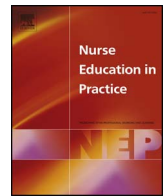




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Original research

## Nursing and midwifery students' experiences with the course of infertility and assisted reproductive techniques: A focus group study from Turkey

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## ABSTRACT

Nurses and midwives without sufficient knowledge of infertility are not likely to provide counseling and support for people suffering from infertility. This study aimed to evaluate nursing and midwifery students' experiences with the Course on Infertility and Assisted Reproductive Techniques. Our study had a qualitative descriptive design. Total number of the participants was 75. The analysis revealed five primary themes and twenty-one sub-themes. The themes were (1) action, (2) learner centered method, (3) interaction, (4) nursing competencies, and (5) evaluation. The active learning techniques enabled the students to retrieve the knowledge that they obtained for a long time, contributed to social and cultural development and improved skills required for self-evaluation, communication and leadership, enhanced critical thinking, skills increased motivation and satisfaction and helped with knowledge integration. Infertility is a biopsychosocial condition, and it may be difficult for students to understand what infertile individuals experience. The study revealed that active learning techniques enabled the students to acquire not only theoretical knowledge but also an emotional and psychosocial viewpoint and attitude regarding infertility. The content of an infertility course should be created in accordance with changes in the needs of a given society and educational techniques.

## 1. Introduction

Becoming parents is a universal goal, and having children is a life plan many people make either instinctively or as a result of roles imposed by society. However, conception may not be achieved easily, and a portion of couples may not have children without receiving medical help (Zegers-Hochschild et al., 2009). It is known that 3.5%–16.6% of the population in developed countries, 6.9%–9.3% of the population in developing countries and 9% of the world population in general suffer from infertility (Boivin et al., 2009). Although the internet and the media are used as sources of information about health at present, several studies have revealed that people do not have sufficient information about factors leading to infertility and interventions directed towards improvement of fertility (Sørensen et al., 2016; Chan et al., 2015; Sabarre et al., 2013; Peterson et al., 2012; Virtala et al., 2011; Rovei et al., 2010; Boivin et al., 2009; Bretherick et al., 2010; Lampic et al., 2006; Svanberg et al., 2006; Tydén et al., 2006; Hashiloni-Dolev et al., 2011; Bunting and Boivin, 2008).

Due to this insufficiency, individuals may not take precautions against preventable risk factors, may not receive medical help on time or may fail to comply with their treatment (Bunting et al., 2013).

Infertility is an unexpected crisis for women, their spouses and families and requires adapting to a life without children and coping with difficulties that may arise (Ying et al., 2016). However, because infertility is a biopsychosocial condition, it may be difficult to understand what infertile individuals experience. Individuals suffering from infertility refer to health professionals to receive counseling and medical help. Health education generally focuses on risk factors, diagnosis and treatment alternatives for infertility (Sherrod, 1998). It is known that psychological health, cultural approaches, laws, religions and how individuals perceive them play an important role in health care for infertile individuals (Devine, 2003; Verkuijlen et al., 2016). Nurses and midwives play a key role in increasing individuals' awareness of reproductive health and providing support and counseling about infertility (Wilson and Leese, 2013).

Warmelink et al. (2016) found that, couples reported that they have needs more psychological support and counseling from midwife after their infertility treatment. Several studies have revealed that nursing and midwives students do not have sufficient knowledge about causes, diagnosis, treatment and legal, religious, reproductive ethics and psychosocial aspects of infertility (Church and Ekberg, 2013; Stamatis et al., 2010; Kılıç et al., 2009; Taşçı and Özkan, 2007).

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Nurses and midwives without sufficient knowledge of infertility are not likely to provide counseling and support for people suffering from infertility. Therefore, it is thought that the contents of infertility courses should be designed in a way that allows nursing and midwifery students to improve their skills with a multifaceted approach because they have to provide support and counseling for infertile individuals when they enter professional employment (Warmelink et al., 2016; Wilson and Leese, 2013).

