CEOG Clinical and Experimental Obstetrics & Gynecology

Original Research

# Obstetric intervention self-efficacy scale and the examination of obstetric intervention self-efficacy regarding department, grade level, and gender

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**Summary**

The aim of this study was to develop the Obstetric Intervention Self-Efficacy Scale (OISES). A sample of 327 university students (307 females, 20 males; 168 from the midwifery department and 159 from the nursing department) were enrolled in the study. Out of 66 items, the 22 items with the highest factor loadings were chosen as a result of preliminary exploratory factor analysis regarding 22 general obstetric intervention behaviors. The final exploratory factor analysis revealed that the 22 items of the OISES had a single factor and 67.21% of the total variance was explained by these items. Cronbach's alpha reliability coefficient was calculated as 0.98. As a result, the overall findings demonstrated that this scale is a valid and reliable instrument. The analysis further revealed that OISES scores of students did change according to gender (females' OISES scores were higher), department (midwifery students' OISES scores were higher), and grade level ($M4^{th} > M1^{st}$,$M2^{nd}$, & $M3^{rd}$; $M3^{rd} > M1^{st}$ & $M2^{nd}$).

*Key words*: Obstetric intervention; Self-efficacy; Exploratory factor analysis; Gender; Grade level; Midwifery; Nursing.

## Introduction

In modern health systems, learning through "trial and error" or by "seeing, hearing, and doing" has been replaced by innovative systems that allow learners to acquire knowledge, skills, and abilities and to improve critical thinking and decision making in clinical care [1, 2].

Fields providing complex healthcare services, such as obstetrics and gynecology, require a strong foundation of knowledge as well as the use of advanced technology, problem solving, and critical decision making. All of these factors should be taken into consideration in women's health nursing education while preparing students for clinical practice in order to ensure the safety and quality of care provided for both women/mothers and fetuses/infants [1, 3-5].

Some non-systematic practices arise in the training and testing of obstetric skills. Evaluation of cervical dilatation, amniocentesis, breech delivery, and management of shoulder dystocia can be taught as skill-development practices in obstetrics. The most essential element in labor is the assessment of fetal head level by vaginal examination. According to a study by Dupuis *et al*. [6], 88% of assistants and 67% of other health staff make mistakes while determining the level of a high fetal head. In the study by Maslovitz *et al*. [7], team performances of midwives and gynecology assistants in obstetric emergencies were assessed and it was found that the most frequent mistakes in obstetric emergencies were due to lack of clinical skills. Bambini *et al*. and Goldenberg *et al*. both reported that preclinical skill training leads to an increase in decision making in critical situations and in cognitive, psychomotor, communication, discussion, and teaching skills [9, 10].

Self-efficacy was first put forward within the scope of cognitive behavior change and a strong sense of individual competence has been found to be associated with better health, higher success, and more social integration [11]. The individual should believe that he or she has the necessary knowledge, skills, and abilities to fulfill a particular duty. If people are not convinced, or in other words, if they do not have a high enough sense of self-efficacy, they may never use the skills they were taught. People with a low sense of self-efficacy focus more on the probabilities of failure and how the difficulties that may arise can overcome their own abilities, which negatively impacts motivation [12]. People with a strong sense of self-efficacy tend to be more comfortable, confident, and strong in difficult times and periods of hard work. When they face failure, they attempt to eliminate the problem by trying harder [13].

Self-efficacy is defined as one's belief about one's capacity to manage and perform future actions or handle situations [13]. An individual's feelings, thinking style, motivation, and actions are affected by self-efficacy beliefs.

