

THE DIFFERENT SCREENING METHODS FOR THE CERVICAL LESION DIAGNOSTIC AND THE ECONOMIC AND SOCIAL IMPLICATIONS OF SCREENING AMONG FEMALE POPULATION



PhD student Codrin Gheorghe¹, Assoc. Prof. Dr. Schröder Verginica², Assoc. Prof. Dr. Stoicescu Ramona², Assoc. Prof. Dr. Dumitru Irina^{1,3}

- ¹ "Ovidius" University of Constanta, Faculty of Medicine, Constanta, Romania
- ² "Ovidius" University of Constanta, Faculty of Pharmacy, Constanta, Romania
- ³ Clinical Infectious Diseases Hospital, Constanta, Romania

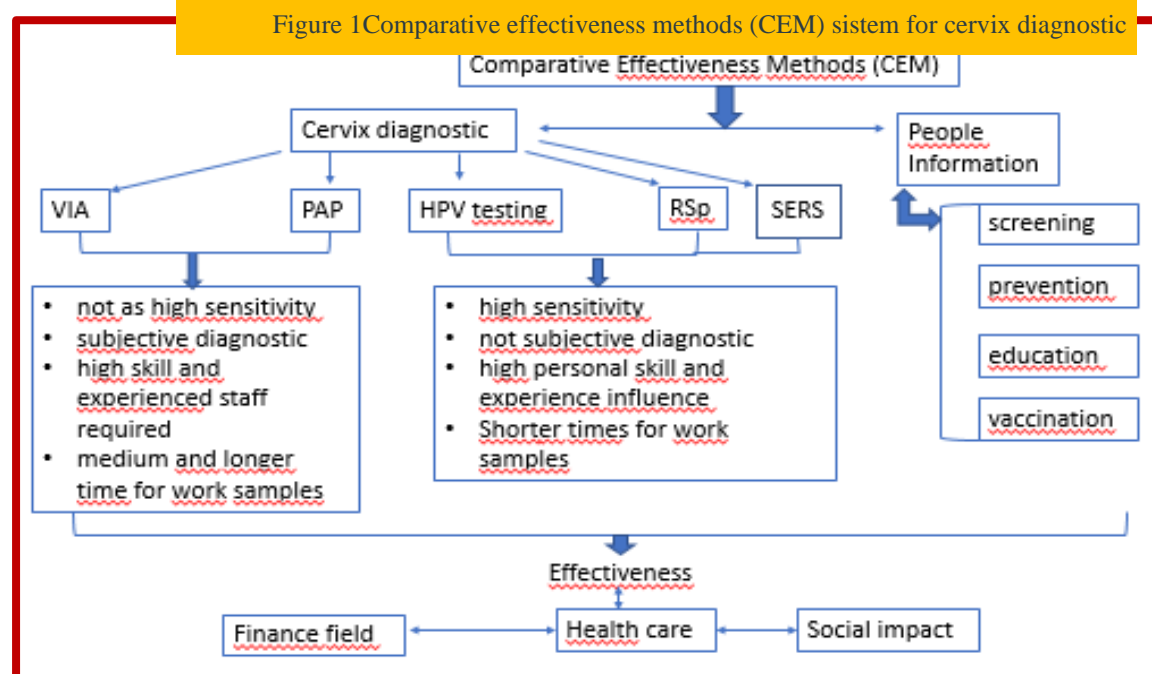
"Ovidius" University from Constanta, Romania

Introduction

Conventionally cervical cancers are diagnosed by visual inspection with acetic acid (VIA), HPV testing, polar probe, Pap smear (PAP) and colposcopy. However, these methods are not providing high sensitivity and specificity; furthermore, the diagnostic potential is highly subjective as it depends on the skills and experience of the persons who were analyzing the samples. Although biopsy and resulting histopathology are considered as the gold standard strategy for cancer diagnosis, it is an intrusive technique and has numerous impediments particularly for mass screening of patients with multiple suspicious lesions. In this context, extensive studies are under progress in the development of real-time, non-invasive and cost-effective molecular diagnostic modality using various techniques [1].

In this study we evaluated and compared the current and modern techniques used for cervix cellular diagnostics. Also, this study helps improve the understanding on the economic and social implications of screening among female population and the impact it has on healthcare system relieving. Romania recorded an incidence of 22.6 cases of cervix uteri cancers / 100.000 women (age standardized rate), and a mortality of 9.6 / 100.000, ranking second highest in the EU zone.

Figure 1 Comparative effectiveness methods (CEM) sistem for cervix diagnostic



Burden of HPV related disease

About **604,127** new cervical cancer cases are diagnosed annually globally (estimates for 2020) ranking on the **3rd** place as the most common cancer site in females. It is established that well-organised cervical screening programmes or widespread good quality cytology can reduce cervical cancer incidence and mortality [2].

