



# Educational intervention through B-learning to improve cervical cytology: experiences of nurses

*Intervenção educacional através do B-learning para melhorar a citologia cervical: experiências de enfermeiras*

*Intervención educativa basada en metodologías B-learning para mejorar las citologías cervicales: experiencias de enfermeras*

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## ABSTRACT

**Objective:** to analyze the nursing staff's experiences in taking cervical smears and other organizational factors during an educational intervention assisted by B-learning methodologies. **Method:** a qualitative study was carried out in San Luis Potosí, Mexico, with 15 nurses. Data collection was done through semi-structured interviews based on a systematization of experiences. The Taguette program and B-learning methodologies as theoretical references were used to analyze the information. **Results:** weaknesses were identified in factors related to the accessibility of users to the service, supplies, infrastructure, biosafety, training of health personnel, delivery of results to patients, and knowledge of the program by the users. **Conclusions and implications for practice:** cervical cancer is a public health problem. Cervical cytology is the most widely used screening test; however, there are limitations in quality, so actions are proposed to improve the knowledge and skills of the nursing staff in their functions. The educational intervention effectively promoted comprehensive learning about taking cervical smears and allowed the nursing staff to share their experiences.

**Keywords:** Cervical Neoplasms; Nursing Education; In-service Training; Pap smear test; Distance Education.

## RESUMO

**Objetivo:** analisar as experiências das enfermeiras na realização de esfregaços cervicais e outros fatores organizacionais durante uma intervenção educacional assistida por metodologias de b-learning. **Método:** estudo qualitativo realizado em San Luis Potosí, México. Participaram 15 enfermeiras. A coleta de dados foi feita por meio de entrevistas semiestruturadas a partir de uma sistematização de experiências. Para a análise das informações, utilizou-se o programa Taguette e metodologias de b-learning como referencial teórico. **Resultados:** foram identificadas fragilidades em fatores relacionados com a acessibilidade dos usuários ao serviço, insumos, infraestrutura, biossegurança, capacitação da equipe de saúde, entrega de resultados aos pacientes e conhecimento do programa pelos usuários. **Conclusões e implicações para a prática:** o câncer do colo do útero é um problema de saúde pública. A citologia cervical é o teste de triagem mais utilizado; no entanto, existem limitações na qualidade, por isso são propostas ações para aprimorar os conhecimentos e habilidades das enfermeiras que estejam desempenhando essa função. A intervenção educacional foi eficaz para promover o aprendizado integral sobre a realização do esfregaço cervical e permitiu que as enfermeiras compartilhassem suas experiências.

**Palavras-chave:** Neoplasias do Colo do Útero; Ensino de Enfermagem; Treinamento em Serviço; Exame Papanicolau; Educação à Distância.

## RESUMEN

**Objetivo:** analizar las experiencias de enfermeras en la toma de las citologías cervicales y otros factores organizacionales durante una intervención educativa asistida por metodologías B-learning. **Método:** estudio cualitativo realizado en San Luis Potosí, México. Participaron 15 enfermeras. La recolección de datos se hizo a través de entrevistas semiestruturadas con base en una sistematización de experiencias. Para el análisis de la información se utilizó el programa Taguette y como referente teórico las metodologías B-learning. **Resultados:** se identificaron debilidades en factores relacionados con la accesibilidad de las usuarias al servicio, insumos, infraestructura, bioseguridad, capacitación del personal de salud, entrega de resultados a las pacientes y conocimiento del programa por parte de las usuarias. **Conclusiones e implicaciones para la práctica:** el cáncer cervical es un problema de salud pública. La citología cervical es la prueba de tamizaje más utilizada; sin embargo, existen limitantes en la calidad, por lo que se proponen acciones para mejorar los conocimientos y habilidades del personal de enfermería que tiene como función la toma. La intervención educativa fue efectiva para fomentar el aprendizaje integral sobre la toma de las citologías cervicales y permitió al personal de enfermería compartir sus experiencias.

**Palabras clave:** Neoplasias del Cuello Uterino; Educación en Enfermería; Entrenamiento en Servicio; Prueba de Papanicolaou; Educación a Distancia.