**Clin. Exp. Obstet. Gynecol. - ISSN: 0390-6663**
**XLVII, n. 3, 2020**
**doi: 10.31083/j.ceog.2020.03.4834**

Table 1. — *First and last exploratory factor analysis results*

| 1st EFA | | 2nd EFA | | 1st EFA | | 2nd EFA | |
|---|---|---|---|---|---|---|---|
| Items | Factor Loading | Items | Factor Loading | Items | Factor Loading | Items | Factor Loading |
| 1 | 0.72 | 6 | 0.87 | 34 | **0.84** | | |
| 2 | 0.85 | 7 | 0.88 | 35 | 0.7 | | |
| 3 | 0.86 | 10 | 0.83 | 36 | 0.68 | | |
| 4 | 0.85 | 18 | 0.86 | 37 | 0.72 | | |
| 5 | 0.86 | 19 | 0.85 | 38 | **0.72** | | |
| 6 | **0.87** | 24 | 0.86 | 39 | 0.74 | | |
| 7 | **0.88** | 25 | 0.88 | 40 | 0.78 | | |
| 8 | 0.83 | 26 | 0.86 | 41 | 0.83 | | |
| 9 | 0.64 | 27 | 0.88 | 42 | 0.87 | | |
| 10 | **0.83** | 34 | 0.84 | 43 | 0.79 | | |
| 11 | 0.75 | 38 | 0.72 | 44 | 0.83 | | |
| 12 | 0.8 | 45 | 0.76 | 45 | **0.76** | | |
| 13 | 0.7 | 52 | 0.86 | 46 | 0.84 | | |
| 14 | 0.7 | 53 | 0.83 | 47 | 0.88 | | |
| 15 | 0.73 | 55 | 0.79 | 48 | 0.85 | | |
| 16 | 0.7 | 57 | 0.72 | 49 | 0.86 | | |
| 17 | 0.74 | 58 | 0.73 | 50 | 0.83 | | |
| 18 | **0.86** | 59 | 0.75 | 51 | 0.88 | | |
| 19 | **0.85** | 61 | 0.77 | 52 | **0.86** | | |
| 20 | 0.85 | 64 | 0.87 | 53 | **0.83** | | |
| 21 | 0.8 | 65 | 0.81 | 54 | 0.82 | | |
| 22 | 0.73 | 66 | 0.84 | 55 | **0.79** | | |
| 23 | 0.76 | | | 56 | 0.82 | | |
| 24 | **0.86** | | | 57 | **0.72** | | |
| 25 | **0.88** | | | 58 | **0.73** | | |
| 26 | **0.86** | | | 59 | **0.75** | | |
| 27 | **0.88** | | | 60 | 0.72 | | |
| 28 | 0.86 | | | 61 | **0.77** | | |
| 29 | 0.87 | | | 62 | 0.82 | | |
| 30 | 0.8 | | | 63 | 0.84 | | |
| 31 | 0.82 | | | 64 | **0.87** | | |
| 32 | 0.79 | | | 65 | **0.81** | | |
| 33 | 0.76 | | | 66 | **0.84** | | |
| | | | | Eigenvalue: 42.74 | | Eigenvalue: 14.79 | |
| | | | | Total Variance Explained: 64.76 | | Total Variance Explained: 67.21 | |

Expectations about self-efficacy determine the type of the activity, the amount of the effort, and the duration of the effort [14]. In short, self-efficacy can be defined as the awareness of and belief in an individual's capabilities to overcome tasks related to any field [15]. General self-efficacy is defined as the individual's belief about her or his capability to execute behaviors in a general or specific area, the latter also being known as specific self-efficacy [16, 17].

In the field of healthcare, the concept of self-efficacy has been considered as an important concept for nurses and midwives, who have essential roles in healthcare and the health improvement of society [18]. For this reason, determining gynecological intervention self-efficacy, as a specific type of self-efficacy, is vital for midwifery and nursing students. In a review of the literature, no measures could be found related to gynecological intervention self-efficacy for nursing and midwifery students. For this reason, it was decided to develop a gynecological intervention self-efficacy scale, the Obstetric Intervention Self-Efficacy Scale (OISES), in the present study. Differences according to department, grade level, and gender were also examined during the development of the OISES.

## Methodology

*Participants*

The sample of the study was constituted using a convenience sampling method, which is easy to apply and enables students to participate voluntarily. A total sample of 327 university students (307 females, 20 males) was enrolled in the study. Of these, 168 were students of the midwifery department (all females) and 159 were students of the nursing department in the faculty of health. According to grade

Table 2. — *Accepted and deleted items and related target behaviors as a result of the first exploratory factor analysis*