As the needs of those who require assistance with infertility increases, nurse educators are challenged to design and deliver a course of study that effectively prepares nurse generalists to meet those needs (Sherrod, 1998). This study aimed to evaluate nursing and midwifery students' experiences with different educational techniques used in the Course of Infertility and Assisted Reproductive Techniques (CIART).

## 2. Methods

### 2.1. Study design

A qualitative descriptive design was applied to record the students' experiences.

### 2.2. Participants

The study included nursing and midwifery students from the School of Health of Nigde University in Turkey. The nursing and midwifery education program incorporates teacher-centered learning. The students have to take two elective courses each semester starting from the second year of the program. Elective courses are 2-h theoretical courses and last for 14 weeks in each semester. The number of students in each elective course is 12–20. CIART is an elective course that can be taken by the students in the last year of the nursing program. Data were collected in focus group interviews.

The study included nursing and midwifery students who were taking the CIART and agreed to participate in the study. It has been proposed in the literature that sampling should continue until a saturation point has been reached in qualitative research (Holloway and

Wheeler, 2002). Accordingly, sampling was continued until the saturation point had been reached in this study. In all, 87 students were invited to participate and 75 students accepted and completed the qualitative focus group interviews. In the present study, five focus groups, each of which comprised between 12 and 18 participants, were created.

The mean age of the participants was  $20.18 \pm 1.06$  years and, of the 75 participants, 4 were male and 71 were female.

#### 2.2.1. Course

One of the most crucial goals of nursing/midwifery education is to equip the student with sufficient knowledge and skills to offer safe and high-quality patient care. Care provided by nurses and midwives changes depending on social and scientific progress and medical and technological advances. It is inevitable to make use of new techniques in nursing/midwifery education so that nurses and midwives can follow advances.

Curricula designed to prepare nurses and midwives must be reflective of the needs of current society. Therefore, in light of the relevant literature, culture, health policies and approaches to infertility available in the country, an education program covering basic knowledge about infertility and assisted reproduction techniques that nurses and midwives need was created, and educational methods and techniques appropriate for the content of the program were determined (Fig. 1).

Some pedagogical models can be use in nursing/midwifery education. The Active Learning in Nursing Education (ALINE) model was used in this study. It was developed by Fay et al., in 2006 to help nursing faculty shift from passive to active learning. ALINE is action based, learner centered, interactive and nursing competency oriented and involves evaluation. Fay et al. (2006) described the steps of active learning as the following: in action based-learning, students actively participate in learning experiences; in learner centered-settings, the action shifts from the teacher to the student; being interactive helps students to gain competency; nursing competency oriented-skills with each other over time; and evaluation requires students to remain continuously involved in performance assessment. The focus of the ALINE

Content and learning techniques used in the Course of Infertility and Assisted Reproduction Techniques

Week	Subjects	Educational technique	Educational activities
Week 1	Introducing yourself Course objectives Introducing sources Introducing the course and educational activities	Lecturing	The lecturer met the students. She presented information about course objectives, educational activities and use of and access to sources to be used. Groups were determined for each educational activity.
Week 2	Factors affecting reproduction	Group discussion	The students were divided into two groups. One group was asked to prepare a presentation on the factors affecting reproduction in females and the other group was asked to prepare a presentation on the factors affecting reproduction in males. Both groups were told to use brain storming and flipcharts. The students were given 30 min for preparation and 10 min for the presentation. After the presentations of the groups, the lecturer made her own

Fig. 1. Content and learning techniques used in the Course of Infertility and Assisted Reproduction Techniques.

presentation on the subject.

Week 3	Creating awareness of reproduction and its importance in terms of infertility - Billing ovulation method	Interactive presentation- Group discussion by using cases	The lecturer performed an interactive presentation based on the literature. The students were divided into four groups and each group was asked to determine fertile and infertile periods and the time of ovulation in a different case and they presented their case with the guidance of the lecturer. During group discussions, student to student and student to lecturer interactions were achieved.
Week 4	Methods of diagnosis of infertility and nurses' role in its diagnosis	Interactive presentation	The lecturer performed an interactive presentation that she prepared based on the literature.
Week 5	Nursing and midwifery approaches to assisted reproductive techniques	Interactive presentation	The lecturer performed an interactive presentation she prepared based on the literature.
Week 6	Infertility in current media	Poster presentation	For five weeks, the students read the newspapers they chose in the first week of the term and collected news about infertility. The students prepared a poster using the news they collected in the first hour. They presented their posters in the second hour. The students taking this course in the fall term displayed their

