

## Effect of Educational Guideline on Nurses' Performance Regarding Assisted Reproductive Technology

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### Abstract

**Background:** Infertility is a source of social and psychological suffering for around one in six couples. Over the past few decades, remarkable progress has been made in modern reproductive technology to solve this problem. For increasing success rate, educational guideline is essential for improving nurses' performance. **The aim of this study** was to evaluate effect of educational guideline on nurses' performance regarding assisted reproductive technology. **Research Design:** A quasi experimental study was used to conduct this study. **Setting:** The study was conducted in IVF unit at Ain Shams University Maternity Hospital. **Sample:** Purposive sample consisted of 130 nurses working in the previously mentioned setting and meet the sample criteria. **Tools:** two tools were used. 1: structured interviewing questionnaire was used to assess general characteristics, nurses' knowledge regarding infertility, infertility treatments, assisted reproductive technologies, artificial insemination and in-vitro-fertilization. 2: practice observational checklists to assess nurses' practice regarding artificial insemination and in vitro- fertilization. **Results** the current study revealed that the majority of studied nurses have good level of total knowledge about in vitro fertilization and artificial insemination post implementation and three months after implementation of educational guideline, while the majority of the studied nurses were competent regarding in vitro fertilization and artificial insemination post implementation of educational guideline and after three months. **Conclusion:** The present study concluded that the majority of the studied nurses were competent and had a good level of total knowledge about in vitro fertilization and artificial insemination after the implementation of educational guidelines. Moreover, there was a positive correlation with high statistical significance between the total score of knowledge and the total score of practice regarding artificial insemination and in vitro fertilization. **Recommendation:** In light of the findings of this study, the researcher recommended that application of educational guidelines for nurses working at IVF units who offer care for women seeking for assisted reproductive technologies and conducting educational training programs about role of nurse regarding assisted reproductive technologies (IVF & AI).

**Key words:** assistive reproductive technology, educational guideline, performance

### Introduction:

Infertility is a source of social and psychological suffering for both men and women, where around one in six couples encounter problems with fertility. Over the past few decades, remarkable progress has been made in modern reproductive technology to solve this problem. Increasingly, couples are turning to assisted reproductive technology (ART) for help with conceiving and ultimately giving birth to a healthy live baby of their own. (Farquhar and Marjoribanks, 2018).

Currently, the latest medical treatment of infertility is ART that involves direct

manipulation of oocytes and sperm in vitro. Infertility etiologies in which ART is needed may be female factors (hormonal disorders, bilateral tubal block, endometriosis or uterine problems), male factors (sperms abnormalities, and varicocele), unexplained infertility and some for genetic purpose. The most common types of ART are intra-cytoplasmic sperm injection (ICSI), cryopreservation of gametes or embryo, gamete intra-fallopian transfer (GIFT) and zygote intrafallopian transfer (ZIFT), artificial insemination (AI) and in vitro fertilization (IVF). (Osman, 2020)

Millions of babies were born worldwide as a result of IVF & AI techniques. In-vitro

fertilization involves fertilization outside the body in an artificial environment. The IVF offers an opportunity to avoid such problems by allowing fertilization to occur outside the body "in vitro"; Latin words which literally means "in glass", while AI is a relatively simple procedure compared with in-vitro fertilization, its popularity as a treatment option for certain diagnostic groups of infertile couples is increasing, since it is intermediate between the simpler ovulation induction (OI) and the more "high tech" IVF. (Kaur,2021)

Each assisted reproduction cycle (IVF & AI) consists of several steps. Basic steps of IVF cycle are ovarian stimulation, egg retrieval, fertilization, embryo culture, and embryo transfer, while steps of AI include ovarian stimulation, semen collection and processing and finally sperms insemination. So, it is important for each step to be supported by good evidence from well-designed studies. On another side, there are a number of barriers for ART (IVF & AI) like high cost of treatment, poor result, social stigma, less success, physical and financial stresses of treatment. (Becker et al., 2020)

There are many factors (cognitive, physical, and organizational) that affect nurses' performance and awareness as nurses engage in multiple tasks during IVF & AI cycles. Professionals working in the field of ART are asked to adapt and incorporate advances into their knowledge and skills to ensure they offer evidence-based care to couples. Patient outcomes and success of IVF & AI are affected by care quality and nurses' performance, which can be improved through many methods as educational guideline, which is an essential method consists of several logical steps to aid the nurse analyzing and resolving health problems, and to be accountable for nurses' actions to their patients and their peers, (Peate, 2017, Cho and Han, 2018).