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## INTRODUCTION

Cervical cancer (CC) is a public health problem where the necessary cause of the disease and its precursor lesions is persistent infection by high-risk human papillomavirus (HPV), particularly types 16 and 18.<sup>1</sup> Cervical cancer is the second most frequent type of cancer worldwide in the female age group between 15 and 44 years. It is estimated that 569,847 new cases have occurred in recent years, with approximately 90% occurring in developing countries.<sup>2</sup> The highest mortality rates in 2020 were recorded in East Africa, followed by Southeast Asia and the Caribbean, with 28.6, 10, and 8.2 per 100,000 women, respectively.<sup>3</sup>

In Mexico in 2019, for the population of women aged 30–59 years, CC was recorded as the second leading cause of death, with a percentage distribution of deaths of 13%.<sup>4</sup> In the 20 to 59 age group, according to 2020 GLOBOCAN figures, it has a mortality rate of 5.7 per 100,000 women and an incidence of 12.6 per 100,000.<sup>5</sup>

Mortality rates have become three times higher than in North America, demonstrating the enormous inequalities in health between the regions of the American continent as a result of the lack of resources and inefficiencies in early diagnosis and prevention programs in Latin American countries.<sup>6</sup>

In CC screening campaigns, cervical cytology is a study performed by observing and analyzing a sample of cells from the endocervix and exocervix through a microscope to determine changes or alterations in the anatomy and physiology of the cells, also known as the Pap Smear Test,<sup>7</sup> is applied for the early detection of CC in precancerous and cancerous lesions and then treat them as necessary, which has decreased in mortality from this disease.<sup>8</sup> However, limitations have been identified in this procedure. Among them, it is reported that the sensitivity and specificity of the test are relatively low<sup>9</sup> due to incorrect fixation and spreading on the lamella, recorded as frequent errors due to lack of cellularity resulting in false negatives<sup>10</sup> in diagnoses where neoplastic changes go unnoticed. Thus, acquiring low-quality samples has different causes, one of the main ones being the lack of training of the personnel who take them. Specifically, weaknesses have been detected in executing the central technique, as well as in the reception of the patient and the final orientation of the patient.<sup>11</sup>

Commonly, training for health service providers has been theoretical, expository, and with little practice. Therefore, in recent years, the introduction of new technologies for in-service training of health personnel has been promoted in such a way to acquire or improve professional skills (knowledge, skills, and attitudes), as indicated by the International Labor Organization (ILO), to eliminate monitoring barriers and improve detection rates and treatment of precursor lesions.<sup>12</sup>

For this reason, an educational intervention was implemented to improve professional skills in taking cervical cytology based on the model called “Andromache” (Copyright© 03-2014-02041 125513001-01INDAUTOR) assisted by software (Copyright© 03-2017-012513040300-01 INDIAUTOR) that includes

the b-learning modality, which promotes more comprehensive and meaningful learning.<sup>13</sup>

This study aimed to analyze nurses' experiences taking cervical cytology smears and some aspects related to the Cervical Cancer Early Detection program before and after an educational intervention.

## METHOD

This study was developed by applying a qualitative tool of systematization of experiences from March 1 to 27, 2021, in the city of San Luis Potosí, S.L.P., Mexico. Fifteen nurses performing cervical cytology in health centers belonging to three jurisdictions of the state of San Luis Potosí in the municipalities of Rio Verde, Tamazunchale, and San Luis Potosí in Mexico participated. The nurses were selected by convenience according to institutional training needs.

In order to train the nursing staff, an educational intervention was applied, which was developed based on theoretical references such as Ausubel's significant learning and the systematization of experiences proposed by Jara and Roberts' model of the three phases of learning.<sup>14-16</sup>

For the systematization of experiences, a semi-structured interview was conducted before and after the educational intervention, with 100 to 140 min per participant. The conversation was conducted through the Microsoft Teams platform, and the information was collected by recording video calls with the prior authorization of the informants. Saturation was worked until the participants shared the abovementioned information in the interviews. For the analysis of the information, the interviews were transcribed into text and through the <Taguette> platform, based on content analysis, the information data were labeled, which led to the following categories: 1) factors related to the users; 2) factors related to the organization of the Cervical Cancer Early Detection Program; 3) factors related to the nursing staff. Chart 1 shows the categories and subcategories analyzed.

After the first interview, the training began, which was applied in a total of 56 hours through the “Andromache” educational model with 45 hours of theoretical and practical sessions assisted by student-centered b-learning tools and 11 hours of in-person training for cervical cytology collection. One of the first phases of this in-service training is the stage of Systematization of Experiences, which aims to recover the experiences that the participants already have, based on a self-perception of their knowledge, skills, and attitudes in the performance of this procedure and based on this a re-adjustment is made in the program so that the participant obtains a more effective training, focused on their needs and context.

