Evaluation of Pregnant Examination Simulation with Mini-CEX in Nursing Education: An Experience of Turkey

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Abstract

The use of simulation is recommended as a powerful teaching strategy for the promotion and assessment of skills. This study was carried out to evaluation of pregnant examination simulation with Mini-CEX in nursing education. The one-group quasi-experimental study was conducted between 14 September 2014 and 14 December 2014 with 109 students. Students were trained on basic procedures of pregnant examination simulation utilizing obstetric simulator and models. Students performed individual simulation application according to statements of Mini-Clinical Evaluation Exercise (Mini-CEX). Data was collected using the Pre-Simulation Feedback Form (Pre-SFF), the Post-Simulation Feedback Form (Post-SFF) and the Mini-CEX. Descriptive statistics, t-test, and the correlation coefficient were used for evaluation of data. The average age of the students was 21.8±2.0. 83.5% of the students were women. The total mean score of Mini-CEX was 2.8±0.2. There were significant relationships between the total mean and items means of Mini-CEX (0.41 ≤ r ≤ 0.80). A significant statistical difference was found between the Pre-SFF and Post-SFF scores (except for 3rd and 6th items) (p<0.05). When the Pre-SFF and the Post-SFF scores were compared, an increase was found in the Post-SFF scores. In this study, it was determined that students
have a high level of proficiency on simulation application of pregnant examination.

**Keywords:** Mini-Clinical Evaluation Exercise; nursing education; pregnant examination; simulation

**Introduction**

Clinical training in nursing is an opportunity for the student to learn how to apply knowledge, skills and attitudes related to patient care (Cant and Cooper, 2010). The best learning in applied sciences is learning by doing (Erden, 2006). The basis of competency-based education is learning through experience. When students are given sufficient time and can use appropriate training methods, they demonstrate the highest level of knowledge and skills (Sullivan et al., 2009).

Educators must also use the humanistic techniques in clinical training. One of these techniques is to use anatomical models and simulators which are very similar to the human body. Simulators facilitate learning, shorten the training time, deliver the level of skills and qualifications required, and reduce the risks faced by the patient. The use of anatomical models in health education is also important in terms of ethics. Simulation training can lead to positive patient outcomes and reduction of medical errors (Sullivan et al., 2009). Using simulator in the training of nursing students is also significant in terms of ensuring patient safety. Areas such as obstetrics and gynecology require specific problem-solving and critical decision-making skills (Şendir, 2013). In addition to these skills, it has also been reported that simulation training improves psychomotor skills and therapeutic communication skills (Cantrell, 2008).

Clinical skills should be evaluated as a whole in order to understand whether there are sufficient clinical skills of students (Wass et al., 2001). Many assessment tools were developed to assess the clinical skills of students. Mini-Clinical Evaluation Exercise (Mini-CEX) is one of the work-placed based assessment vehicles. The Mini-CEX was first developed by the American Board of Internal Medicine in 1972 (Norcini et al, 2003). The Mini-CEX is can also be used to evaluate nurses at any time and in any setting (British Dermatological Nursing Group, 2015).

This study was carried out to evaluation of pregnant examination simulation with the Mini-CEX in nursing education.

**Methodology**

**Participants & settings**

This one-group quasi-experimental study was conducted on 109 undergraduate nursing students in the obstetrics and gynecology course of Afyon Kocatepe University, Turkey.
Informed consent was obtained from the Ethics Committee of Afyonkarahisar Clinical Research, the institution, and the students who participated in the research.

Inclusion criteria were as follows: students attending in the obstetrics and gynecology class, attending in the meeting of introducing Mini-CEX method.

**Tools**

Simulation Feedback Form – SFF (10 items, 3-point scale): The SFF was developed by researchers. Three experts were asked to give proposal each item in the instrument. Items in the instrument changed in terms of sentence structure by the experts. The SFF show students' thinking and satisfaction about simulation before and after simulation training (Pre-SFF and Post-SFF). The Pre- and Post-SFF comprise same items. We assessed the SFF as follows: 1 'not agree'; 2 'no opinion'; 3 'agree'. If the scores on the Post-SFF increase, it is considered that students' thinking and their satisfaction level regarding the training are more positive.