| Item no. | Accepted item no. | Target behavior | Deleted item no. | |
|---|---|---|---|---|
| 1 | 6 | *Defining cervical effacement via vaginal examination* | 28 | 50 |
| 2 | 7 | *Defining cervical dilatation via vaginal examination* | 29 | 51 |
| 3 | 10 | *Examining fetus malposition via vaginal examination* | 32 | 54 |
| 4 | 18 | *Clamping umbilical cord* | 40 | 62 |
| 5 | 19 | *Cutting umbilical cord* | 41 | 63 |
| 6 | 24 | *Examining first Leopold maneuver (fundal grip)* | 2 | 46 |
| 7 | 25 | *Examining second Leopold (umbilical grip)* | 3 | 47 |
| 8 | 26 | *Examining fourth Leopold maneuver (2nd pelvic grip)* | 4 | 48 |
| 9 | 27 | *Examining third Leopold maneuver (1st pelvic grip)* | 5 | 49 |
| 10 | 34 | *Examining uterine contractions via fundal palpation* | 12 | 56 |
| 11 | 38 | *Repairing obstetric lacerations occurring in delivery* | 16 | 60 |
| 12 | 45 | *Measuring pelvic bone diameter* | 1 | 23 |
| 13 | 52 | *Evaluating amniotic fluid via vaginal examination* | 8 | 30 |
| 14 | 53 | *Examining any abnormality of fetus position via vaginal examination* | 9 | 31 |
| 15 | 55 | *Performing fetal heartbeat follow-up* | 11 | 33 |
| 16 | 57 | *Moving the mother into the appropriate position for delivery* | 13 | 35 |
| 17 | 58 | *Performing episiotomy if necessary* | 14 | 36 |
| 18 | 59 | *Repairing episiotomy* | 15 | 37 |
| 19 | 61 | *Evaluating anomalies of the umbilical cord* | 17 | 39 |
| 20 | 64 | *Examining signs of placental separation and removing the placenta properly* | 20 | 42 |
| 21 | 65 | *Controlling bleeding after delivery* | 21 | 43 |
| 22 | 66 | *Examining involution of the uterus* | 22 | 44 |

level, 78 students were freshmen, 59 students were sophomores, 84 students were juniors, and 102 students were seniors. Four students' grade levels were unknown.

*Procedure*

For the development of the OISES, an item pool was prepared. After a literature review, 22 target behaviors corresponding to obstetric intervention were determined and the OISES was composed of these 22 target intervention skills. For each behavior, 3 items were created. Therefore, the initial version of the OISES consisted of 66 items. Those items were then evaluated by 3 experts. They checked the scale and made necessary changes. Finally, the item pool was ready for the pilot study. This item pool was delivered to 22 students, and they were asked to give feedback about the clarity and understandability of the scale. During this process, 3 items were written again based on the feedback from the students. These students were also enrolled in the midwifery and nursing departments.

The factor structure of the OISES was investigated by exploratory factor analysis (EFA). In order to assess the factor numbers of the scale, the scree plot was examined. For reliability analysis, Cronbach's alpha was applied. For item analysis, item-total correlation was used. The reliability and validity values were calculated by SPSS 23.0.

## Results

*Structural validity*

Kaiser-Meyer-Olkin (KMO) sampling adequacy and Bartlett's sphericity test were applied to decide whether the data were appropriate for EFA. It is suggested that the KMO score should be higher than 0.60 and Bartlett's test should be significant to use factor analysis [19]. The KMO sampling adequacy test result was 0.97, and Bartlett's sphericity test was significant at $\chi^2 = 34693.44$ ($p < 0.0001$). Thus, the items were suitable for EFA. Varimax rotation was applied and the scree plot was evaluated. The factor numbers are exhibited in Figure 1.

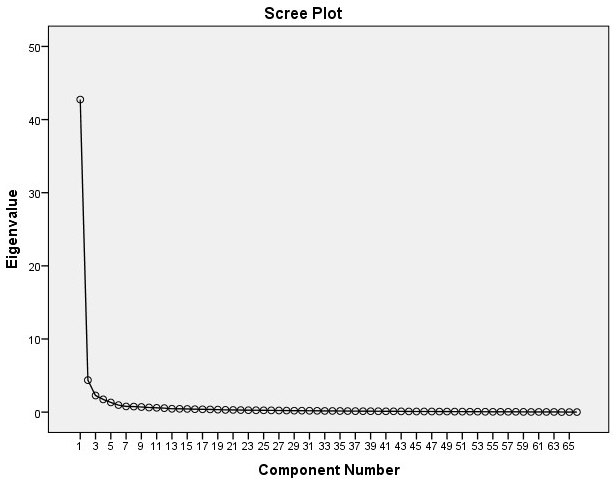


Figure 1. — OISES items categorize in the study group (The factor numbers).