After the training and as an activity to conclude the course, the Systematization of Experiences was implemented again, in which they answered the same questions of the initial interview and expressed their self-perception after having lived the training experience and having shared their learning with the other participants. An electronic system called the Electronic System for the Registration of cervical cytology and cytopathology reports

**Chart 1.** Categories and subcategories of analysis.

CATEGORIES AND SUBCATEGORIES OF ANALYSIS		
Users-related factors	Factors related to the organization of the Cervical Cancer Early Detection Program	Factors related to nursing staff
· Economic, geographic, and social factors influencing access to screening services.	· Procurement of sanitary supplies and equipment.	· Execution of the procedure for taking cervical cytology smears:
· Information about Cervical Cancer Early Detection Program.	· State of infrastructure.	- Material preparation.
	· Biosafety.	- Central technique (location of the cervix, collection, spreading, and fixation).
	· Training of health personnel.	- Guidance to the user before, during, and after the procedure.
		- Management of clinical records.

Source: the authors.

(SISCAP-DOCACU)<sup>17</sup> was used to record the patients' clinical data as a technological innovation for patient care.

Each person was asked to participate voluntarily by signing an informed consent form. The data collected were used only for research purposes, and the ethical principles of respect for autonomy and guarantee of confidentiality of the information were safeguarded. The project was approved by the Ethics and Research Committee of the Faculty of Nursing and Nutrition of the UASLP with registration code CEIFE-2021-351.

## RESULTS

Among the characteristics of the participants, most (10) are 40 years old or younger; on the other hand, the years of seniority in the job range from 1 to 24 and coincide with the years of experience taking cytology (Table 1).

### Users-related factors

For the geographic factor, there are limitations in access to health centers in marginalized areas.

*[...] I am in a health center... it is the most distant, and it has as an area of influence several localities that belong to the health center; therefore, when the patients make their appointments, it takes them more than two hours to get to the community, to the health unit, they travel from their community, they walk; so this is an obstacle that I have because sometimes I make appointments and they cannot get there. [...].* (Nurse in Tamazunchale)

Regarding the economic factor, it was identified that the lack of monetary resources negatively impacts the female population receiving health services, and many participants find it impossible to pay for some type of transportation.

*[...] the population really lacks resources at times, so if they do not have enough to eat, much less will they have enough money to travel by truck to go to the health center, which is where we have to support them with the mobile unit, however, it is a complicated thing to do. [...].* (Nurse in San Luis Potosí)

In addition, in recent years, the lack of governmental financial support from the "PROSPERA" program has led to a lack of willingness to seek health care.

*[...] since the Federal Government's support program "PROSPERA" was taken away from them, well, they also say, "no, I'm not going because what are you going to give me?" and they want to receive something in exchange for; then "they don't support me, they don't give me the support, I can't, I can't pay for a truck to take me," and those are the kinds of obstacles more than anything else [...].* (Nurse in Tamazunchale)

Regarding social factors, nurses described that feeling grief, anxiety, or fear about the procedure and the lack of importance of attending the service due to prioritizing the care of their families are very common obstacles to the performance of cervical cytology.

*[...] I see a problem, patients are scheduled for their appointments, but they do not go to them, and they tell us that it is because they are taking care of the children and the husband. They have to make lunch for the husband, in short, it is their role as caregivers... I think it hinders us a little because they do not keep their appointments. [...].* (Nurse in San Luis Potosí)

**Table 1.** Characteristics of nurses taking cervical cytology smears.

No.	Health Jurisdiction	Health center	Age in years	Position	Years of service	Years of experience taking cervical cytology
1	San Luis Potosí	A	38	Head of Nursing	10	10
2		B	47	Nurse Manager	24	24
3		C	37	General Nurse	6	6
4		D	44	Head of Nursing	23	2
5		E	39	Head of Nursing	10	6
6		F	47	Head of Nursing	19	19
7	Rio Verde	G	47	General Nurse	22	22
8		H	33	General Nurse	5	5
9		I	32	General Nurse	7	7
10		J	27	General Nurse	1	1
11	Tamazunchale	K	54	General Nurse	18	15
12		L	40	General Nurse	11	11
13		M	29	General Nurse	5	4
14		N	23	General Nurse	2	1
15		Ñ	35	General Nurse	12	12

