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CLINICAL ARTICLE

Web-based instrument to assess skills in visual inspection of the cervix among healthcare providers

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ABSTRACT

Objective: To validate a web-based instrument for assessing healthcare providers' skills in visual inspection with acetic acid or Lugol iodine (VIA/VILI) for the diagnosis and management of cervical intraepithelial neoplasia. *Methods:* An observational cross-sectional study enrolled healthcare providers in a web-based assessment of VIA/VILI skills between August and November 2014. Participants participated in a four-module training course, followed by a multiple-choice test with 70 questions based on cervical photographs of HPV-positive women participating in cervical screening. Logistic regression was used to identify relationships between independent variables and success on the test. *Results:* Overall, 255 participants completed the test and 99 (38.8%) passed. No correlation was found between age or sex and test performance. Compared with other healthcare workers, physicians (odds ratio [OR] 1.91, 95% confidence interval [CI] 1.01–3.63; $P = 0.048$), and participants with more colposcopy experience (OR 3.62, 95% CI 1.91–6.85; $P < 0.001$) and postgraduate VIA/VILI training (OR 1.95, 95% CI 1.16–3.29; $P = 0.012$) were more likely to pass the test. Participants who repeated the test (31/255 [12.2%]) were five times more likely to succeed on their second repeat (OR 5.89, 95% CI 1.46–23.73; $P = 0.013$). *Conclusion:* Web-based training for VIA/VILI is feasible and can identify healthcare workers who are proficient in this technique.

1. Introduction

Cervical cancer is one of the leading causes of cancer deaths among women in low- and middle-income countries (LMICs) [1]. The natural history of this disease allows screening and treatment at a precancerous stage; however, a lack of resources and infrastructure in LMICs has impeded the implementation of standard strategies such as cytology [2–4]. Visual inspection of the cervix with acetic acid (VIA) or with Lugol iodine (VILI) constitutes an alternative screening approach adapted to LMICs [5–9].

VIA and VILI procedures require very little equipment and can provide patients with immediate results and management [9–11]. They also have the advantage of not requiring laboratory analysis, and can be performed by healthcare providers with different backgrounds (e.g. doctors, nurses, and midwives) [12–14]. However, this approach has limitations, including highly subjective results dependent on individual interpretation [15].

In a recent meta-analysis on the accuracy of VIA in LMICs [16], healthcare providers correctly identified between 41% and 92% of women with cervical intraepithelial neoplasia grade 2 or worse (CIN2+). Moreover, in two recent cross-sectional studies in Sub-Saharan Africa [17,18], the success rate of VIA for the detection of CIN2+ lesions among women positive for HPV ranged from 25% to 36%. These data suggest that the method has intrinsic limitations and that acquiring good VIA skills is mandatory to lower the impact of these limitations.

Several educational resources and programs dedicated to training of healthcare workers in the diagnosis and management of VIA-based screening are available through the WHO and International Agency for Research on Cancer websites [19,20]. These tools are important but could be insufficient because they do not assess competence and management decisions. The exposure of healthcare providers to physiological and pathologic cervical conditions varies widely [21–25], as does their need for training and educational support. Therefore, an assessment tool offering the possibility of differentiating between novice and experienced professionals might potentially identify critical educational needs and thus help to appropriately distribute limited resources.

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The aim of the present study was to validate a web-based instrument to assess healthcare providers' skills in diagnosis and management using VIA/VILI, and to determine whether such an instrument can differentiate between novice and experienced VIA/VILI providers in primary-care settings.

2. Materials and methods

The present cross-sectional observational study was conducted between August 1 and November 30, 2014, among postgraduate healthcare providers participating in the Geneva Foundation for Medical Education and Research Training Course in Sexual and Reproductive Health [26]. Participation was voluntary and confidential. There were no inclusion criteria, and participants were not tested for color blindness. The study was exempt from review board approval because it fell in the exempt category 45 CFR 46.101(B) of the Office for Human Research Protections. Informed consent was included on the data registration form, and participants gave consent by clicking on the corresponding link.

The study website provides an optional four-module comprehensive course on the VIA/VILI approach that is intended to improve the screening skills of healthcare professionals working in the field of cervical cancer screening in LMICs [27]. Module 1 teaches participants to recognize the anatomic and histologic landmarks of the cervix and to understand the changes that occur during reproductive life and the transformation process. Module 2 familiarizes participants with the principles of VIA/VILI examination by identifying and locating abnormal areas during cervical examination. Module 3 presents the main treatment options for cervical dysplasia in a "see-and-treat" approach. Module 4 allows participants to assess their current knowledge of basic skills before being invited to complete a web-based VIA/VILI diagnosis and management assessment test [26] and then an online survey.

