Title: Students’ views on the impact of two pedagogical tools for the teaching of breast and pelvic examination techniques (video-clip and training model): a comparative study.

Short title: Teaching of gynecological examinations using a video and a model

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**Objective:** To investigate the views and experience of undergraduate medical students concerning two methods used in the teaching of pelvic and breast examinations: a video clip and a training model.

**Methods:** Second and third year students prospectively studied. All of them were handed oral information on the clinical aspects of pelvic and breast examination. Thereafter, they underwent a training session using silicon models and video clips. All students were asked to complete a satisfaction questionnaire prior to the training session and after their first “real” examination.

**Results:** Seventy-nine students, 53 female and 26 male were included in the present study. The median age was 20 years (18-24). Overall, students appreciated both videos and training models, which were useful in decreasing the stress and discomfort associated with their first clinical examinations. For pelvic examinations, students rated the video clip with a higher degree of satisfaction than the training model, in terms of its contribution towards improved theoretical knowledge (median satisfaction ratings: 4 vs. 3, \(P<0.004\)). In addition, students rated the training silicone breast model with a higher degree of satisfaction when compared to the video clip (median satisfaction rating 4 vs. 3, \(P<0.001\)), to improve self-confidence before their first real breast examination. Finally, students’ satisfaction was significantly correlated with their level of study.

**Conclusion:** Teaching sessions, which combine use of videos and training models for learning pelvic and breast clinical examination are associated with a high degree of satisfaction from students in their 2nd or 3rd student’s year. Therefore we recommend this approach for pre-clinical teaching.

**Key words:** pelvic examination model; medical teaching; clinical female pelvic trainer; pelvic trainer; silicone breast model; silicone model; silicone pelvic model; pelvic model; teaching sessions; simulated patient.
INTRODUCTION

Although pelvic and breast examinations involve essential skills, required of all medical trainees, their sensitive nature makes them challenging to learn. The intimate nature of pelvic and breast examinations poses a challenge to their demonstration and practice. Physicians graduating from all medical universities should have attained a basic level of knowledge and skill in the care of female patients. Although it is essential for medical students to learn the gestures of the clinical examination of "real" patients, for ethical reasons it is important that these students receive a sufficient level of "preclinical" training. Professional patients are a tempting option [Siwe K et al., 2007] [Nelson, 1978], but their recruitment is problematic, and this type of education is not an option for large groups of students. "Preclinical" pedagogical tools are thus often required. Various educational tools (training models and video clips, for example) have been developed to better prepare our students. However, there are few studies, which have actually evaluated and compared these different educational tools [Hitchcock et al., 1992]. Specifically, it is possible that some tools may be more appreciated by some students, and better adapted to their age and gender. Few studies have focused on the degree of student satisfaction associated with the use of learning tools, before they meet their first patients. To our knowledge, no study has compared student satisfaction based on the use of two different pedagogical tools. The aim of the current study was to evaluate the satisfaction and feelings of the medical students with regard to two pedagogical tools (video clips and a training model), for the teaching of breast and pelvic examinations.

METHODS

The participants were medical students at the Paris South University (University of Paris XI, Le Kremlin Bicêtre, France) in their 2nd and 3rd study years, who were following an 8-10 week course on gynecological semiology (3 hours per week). None of these students had received any training in pelvic/breast examination before the current learning sessions. Before the teaching
sessions, the students were given oral information concerning gynecological examinations. None of the students declined to participate. Each undergraduate medical student participated in a training session involving the use of a training model (silicone pelvic and breast training models), and viewed a video clip presentation.

Subsequently, the students completed a satisfaction questionnaire, which included items related to the pedagogical value of these two different types of tool (training models and video clips). The questionnaires were completed before the students' first real pelvic / breast examination.

Seventy-nine students completed the questionnaire, relating to their satisfaction with the components of this training session, on the basis of the following findings: theoretical data; practical data, duration of the pedagogical session.

**Pelvic training model**

A plastic pelvic model (non-computerized) was used (GYN/AID® Gynecologic Simulator). Its modular design permits: vaginal and rectal examinations, standard vaginal examination procedure, introduction to various pathologies and the cervical smear procedure. The model has a modular design, and enables trainees to become familiar with the detailed procedure of a clinical examination using a speculum. Furthermore, different pathological assemblies are interchangeable and can be introduced according to the training requirements. During the session (10 minutes), in addition to considerations arising from the patient/physician relationship, technical aspects were addressed.

