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Influence of the Simulation in the Training of the 7th Grade Medical Students in the Insertion of the Interval Intra-Uterine Device

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Abstract

Introduction: A simulation laboratory has been set up in the Department of Obstetrics and Gynaecology at Yalgado Ouedraogo Teaching Hospital. The objective of this study was to evaluate the role of the simulation in training of 7th grade students on interval IUD insertion. **Material and Method:** This was an evaluation study of skills before and after training that included 38 students of 7th grade medicine. Pre-training knowledges and skills were compared to those based on training using the paired Student test with a 5% significance level. Perceptions and suggestions for improvement of training made by students were collected. **Results:** The sex ratio of the study participants was 1.1. Their average age was 26.8 ± 0.9 years. The training increased the average knowledges score from 48.2% to 93.0% ($p < 0.001$). The average skills score increased from 34.4% to 92.8% ($p < 0.001$). The 7th grade medicine students had a good perception of this training. **Conclusion:** The training of 7th grade medicine students in IUD insertion using simulation had a positive impact on their knowledges and skills and was well appreciated.

Keywords

Insertion, IUD, Simulation

1. Introduction

In Burkina Faso, maternal and neonatal morbidity and mortality are high [1]. One of the pillars retained by the country for the reduction of this health problem is family planning (FP). Among FP methods, the intrauterine device (IUD)

offers the best cost-benefit ratio [2] [3]. Burkina Faso has opted to promote this method but its insertion requires a technical nature requiring quality training. Interval insertion of IUD is done after the first 42 days after delivery.

In the curriculum for general practitioners, a theoretical lesson followed by a practice in family planning is given to students in grade 5. Then the students in grade 7 benefit from a clinical internship in obstetrics and gynaecology. Since 13 July 2018, the Department of Obstetrics and Gynaecology (DOG) at the Yalgado Ouedraogo University Hospital Center (UHC-YO) has been equipped with a skills' laboratory. This laboratory provides an opportunity for students to acquire skills on anatomical models before practicing on real patients. The objective of this study was to evaluate the influence of simulation in training 7th grade students on the interval IUD insertion. The 7th grade students are students in their final year of general medical studies.

2. Methods

It was an analytical cross-sectional study that evaluated the impact of training using an anatomical model. It took place from 02 to 28 February 2019 in the skills' laboratory in the DOG of UHC-YO. This skills' laboratory has 5 stations to learn about fifteen clinical skills. The study involved all the 38 grade 7 students assigned to the DOG for their practical training. The variables collected were the socio-demographic characteristics of the students, the knowledge variables namely the ability to check the contraindications of IUD insertion: absence of pregnancy or uterine anomaly, cervical dysplasia, acute pelvic inflammatory disease, untreated acute cervicitis or vaginitis before insertion of the interval IUD. The participants' knowledges of the equipment for interval IUD insertion, of the order of the gynaecological examination preceding the interval IUD insertion, the interval IUD insertion procedure, interval IUD efficacy were also collected. The variables used for the assessment of skills were the mastery of the steps of interval IUD insertion, the respect of the order of execution of the steps of the interval IUD insertion. The variables for assessing the perception of interest of the skills' laboratory were the answers to the following statements: "the skills' laboratory is a good learning tool" and "the skills lab helped me in acquiring proficiency for interval IUD insertion". The students had to use the Likert scale [4] as follows to give their views in relation to each of statements: not at all agree = 1; not agree = 2; neither disagree nor agree = 3; agree = 4; totally agree = 5.

After explaining to the students, the course of interval IUD training, a standardised cognitive pre-test was administered to them. Then each student was observed to insert an IUD on an anatomical model. Using the structured observational fiche, the teacher gave a score for the practice. The addition of the cognitive score and the observational score for interval IUD insertion allowed an overall score for each student. Then, the students were distributed into 4 groups of 12 to 13. Each group received a theoretical course recalling the mechanism of action of the copper IUD, the stages of its insertion and specific counseling to

this contraception method. Using a standardization fiche, teachers demonstrated the interval IUD insertion. Then by subgroup of 6, the students practiced for 4 hours under a teacher's guide, always using the standardization fiche. After all students in all groups benefited the training, a theoretical and practical assessment using the same questionnaire and the same observational fiche was conducted.

