

# Contribution of Simulation to the Skills Laboratory for the Learning of Obstetrical Examination in an African Setting with Limited Resources

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## Abstract

**Objective:** To evaluate the interest of the simulation in the learning of the obstetric examination of parturient by medical students. **Materials and methods:** It was an analytical cross-sectional study that took place from 1 to 28 February 2020 at the Yalgado Ouedraogo Teaching Hospital in Ouagadougou, Burkina Faso. The study population was made up of medical students at the Doctorate II level. The previous experience of the students in the obstetric examination of the parturient, the contribution of the simulation on their feelings and on their skills towards this examination were studied. The Mc Nemar Chi<sup>2</sup> test was used to compare percentages on paired samples. **Results:** The level of difficulty in performing the obstetrical examination in the parturient evolved downwards after the practice of the simulation. The stress level to perform the obstetric exam has been significantly reduced. On the other hand, confidence has increased. The students' ability to appreciate each of the elements of the obstetric examination studied had improved after the practice of simulation. **Conclusion:** The simulation in the skills laboratory was a great contribution and the acquisition of models of better fidelity would help to improve the contribution to the confidence building and the acquisition of skills by learners.

## Keywords

Simulation, Skills Laboratory, Obstetrical Examination, Students

## 1. Introduction

Simulation is an important educational tool [1] [2] [3]. Its use in medical learning is an emerging practice [4] [5]. It corresponds to the use of material, virtual reality or a standardized patient to reproduce situations or care environments, with the aim of teaching diagnostic and therapeutic procedures and of repeating processes, concepts medical or decision-making by a health professional or a team of professionals [6] [7]. It not only allows learners to absorb clinical facts with more confidence, thus creating an atmosphere that puts patients at ease, but also improves patient safety, while reducing medical errors, hence the postulate “never the first time on a patient” [8] [9]. The simulation could allow students to arrive on a hospital internship after having acquired certain basic technical and clinical skills and/or deemed essential for the transition to reality. Also in a context of massification of student numbers and scarcity of internship sites, the use of simulation constitutes an alternative for the acquisition of skills. In addition to its use in student training, simulation is also used for the assessment of both technical and non-technical knowledge of students [10]. In 2018/2019, Burkina Faso had 132,569 students enrolled in public and private Higher Education and Research Institutions. Compared to the year 2017/2018, the number of students increased by 12.6%. The ratio of students to the number of permanent teachers in public institutions was 140 students for one teacher. This ratio was well above the UNESCO standard (25 students for one teacher) [11]. Medical training knows the same realities. This is how the Health Sciences Training and Research Unit (UFR SDS) of the Joseph Ki Zerbo University (UJKZ) of Ouagadougou is faced with this phenomenon of overstaffing with only three practical training sites in Ouagadougou, which leads to saturation of practical training sites. There are many gestures and skills to master in obstetrics. The obstetrical examination in the parturient is of paramount importance [12] [13] and includes several maternal and fetal parameters to be assessed. Learning this exam requires repetition of gestures and could be facilitated like many other gestures [14] by practicing simulation in the skills laboratory. Such a laboratory was built at the Yalgado Ouédraogo Teaching Hospital, equipped and made available to the Health Sciences Training and Research Unit by Jhpiego since July 13, 2018. The objective of this study was to assess the contribution of this laboratory in the learning of the obstetrical examination of the parturient by the medical students of Doctorate II of the Health Sciences Training and Research Unit of the Joseph Ki Zerbo University, promotion 2019-2020, through an evaluation of their performance before and after the simulation as well as their level of difficulty.

## 2. Materials and Methods

This was a descriptive and analytical cross-sectional study. Data collection took place from December 1, 2020 to January 17, 2021 in the obstetrics gynecology department at Yalgado Ouédraogo Teaching Hospital. The study population consisted of doctoral level II medical students from the Health Sciences Training

and Research Unit of the Joseph Ki Zerbo University in Ouagadougou.

The sampling was exhaustive, including all doctoral II medical students newly arrived in the department of gynecology and obstetrics of Yalgado Ouédraogo Teaching Hospital for their internship during the study period.

The variables studied concerned the characteristics of the learners, their feelings about the examination of the parturient, their acquisition of skills in obstetrical examination of the parturient, their suggestions and the opinions of their monitors.

The variables were identified taking into account the evaluation levels according to Kirkpatrick's classification [15] for health simulation, adapted by L'Her *et al.* [16].