**Pelvic examination video clip**

This video explained and demonstrated each aspect of the pelvic examination: angle of insertion of the speculum (angle of insertion at entry and angle at full insertion), opening of the speculum, bimanual examination. Duration of the video clip: 10 minutes.

**Breast training model**
A non-computerized Breast Examination Wearable Model® (3B Scientific Products®), made of new 3B SKINlike™ high-quality silicone, was used for the current study. Breast examinations are possible in both the upright and the lying positions. This model provides information on the characteristics of benign and malignant tumors at different stages of development and is a support for teaching home self-examination. During the session (10 minutes), in addition to considerations arising from the patient/physician relationship, technical aspects were addressed.

*Breast examination video clip*

The video clip explained and demonstrated each aspect of the examination of the breasts and axillary nodes on a real patient: visual and manual examinations, in the seated (arms overhead) and lying positions. Duration of the video clip: 10 minutes.

*First “real” pelvic examination*

Students performed their first “real” pelvic/breast examination on a patient under general anesthesia. The pelvic examination is a component of the surgical procedure used under general anesthesia. Consent for a pelvic examination by medical trainees who are part of the surgical team is therefore implicit, when consent has been obtained for medical trainees to participate in the surgical procedure. Regardless of the gender of the undergraduate medical trainee, pelvic examinations were performed under the appropriate supervision of a chaperone (experienced obstetrician/gynaecologist) (XD).

*Student’s satisfaction questionnaire*

The questionnaires were handed to the students prior to the training session and their first “real” examination, which they were asked to complete before and following their first clinical examination.

The 79 student participants answered the questionnaire after the learning session, in order to measure various aspects of each pedagogical tool before their first “real” clinical examination. Twenty eight students (28/79, 35%) completed the questionnaire-based evaluation of the
pedagogical tool (video and training model before and after their first clinical examination. The remaining 51 students completed the questionnaire before their first real examination, but did not (forgot to) complete the questionnaire afterwards.

A 7-item questionnaire based on the Likert scale was designed to measure various aspects of the students' experience in the context of a pelvic/breast examination, and to rate their own degree of satisfaction with the two pedagogical tools (very unsatisfied, unsatisfied, satisfied, very satisfied).

The questionnaires were completed (non-anonymously), directly after each training session.

**Ethics**

The patients gave their written informed consent for the pelvic/breast examinations and the production of video recordings.

**Analysis of questionnaire data and statistics**

The answers provided by respondents to the questionnaires were entered into a spreadsheet, for quantitative statistical analysis using R software (R is a free software environment for statistical computing and graphics [http://www.r-project.org/](http://www.r-project.org/)). Pearson’s Chi-squared test with Yates’ continuity correction was used for the comparison of proportions. Univariate analysis was performed using Spearman's rank correlation rho test for categorical data.

**RESULTS**

**Student population characteristics**

The student population characteristics were as follows: $n=79$; sex ratio: female ($n=53$, 67%); male ($n=26$, 33%). The median age was 20 (IQR: 19-20), with age extremes from 18 to 24 years. The students' grade levels were: 2$^{nd}$ study year ($n=69$, 87%) and 3$^{rd}$ study year ($n=10$, 13%).
Evaluation of students' degree of satisfaction

Most of the students ranked their own satisfaction in each teaching session as either very satisfied or satisfied (see Tables 1 & 2): the median rating was 3 or 4 for each item.

Comparison of the two pedagogical tools

The results of the comparison between the students' satisfaction with the training models and video clips are provided in Table 2.

For the breast examinations, no significant difference was noted between the training model and the video clip, in terms of the students' satisfaction with these pedagogical tools and their contribution towards improved theoretical knowledge.

For the pelvic examinations, the students rated the video clip with a higher degree of satisfaction than the training model, in terms of its contribution towards improved theoretical knowledge (median satisfaction ratings: 4 vs 3, p=0.004).