Data collected from the study were recorded in the Microsoft Office Excel 2010 and subsequently analyzed using Epi Info version 7 software package. Performance scores obtained before and after training were compared using the paired Student's t-test. A difference was considered significant if $p < 0.05$. At the operational level, we defined:

- good performance level if overall score ≥ 85%.
- middle level performance if 50 < overall score < 85.
- insufficient level of performance if overall score ≤ 50.

The data collection was anonymous. The confidentiality of the data has been respected. Because the study is part of a normal training process for students and this without human manipulation, the agreement of the ethics committee is not required in Burkina Faso.

3. Results

3.1. Study Population Socio-Demographic Characteristics

The students' average age was 26.8 ± 0.9 years. The extreme ages were 25 and 29 years old. Among the 38 students, 20 (52.6%) were male. The sex ratio was therefore 1.1. In terms of nationality, there were 31 (81.6%) Burkinabe, 4 Chadians, 2 Beninese, 1 Cameroonian. Thirty students had completed their secondary education in Benin, four in Ivory Coast, two in Chad, and two in Cameroon. Table 1 shows the sociodemographic characteristics of the students.

3.2. Results of before Formation Assessment

Thirty-eight (38) 7th grade students participated in this initial assessment. The average score was 48.2% for theoretical knowledge with extremes of 22.2% and

Table 1. Sociodemographic characteristics of the students.

Sociodemographics characteristics	Frequency or mean
Gender n (%)	
- Male	20 (52.6)
- Female	18 (47.64)
Mean age (years)	26.8 ± 0.9
Nationality n (%)	
- Burkinabe	31 (81.6)
- Chadians	4 (10.5)
- Beninese	2 (5.3)
- Cameroonian	1 (2.6)

88.9%. The mean score for the initial evaluation of interval IUD insertion on an anatomical model was 34.4%. The extreme scores were 0% and 66.7%. Before training, the average global score (theoretical knowledge and performance for interval IUD insertion) was 37.4% with extremes of 15% and 65%.

3.3. Results of after Formation Assessment

All the 38 grade 7 students took part in the training assessment. The mean for theoretical knowledge score was 93.0% ± 6.4%. The extreme scores were 77.8% and 100.0%. All 38 grade 7 students took part of after training assessment on infernal UID insertion using anatomical model. The average score was 92.8% with extreme scores of 63.6% and 100%. The average global score was 92.9% with extremes of 85% and 100%. Figure 1 shows the results of the answer to theoretical questions and practice per student. Figure 2 shows the boxplot of global score before and after training.

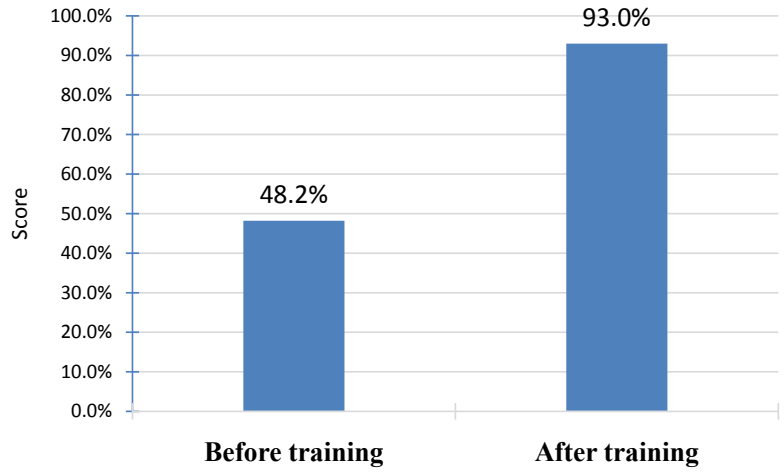

Figure 1. Mean of theoretical knowledge score of 7th grade students before and after training.