Data on students' knowledge and feelings were collected on the basis of a self-administered questionnaire previously validated through a pre-test. Their skills were assessed on the basis of a practice observation grid. Immediately after the student's practice, the instructor also carried out the clinical examination of the client in order to judge the student's results according to his own.

The collection process was sequenced. Initially, the theoretical teaching on the elements of the obstetrical examination of the parturient was recalled for the benefit of all the students followed by the collection of their informed consent after having given them information on the objectives and the conduct of the study. We then proceeded to the collection of data concerning the initial knowledge of the students followed by the evaluation of skills in the delivery room before the simulation by two supervisors according to the observation grid and their feelings before the practical training. Then we proceeded to organize the simulation sessions at the skills laboratory. To do this, the learners were divided into small groups of five people. Subsequently, a demonstration of each technical gesture was carried out by the trainer in all the groups. The skills involved consisted of the appreciation of fetal heartbeat, the judgment of cervical dilation, the determination of the presentation of the fetus and its variety, the judgment of level of progression of fetal presentation and appreciation of the maternal pelvis. This was followed by the training of the students under the supervision of the instructors. At the end of the simulation, a reassessment of skills in the delivery rooms was carried out by the two supervisors. The data collection was finally completed by the collection of the opinions of the instructors at the end of the practice sessions.

The duration of the training session per group was half a day per group. The course of the session respected the required steps [6], namely the briefing, the course of the scenario and the debriefing.

Individual student performance in obstetrical examination of the parturient was designated by their ability to correctly perform the obstetrical examination of the woman in labor. Each of the parameters evaluated was scored from 0 to 1 (0 if the result was incorrect; 1 if the result was correct). Performance was determined by the total score obtained: good for a score of 5 or 6; average for a score of 3 or 4; insufficient for a score of 0 to 2. Student satisfaction was assessed

using the ordinal Likert scale [17] on four points: very satisfactory, fairly satisfactory, unsatisfactory, not satisfactory.

Data entry was done using Epidata version 3.1 software and analysis using IBM-SPSS Statistics version 19 and Epidata analysis version 2.2.183 software. Mc Nemar's Chi<sup>2</sup> test was used for the comparison of percentages on paired samples (before and after the simulation). The paired Student test was used for the comparison of means. A value of  $p < 0.05$  was considered significant.

Approval from the regional health department was first obtained. Informed consent from respondents was required. Anonymity and confidentiality were respected.

### 3. Results

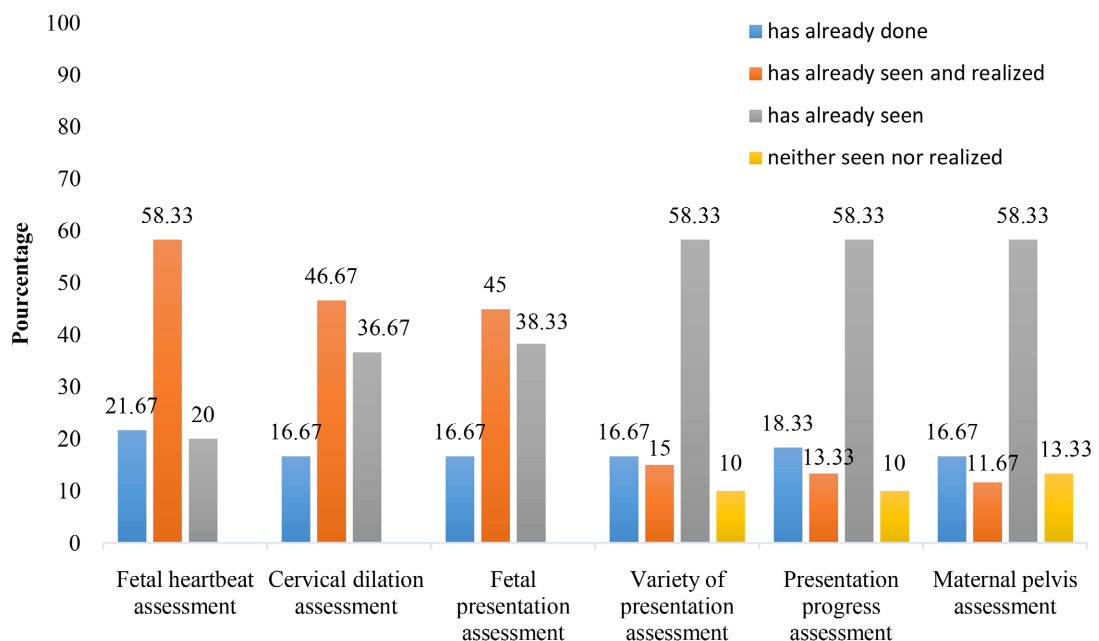
#### 3.1. General Characteristics of the Sample

A total of 60 students were included including 30 male and 30 female with a sex ratio of 1. Their age ranged from 24 to 32 years with an average of  $26.5 \pm 2.1$  years.