For their satisfaction with the pedagogical tools, in terms of the degree to which they contributed towards practical knowledge of the examination procedures, the students rated the video clip with a higher degree of satisfaction than the training model, for both breast and pelvic examinations (median satisfaction ratings: 4 vs 3, p<0.001; median satisfaction ratings: 4 vs 4, p=0.003; respectively).

Concerning satisfaction with the pedagogical tools, assessed in terms of the degree to which they contributed towards improved self-confidence before the students' first real breast examination, the students rated the training silicone model with a higher degree of satisfaction when compared to the video clip (median satisfaction rating 4 vs 3, p<0.001).

Comparison of the students' satisfaction before/after the first "real" examination

28 students (28/79, 35%) completed the evaluation of the pedagogical tool (video and training model), both before and after their first clinical examination. The results of the comparison between the students' satisfaction before and after their first "real" examination are given in Table
3. The students rated both pedagogical methods with a level of satisfaction which was higher after, than before, the first “real” examination.

*Analysis of factors related to the teaching methods having influenced the students’ satisfaction*

The results of the univariate analysis concerning the breast examination are provided in Table 4. The students’ satisfaction was significantly correlated with their level of study. For example, for the teaching of the breast examination using a silicone training model, the 2nd study year students (lower student’s grade level) were more satisfied than the 3rd study year students, with regard to the method’s suitability for providing theoretical and practical knowledge related to the examination (see Table 4). In addition, when compared with the male students, the female students were less inclined to agree that the silicone breast training model gave them confidence in performing their first clinical examination. Another aspect of this analysis is that a correlation can be found between age and satisfaction, concerning the video clips used for the teaching of the breast examination: as age increases, the students tend to be more satisfied.

**DISCUSSION**

The aim of the present study was to compare the satisfaction and feelings of medical students, with respect to two pedagogical methods used for the teaching of both breast and pelvic examination techniques. We show that the students appreciated both the videos and the training models.

In addition, it is noticeable that satisfaction scores change over time, depending on whether the evaluation takes place just after the teaching session, or following the first clinical examination. It is important to consider this issue when publishing the results of student satisfaction with respect to a particular teaching method.

Physical diagnostic skills are considered essential for the practice of medicine [Kern et al., 1985]. However, several studies have noted declining clinical skills among medical school graduates [Wiener and Nathason, 1976; Mangione and Nieman, 1997; Mangione and Peitzman,
This phenomenon may be explained by changes in medical teaching in recent years, which have led to a reduction in the number of hours spent in practical training, particularly under direct supervision [Naftalin, 2003].

The more recent generations of medical students learn differently, using multimodal and stimulus-dependent approaches, associated with various technologies (internet, books, videos, 3D-computerized models...). As a consequence, the pedagogical tools have also been modified and upgraded, in order to meet the students' expectations, and to improve the medical skills of future physicians. As a consequence, we have recently observed a shift from classical teaching methods, using real patients, to the use of preclinical outpatient sessions.

It is commonly established that the teaching and learning of pelvic/breast examinations is essential. However, in Western societies, the breasts, as well as the genital area, are considered to be intimate body areas [Metcalf et al., 1982]. Medical students may thus experience a variety of uncomfortable feelings such as embarrassment, fear, and disgust during their initial encounters with patients [Chinnah et al., 2011; Beckmann et al., 1986]. Finally, the teaching of clinical examinations of these “socially sensitive” areas still remains challenging. Traditionally, medical students have learnt the examination of intimate body areas through the examination of real patients under anesthesia, too commonly without the patients' knowledge or explicit consent [Ubel et al., 2003]. Despite regulatory bodies (e.g. General Medical Council in 2001) having provided clear guidelines against the examination of anaesthetized patients' intimate body areas without their prior consent, this practice is still thought to be common, even though many patients willingly consent to medical students examining their intimate areas when asked [Bibby, 1988]. To overcome the limitations of training with clinical patients, educational programs with professional patients (PP) were developed worldwide [Johnson et al., 1975; Livingstone et Ostrow, 1978; Beckmann et al., 1986; Beckmann et al. 1988; Nelson, 1978; Pickard et al., 2003; Abraham, 1998; Siwe et al. 2006 ; Waggren et al., 2005]. Conversely to the case of clinical patients, the professional patient’s knowledge is usually good enough to allow beneficial interaction and feedback with the students. However, the recruitment of professional patients can be problematic and this type of education is not an optimal option for large groups of students.
Although some authors have reported the use of video training for the teaching of pelvic examinations [Rosenthal et al., 1980], a precise evaluation of this approach is still lacking. Overall, the use of a video tutorial for instruction allows the amount of faculty time to be reduced. The students also are able to review the instructions as often as necessary, and at their own pace. Despite its feasibility and usefulness for large groups of students, the cost of these new pedagogical tools also has to be considered (several thousands of euros/dollars are needed for the casting and production of a high quality video). Therefore, an accurate cost-benefit analysis of these new pedagogical tools is needed.