The Mini-CEX: This tool evaluates a clinical encounter with a patient to provide an indication of competence in skills essential for good clinical care. The tool consists of seven items: nursing interviewing skills, physical examination skills, communication skills, clinical judgment, care of the patient, organization, and overall clinical competence. Each statement evaluates trainees' ability to do mentioned skills in well below expectation - well above expectation (British Dermatological Nursing Group, 2015). We assessed tasks of students in Mini-CEX as follows: 1 equaled ‘below level expected’: this meant students demonstrated basic consultation skills resulting in incomplete history taking and showed little clinical judgments following the encounter; 2 equaled ‘performed at the level expected’: this meant students demonstrated sound consultation skills resulting in adequate history taking and showed basic clinical judgment following encounter; 3 equaled ‘Performed higher than level expected’: this meant students demonstrated excellent and timely consultation skills resulting in a comprehensive history. In this study, Cronbach's alpha of Mini-CEX was 0.74.

We assessed different statements in each item. Statements of nursing communication skills are saying hello and introduce yourself, taking the patient medical history, active listening skills, obtaining accurate and adequate information, and responding appropriately to patient. Statements of physical examination skills are efficient logical sequence, informing patient, sensitive to patients’ comfort and dignity, providing empty the bladder, providing suitable position, standing in the appropriate position, and listening to the fetal heart rate with Doppler. Statements of communication skills are agreeing plan with patient, explaining rational for test treatment, and obtaining patients consent. Statements of care of patient are showing respect, empathy, establishing trust, ensuring patients comfort and confidentiality of information. Statements of clinical judgment are deciding on appropriate diagnostic investigations, assessing cervical dilatation and effacement, determining the months of pregnancy, and determining
what part of the fetus is lying above the lower abdomen. Statements of organization are prioritizes, planning effectively, applying steps of Leopold maneuvers correctly and respectively. Statements of overall clinical competence are demonstrating judgment, caring, effectiveness and efficiency.

**Simulation**

The students were divided among two researchers into groups of 10-12 students. Information was given students about the study. The laboratory practice of each group was carried out on different days between 14 October 2014 and 14 December 2014. Simulation training was performed utilizing a birthing simulator, a Fetal Doppler, a pelvis model, and fetus models.

Firstly, training was given by researchers to students about pregnant examination. The training contains anamnesis, vaginal and abdominal examinations of pregnant women. Then, students placed in a semi-circle in the simulation laboratory. Researcher sat in with the group during the simulation and observed. All students in group were asked to fill in the Pre-SFF. The researcher demonstrated and implemented pregnant examination on simulator according to statements of Mini-CEX. Then, students in the group performed individual simulation application according to statements of Mini-CEX.

Clinical skills of students with Mini-CEX were conducted by researcher observe students interacting directly with simulator for 15 minutes, then 5 minutes researcher provide constructive feedback to student on his/her achievement. If the specific competency was assessed to ‘below level expected’, the student was asked to repeat this components. The scenario given (age, gestational age, number of pregnancies) was changed for each student. After the simulation, the students’ experiences were discussed and students were asked to fill in the Post-SFF.

**Data Analysis**

Data were analyzed with SPSS 18.0 program using descriptive statistics, t-test, and the Pearson Correlation. Cronbach's alpha was used for reliability test of Mini-CEX. Statistical significance level was accepted as p<0.05.

**Results**

The average age of the students was 21.8±2.0. 83.5% of students were women. Correlations and scores of Mini-CEX items are given in Table 1. As shown, total mean score of Mini-CEX was 2.8±0.2. There were significant relationships between the mean score of Mini-CEX and its items (0.41 ≤ r ≤ 0.80) (p<0.01).