Fig. 1. (continued)

			posters on the notice board prepared to create awareness of infertility. The students taking this course in the spring term presented their posters on Nurses and Midwives' Day.
Week 7	Traditional practices related to infertility	Interactive presentation	The lecturer performed an interactive presentation she prepared based on the literature.
Week 8	Discussing infertility within the framework of Islam, culture and women	Group discussion	The students had been divided into two groups and assigned to study the subject in week 7. The subject was presented by the groups and a discussion was conducted under the guidance of the lecturer.
Week 9	Mid-term exam Discussing psychosocial and psychosexual effects of infertility	Reading a book and writing an article	The students were asked to write an article about psychosocial and psychosexual effects of infertility after reading read a book about infertility at the beginning of the term. The article was considered as the Mid-term exam.
Week 10	A visit to the infertility clinic	A technical visit	The students visited the infertility unit. They were encouraged to communicate with the patients and ask questions about how the clinic functions and observe some interventions.

Fig. 1. (continued)

Week 11	Surrogate motherhood	A debate	The students were divided into two groups and were asked to participate in a debate. One group was asked to argue for surrogate motherhood and the other group was asked to argue against surrogate motherhood. They debated about their views in accordance with the principles of debating.
Week 12	Effects of infertility on family members	Watching a film	The film “Juno”, directed by Jason Reitman, was watched.
Week 13	Ethical problems with and regulations for assisted reproductive techniques	Interactive presentation	The lecturer performed an interactive presentation that was prepared based on the literature.
Week 14	Assessment	Self-assessment Peer assessment Written exam	The students determined whether they achieved the course objectives weekly throughout the term. In group works, each group member assessed all the other group members. At the end of the term, a written exam composed of open and closed ended questions on all the subjects covered was taken by all the students.

Fig. 1. (continued)

model is learning experiences are student-centered and action-based (Fay et al., 2006).

2.3. Ethical considerations

The study and education protocols were approved by the university educational committee. Written permission was obtained from the institution where the study was performed. The students were informed about the aim of the study in the introduction of the during the first class of the semester. All students participated voluntarily, and informed oral and written consent was obtained from the participants. So that the students did not worry about their grades, focus group interviews were conducted after the course grades were announced. All participants were assured that they were free to withdraw from the study at any time. The policy of the Helsinki Declaration II was followed throughout the process.

2.4. Data collection

A semi-structured interview was chosen because it is suitable to capture an understanding of the students’ experiences with the CIART.

Interviews were conducted in the school. The interviewer strove to create a comfortable and confidential setting. The authors created the interview guide and conducted the interviews. Participants first responded to the prompt, “How did you experience the course?”; “How did you feel during the process?”; “How do you assess the learning activities used in the teaching of infertility?”; “How has affected the your perspective on infertility in this course?”; “What was good or not so good in the course?”. Questions of clarification included: “Please describe more about what you said.”; “How did you feel then?”; “Can you please give an example”; and “What did you mean?”.

Durations of the interviews were 45 min on average (range: 25–60 min). Interviews were tape-recorded and transcribed verbatim by authors.

2.5. Data analysis

The transcriptions were analyzed with thematic analysis. Latent thematic analysis was applied as described by Braun and Clarke (2006). The analysis involved an iterative process through which coded categories were continuously revised. First, we read the transcripts many times to obtain an overall impression and we generated initial codes. We organized codes into potential themes, gathering all data relevant to each potential theme. In this phase, latent analysis was conducted. We reviewed the themes by comparing them with each other. We defined, redefined and finally labeled the themes identifying the essence of each theme. We made a final analysis and selected vivid examples from the

Table 1  
Themes and sub-themes.