The use of an anthropomorphic model for the instruction of pelvic examinations has been previously reported [Godkins et al., 1974; Rakestraw et al., 1985]. In addition, standardized clinical breast examination training using a silicone breast model has been shown to improve medical students' ability to detect and describe breast masses [Benincasa et al., 1996; Aliabadi-Wahles et al., 2000; Steiner et al., 2008]. Pilgrim et al. (1993) reported that training, with potentially immediate feedback (on silicone models and professional patients), is more effective than classical lectures alone for the learning of clinical breast examinations [Pilgrim et al., 1993]. Furthermore, students who appreciate didactic skills generally emphasize the importance of having a teaching chaperone to provide immediate informative feedback, thereby reducing their anxiety during the teaching sessions [Martens et al., 2009]. It is our opinion that the utilization of simulated patients (silicone models) is useful for the teaching of routine clinical pelvic and breast examinations. However, video training may be a useful complementary approach, having the advantage of demonstrating different aspects of the clinical examination.

The present study is the first of its kind to have evaluated the use of videos and simulation training as pedagogical tools for the teaching of pelvic/breast examinations. We show that both pedagogical methods have advantages and drawbacks, and are useful in decreasing the stress and discomfort associated with the students' first clinical examinations. Furthermore, it is noticeable that students rated the use of a silicone training model with a higher degree of satisfaction than the video clip, with respect to its contribution to an improvement in their self-confidence before performing the first real breast examination. As medical students attending the
courses have a wide range of ages (up to 4 years for students in the same student year), it appears important to offer them a teaching approach combining the use of both videos and training models, in order to meet their varying degrees of maturity and expectations.

A possible limitation of the study is that the questionnaires were completed in a non-anonymous fashion, in order to correlate findings before and after the students' first clinical examination. Another point is that we chose to perform the first clinical pelvic and breast examinations under anesthesia, since this approach allowed learners to encounter normal and abnormal anatomies with a relaxed pelvis, and to correlate their findings with an intra-operative pathology. This scenario enables students to understand the findings of breast and/or pelvic examinations, without time pressure and with reduced patient discomfort. In addition, the analysis of the results found in the present study is difficult, since there is no close relationship between a student's age and his/her grade level. There are various reasons for which a student in a given grade may be older than average: some have repeated a grade (during primary school for example), and others may have followed other university courses before medical school. Therefore, a slightly greater age is not necessarily synonymous with a student's learning difficulties. Further studies should include specific questions, in order to analyze the students' background prior to their first year of medical school. In addition, further studies should involve trials in which the pedagogical tools first proposed to the students are selected randomly, according to their grade, gender and age.

CONCLUSION

Female pelvic and breast examinations are procedures, which need to be carried out by all physicians. Undergraduate medical trainees should be appropriately chaperoned at all times, to ensure both the safety of the patient and the value of the learning opportunity. However, training away from the patient is essential. Teaching sessions, which make combined use of videos and training models, are associated with a high degree of satisfaction from students in their 2nd or 3rd
student’s year. On the basis of the results of this study, we recommend this type of approach for pre-clinical teaching.

PRACTICE POINTS

Most undergraduate medical students are highly satisfied with video / training model pedagogical sessions, for the learning / teaching of pelvic / breast examinations.

The use of innovative approaches, such as combined videos and training model sessions, helps students develop a mental picture of the correct skills required by the practitioner, and of the locations of deep pelvic structures situated beneath the vagina and the abdomen wall, encountered during a physical examination.