Nurses are one of healthcare professionals, have multidimensional and key roles in IVF & AI techniques as care giver, educator, counselor, manager and researcher. Through a holistic health care, nurses are able to better prepare couples, promote their empowerment, coordinate various stages of ART, support, and help couples to achieve physical, psychological and social well-being

and success. Nurses also use evidence based researches and practice to increase quality of care during IVF & AI. So that, improving nurse's performance is necessary by using integrated knowledge and skills they gained through continuous education and experience (Swan, 2019).

#### **Justification of the study:**

Worldwide, the use of ART has increased dramatically and has made pregnancy possible for many infertile couples. The ART procedures reported in 2016 were 208,786. These procedures resulted in 57,332 live-birth deliveries (CDC, 2016). More than 9 million babies have been born worldwide since the first IVF baby was born in 1978. (Ishihara et al, 2019).

Nurses' performance is considered one of the essential factors on the quality of health service of ART. Low-performance of nurses has impact on increasing hospital expenses, reaching to more than 5% of the annual hospital operating costs. (Trihastuti et al, 2016). Many studies found that optimal nursing performance was influenced by various factors as continuous education and training, motivation, availability of equipment, staff satisfaction, and nurses' attitudes in providing quality of nursing care. There is a clear association between learning and development activities and nurse's performance (Adatara et al., 2016 and Saputera et al., 2021).

Lack of adequately trained competent staff is a key barrier in preventing success of (ART). So, modern infertility practice utilizing ART needs nurses to be better selected, well prepared and highly trained.(Fuchs et al., 2016). So, it was necessary to create a standardized communication protocol by using educational guideline and training for knowledge and practice and more research must be conducted to improve nurses' performance.

#### **Aim of the Study:**

To evaluate effect of Educational Guideline on Nurses' Performance Regarding Assisted Reproductive technology, through: -

- 1- Assessing nurses' performance related to ART (IVF and artificial insemination).

- 2- Designing and implementing educational nursing guideline regarding ART (IVF and artificial insemination).
- 3- Evaluating effect of Educational Guideline on nurses' performance related to ART (IVF and artificial insemination) post intervention.

#### **Research hypothesis:**

Educational Guideline will improve Nurses' Performance Regarding Assisted Reproductive technology.

### **Subjects and Methods**

#### **1- Technical design:**

Technical design was used for the study discussed the following four categories: research design, the setting of the study, the subjects, the tools used for data collection, and the ethical considerations.

#### **Research Design:**

A quasi experimental design was utilized to conduct this study.

#### **Setting:**

This study was conducted at Ain Shams University Maternity Hospital, IVF unit.

#### **Subject (sampling):**

**Sample Type:** Purposive sample was used.

#### **Sample size:**

Study subjects include total nurses working at Ain Shams University Maternity Hospital; 130 nurses participated in the study.

#### **Data collection tools:**

**Two tools were used:**

#### **• Tool I: Structured Interviewing Questionnaire:**

It was used pre/post intervention and developed by the researchers after reviewing recent related literature (**daniluk and koert, 2016**) and it comprises two parts.

**Part I:** assessed nurses' personal and professional characteristics including 5 questions (such as age in years, residence, level of education, training programs, and total experience in years).

**Part II:** assessed nurses' knowledge related to infertility and methods of treatment.

**Part III:** assessed nurses' knowledge related to assisted reproductive technologies, in vitro fertilization and artificial insemination as ART definition and types, IVF and AI (definition, indications, lab investigation, steps, hazards, danger signs and follow up, nurses' roles pre, during, post procedure.

#### **❖ Scoring system for evaluating nurses' knowledge was developed as the following:**

For the knowledge items, each question scored as (3) for the complete correct answer, (2) for the incomplete correct answer, and (1) for an incorrect answer, so the total knowledge scores could range from a minimum of 24 to a maximum of 72 score.