Table 3. — *Item-total correlations and Cronbach's alpha coefficient if item deleted*

| Item number | Rjx (corrected item-total correlation) | Cronbach's alpha if item deleted |
|---|---|---|
| OGO6 | 0.84 | 0.974 |
| OGO7 | 0.86 | 0.974 |
| OGO10 | 0.81 | 0.974 |
| OGO18 | 0.85 | 0.974 |
| OGO19 | 0.83 | 0.974 |
| OGO24 | 0.86 | 0.974 |
| OGO25 | 0.88 | 0.974 |
| OGO26 | 0.86 | 0.974 |
| OGO27 | 0.87 | 0.974 |
| OGO34 | 0.69 | 0.976 |
| OGO38 | 0.68 | 0.975 |
| OGO45 | 0.75 | 0.975 |
| OGO52 | 0.85 | 0.974 |
| OGO53 | 0.82 | 0.974 |
| OGO55 | 0.77 | 0.975 |
| OGO57 | 0.7 | 0.975 |
| OGO58 | 0.7 | 0.975 |
| OGO59 | 0.72 | 0.975 |
| OGO61 | 0.74 | 0.975 |
| OGO64 | 0.86 | 0.974 |
| OGO65 | 0.8 | 0.974 |
| OGO66 | 0.83 | 0.974 |

The scree plot showed that the OISES items can be categorized in a single structure. In order to construct the OISES with the least number of items, the highest factor loading items for each of the 22 target behaviors were chosen regarding the first EFA. After that, a second EFA was conducted to find the factor loadings of the remaining items. The results of the first and second EFA are given in Table 1. In Table 2, the target behaviors, accepted item numbers, and deleted item numbers are displayed.

*Reliability*

Cronbach's alpha coefficient was applied for reliability analysis and this coefficient score was found to be 0.98.

*Item Analysis*

For item analysis, the corrected item-total correlations were calculated and the Cronbach's alpha if an item was deleted was checked. The corrected item-total correlation scores of the OISES ranged from 0.68 to 0.88 and no item needed to be deleted. Thus, all item-total correlations were above 0.30 [19]. Item-total correlations and Cronbach's alpha coefficients if items were deleted are presented in Table 3.

*Differences in terms of gender and grade level*

The independent samples *t*-test was applied to the OISES scores of the participants in order to find out the differences in terms of gender and department. Independent samples *t*-test results showed that the OISES scores of students changed according to gender; specifically, female students' OISES scores ($M$ = 15.10, $SD$ = 14.25) were higher than those of males ($M$ = 7.60, $SD$ = 8.12) ($t(27.32) = 3.77$, $p < 0.005$). The OISES scores also changed according to department, as the OISES scores of students in the midwifery department ($M$ = 19.36, $SD$ = 14.33) were higher than those of nursing department students ($M$ = 9.65, $SD$ = 11.92) ($t(319.82) = 6.67$, $p < 0.001$). Table 4 demonstrates the descriptive statistics and the *t*-test results according to gender and department.

The OISES scores of students were also investigated regarding students' grade levels after Levene's test for equality of variances was examined. Levene's test for equality of variances proved that the variances were distributed equally ($p$ = 0.30). The results of Levene's test were non-significant, so one-way ANOVA with Tukey's HSD post hoc test was applied to examine any differences and the sources of differences according to grade level.

The analysis revealed that there were some differences regarding grade level. The mean score of first-year (freshman) students was lower than those of students in the second, third, or fourth year [$F(3,319) = 60.74$, $p = 0.000$]. Table 6 shows the results of Tukey's HSD post hoc test.

As presented in Table 5, some significant mean differences were found between OISES scores of freshmen and sophomores, juniors, and seniors, whereby the scores of the first-year students (freshmen) were the lowest ($M_1$= 5.46; $M_2$= 8.49, $M_3$= 13.80, $M_4$= 26.47). Although the mean difference between freshmen and sophomores was not statistically significant, the rest of the mean differences were significant as $M_1 < M_3 < M_4$.

## Discussion

The results of this study proved that the OISES has a single factor with an eigenvalue of 14.79, explaining 67.21% of the total variance, respectively. The eigenvalue of a factor should be higher than 1.0 [19]. Thus, the OISES with a single factor has an acceptable eigenvalue.

In the related literature, item loadings lower than 0.30 [19] or 0.50 or 0.70 [20] could be a reason for item deletion. In this study, the OISES items' factor loadings were all higher than 0.50, so no omission was necessary in the second EFA. This also shows that the factor loadings of the OISES items are acceptable.

In the literature, a reliability level of 0.60 or higher is acceptable for the reliability of a scale [21]. In this respect, the present reliability analysis results revealed that the reliability score of the OISES is quite high. Moreover, item analysis of the OISES was examined and the scale was found to have sufficient item discrimination powers. According to Büyüköztürk, values of 0.30 and higher for item-total correlations are acceptable [19]. As a result, the OISES is a valid and reliable instrument. This research is crucial for developing a new scale to measure the obstetric intervention self-efficacy of nursing and midwifery students.

