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EDUCATION AND TRAINING

A prospective study into the benefits of simulation training in teaching obstetric vaginal examination

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ABSTRACT

Objective: To assess the benefits of incorporating simulations in obstetric vaginal-examination training. *Methods:* A single-center, randomized, prospective study was conducted in a French University Hospital. Medical students without obstetric experience were assigned, by simple random sampling, to perform either 10 or 30 vaginal-examination training procedures using a simulator. A control group of students that had not performed any simulator training procedures was also enrolled. Medical students performed six vaginal examinations on patients who were in labor. The students reported the findings of the examinations in terms of five items (cervical length, position, consistency, dilation, and fetal presentation). The students' findings were then compared with those of experienced midwives (whose answers were considered to be the gold standard) who examined the same patients. *Results:* A total of 66 students were included in the analyses. Students who had performed 10 simulated procedures demonstrated significantly greater accuracy in vaginal examination assessments in comparison with the control group ($P < 0.001$). No significant difference was observed between the results for students that had performed 10 or 30 simulated procedures ($P = 0.44$). *Conclusion:* Simulation training assisted novice students in improving their vaginal-examination skills before performing such procedures on real patients. Vaginal-examination simulations should be included in the training curriculum for students who will examine pregnant patients.

1. Introduction

Teaching technical skills during medical training can present some ethical and medico-legal issues [1]. Vaginal examinations are an area of concern because they involve the genital area [2–4] and obstetric management. However, being able to perform vaginal examinations correctly is recognized as an essential skill in labor management [5] and several studies have reported low levels of accuracy in vaginal examinations performed by interns working in gynecology and obstetrics departments [6]. This low reliability in examination techniques is due, in particular, to the fact that these techniques cannot be learnt by observation alone; students need to perform multiple vaginal examinations on pregnant patients. Normally, these examinations are performed under the supervision of an instructor who will then repeat the examination for each patient. This helps to explain the difficulties experienced by medical students in learning these techniques.

The hypothesis of the present study was that, in medical situations where intimate areas of a patient's anatomy are involved, initial training using a simulator could be beneficial for novice students, allowing them to improve their skills and gain confidence in comparison with students who do not receive simulation training.

The aim of the present study was to assess the benefits of simulation training in teaching obstetric vaginal-examination techniques to medical students.

2. Materials and method

A single-center, randomized, prospective study was performed at the Department of Obstetrics and Gynecology, Archet Hospital (Nice University Hospital), France, between November 1, 2012 and November 1, 2013. All fifth-year medical students beginning their clinical rotation in the department were eligible for inclusion in the study. All patients admitted to the study institution for an uncomplicated delivery while enrolled students participants were performing patient assessments were eligible for enrollment in the study. Students and patients provided verbal informed consent for participation in the study. The patient-examination protocols used in the present study did not differ from normal practice

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at the study institution (patients are normally examined twice, once by a midwife, and once by a midwifery or medical student); consequently, institutional review board approval was not required.

At the study institution, fifth-year medical students complete a 2-month clinical rotation in the Department of Obstetrics and Gynecology. Groups of 25 students complete the rotation concurrently. All the fifth-year medical students attending the first day of their clinical rotation received a 30-min standardized course summarizing how to perform an obstetric vaginal examination. The course included details of evaluating cervical length, cervical position, cervical consistency, cervical dilation, and fetal presentation. At the end of the course, the aims of the present study were explained to all students and students had the opportunity to volunteer to participate.

Students from four consecutive rotation classes were assigned, using simple random sampling (performed by drawing a piece of paper with a group assignment written on it from a box with an equal number for each group), to perform either 10 or 30 vaginal examinations using a simulator.

Training sessions used a shoe box-shaped simulator with a silicon vulva and vagina (Health Edco, Fetal Monitoring and Labor Progress Model Set, Fleetwood, UK) (Fig. 1). This simulator allowed the combined use of two modules, one reproducing the cervix (four different cervix models: long and closed, two-finger dilation and mid-length, 4-cm dilation and effaced, and 9-cm dilation and effaced) and one reproducing fetal presentation (two different presentation models: a cephalic presentation and an incomplete breech presentation). For each simulated vaginal examination, an instructor presented students with a pre-determined sequence of module configurations. Similar to a real patient examination, students had to examine the simulator using a finger cot. Of the five features students would be asked to assess when examining a patient in the study, only three were modifiable for the simulation: dilation, length, and fetal presentation. The remaining two features (position and cervical consistency) could not be assessed using the simulator. Each student performed a vaginal examination of the simulator and then described the three parameters to an instructor. The instructor then explained any differences between the actual parameters of the simulator and the student's assessment of the parameters to the student.