The opinions of students according to the Pre-SFF and Post-SFF are shown in Table 2. The Pre-SFF mean scores of students were 2.5±0.2 and the Post-SFF mean scores of students were 2.8±0.2. A significant statistical difference was found between the items mean scores of Pre-SFF and Post-SFF (except for 3rd and 6th items) (p<0.05). When the points from the Pre-SFFs and the Post-SFFs
were compared, an increase was found in the Post-SFF scores. It could thus be seen that students were satisfied with the simulation application.

**Discussion**

This study was conducted to evaluate of pregnant examination simulation with Mini-CEX in nursing education. Applying the simulation application with an obstetric simulator for pregnant examination resulted that the most of students determined increases students' Mini-CEX scores and Post-SFF scores after the simulation application.

Although there are numerous studies worldwide, the use of simulation in nursing education in Turkey is a new approach (Terzioğlu et al., 2012). The use of simulation is recommended as a powerful teaching strategy for the promotion and assessment of skills, especially in the field of obstetrics and gynecology (Gardner and Raemer, 2008; Roberts and Greene, 2011). In some studies, simulation has been used to improve teamwork skills in an inter-professional obstetrics team (Birch et al., 2007; Fransen et al., 2012). Pilcher et al. (2012) used mobile simulations to address problems in communication that led to poor perinatal and neonatal outcomes. Further, it was reported that simulations improved the confidence of nursing students during training for the discharge of postpartum mothers (Wagner et al., 2009). Reilly & Spratt (2007) and Dearmon et al. (2013) identified that simulation-based initiatives increase in students’ clinical competence and decrease their stress. Chiang & Chan (2014) reported that simulation provide positive learning environment. And, there were significantly increased students’ analyticity, confidence and overall critical thinking disposition scores.

The Mini-CEX evaluates a clinical competence in skills essential for good clinical care. We determined significant relationships between the mean score of Mini-CEX and its items (p<0.01). This means, student’s interviewing, examination, communication, care of patient, judgment, organization, and overall clinical competence skills affect their clinical competence. The scores of Mini-CEX and its items were higher overall and there were significant relationships among them. In a similar study, a group of students was trained on basic procedures utilizing an obstetric simulator. Trained students were significantly more comfortable with in the evaluation of obstetric results such as fundal height measurements and Leopold maneuvers (Deering et al., 2006). Peteani (2004) stated in the simulation-based study that students’ cognitive, psychomotor, and affective skills increased their competence. Similar findings were published by Alinier et al. (2006). They reported that there was a significant difference in students’ competence scores between simulation and control groups. In some simulation-based studies, raise was determined nursing students’ academic performance and proficiency levels (Shin et al., 2014; Fan et al., 2015). On the other hand, there are some studies which have published different findings.
Feingold et al. (2004) found that fewer than half of students believed that simulation improved their clinical competence. Blum et al. (2010) found a greater increase in clinical competence in the traditional group.

The use of simulation in nursing provides simulation provides the opportunity to enrich the student experience and a way for self-determined learning (Cardoza and Hood, 2012). The Pre- and Post-SFF was used to measure students' thinking and satisfaction regarding the simulation application in this study. We have determined that an increase the Post-SFF scores according to the Pre-SFF and students were satisfied with the simulation application. In Bremner et al.’s study (2006), 95% of students rated their training session as ‘good’ and ‘excellent’. The most of students indicated that simulation should be a mandatory component of their nursing education and felt that the experience gave them confidence in their ability to perform physical assessments. Similarly, Hur (2013) reported that simulation improves nursing student’s perceptions of their tasks. The results of these studies indicate that simulation applications improve clinical competence of students and providing a more positive learning environment.

Limitations

We restricted our study to nursing students who were completing their rotations in a single academic year so as not to introduce possible bias. Although we could not exclude all selection bias from the timing of their rotations, we felt that carrying out the study with third-year students would mean they were over the major learning curve that initially comes with clinical rotations.

Conclusions

In this study, it was determined that students have a high level of proficiency on simulation application of pregnant examination. Although some studies have suggested that simulations can play a substantial role in increasing the competency of students, evidence is needed for supporting this notion. In addition to its usefulness in nursing education, simulation allows the acquisition of skills necessary to be an effective nurse. Because of the contribution that simulation can make to nursing education, its wider use is recommended.