Source: The authors

Similarly, the restrictions by their partners;

*[...] it turns out that when the patient returns for a check-up because she is scheduled for a check-up to see if the treatment is working, it turns out that the patient is the same, and it turns out that the husband did not take the treatment because they are reluctant to take the treatment because the patients say that the husband says that "he does not feel anything," "he has nothing," and "it is the patient who is sick"; so there is a problem that we cannot deal with, because in this case "how do we get the man to take the treatment?" "Also, since they drink alcoholic beverages, they think that they cannot take the medication, so there we have a limitation for the treatment with the patients [...]. (Nurse in Tamazunchale)*

Moreover, the lack of knowledge of the health program because "it will never happen" to them to get cervical cancer and the low knowledge about HPV.

*[...] so when I had to ask them, "why didn't they get a Pap smear," they didn't think it was going to happen to*

*them, that is, they were not very sensitive to the fact that they could identify the possibility of dying from cervical cancer..." (Nurse in San Luis Potosi)*

*[...] many do not want to undergo [cervical cytology]; I think it's a cultural issue, so we persuade them by telling them the disease it prevents, what could happen if they don't realize it, and some agree, and some don't... I think that's the problem with the approach to performing the cytology, that the patient sometimes does not want the test to be taken and not because of the pain but because they are ashamed [...]. (Nurse in Tamazunchale)*

### **Factors related to the organization of the Cervical Cancer Early Detection Program.**

Nonetheless, the nursing staff identified factors related to the organization of the Cervical Cancer Early Detection Program, finding problems in the delivery of results to the participants due to long waiting times and weaknesses in the execution of the program due to the disorganization resulting from the lack

of material, among which the lack of cytobrush, the shortage of gowns and sheets in good condition.

*[...] we do not really have the brushes or the cytobrush, they have been provided with this equipment when HPV detection is performed, but for cytology, we are generally not provided with this equipment. (Nurse in San Luis Potosí)*

*[...] I struggle a lot with the supplies and the organization with the Nurse Manager... she says there are never any gloves. Every procedure I go to do, I have to leave, and she always gives you a pair or two pairs, so this is demotivating; it is one of my limitations in my health center [...]. (Nurse in San Luis Potosí)*

And lack of biosafety equipment.

*[...] in terms of biosafety, no, in fact, to tell you that I don't even have a gown for the patient, so the only thing I do is to cover her with the sheet that is provided for the expulsion bed, I don't have glasses, I don't have a gown for myself, gloves we do get them, mouth covers either, that's on us [...]. (Nurse in Tamazunchale)*

Similarly, another priority attention factor was identified as the state of the infrastructure and equipment within the health centers. In the interviews, the nursing staff stated that there are no exclusive areas for taking cervical cytology tests because the space where they are performed is limited.

*[...] in terms of infrastructure, we share the area with cures, so we also look for the opportunity to have the space for the Papanicolaou, but sometimes we have to combine cures and Papanicolaou, so we have to optimize the time we have. [...]. (Nurse in San Luis Potosí)*

Other limitations are the lack of changing areas for patients.

*[...] that the patient does not have a place to change or put her clothes because it is a little bit difficult because we only have a ward screen, and the ward screen was put in the doctor's office. (Nurse in Tamazunchale)*

Doors in poor condition, examination tables with broken legs, and lack of computer equipment.

*[...] the exam table with the leg braces is broken; that is, the leg braces can be accommodated, but they are a little uncomfortable, our health center is small; we have observation together with gynecology. (Nurse in Rioverde)*

The nurses interviewed had an average length of service of 11.46 years and 9.86 years of experience in taking cervical cytology smears. In spite of this, most of them expressed that they had never received formal training from the centers where they work.

*[...] I had not received [training] other than what I learned at the uni [university] and what I learned technically when I did my social service... (Nurse in Rioverde)*

*[...] last time we had an only theoretical course... where we were asked to make the data legible, to put also how we see the patient's cervix, more than anything else, the records that were more because in a hurry sometimes they do not fill in all the data required and then it was difficult for them and also for the data entry clerk...but a practical workshop, no, we have not had one. (Nurse in Tamazunchale)*

Their skills and knowledge have been developed based on self-taught learning by reading manuals and seeking information for the performance of the cervical cytology technique or also from advice from colleagues in the same profession.