Themes	Sub-themes
Action	Interactive presentation Preparation of a poster Reading a book and writing an article Visits to the clinic Debate
Learner centered	Watching a video or a film Learning style Motivation Responsibility
Interaction	Teacher to student Student to student Student to resource
Nursing Competencies	Assessment Communication Critical thinking Teaching Leadership
Evaluation	Knowledge integration Learner’ ability to self-assess Peer assessment Exam

data-extract. The analysis was performed with collaboration among authors. Based on the analysis of the interviews, five themes and twenty one sub-themes emerged.

To increase the credibility of the data, the students were asked to verify whether the data transcribed were the same or different from their responses within the first week after the interviews. Coding mistakes, if any, were corrected. To increase the dependability and conformability of the data, data analyses were made by two independent researchers. To increase the transferability of the findings, characteristics of the participants and the method of the research were defined in detail (Jayasekara and Edu, 2012). Two researchers independently assessed the reporting of obtained findings using the consolidated criteria for reporting qualitative research (COREQ) framework and conducted discussions to resolve their disagreements (Tong et al., 2007).

### 3. Results

The findings of the study were categorized under five primary themes and twenty-one sub-themes. The five primary themes were action, learner centered, interaction, nursing competencies and evaluation according to the ALINE model. Sub themes emerged as results of the research (Table 1).

#### 3.1. Action

The action was categorized under six sub-themes that included interactive presentation, preparation of a poster, reading a book and writing an article, visits to clinics, debating and watching a film or a video. Some students reported that learning activities increased their ability to understand the subjects covered and helped them to socialize and keep track of advances. Some students said that, although they spent more accessing knowledge, what they learned was permanent:

*Before taking the course, I used to think what the people suffering from infertility said were exaggerated. I have been able to understand the difficulties they experience thanks to reading the book, news and discussions. (Group 2)*

*It takes longer to learn about a subject in active learning. Searching, reading, understanding and telling. Effects of these techniques are equal to those of listening to the teacher ten times. One has no alternatives, but learning. (Group 1)*

The students reported that some subjects were difficult and that they could understand them only when the teachers explained the concepts:

*Even during the weeks when the teacher presented classes, they were different. Unlike other courses, this course allowed us to interact. Otherwise, our attention was distracted and classes were boring. The teacher involved us in classes and we had discussions in groups and actively participated in classes. (Group 5)*

The students found that the learning activities were enjoyable, and they acquired the habit of reading, improved their ability to create, improved their skills for empathy and contributed to their occupational skills and professionalism. It allowed them to search for knowledge and acquire skills to search for knowledge. They learned about different subjects and enriched their background knowledge:

*I normally go through headlines and read the news only when the headlines attract my attention. During preparation of poster, I read bits and pieces in the newspaper. Thus, I, uninformed about the world, learned many things. (Group 1)*

*I got confused when I first went to the clinic. There were many people who hoped to have a baby. The only thing I could do was to provide an opportunity for a woman to express her feelings and to provide support for her. When she said 'Fortunately, you're with me', I got happy. (Group*

2)

*I was assigned into the group of surrogate motherhood. It was really difficult to argue for the view –There should be surrogate motherhood-which is forbidden in our country and by the religious system of Islam. We had to know about universal values. I discovered that I had the same view point as the society in which I lived. I realized that there are other views and that we have to understand them. (Group 5)*

#### 3.2. Learner centered approach

The learner centered approach was categorized under three sub-themes that include learning style, motivation, and responsibility. The students explained that active learning techniques enabled them to access knowledge more easily and to learn by themselves, which they found enjoyable. However, some students commented that they had a learning style different from that required by the course and could not adapt to the way the classes were conducted. The students reported that active learning techniques increased their motivation and self-confidence and improved their ability to express their opinions. The students reported that they took responsibility for their own learning during individual works and for the members' learning during group activities:

*Actually, everything is ready and you will just memorize it. Therefore, I get bored and I can't learn or I think as if I learned and I easily forget what I have learned. (Group 1)*

*Having the responsibility for our own learning in this course made us more serious about the course. We hardly ever skipped classes because when we wanted to skip classes, we had to ask our teammates for permission. We attended regularly not to lose their respect. (Group 3)*