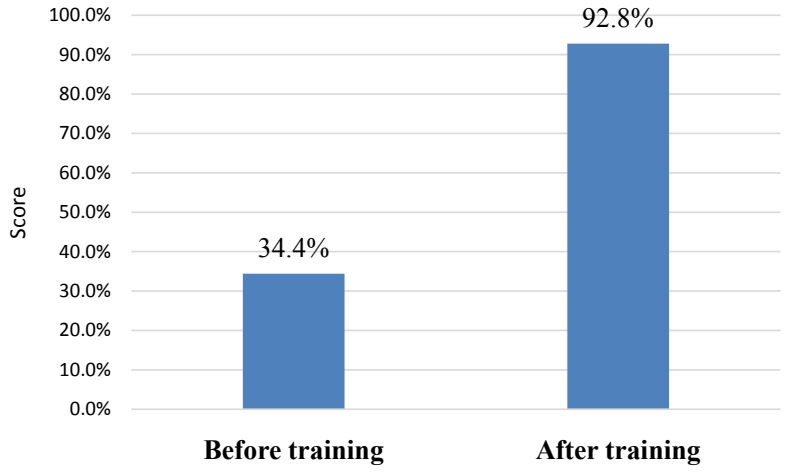

Figure 2. Average score of skills on anatomical model of 7th grade students before and after training.

Figure 3 compares the average scores by 7th grade students in the assessment of theoretical knowledges before and after training. The theoretical knowledge score was higher after training that before it. The difference was statistically significant. Figure 4 compares the average scores obtained by 7th grade students in the assessment of skills on anatomical model before and after training. The skills' score was higher after training that before it. The difference was statistically significant.

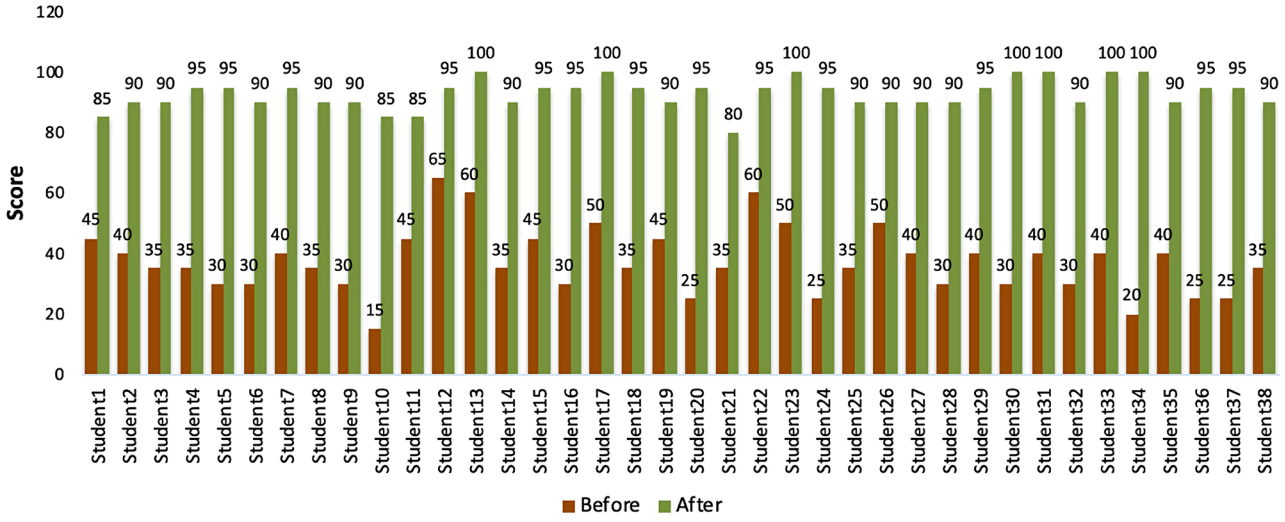

Figure 3. Global score by student before and after training.