*[...] when I started working, I did not receive training, as such, on the procedures and how to perform, everything was learned by reading the manuals from the colleagues who explained to us, well, yes, they explained to us how to do it, and as I went along, I got the knowledge. (Nurse in Tamazunchale)*

The educational intervention identified areas of opportunity to improve the program's organization.

*[...] the course helped me a lot, it helped me a lot from the moment of placing the material... my office is very small, and with all the material that is required, one adapts, where are you going to put it, where are you going to put the garbage can because it is a battle, one grabs the sheet with the hands and moves the garbage can with the foot, and the important thing is the technique, to do it well." (Nurse in Rioverde)*

*[...] after all this course, I feel that I have acquired skills that I didn't even know I could have...one aspect that I consider that I was not considering was my safety, the biosecurity of my equipment...taking care of our health. (Nurse in San Luis Potosí)*

*[...] I learned a lot from the course they gave us, and now I feel more confident in taking the samples; in fact, when I used to take the sample, I used to say, "that one is going to come back to me. This one will come out more or less," now I realize why, because there are things I didn't do, for example, using the saline solution to clean the cervix...now I know how I should do it; I feel more capable of telling you the truth. (Nurse in Tamazunchale)*

*[...] I had never seen the explained images of a cervix with some details such as cancer or some kind of infection. However, I had to see women as an intern who had external lesions, and as the doctor told us, in that case,*

*they had to be sent to the specialist to be treated, and here they did not take much importance to the external lesions they had. (Nurse in Tamazunchale)*

*[...] I learned that it is always very important to tell them that the fact that they go for a Pap smear is not exempting them from any disease. The important thing is the result because many patients think that when they have a Pap smear, they are done, and they don't come back for the result. (Nurse in Rioverde)*

### **Factors related to nursing staff**

During this study, factors related to nursing staff, such as the execution of the core technique and material preparation, were also identified.

*[...] I have been struggling a lot with the size of the mirror, and not from small to medium, but from medium to large. I have even used both mirrors. (Nurse in Tamazunchale)*

*[...] when the spatula is very rigid, you can't get a good shot as it is. I struggle a lot [...] they came out inadequate because it took me a long time to fix them. (Not having the cytospray ready), they made this observation to me. (Nurse in Tamazunchale)*

#### **Localization of cervix.**

*[...] sometimes it is difficult for me to locate the cervix in those people who are a little bit obese in taking the sample because I would really like to improve my sample taking, my spreading of the sample, and sometimes I feel that the sample I send is not enough. (Nurse in San Luis Potosí)*

#### **Sampling.**

*[...] to take the right amount of sample, sometimes I get a small sample, a very small sample, so I struggle because I still can't do it as it should be. I think that's the main problem I have. (Nurse in Tamazunchale)*

#### **Extending and fixing.**

*[...] in the fixation, I try putting the slide correctly. However, sometimes when I put the spray on, I think it happens to many of us that I say, "oh no, I don't think it fell," and I put it again, that's my mistake, and I've known it for a long time, but I try to avoid it and put the fixative spray on again. (Nurse in Rioverde)*

Regarding the orientation to the patient before, during, and after the procedure, the participants mentioned the following.

*[...] many patients, as I said, are very embarrassed, so even though I tell them every step of the way what I am going to do, that I am going to touch them, that I am going*

*to uncover them, I show them the mirror, the material, I show them everything so that they feel more confident... sometimes they try to cover themselves out of reaction [...]. (Nurse in Tamazunchale)*

On the other hand, the management of clinical records:

*[...] We basically use the formats provided by the federal level for the clinical breast examination, the traditional cytology, and the HPV test. However, we had this... I mention this because that is the reason why we may have to do double work because we handle a diary that is called the cytology diary, but it is really a detection diary of the cancer program because it includes the patient's registration, the federal taxpayer registry of the person who took the test, the date of the test, whether it was first-time cytology, subsequent ones after 3 years, whether it is HPV screening or follow-up, for clinical breast examination and mastography, the address of the patient and whether she has an appointment for colposcopy or an appointment for a breast ultrasound or biopsy. This is what takes the most time. (Nurse in San Luis Potosí)*

After the educational intervention, the nursing personnel reflected on the professional skills acquired, expressing the following.