Only two students had resumed the teaching year of the obstetrics gynecology module which is the Master II level.

#### 3.2. Prior Experience of Learners

All the students stated that they had previously seen and practiced each of the gestures studied. The proportion of students who completed the fetal heart sound assessment examination was higher than that of students who simply saw this examination performed. The past experience of students in obstetrical examination of the parturient is summarized in **Figure 1**.



**Figure 1.** Prior experience of learners in performing obstetrical examinations in parturients.

### 3.3. Perception of Difficulty, Stress and Confidence in Performing the Obstetrical Examination in the Parturient

The level of difficulty in performing the obstetrical examination in the parturient evolved downwards after the practice of the simulation. The level of stress to carry out the obstetrical examination was significantly reduced. Conversely, the level of trust has increased. **Table 1** summarizes the difficulty and the stress in carrying out the obstetrical examination of the parturient perceived by the students and their degree of confidence in carrying out this examination before and after the simulation.

### 3.4. Skills for Performing the Obstetrical Examination of the Parturient

The ability of the students to appreciate each of the elements of the obstetrical examination studied had improved after the practice of the simulation (**Table 2**).

The overall performance of the learners for the realization of the obstetrical examination had improved after the practice of the simulation (**Table 3**).

The average performance score (rated from 0 to 6) for skills was significantly higher after the simulation (4.463) than before it (1.561) with a p-value of 0.000 on the Student test.

### 3.5. Learner Satisfaction

The majority of students (90%) were very satisfied, or somewhat satisfied with the training at the competence laboratory (**Table 4**).

**Table 1.** Level of difficulty, stress and confidence in performing the obstetrical examination of the parturient woman before and after the simulation.

Item of the exam	Before simulation		After simulation		p-value
	Weak	Medium to strong	Weak	Medium to strong	
<b>Difficulty level</b>					
Fetal heartbeat assessment	12 (20)	48 (80)	40 (66.67)	20 (33.33)	0.000
Cervical dilation assessment	4 (6.67)	56 (93.34)	34 (56.67)	26 (43.33)	0.000
Fetal presentation assessment	6 (10)	54 (90)	29 (48.33)	31 (51.67)	0.001
Variety of presentation assessment	2 (3.33)	58 (96.66)	14 (23.33)	46 (76.67)	0.001
Presentation progress assessment	1 (1.67)	59 (98.34)	14 (23.33)	46 (76.66)	0.003
Maternal pelvis assessment	0 (00)	60 (100)	10 (16.67)	50 (83.33)	0.007
<b>Level of stress and confidence</b>					
Stress level	9 (15)	51 (85)	33 (55)	27 (45)	0.001
Trust level	13 (21.7)	47 (78.3)	2 (3.3)	58 (96.7)	0.007

**Table 2.** Practical skills for carrying out the obstetrical examination of the parturient woman before and after the simulation.

Item of the exam	Before simulation		After simulation		p-value
	Wrong	Good	Wrong	Good	
Appreciation of fetal heartbeat	29 (48.3)	31 (51.7)	52 (86.7)	8 (13.3)	<b>0.000</b>
Assessment of cervical dilation	23 (38.3)	37 (61.7)	51 (85)	9 (15)	<b>0.000</b>
Assessment of fetal presentation	45 (75)	15 (25)	59 (98.3)	1 (1.7)	<b>0.001</b>
Appreciation of the variety of presentation	2 (3.3)	58 (96.7)	24 (40)	36 (60)	<b>0.000</b>
Appreciation of the presentation descent	5 (8.3)	55 (91.7)	29 (48.3)	31 (51.7)	<b>0.000</b>
Appreciation of the maternal pelvis	7 (11.7)	53 (88.3)	48 (80)	12 (20)	0.000

**Table 3.** Overall performance of the students for the realization of the obstetrical examination before and after the practice of the simulation.