*All members of the group had to read what was covered in all sources in group activities. Therefore, we studied for long hours before group works. Because performance of the group was directly affected by how much one studied, everybody had to study hard. (Group 4)*

#### 3.3. Interaction

Three forms of interaction occurred; i.e., teacher to student, student to student and student to resource:

*Normally, I mean in other courses, teachers explain things and we listen to them. In this course, I mean we taught her as well. There were even times when the teacher said 'I didn't know it'. (Group 2)*

*I found out that I could learn a lot during group works. Suppose everyone provided three different pieces of information. Thus, one could learn 15 pieces of information at a time. (Group 1)*

*Although we go through "an era of computers", we use computers just to send e-mails, post things on Facebook, tweet or prepare presentations. I used my computer and the internet to do research in this course as it always had to be so. (Group 3)*

#### 3.4. Nursing competencies

The nursing competencies were categorized under six sub-themes that included assessment, communication, critical thinking, teaching, leadership, knowledge and integration. The students said that knowing course objectives in general and having goals set for each subject covered had a positive influence on their performance and contributed to their self-assessment, but sometimes caused stress.

The students reported that learning activities used in the course improved their communication skills, enhanced their critical thinking skills, acquired new information in their free time, had higher motivation for learning new information, discovered their own leadership



characteristics, and improved their ability to make analyses and syntheses:

*Normally, I'm not talkative. This course made me to participate in classroom activities. I think I started to express my opinions. If I take more courses like this, I think I can improve my communications skills until graduation. (Group 1)*

*Basically, I have discovered that not all pieces of information I have learned is accurate. I have to criticize, think about and search for it and get other sources to confirm it. (Group 4)*

*I felt as if was managing this course. I didn't skip classes since I felt as if an important member of the team would be missing. (Group 2)*

*It was extraordinary. In fact, it required many things: reading, understanding, drawing conclusions and discussing about it. I had to read about the topic in different sources and discussed things I hadn't been able to understand with my friends and I was able to have an insight into the topic and write about it. It was so difficult. (Group 2)*

### 3.5. Evaluation

The evaluation was categorized under three sub-themes that include learners' ability to self-assess, peer assess, and exam. The students reported that they could evaluate their own performance in group works thanks to the provision of the course objectives at the beginning of the term, and being responsible for assessment of their friends' performances in group works forced them to participate in the classes and be more attentive. While some students admitted that they even did not feel the need for revision during the exam and were relaxed before the exam, others reported that they felt stress:

*Being informed about the course objectives at the beginning of the term was advantageous. I read them after each class and evaluated whether I had achieved them. (Group 5)*

*This was the first time we had been assessed by our friends, which was good. This made me listen to my friends more carefully because we were responsible for assessing their performance. I felt as if I acted like an adult. (Group 3)*

## 4. Discussion

The aim of this qualitative study was to explore an evaluation of nursing and midwifery students' experiences with CIART. In light of the findings obtained, it seems that the education-teaching design used in the study is effective in nurses and midwives who will provide care for Turkish society.

Contents of courses and education-teaching methods in the midwifery and nursing education are based on not only international standards but also needs of the society and health policies. Therefore, this education-teaching design could be used in other countries either without changing or by modifying in accordance with needs of the countries. Health care for infertile individuals involves identification of risk factors for infertility, reproductive ethics changes in nutrition and life styles, helping individuals to know their own reproduction physiology and to detect diversions from their normal reproduction status and encouraging individuals to refer to health professionals for appropriate health care earlier (Church and Ekberg, 2013; Wilson and Leese, 2013; Homan et al., 2007). It is crucial that several content areas be addressed to provide basic knowledge and understanding of infertility. These topics include the incidence, etiology, and current treatment. The most important of all content is the emotional and psychosocial impact of infertility because these are the greatest concerns and needs according to infertile couples ((Warmelink et al., 2016; Wilson and Leese, 2013; Sherrod, 1998).

The increase in infertility needs certainly makes infertility timely

and relevant and, therefore, it should be included in every baccalaureate nursing/midwifery curriculum. Stamatis et al. (2010) found that midwives' lack knowledge on a range of assisted reproductive technologies issues. Studies from Turkey have also revealed that nursing students have insufficient knowledge and awareness of infertility although curricula in nursing schools cover this topic extensively (Kılıç et al., 2009; Taşçı and Özkan, 2007).