Despite the higher values of validity and reliability

Table 4. — *OISES differences, means, and t-values in terms of gender and department*

| | N | $\bar{X}$ | *Sd* | *df* | *t* | *p* | |
|---|---|---|---|---|---|---|---|
| Gender | Female | 307 | 15.1 | 14.25 | 27.32 | 3.77 | 0.001 |
| | Male | 20 | 7.6 | 8.12 | | | |
| Department | Midwifery | 168 | 19.36 | 14.33 | 319,820 | 6,674 | 0 |
| | Nursing | 159 | 9.65 | 11.92 | | | |

Table 5. — *Descriptive statistics of OISES scores according to grade level*

| | | *N* | $\bar{X}$ | *SD* |
|---|---|---|---|---|
| Grade level | Freshman | 78 | (M1) 5.46 | 10.94 |
| | Sophomore | 58 | (M2) 8.49 | 11.42 |
| | Junior | 84 | (M3) 13.80 | 10.66 |
| | Senior | 102 | (M4) 26.47 | 11.89 |

scores, there are some limitations to this test construction study. For example, as no other scale to determine obstetric intervention self-efficacy was identified in the literature review, concurrent validity could not be studied. Moreover, the lack of test-retest reliability analysis is another limitation of the study. Future research can accordingly focus on the concurrent validity and test-retest reliability of the OISES.

The OISES scores of students were investigated according to gender, department, and grade level via independent samples *t*-test and Welch's *t*-test with Tukey's HSD in this study. The OISES scores of students varied according to gender. This result was reasonable, because all of the male students were in the nursing department and midwifery had no male students, and nursing students do not have lectures related to obstetric interventions.

The OISES scores also changed according to the department. The mean OISES score of midwifery students was significantly and statistically higher than that of nursing students. The scale items mostly consisted of obstetric intervention behaviors, while nursing students only have a few courses that touch upon obstetric nursing called "Women's Health and Diseases", "Perinatology", and "Women's Sexual Health". Midwifery students, on the other hand, have many courses on these topics. For this reason, nursing students may not feel as competent about obstetric interventions as midwifery students do, and so students of the midwifery department may have relatively higher OISES scores than nursing department students. This result may be accepted as a kind of discriminant validity of the scale, because of the difference between nursing and midwifery curricula. In other words, the OISES aims to measure self-efficacy related to obstetric intervention skills, and because the nursing curriculum rarely covers such topics, the scale can discriminate between the obstetric intervention self-efficacy of nursing and midwifery students.

The results also showed that OISES scores of the students changed according to grade level. The OISES scores of the freshmen were the lowest, and seniors' OISES scores were higher than those of students in their third, second, and first years. Interestingly, first-year students' OISES scores did not significantly differ from those of second-year students. No related research on this topic was found in our literature review, but we may still suggest some explanations for these differences according to grade level. First, the difference between freshmen and the upper grade levels may arise from health intervention knowledge skills. The first-year students only take introductory courses and do not have courses related to intervention. It is thus reasonable to expect that students at higher grade levels may feel more self-efficient than those at lower grade levels, because as the timespan of the students' health education increases, their intervention knowledge and experience also increase. The courses that they take also become more interventional and experiential as the grade level advances. This assumption is supported by our findings, except for the mean OISES score of sophomore students. While the mean OISES score of sophomore students was higher than that of freshmen, this difference was not statistically significant. Such a result might be related to specific characteristics of the second-year students or the sample as a whole, or the courses that sophomore students take. For example, first-year courses are English, Basic Principles and Applications in Nursing/Midwifery, Physiology, Anatomy, Microbiology, Physical Examination in Nursing/Midwifery, and Pharmacology. Almost all of these courses are theoretical and do not include intervention skills. In the second year, however, courses covering intervention skills and knowledge are given to the students of both departments. For instance, internal diseases, surgical diseases, women's health and diseases, first aid and emergency care, pathology, histology, and infectious diseases are addressed. The second-year midwifery department students also take courses on normal pregnancy and medical care and basic principles and applications in midwifery. More experiential and interventional courses may help develop the self-efficacy of these second-year students, but it may not be enough to make a significant difference as they are taking such interventional courses for the first time in their curriculum. As this is an unexpected and interesting result, the OISES may be applied to all grade levels among samples of different midwifery and nursing students in future studies. Such interventional courses for the students cumulatively increase until they graduate, and so students may feel more confi-