*[...] I took advantage of this course because I did not know many things, now when taking cytology, I practiced so many important points that I did not know before and that I did not know about the anatomy of the cervix and how each part of the cervix was called, so, I hope that my samples... will not be rejected so much when I am taking them. (Nurse in Rioverde)*

*[...] as for the technique, if I omitted some steps, first I took the endocervix and then the exocervix, then I think it is crucial to perform it properly, both the spreading and the fixation. (Nurse in Rioverde)*

*[...] the course has helped me a lot on how to fix, how to clean my slide, so it doesn't get dirty, now I have even seen that it takes me less time to do the whole procedure since I interview the patient and the sheet I fill it very fast because I already know it, I have also put into practice to take care of the patient's privacy, I put her sheet, in fact, I almost cover her completely, and I only leave in sight where I am observing her genitals, in fact even a patient told me that she felt very comfortable because I took care of her privacy. (Nurse in San Luis Potosí)*

*[...] I feel more confident in the process of taking the sample, and I feel that I have the tools to make a better decision in the follow-up of the patient in the interview,*

*now I focus on her gynecological-obstetric history, which is what I think I was not, well, I was not asking enough questions... in the registry, I found the electronic system [SISCAP-DOCACU] good, I would like us to continue using it, it is much faster with this system, with legible handwriting it is much easier to keep track of the patients, I really liked the system.” (Nurse in San Luis Potosi).*

*[...] as for the course, I think it has been very enriching because it is very practical and you learn visually; it covers all the learning areas. (Rioverde Nurse)*

*[...] regarding the video, also, as I was saying, I am also visual; so many techniques that were there, it was much clearer to me because I tell you if you read it or comment on it, but I did not understand it, so the video helped me to clarify the doubts I had or to improve the technique I was doing. (Rioverde Nurse)*

*[...] I think the video was very illustrative, as they said it is very practical. The truth is, I think that when we watch it, it makes us see step by step the whole process of the Papanicolaou test, from the interview with our patient, everything about the orientation, before, during, and after the Pap smear, the placement on the slide, the fixation, I think the video is very good. (Nurse San Luis Potosi).*

## DISCUSSION

The educational intervention applied in this study was fundamental in showing progress in the professional skills of the nursing staff by allowing them to describe their experiences as health service providers, which allowed them to reflect on their work.

During the application of the interviews, the nurses described the presence of patients-related factors such as geographic, economic, and social factors that influence the success of the Cervical Cancer Early Detection Program, which is consistent with what Montoya-Ballena described for the Latin American and Caribbean regions,<sup>18</sup> who describe the association of incidence and mortality of CC in low-income populations with multiple barriers to access to Pap smears.

For a similar population addressed in the present study, Terán et al.<sup>19</sup> reported that women living in poverty and marginalization face greater disadvantages in accessing health services in the state of San Luis Potosí. In this sense, Terán et al.<sup>20</sup> have highlighted the importance and advantages of using geospatial tools in epidemiology to establish the characteristics of each population, specific health education programs, and direct primary care, as well as to follow up on positive and negative cases in order to generate better health service coverage.

Social problems have consequences in the decrease in the early care of the female population, and our findings corroborate

other studies such as that of Gutiérrez,<sup>21</sup> Salas,<sup>22</sup> Aranguren,<sup>23</sup> and Matassini<sup>24</sup> where a predominance of fear or apprehension for screening was reported. In other studies on Mexican women, such as the one by Rojas<sup>25</sup> and Saldaña,<sup>26</sup> other aspects, such as pain and embarrassment when exposing the genitalia during the procedure, were reported by Claire<sup>27</sup> in Bolivian women who feel embarrassment and discomfort.

Regarding healthcare attendance, Vergara<sup>28</sup> concluded that self-care is not a priority for the participants but that care for their families is. In another study in a Mexican population, Acosta<sup>29</sup> points out that women have little freedom to make decisions regarding their health when a partner is restrictive and possessive, as this acts as a barrier to early detection, Rojas<sup>25</sup> referred to a lack of knowledge about the usefulness and benefits of the Pap test and Zapata<sup>30</sup> reported findings in indigenous women who have never had a Pap smear for reasons of lack of interest, partner influence and not knowing the purpose of having the procedure done periodically. Therefore, Medina,<sup>31</sup> Franco,<sup>32</sup> and Hernández<sup>33</sup> have proposed promoting the strengthening of women's knowledge about HPV and CC since if they are aware of the implications of this health problem, they give more importance to the screening test. In addition, the findings found in this study expose numerous areas of opportunity in which health systems could work to increase women's participation in self-care.