The syllabus of the CIART offered at the health school where this study was performed was designed to adopt a whole person approach including biopsychosocial dimensions of infertility and to allow the students to understand all aspects of infertility.

It is expected that the students receiving this course should not only be equipped with sufficient knowledge but also be able to follow current trends and scientific evidence, have critical thinking skills depending on individuals and situations, develop and use decision making skills, empathize with infertile individuals and offer support and counseling for them. In this study, the students underlined the importance of understanding and supporting infertile individuals in practice, during which they were allowed to use knowledge and experiences they acquired with the active learning methods.

Current nurses/midwives need more preparation in critical thinking, management skills, communication and leadership skills and knowledge integration (Andreou et al., 2013; Mann, 2012; Christensen, 2011; Chabelli, 2007). Therefore, many educators have argued that active educational techniques should be used (Fay et al., 2006). Gauci et al. (2009) found that active educational techniques increased motivation for learning and had a positive impact on students' grades.

In the present study, the students reported that active learning techniques helped them to understand infertility more easily and to retrieve what they learned for a long time and even contributed to their social and cultural improvement. The students reported that active learning techniques, compared to conventional deductive education, allowed them to interact with each other, their teacher and resources more, which increased the chance of sharing knowledge and enhanced their communication and leadership skills. They also noted that their critical thinking skills improved during preparation of a poster, conduction of a debate and writing an article. Critical thinking refers to a higher-order meta-cognitive thinking involving judgment, decision-making and problem solving (Mann, 2012).

It is an essential competency in nursing/midwifery (Chabelli, 2007). Therefore, it was proposed that nursing/midwifery students should be offered a wider variety of learning techniques likely to improve critical thinking skills (Andreou et al., 2013). Another higher order competency desired in nursing graduates is knowledge integration. It is the process of synthesizing knowledge from multiple sources and putting theoretical knowledge into practice (Christensen, 2011). In the present study, the students explained that they acquired considerable information about a subject through several educational activities and used their ability to analyze and synthesize knowledge. They had a chance to put some of their knowledge and attitudes into practice in the clinic. However, time constraints and clinical insufficiencies might have prevented the students from effectively using their knowledge. Therefore, more time should be allowed for practicums in nursing/midwifery curricula and nursing/midwifery students should be provided with practicums in well-equipped infertility centers, which may facilitate putting theoretical knowledge into practice.

Based on the obtained findings, it can be suggested that using some active learning techniques can be effective in understanding and criticizing the process of infertility and in changing their knowledge into behavior for nursing/midwifery students. This research is the first qualitative study that evaluated nursing and midwifery students' experiences about the CIART in Turkey.

However, it had some limitations. First, the courses offered at the school where the study was performed are usually conducted through deductive education in which students listen to their lecturers and take notes. The students were first introduced to active learning techniques

in our study.

Because the students did not have sufficient experience with active learning, the techniques used might not have been evaluated effectively. In addition, general active education techniques were used. In future studies, infertility-specific active education techniques should be developed. Secondly, five focus groups, each of which comprised 12–18 participants, were created. The groups were so large. Everybody said something but this situation may have negative impact on discussion. Thirdly, the data had to be collected by the lecturer researcher, and the fact that the lecturer offering the course will offer other courses at this school due to insufficient faculty staff might have prevented the students from revealing their negative opinions about the techniques. Therefore, to eliminate any bias about data collection and to ensure that students express themselves freely, the interviews were conducted by a lecturer who was blinded to the study protocol. Randomized, controlled studies are needed to investigate the effects of different educational techniques on the CIART in future research.

#### 4.1. Conclusion and recommendations

The findings of this study provided increased understanding of nursing and midwifery students with the CIART. Infertility is a biopsychosocial condition and it may be difficult for students to understand what infertile individuals experience. The study revealed that active learning techniques allowed the students to acquire not only theoretical knowledge but also an emotional and psychosocial viewpoint and attitude.