Table 6. — *Tukey's HSD post hoc test results according to grade level*

| | (I) Grade | (J) Grade | Mean difference (I-J) | Std. error | Sig. | 95% Confidence interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower bound | Upper bound |
| Tukey HSD | 1 | 2 | -3.02999 | 1.94373 | 0.404 | -8.0499 | 1.9899 |
| | | 3 | -8.34799* | 1.77141 | 0 | -12.9229 | -3.7731 |
| | | 4 | -21.00905* | 1.69449 | 0 | -25.3853 | -16.6328 |
| | 2 | 1 | 3.02999 | 1.94373 | 0.404 | -1.9899 | 8.0499 |
| | | 3 | -5.31800* | 1.9136 | 0.029 | -10.2601 | -0.3759 |
| | | 4 | -17.97906* | 1.84262 | 0 | -22.7379 | -13.2203 |
| | 3 | 1 | 8.34799* | 1.77141 | 0 | 3.7731 | 12.9229 |
| | | 2 | 5.31800* | 1.9136 | 0.029 | 0.3759 | 10.2601 |
| | | 4 | -12.66106* | 1.65984 | 0 | -16.9478 | -8.3743 |
| | 4 | 1 | 21.00905* | 1.69449 | 0 | 16.6328 | 25.3853 |
| | | 2 | 17.97906* | 1.84262 | 0 | 13.2203 | 22.7379 |
| | | 3 | 12.66106* | 1.65984 | 0 | 8.3743 | 16.9478 |

*The mean difference is significant at the 0.05 level.

dent about obstetric intervention as their grade levels advance and their interventional training accumulates. However, this is only applicable for midwifery students, because they have courses related to the obstetric field.

The OISES can be applied to all class levels among different midwifery and nursing student samples in future studies. It is thought that this will serve as a helpful evaluation tool and make new contributions to the literature.

## Conflict of Interest

The authors declare no competing interests.

Submitted: April 16, 2018
Accepted: October 30, 2019
Published: June 15, 2020

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## Appendix

*Obstetric Intervention Self-Efficacy Scale (OISES)*

Please read the following statements carefully. Assess your self-efficacy level regarding each statement **by typing a cross (X) under one of (0), (1), and (2) scores** based on the following explanations.

| | |
|---|---|
| 0: I cannot perform/I perform incorrectly | Inability to perform the skill or incorrect performance |
| 1: I need to improve | Insufficient performance of skill or inability to perform in the correct order |
| 2: I perform correctly | Correct and full performance of skill in the correct order |

| **Item No.** | **Old Item No.** | **0**: I cannot perform/I perform incorrectly/ **1**: I need to improve / **2**: I perform correctly | **0** | **1** | **2** |
|---|---|---|---|---|---|
| 1 | 6 | I can identify cervical effacement by vaginal examination. | | | |
| 2 | 7 | I can identify cervical dilatation by vaginal examination. | | | |
| 3 | 10 | I can assess fetal malposition by vaginal examination. | | | |
| 4 | 18 | I can perform umbilical cord clamping. | | | |
| 5 | 19 | I can cut the umbilical cord. | | | |
| 6 | 24 | I can assess by the first Leopold's maneuver. | | | |
| 7 | 25 | I can assess by the second Leopold's maneuver. | | | |
| 8 | 26 | I can assess by the fourth Leopold's maneuver. | | | |
| 9 | 27 | I can assess by the third Leopold's maneuver. | | | |
| 10 | 34 | I can assess uterine contractions by fundal palpation. | | | |
| 11 | 38 | I can fix perineal lacerations. | | | |
| 12 | 45 | I can measure diameters of the pelvic bone. | | | |
| 13 | 52 | I can assess if amniotic sac has ruptured by vaginal examination. | | | |
| 14 | 53 | I can assess an abnormality in fetal position by vaginal examination. | | | |
| 15 | 55 | I can monitor fetal heart rate. | | | |
| 16 | 57 | I can position the pregnant woman correctly for delivery. | | | |
| 17 | 58 | I can perform an episiotomy, if necessary. | | | |
| 18 | 59 | I can repair an episiotomy. | | | |
| 19 | 61 | I can assess umbilical cord abnormalities. | | | |
| 20 | 64 | I can monitor the signs of placental separation and remove the placenta correctly. | | | |
| 21 | 65 | I can check postpartum hemorrhage. | | | |
| 22 | 66 | I can perform involution assessment. | | | |