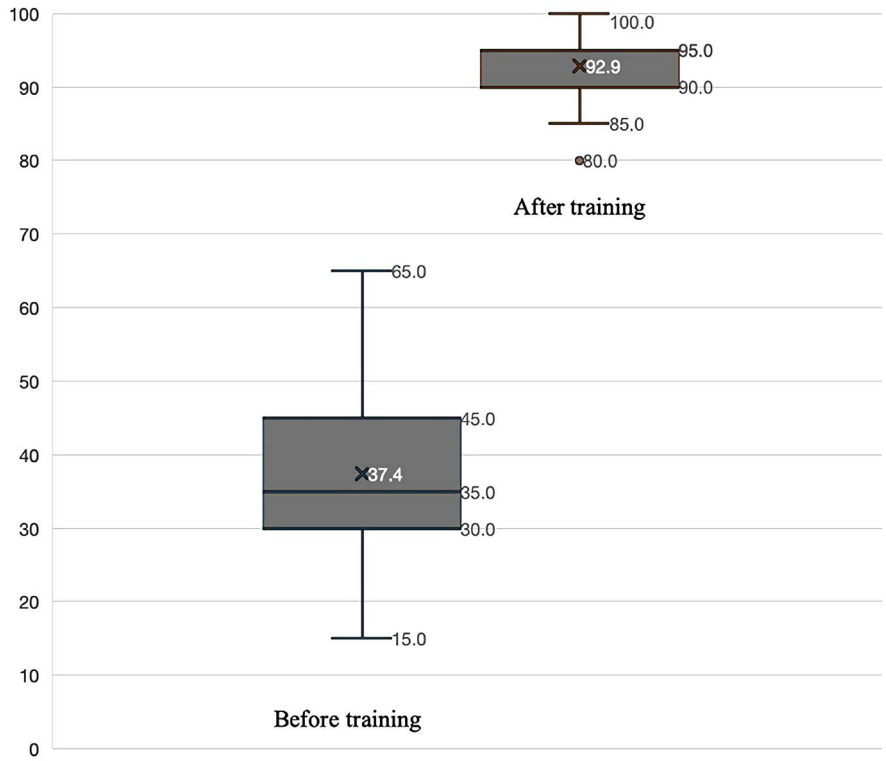

Figure 4. Global score of 7th grade students before and after training.

3.4. Perceptions of Training with Anatomical Model by 7th Grade Students

Table 2 gives the responses of 7th grade students at the assertion "skills laboratory is a good learning tool". Ninety-seven-point four percent (97.4%) of 7th grade students either agreed or strongly agreed with the statement. Table 3 gives the responses of 7th grade students to the assertion "the skills' laboratory helped me in acquiring skills for the interval IUD insertion". All 7th grade students were either agreed or strongly agreed with the statement.

4. Discussion

4.1. Strengths and Weaknesses of the Study

The purpose of this study was to evaluate the impact of the training on the improvement of trainees' knowledge and skills on the insertion of the interval IUD. One of the weaknesses of the study is that it did not take into account all 7th grade students of the promotion. In fact, not all trainees are doing the Obstetrics Gynaecology stage at the same time. They are divided into several groups and each group does their internship for 3 months. Another weakness is the simulation tool used which does not allow a perfect reproduction of the reality of interval IUD insertion in a real woman. Despite these weaks, the study has a strength in that it has an analytical study which compared knowledge and skills of 7th grade students before and after training. In addition, the assessment was done by the same teachers thus reducing the risk of variability of appreciation.

Table 2. 7th grade students' responses to the statement "The skills laboratory is a good learning tool".