The techniques also enabled the students to retrieve the knowledge they gained for a long time, contributed to social and cultural development and improved skills required for self-evaluation, communication and leadership, enhanced critical thinking, skills increased motivation and satisfaction and helped knowledge integration. All of these are very important components of education on infertility. The qualitative results were important in preparing the CIART. The content of a nursing/midwifery curriculum should be created in accordance with changes in the needs of a given society and educational techniques should be updated accordingly. However, further experimental studies are required to confirm the effects of each active learning method in the CIART.

#### 5. Conflicts of interest

No conflict of interest.

#### References

- Andreou, C., Papastavrou, E., Merkouris, A., 2013. Learning styles and critical thinking relationship in baccalaureate nursing education: a systematic review. *Nurse Educ. Today* 34, 362–371.
- Boivin, J., Bunting, L., Collins, J.A., Nygren, K.G., 2009. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. *Hum. Reprod.* 22, 1506–1512.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3 (2), 77–101.
- Bretherick, K.L., Fairbrother, N., Avila, L., Harbord, S.H., Robinson, W.P., 2010. Fertility and aging: do reproductive-aged Canadian women know what they need to know? *Fertil. Steril.* 93, 2162–2168.
- Bunting, L., Boivin, J., 2008. Knowledge about infertility risk factors, fertility myths and illusory benefits of healthy habits in young people. *Hum. Reprod.* 23, 1858–1864.
- Bunting, L., Tsubulsky, I., Boivin, J., 2013. Fertility knowledge and beliefs about fertility treatment: findings from the International Fertility Decision-making Study. *Hum. Reprod.* 28, 385–397.
- Chabelli, M.M., 2007. Facilitating critical thinking within the nursing process framework: a literature review. *Health SA Gesondheid* 12, 69–89.
- Chan, C.H.Y., Chan, T.H.Y., Peterson, B.D., Lampic, C., Tam, M.Y.J., 2015. Intentions and attitudes towards parenthood and fertility awareness among Chinese university students in Hong Kong: a comparison with Western samples. *Hum. Reprod.* 30, 364–372.
- Christensen, M., 2011. Advancing nursing practice: redefining the theoretical and practical integration of knowledge. *J. Clin. Nurs.* 20, 873–881.
- Church, S., Ekberg, M., 2013. Student midwives' responses to reproductive ethics: a qualitative focus group approach using case scenarios. *Midwifery* 29, 895–901.
- Devine, K.S., 2003. Caring for infertile women. *MCN* 28, 100–105.
- Fay, V.P., Johnson, J., Selz, N., 2006. Active learning in nursing education (ALINE). *Nurse Educ.* 31, 65–68.
- Gauci, S.A., Dantas, A.M., Williams, D.A., Kemm, R.E., 2009. Promoting student-centered active learning in lectures with a personal response system. *Adv. Physiol. Educ.* 33, 60–71.
- Hashiloni-Dolev, Y., Kaplan, A., Shkedi-Rafid, S., 2011. The fertility myth: Israeli students' knowledge regarding age-related fertility decline and late pregnancies in an era of assisted reproduction technology. *Hum. Reprod.* 26, 3045–3053.
- Holloway, I., Wheeler, S., 2002. *Qualitative Research in Nursing*, 2nd ed. Blackwell Science, Oxford.
- Homan, G.F., Davies, M., Norman, R., 2007. The impact of lifestyle factors on reproductive performance in the general population and those undergoing infertility treatment: a review. *Hum. Reprod. Update* 13, 209–223.
- Jayasekara, R.S., Edu, P., 2012. Focus groups in nursing research: methodological perspectives. *Nurs. Outlook* 60, 411–416.
- Kılıç, S., Uçar, M., Türker, T., Koçak, N., Aydın, G., Günay, A., Gençtürk, D., 2009. Determination of the attitudes of the GATA Nursing School students about the surrogate motherhood. *Gulhane Med. J.* 51, 216–219.