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Table 1
Correlations and scores of Mini-CEX items (n=109)

<table>
<thead>
<tr>
<th>Items</th>
<th>( \bar{x} \pm SS )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nursing interviewing skills</td>
<td>2.9±0.2</td>
<td>0.07</td>
<td>0.12</td>
<td>0.35**</td>
<td>0.32**</td>
<td>0.40**</td>
<td>0.59**</td>
<td></td>
</tr>
<tr>
<td>2. Physical examination skills</td>
<td>2.8±0.3</td>
<td>0.24**</td>
<td>0.55**</td>
<td>0.27**</td>
<td>0.04</td>
<td>0.31**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Communication skills</td>
<td>2.9±0.2</td>
<td>0.27**</td>
<td>0.19*</td>
<td>0.20*</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Care of patient</td>
<td>2.7±0.4</td>
<td>0.54**</td>
<td>0.21*</td>
<td>0.57**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Clinical judgment</td>
<td>2.7±0.5</td>
<td>0.35**</td>
<td>0.57**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Organization</td>
<td>2.7±0.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Overall clinical competence</td>
<td>2.9±0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mean</td>
<td>2.8±0.2</td>
<td>0.57**</td>
<td>0.57**</td>
<td>0.41**</td>
<td>0.80**</td>
<td>0.79**</td>
<td>0.55**</td>
<td>0.73**</td>
</tr>
</tbody>
</table>

* p<0.05; ** p<0.01
Table 2
The scores of the Pre- and Post-Training Feedback Form (n=109)

<table>
<thead>
<tr>
<th>Items</th>
<th>Pre-SFF ± SS</th>
<th>Post-SFF ± SS</th>
<th>Statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The lab is an adequate location for the application</td>
<td>2.2±0.7</td>
<td>2.9±0.2</td>
<td>-9.685</td>
<td>0.000*</td>
</tr>
<tr>
<td>2. The time is sufficient for simulation</td>
<td>2.7±0.4</td>
<td>2.9±0.2</td>
<td>-4.185</td>
<td>0.000*</td>
</tr>
<tr>
<td>3. It is useful to practice on the simulator</td>
<td>2.9±0.3</td>
<td>2.9±0.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. The simulator used for the application is sufficient</td>
<td>1.9±0.6</td>
<td>2.2±0.7</td>
<td>-4.969</td>
<td>0.000*</td>
</tr>
<tr>
<td>5. The educator shows simulation application effectively</td>
<td>2.8±0.3</td>
<td>2.9±0.1</td>
<td>-2.925</td>
<td>0.004*</td>
</tr>
<tr>
<td>6. I repeat until the application is correct and complete</td>
<td>2.8±0.3</td>
<td>2.9±0.2</td>
<td>-1.352</td>
<td>0.179</td>
</tr>
<tr>
<td>7. I use the interviewing, communication, and physical examination</td>
<td>2.3±0.5</td>
<td>2.7±0.4</td>
<td>-7.729</td>
<td>0.000*</td>
</tr>
<tr>
<td>8. I decide on appropriate diagnostic investigations</td>
<td>2.1±0.5</td>
<td>2.7±0.4</td>
<td>-10.497</td>
<td>0.000*</td>
</tr>
<tr>
<td>9. I carry out a pregnancy abdominal examination effectively</td>
<td>2.7±0.5</td>
<td>2.9±0.1</td>
<td>-4.038</td>
<td>0.000*</td>
</tr>
<tr>
<td>10. Simulation applications are necessary to gain professional skills</td>
<td>2.8±0.5</td>
<td>3.0±0.0</td>
<td>-3.446</td>
<td>0.001*</td>
</tr>
<tr>
<td>Total mean</td>
<td>2.5±0.2</td>
<td>2.8±0.2</td>
<td>-12.557</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

*p<0.01; Pre-SFF = Pre-Training Feedback Form, Post-SFF = Post-Training Feedback Form