All patients admitted to the study institution experiencing an uncomplicated delivery during the study period had the study aims explained to them and were offered the opportunity to participate in the present study. Oral consent for participation was provided by all participants. Each student performed vaginal examinations on six patients in the delivery unit who were in labor.

Students were instructed to report on five pre-specified features of their examinations: cervical length, cervical position, cervical consistency, cervical dilation, and fetal presentation. The students reported their findings using a multiple choice questionnaire for each of these items: long, half-long, short, effaced, or nonexistent for cervical length; posterior, centered, or anterior for cervical position; tonic, transitional, or soft for cervical consistency; 0–10 cm for cervical dilation; and cephalic (giving orientation) or breech (giving type) for fetal presentation. In accordance with previous studies [7–9], an error of ± 1 cm was considered accurate when reporting the cervical dilation.

After four rotation classes had completed simulator training and patient examinations, a fifth rotation class was included in the study. All students who enrolled from this class were assigned to a control group. This group performed no simulated procedures and completed only the standardized 30-min course before they began patient examinations, having received the same instructions as the simulator-trained groups regarding what features to report while examining patients.

All the students (in the simulator-trained groups and the control group) were supervised during patient examinations by midwives who had longer than 5 years of experience. Neither the midwife nor the patient was informed which of the study groups the students belonged to. The midwives examined the patients first and then the students performed a vaginal examination. All midwives and students reported the results of their examinations separately.

After delivery, the results of the students' examinations were compared with the midwives' results. The results of the vaginal examinations performed by midwives were used as the basis for comparison because they were considered to be the gold standard of obstetric vaginal examinations.

For each vaginal examination, the students' answers for the five features were analyzed independently, and the average rate of accuracy of each group was evaluated and expressed in the form of a percentage. Students' answers regarding each of the assessed items were rated as follows: 1 point if there was equivalence between the student's and the midwife's vaginal-examination result, or 0 points if the students obtained different results to the midwife. This allowed the results of the examinations to be expressed as a vaginal-examination accuracy score that took into account the totality of the items, in order to give a clearer representation of whether the vaginal examination items were assessed correctly. This score was calculated based on the number of successfully assessed features across the six patients assessed by each student, resulting in a score graded on a 30-point scale.

The participants in the control group were selected from a unique rotation class where no students were assigned to receive any simulator training because it was hypothesized that, if some students within a rotation class seemed very inexperienced or lacking confidence in comparison with their classmates, the midwives might coach these students through their examinations of patients, biasing the patient assessments made by these students.

Quantitative data were expressed as the mean $\pm$ SD and as medians with quantiles. The average accuracy scores for the three groups were compared using the Wilcoxon test, after the non-normality of the data was verified using the Shapiro–Wilk test. The qualitative data, expressed

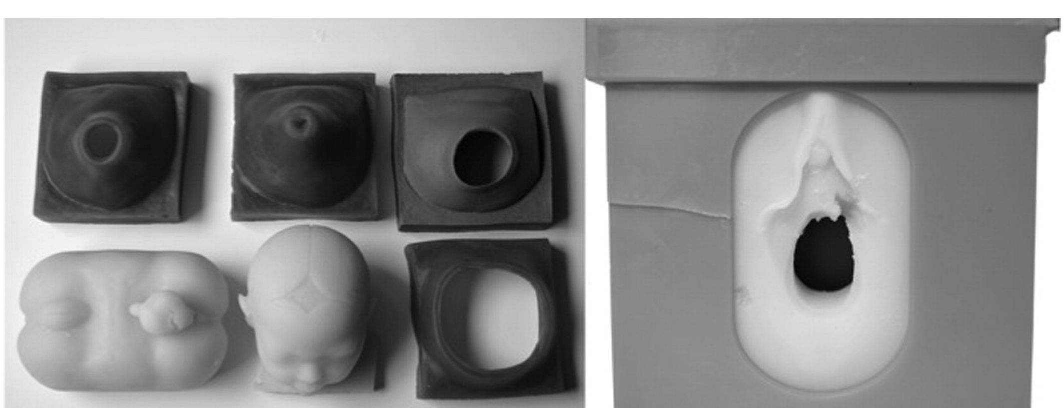

Fig. 1. Training-simulator models.

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