Answers (Likert scale)	Numbers	Percentage
1	0	0
2	0	0
3	1	2.6
4	16	42.1
5	21	55.3
Total	**38**	**100.0**

Table 3. The 7th grade students' responses to the assertion "the skills laboratory helped me in acquiring competence for interval IUD insertion".

Answers (Likert scale)	Numbers	Percentage
1	0	0
2	0	0
3	0	0
4	10	26.3
5	28	73.7
Total	**38**	**100.0%**

4.2. Impact of Training Using Simulation for Skills' Acquisition

Our study showed how a short theoretical training followed by the use of simulation on anatomical model can help the acquisition of knowledge and clinical skills. Martineau *et al.* [5] have shown that learners' feedback facilitates the learning of complex gestures. In our study, this feedback was made by peers (the other 7th grade students) and teachers. The use of the learning card has allowed the standardization of clinical competence. The initial level of knowledge and clinical skills of our 7th grade students was very insufficient and required a good training and supervision. The acquisition of complex gestural skills such as the insertion of an interval IUD requires progressive learning. According to the model of Fitts and Posner [6], the first phase is cognitive learning each elemental step of the skill. The theoretical presentation and the demonstration done by the teachers allowed this elementary learning of the steps of insertion of the interval IUD. This phase also requires the attention of the learner who must follow the steps and memorize them. The second phase is the assimilation that allows to move from the knowledge of the elementary stages to a sequence of coordinated elementary gestures. This phase therefore requires good concentration on the part of the learners and careful monitoring by the teachers. The third phase is that of automation. During this phase, the learner will progressively empower the sequence of elementary steps. In our study, the use of anatomical model probably facilitated these steps. Indeed, the anatomical model being an inanimate object, the learner is less afraid of failing and harming the health of a person. The effectiveness of simulation in the acquisition of complex skills has been demonstrated by a few studies [7] [8] [9] [10] [11]. The dogma "observe, realize, teach" becomes "observe once, simulate many times, perform once with skill and teach everyone" [12] [13]. Our results have shown a clear improvement in knowledge and skills by using simulation on anatomical model. It is therefore essential that training be continued on humans in the family planning unit. This last phase of human training to achieve proficiency can be short because of prior training on an anatomical model. This teaching was punctual as part of the study. As the results suggest that it was beneficial, it would be interesting to do this type of training for all garde students for the main procedures in obstetrics and gynecology. Achieving this objective requires a great challenge of financial, material and human resources that are difficult to mobilize by African universities whose budgets are often very limited.

Currently, the assessment of medical students focuses on theoretical knowledge. The assessment on the procedures is not made or is considered erroneously acquired at the end of courses. In this context, the results of this study have two interests. First, it provided evidence that the simulation on anatomical model allows the acquisition of skills and must be developed. Secondly, it is usable for assessing the skills of students. For these reasons, the anatomical models can be used in the acquisition of skills in the curriculum of training and for evaluation as suggested Bashankaev *et al.* and Munshi *et al.* [14] [15].

4.3. Perceptions of 7th Grade Students about the Usefulness of the Simulation

The students of grade 7 had a good appreciation of the training by simulation using the anatomical model in the clinical skills laboratory. All recognized that this laboratory has been of great help to them in acquiring clinical skills. Other authors like Lemay *et al.*, Nash and Harvey, Falloon, and Juhary also found that learners appreciate the use of simulators in their training [7] [16] [17] [18]. This positive perception by the learners is a factor of good attendance at teaching sessions. In our study, all 7th grade students who started training completed this.

5. Conclusion

Our study population included 7th grade students. The training of these students on the insertion of the IUD using an anatomical model allowed a clear improvement of their knowledge and skills. This training was well appreciated by these students. For these reasons, the simulation on anatomical models can be promoted in the medical schools. Simple anatomical models can be used in low-income countries.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviations

DOG = Department of Obstetrics and Gynaecology;
FP = Family Planning;
IUD = Intra Uterine Device;
UHC-YO = University Hospital Center Yalgado Ouedraogo.