- Lampic, C., Svanberg, A.S., Karlström, P., Tydén, T., 2006. Fertility awareness, intentions concerning childbearing, and attitudes towards parenthood among female and male academics. *Hum. Reprod.* 21, 558–564.
- Mann, J., 2012. Critical thinking and clinical judgment skill development in baccalaureate nursing students. *Kans. Nurse* 87, 26–30.
- Peterson, B.D., Pirritano, M., Tucker, L., Lampic, C., 2012. Fertility awareness and parenting attitudes among American male and female undergraduate university students. *Hum. Reprod.* 27 (5), 1375–1382.
- Rovei, V., Gennarelli, G., Lantieri, T., Casano, S., Revelli, A., Massobrio, M., 2010. Family planning, fertility awareness and knowledge about Italian legislation on assisted reproduction among Italian academic students. *Reprod. Biomed. Online* 20, 873–879.
- Sabarre, K.A., Khan, Z., Whitten, A.N., Remes, O., Phillips, K.P., 2013. A qualitative study of Ottawa university students' awareness, knowledge and perceptions of infertility, infertility risk factors and assisted reproductive technologies (ART). *Reprod. Health* 10 (41), 2–10.
- Sherrod, R.A., 1998. Infertility education in Baccalaureate schools of nursing. *J. Nurs. Educ.* 37, 412–414.
- Sørensen, N.O., Marcussen, S., Backhausen, M.G., Juhl, M., Schmidt, L., Tydén, T., Hegaard, H.K., 2016. Fertility awareness and attitudes towards parenthood among Danish university college students. *Reprod. Health* 13, 146.
- Stamatis, P., Evangelia, N., Martha, M., Dimitrios, H., 2010. Assisted reproduction and midwives: student and certified midwives' educational needs on reproductive biology. *Sex. Reprod. Health* 1, 163–168.
- Svanberg, A.S., Lampic, C., Karlström, P.O., Tydén, T., 2006. Attitudes toward parenthood and awareness of fertility among postgraduate students in Sweden. *Gend. Med.* 3, 187–195.
- Taçı, K.D., Özkan, S., 2007. University school for health sciences students' opinions about infertility. *TAF Prev. Med. Bull.* 6, 187–192.
- Tong, A., Sainsbury, P., Craig, J., 2007. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int. J. Qual. Health Care* 19, 349–357.
- Tydén, T., Svanberg, A.S., Karlström, P.O., Lihoff, L., Lampic, C., 2006. Female university students' attitudes to future motherhood and their understanding about fertility. *Eur. J. Contracept. Reprod. Health Care* 11, 181–189.
- Verkuijlen, J., Verhaak, C., Nelen, W.L.D.M., Wilkinson, J., Farquhar, C., 2016. Psychological and educational interventions for subfertile men and women. *Cochrane Database Syst. Rev.* 2016 (3). <http://dx.doi.org/10.1002/14651858.CD011034.pub2>. Art. No.: CD011034.
- Virtala, A., Vilksa, S., Huttunen, T., Kuntu, K., 2011. Childbearing, the desire to have children, and awareness about the impact of age on female fertility among Finnish university students. *Eur. J. Contracept. Reprod. Health Care* 16, 108–115.
- Warmelink, J.C., Adema, W., Pranger, A., Paul de Cock, T., 2016. Client perspectives of midwifery care in the transition from subfertility to parenthood: a qualitative study in The Netherlands. *J. Psychosom. Obstet. Gynaecol.* 37, 12–20.
- Wilson, C., Leese, B., 2013. Do nurses and midwives have a role in promoting the well-being of patients during their fertility journey? A review of the literature. *Hum. Fertil.* 16 (1), 2–7.
- Ying, L., Wu, L.H., Loke, A.Y., 2016. The effects of psychosocial interventions on the mental health, pregnancy rates, and marital function of infertile couples undergoing in vitro fertilization: a systematic review. *J. Assist. Reprod. Genet.* 33, 689–701.
- Zegers-Hochschild, F., Adamson, G.D., Mouzon, J., Ishihara, O., Mansour, R., Nygren, K., Sullivan, E., Vanderpoel, S., On Behalf of ICMART and WHO, 2009. The international committee for monitoring assisted reproductive technology (ICMART) and the world health organization (WHO) revised glossary on ART terminology. *Hum. Reprod.* 24, 2683–2688.