New trends on cervix diagnostic

Diffuse Reflectance Spectroscopy

Steady-state reflectance spectroscopy (RSp) is a technique where light after multiple scattering in the tissue is collected and studied for qualitative and quantitative information (Figure 1). A study of reflectance spectroscopy involving 324 sites of 164 precancerous patients has found the discrimination ability between squamous normal and high-grade squamous intraepithelial lesions with sensitivity and specificity of **72%** and **83%** respectively [3].

Surface-Enhanced Raman Spectroscopy (SERS)

Since Raman effect is a weak phenomenon, researchers around the globe have tried to enhance the weak effect. Employing SERS in exfoliated cell samples for cervical cancer detection will provide direct understanding into the cause of abnormalities offering some unmistakable advantages over different procedures like less time preparing the samples and minimal influence of water bands [4,5].

diagnostic accuracy of **94%**, **74%** and **92%** of the three grades (LSIL, HSIL, Cervical Cancer) [4].

In a survey conducted online, 116 of 126 (92.1%) participants responded that they did not get any HPV vaccines (Figure 2) even though most of them talked about it with their medical practitioners. Furthermore, our survey found that 82.5% of the participants did not get any form of cervical examination (Figure 2). The highest rate of respondents was in the age group of 21-30 (75 of 126 or 59.5%).

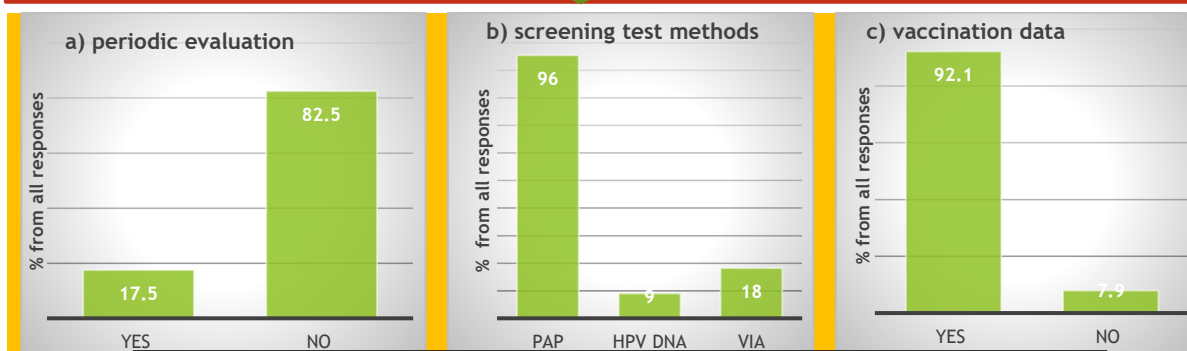


Figure 2 HPV information - responses of survey conducted online for age group 21-30

Conclusions

- The lack of cost-effectiveness studies outside of Western Europe, especially in LMICs, that include data on real-world implementation scenarios, represents an important gap in the literature.
- Future cost-effectiveness studies within screening programs should model the impact of new triage strategies, development of HPV-SS outreach materials, and increasing HPV vaccination rates.
- Cervical cancer remains a significant public health problem in Romania. It ranks third in the country after breast and colorectal cancer. Unfortunately, the first attempt of campaign vaccination in Romania proved short to deliver.

References

1. Pappu Raja, Prakasrao Aruna, Dornadula Koteeswaran, Singaravelu Ganesan, Characterization of blood plasma of normal and cervical cancer patients using NIR raman spectroscopy, *Vibrational Spectroscopy*, Volume 102, 2019.
2. International Agency for Research on Cancer, WHO, <https://gco.iarc.fr/>
3. Daniel A., Savarimuthu W.P. (2019) Current Advances in Optical Screening for Cervical Cancer. In: Farghaly S. (eds) *Uterine Cervical Cancer*. Springer, 2019.
4. Varsha Karunakaran, Valliamma N. Saritha, Manu M. Joseph, Jyothi B Nair, Giridharan Saranya, Kozhiparambil G. Raghu, Kunjuraman Sujathan, Krishnannair S. Kumar, Kaustabh K. Maiti, Diagnostic spectro-cytology revealing differential recognition of cervical cancer lesions by label-free surface enhanced Raman fingerprints and chemometrics, *Nanomedicine: Nanotechnology, Biology and Medicine*, Volume 29, 2020.
5. Wang, J., Zheng, CX., Ma, CL. *et al.* Raman spectroscopic study of cervical precancerous lesions and cervical cancer. *Lasers Med Sci*, 2021.