Combined videos / training model sessions, used as a teaching tool in a clinically integrated curriculum, may be a innovative approach to the necessary transition from pure theory to the first performance of a practical breast/ pelvic examination.

DECLARATION OF INTEREST

We thank the University of Paris South (Université Paris Sud), the Kremlin Bicêtre School of Medicine (Faculté de medicine du Kremlin Bicêtre) and the Francophone internet medical school (UMVF Université médicale virtuelle francophone) for supporting this study (grants for video production and training models).

REFERENCES


“How satisfied are you with the pedagogical tool, in relation to …” | the quality of the training model's texture | the quality of the training model phantoms | the quality of the video clip production | the quality of the scenario | the duration of the teaching session / of the video clip
---|---|---|---|---|---
**Breast examination**
Model (median (IQR)) | 3(3-4) | 4(3-4) | - | - | 4(3-4)
Very unsatisfied (n) | 0 | 1 | - | - | 0
Unsatisfied (n) | 1 | 3 | - | - | 2
Satisfied (n) | 57 | 33 | - | - | 30
Very satisfied (n) | 21 | 42 | - | - | 47
Video (median (IQR)) | - | - | 4(3-4) | 4(3-4) | 4(3-4)
Very unsatisfied (n) | - | - | 0 | 0 | 0
Unsatisfied (n) | - | - | 2 | 0 | 0
Satisfied (n) | - | - | 34 | 25 | 27
Very satisfied (n) | - | - | 43 | 54 | 52
**Pelvic examination**
Model (median (IQR)) | 3(2-3) | 3(2-3) | - | - | 4(3-4)
Very unsatisfied (n) | 0 | 0 | - | - | 0
Unsatisfied (n) | 34 | 24 | - | - | 0
Satisfied (n) | 43 | 46 | - | - | 31
Very satisfied (n) | 2 | 9 | - | - | 48
Video (median (IQR)) | - | - | 4(3-4) | 4(3-4) | 4(3-4)
Very unsatisfied (n) | - | - | 0 | 0 | 0
Unsatisfied (n) | - | - | 3 | 0 | 15
Satisfied (n) | - | - | 34 | 29 | 23
Very satisfied (n) | - | - | 42 | 50 | 41

**Table 1**

Student’s satisfaction with two pedagogical tools.

*Abbreviations: n, number; IQR, interquartile range; vs, versus.*
“How satisfied are you with the pedagogical tool, in relation to ...” | its contribution towards theoretical knowledge | its contribution towards practical knowledge of the examination procedure | Its contribution towards improved self-confidence before the first real clinical examination

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<td>3(3-4)</td>
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<tr>
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* Pearson’s Chi-squared test with Yates’ continuity correction

Table 2

Student’s views on the impact of two pedagogical tools: comparison between the two methods.

**Abbreviations:** n, number; IQR, interquartile range; vs, versus.
“How satisfied are you with the pedagogical tool, in relation to…”

<table>
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<th></th>
<th>its contribution towards theoretical knowledge</th>
<th>its contribution towards practical knowledge of the examination procedure</th>
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<td>Model</td>
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<td>3(3-4)</td>
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<td>After (median (IQR))</td>
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<td>4(4-4)</td>
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<tr>
<td>Comparison before vs. after</td>
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<td>Video</td>
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<tr>
<td>Before (median (IQR))</td>
<td>3 (3-4)</td>
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<tr>
<td>After (median (IQR))</td>
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<td>4 (4-4)</td>
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<tr>
<td>Comparison before vs. after</td>
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<td>p = 0.008*</td>
<td>p &lt; 0.0001*</td>
<td>p = 0.42*</td>
</tr>
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</table>

* Wilcoxon signed rank test with continuity correction

**Table 3**

Evaluation of students' satisfaction with two pedagogical tools, before and after their first "real" clinical examination (breast examination)

Results are given for 28 students who completed the questionnaire both before and after the first “real” clinical examination.

*Abbreviations*: IQR, interquartile range; vs, versus.
### Table 4

Univariate analysis of factors influencing student satisfaction with various teaching methods (breast examination).

Univariate analysis using Spearman’s rank test (Spearman’s rank correlation rho (rs)).