The "VIA/VILI MCQ Knowledge Assessment Test" consists of 70 multiple-choice questions, requiring participants to identify one correct answer from a set of four options (Figs. 1–4). The questions comprised 70 clinical cases of HPV-positive women aged between 30 and 49 years, corresponding to real-life screening conditions in terms of CIN2+ prevalence (expected rate 10%–15%). The photographs were taken during cervical cancer screening campaigns conducted in Sub-Saharan Africa (Madagascar), and all women gave signed informed consent permitting the use of their digital cervical images for teaching and research purposes. A confirmatory cervical biopsy sample was obtained in all 70 cases. Among the 70 HPV-positive women, 13 (19%) presented with cervical dysplasia or cancer. Of these, 4 (6%) had cervical intraepithelial neoplasia grade 1 (CIN1) and 9 (13%) had CIN2+. Of the women with CIN2+ lesions, four had cervical intraepithelial neoplasia grade 3 (CIN3) and two had cancer.

The study participants were required to correctly recognize precancerous and cancerous cervical lesions, and to indicate the correct treatment using a see-and-treat approach. With respect to CIN1 lesions, both treating and not treating were accepted as correct answers. The established pass score was 39 out of 70 (i.e. 55% of correct answers). Successful candidates received a signed certificate by Geneva University Hospitals and the Geneva Foundation for Medical Education and Research. Unsuccessful candidates could repeat the test either immediately or after reviewing the educational material of their choice.

The online survey obtained information about the demographic characteristics of the study participants.

Data were analyzed via Stata version 13 (StataCorp, College Station, TX, USA). The Pearson χ^2 test was used to assess the relationship between each independent variable and successful test performance. One-way analysis of variance was performed to evaluate differences among multiple subgroups and the test score achieved. Univariate and multivariate logistic regression were used to determine the relationship between each independent variable and successful performance on the test. These results are reported as odds ratios (ORs) and 95% confidence intervals (CIs). ORs were adjusted for different potential confounders such as age, profession, and years of professional experience. Statistical significance was accepted at $P < 0.05$.

3. Results

Overall, 255 participants from more than 100 countries completed the survey. The median age was 35 years (interquartile range 30–43) and slightly more than half were female (Table 1). Approximately three-quarters of participants were physicians (Table 1).

The mean length of experience with VIA/VILI in the study group was 8 years (range 0–36). Notably, 104 (40.8%) participants had never performed a colposcopy or VIA/VILI, whereas 62 (24.3%) had performed these procedures more than 50 times (Table 2). Among the 151 participants who had experience in colposcopy or VIA/VILI, 62 (41.1%) had performed these tests very recently. Additionally, 79 (52.3%) performed at most 30 colposcopies or VIA/VILI procedures annually. Among the

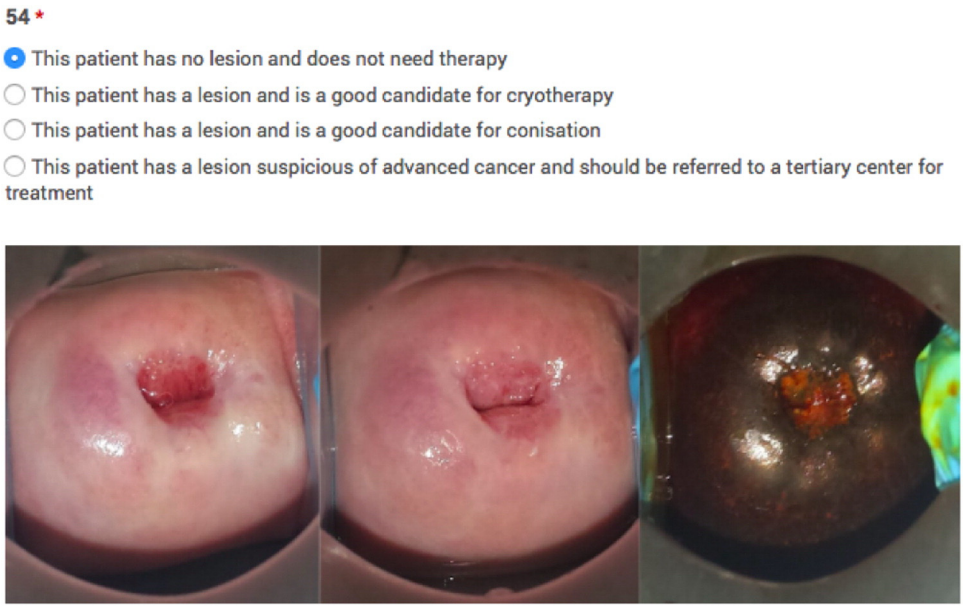

Fig. 1. Question from the test containing photographs of a normal cervix. Left: native; middle: after application of acetic acid; right: after application of Lugol iodine.

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