It is also relevant that the deficient infrastructure conditions and the scarcity of supplies make it difficult to carry out continuous training to improve the application of the technique. Given the characteristics of the screening service, the practical component is an essential determinant in the success of the Cervical Cancer Early Detection Program.

The implementation of the educational intervention in this study resulted in the participants living the experience of nursing education that effectively increases their knowledge, skills, and attitudes that integrate the field of professional competencies. This is because the participants themselves mentioned that strengthening issues related to the health service of cervical cytology contributes to improving their professional performance, which is consistent with the results reported by Ojieabu,<sup>34</sup> who demonstrated that the effectiveness of the educational intervention evaluated as a means to improve cervical cancer knowledge among health care students could increase their knowledge of the topics from around 20 to just over 90%. These data also corroborate Torabizadeh,<sup>35</sup> where healthcare workers and nursing students after participating in an educational intervention increased their knowledge of cervical cytology screening.

The participants of this study, as nurses, recognized after the educational intervention that anatomical knowledge is essential in their professional training and the performance of the cytology technique. In other studies, such as that of Lazaro,<sup>36</sup> Bonilla,<sup>37</sup> and Ordoñez,<sup>38</sup> healthcare personnel in training were reported to have low to medium level knowledge of HPV and cervical cancer

prevention attitudes and cognitive deficiencies in the basics of the cervical screening procedure.

In this intervention, practical skills were strengthened concerning the technique of taking cervical cytology smears. The most outstanding results are taking, spreading the sample, and fixation, as indicated in the normative procedure manuals. The availability of adequate specimens allows for better reading and interpretation of the samples by the pathologist, thus avoiding false positives or negatives. Participants perceived that their procedural skills improved along with their cognitive skills, which significantly increased their learning.

The orientation to the patient was identified as a determining factor for the successful development of the procedure because the nursing staff, after the educational intervention, recognized that it is vital to provide a dignified and kind treatment before, during, and after the sample collection, since, in addition to improving a procedural competence, the attitudinal competence must also be improved by considering the patient as deserving of good care.

Another factor identified is related to records, which in turn is an important point addressed in the educational intervention because it is known that a characteristic weakness of the program is the incomplete and non-standardized filling out of the corresponding information, as a result of which it becomes repetitive and exhaustive to handle several records at the same time.

In this sense, the proposed software and the B-learning methodologies (use of digital platforms and videos) represents a good strategy for training health personnel since more autonomous and meaningful learning can be achieved.

## CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

Quality care is an aspect that patients take with great consideration when seeking health services, so nurses must have all the necessary elements and implement technological innovations in their practice to provide comprehensive and risk-free care. The educational intervention allowed participants to identify areas of opportunity to build and improve their knowledge and skills, develop critical thinking, enhance collaboration and teamwork, and motivate themselves to improve their performance.

The student-centered learning methods, including the innovative educational model called “Andromache,” seeks to achieve a comprehensive education and training for developing professional skills according to national or international profiles. The “Andromache” software is designed to distribute and control the theoretical and practical activities of classroom and non-classroom training in order to improve the quality of cervical cytology examinations.

In the present work, the teaching model was assisted by B-learning methodologies, which help to make learning more meaningful and autonomous. It uses electronic tools and is unique

and innovative as it is a training model for health professionals in service and training.

It is essential to make adjustments that increase the probability of success of the health programs. In this case, the Early Detection of Cervical Cancer, through interventions and educational strategies with strict adherence to the regulations and quality of the study programs that allow the establishment of a qualified work team for these actions in the health units, in addition to promoting awareness and sensitivity in the staff to this public health problem such as cervical cancer, through the proper taking of cervical cytology and early detection activities.

It is important to mention that during the present study, it was possible to identify limitations in accessing information about the program for the early detection of the disease and the authorities of the health institutions to provide facilities for the personnel to attend training. Likewise, increasing the number of informants.

## AUTHOR'S CONTRIBUTIONS

Study design. Gutiérrez Enríquez Sandra Olimpia. Terán Figueroa Yolanda

Data acquisition. Hernández Cedillo Coral.

Data analysis and interpretation of results. Gutiérrez Enríquez Sandra Olimpia. Hernández Cedillo Coral. Terán Figueroa Yolanda.

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