Period	Performance		p-value
	Insufficient	Mean/Good	
Before simulation	43 (71.7)	17 (28.3)	<b>0.000</b>
After the simulation	1 (1.7)	59 (98.3)	

**Table 4.** Distribution of students according to their level of satisfaction with the simulation.

Level of satisfaction	Workforce	Percentage %
Very satisfying	30	50
Quite satisfying	24	40
Unsatisfactory	5	8.3
Not satisfying	1	1.7
<b>Total</b>	<b>60</b>	<b>100</b>

## 4. Discussion

### 4.1. Strengths and Limitations of the Study

Simulation in the skills laboratory is a new approach in our context. This was an analytical study that used a combination of techniques for data collection, thus allowing for better reliability of the data. The skills assessment was carried out in a real situation, reflecting the practical interest of the approach. However, the small size of our sample constitutes a limitation for the study. The sample concerned only students who were assigned to the obstetrics and gynecology department of Yalgado Ouedraogo Teaching Hospital Center during the study pe-

riod. Finally, the evaluation of practices on patients in the delivery room after the simulation was not carried out at the same time for all the students. Some were evaluated immediately after their visit to the laboratory and others had to wait a few days before being assessed due to the low attendance rate by patients during the period in question.

#### 4.2. Perception of Learners

The level of difficulty in performing the obstetrical examination in the parturient evolved downwards after the practice of the simulation. Bouet *et al.* [14] highlighted a significant defector of students estimating the level of difficulty of the gesture as weak at the end of the session whereas they considered it as medium or strong at the beginning of the session.

The level of stress to carry out the obstetrical examination was significantly reduced. On the other hand, the learners gained in confidence. This has been reported in the literature for other procedures in obstetrics gynecology [14] [18] [19]. Indeed, the stress and apprehension in learning medicine results from the fear of failing or harming the patient. This fear is gradually dissipated by training on anatomical models which are inanimate objects whose manipulation is without particular danger.

The majority of students (90%) were very satisfied, or somewhat satisfied with the simulation and felt that their time in the skills lab will help improve their practice. They really appreciated this simulation, which they described as a “very good teaching method”. Grynberg *et al.* [20] reported that more than 90% of hospital students were satisfied or very satisfied with learning about gynecological examination on mannequins. Other authors have also found that learners appreciate the use of simulators in their training [21] [22] [23] [24]. The learners’ interest in the simulation was also expressed by the formulation of suggestions such as the sustainability of the initiative, its extension to more skills to be acquired in gynecology and obstetrics, its extension to other areas of learning in medicine as well as its systematization and use in the evaluation of students. This positive perception by learners is a factor of good attendance at teaching sessions and success.

#### 4.3. Skills Acquisition

There was a significant defector of students with average or good performance at the end of the session while they had poor performance before the session. The overall performance of the learners for the realization of the obstetrical examination was therefore reinforced after the practice of the simulation. Their ability to appreciate each of the elements studied had improved, reflecting an acquisition of skills favored by the simulation. The acquisition of skills observed is the result of a three-phase process: the briefing, the course of the simulation and the debriefing [25]. However, maintaining and consolidating these acquisitions requires continuous supervision of student practices in order to achieve perfect

mastery of gestures. As much as for the acquisition of skills, simulation could be used for the evaluation of students' skills [26].

## 5. Conclusion

The simulation in the skills laboratory allowed a dissipation of the difficulties and the stress felt by the students for the practice of the obstetrical examination in the parturient. It also allowed the acquisition of skills by these learners who also very much appreciated this training in the laboratory. The acquisition of dummies with better fidelity would contribute to improving the contribution of simulation to the skills laboratory, which would make it possible to enhance the quality of training, especially in the context of massification of student numbers.

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## Authors' Contributions

HZ: Design of the study, conduct of the study, analysis of the results, writing of the manuscript, approval of the manuscript. DPK: Design of the study, analysis of the results, writing of the manuscript, approval of the manuscript. SK: Design of the study, analysis of the results, writing of the manuscript, approval of the manuscript. WRS: Design of the study, conduct of the study, analysis of the results, writing of the manuscript, approval of the manuscript. AO: Design of the study, conduct of the study, analysis of the results, writing of the manuscript, approval of the manuscript. BBT: Design of the study, conduct of the study, analysis of the results, writing of the manuscript, approval of the manuscript.

## Conflicts of Interest

The authors have no conflicts of interest.

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