+ probabilities according to the combination of HPV testing, cytology and colposcopic impression.

HPV test (high risk)	Cervical cytology (high grade)	Colposcopic impression (high grade)	CIN2+ probability (95%CI)
positive	negative	negative	0.8% (0.0 - 5.1%)
positive	negative	positive	27.3% (1.4 - 74.0%)
positive	positive	negative	31.1% (2.8 - 71.6%)
positive	positive	positive	94.9% (89.9 - 98.6%)

Conclusions

Bayesian LCA quantifies the incremental contribution of colposcopy to CIN2+ risk estimation beyond HPV testing and cytology. **Colposcopy provides its greatest clinical value in discordant screening scenarios, particularly when negative colposcopic findings reduce the estimated risk of CIN2+.**

Posterior CIN2+ probability: diagnostic patterns and classical risk category