The overall level of knowledge was assessed by summing scores for all responses, and then a percentage score was calculated. This percentage score was categorized into Good level of knowledge  $\geq 75\%$ , Average level of knowledge  $60\% - <75\%$  and Poor level of knowledge  $<60\%$ .

#### **Tool II:**

#### **Observational checklists**

One was related to IVF and another for artificial insemination to assess pre and post intervention and Follow-up after 3 months nurses' practice regarding IVF and artificial insemination. It was designed by researcher after reviewing the relevant literature. (**CDC, Society for ART, 2019**).

#### **It consisted of (three) main parts:**

**A-** Pre procedure steps (preparation for procedure):- It contains 3 steps. Every step has sub statements as obtain complete fertility assessment and complete history taking and Prepare the couple.

**B-** During procedure IVF and artificial insemination steps: -

•IVF steps are divided into three sections regarding sessions of IVF procedure.

1.1st session (induction) contained 4 statements as arrange necessary medical and surgical appointments, tell woman about ways

of ovulation monitoring and instruct the couple about medications

2. 2nd session (egg retrieval) contained 6 statements as give woman pre-retrieval instructions, Prepare the environment, Prepare woman, assists anesthetic and physician during retrieval and give couple post-retrieval information and instructions.

3. 3rd session (embryo transfer) contained 5 steps as Pre- embryo transfer instructions, Prepare the environment and woman, Nurse assists anesthetic doctor and physician during embryo transfer and Post-embryo transfer instructions.

•Steps of AI are divided into two sections regarding AI sessions.

1. 1st session (induction) contained 5 statements as induction for IVF.

2. 2nd session (insertion) contained 7 statements as labels the semen container with husband's data, handle the semen container carefully, prepare woman and help Physician in inserting.

C-Post procedure steps: - consisted of 6 steps for IVF checklist and 6 steps for AI checklist as places a pillow under woman's buttocks and give couple post procedures information and instructions.

#### ❖ Scoring system:

• The maternity nurses' practice was scored as follow: "as reported by nurse," each statement was scored as 2 for done competent and scored as 1 for done incompetent.

• The total practice score was summed up and categorized to  $\geq 85\%$  Competent and  $< 85\%$  Incompetent.

**Supportive material** "Arabic guideline regarding knowledge on assisted reproductive technology and procedure of IVF and artificial insemination technique involving pictures" developed by the researcher based on review of literature. Outlines of this guideline booklet included definition of infertility, methods of infertility management, and definition of assisted reproductive technologies, definition, indications, investigations, steps, failure, danger signs of IVF & AI and role of nurse regarding ART (**National Health Service, 2020**).

#### Validity and reliability:

The data collection tools were submitted to a panel of three nursing and medical expertise in obstetric –gynecological to test content validity. Modifications were done according to the panel's judgments on the clarity of sentences and the content's appropriateness.

#### Tools reliability:

Testing the reliability of the tools was through Alpha Cronbach reliability analysis.

Tools	Alpha Cronbach
Structured Interviewing Questionnaire	0.830
Observational checklists	0.743

#### Ethical Considerations:

The ethical research considerations in this study include the following:

- The research approval was obtained from Scientific Research Ethical committee in Faculty of Nursing at Ain Shams University before starting the study.
- An official permission was obtained from director of Ain shams university maternity hospital in which the study will be conducted.
- The researcher clarified the objective and aim of the study to nurses that included in the study.
- The researcher assured maintaining anonymity and confidentiality of the subject data.
- No harm occurred to nurses.
- Nurses were informed that they are allowed to choose to participate or not in the study and that they have the right to withdraw from the study at any time.

#### 2- Administrative Design:

An official approval to conduct this was obtained from Dean of faculty of nursing Ain Shams University, a letter containing title and aim was directed to the director of Ain Shams maternity Hospital and oral approval from the director of IVF unit, nurses and patients to obtain this approval for data collection.

#### 3- Operational Design:

The operational design included; the preparatory phase, including administrative

design and pilot study, implementation phase, and follow-up phase.

### **The Preparatory Phase:**

Review of the past and current local and international related literature using text books, scientific magazines, and net search articles, and then tools are designed. The developed tools were examined by experts to test their reliability for the study.

### **Pilot Study:**

The pilot study was carried out on 10% (13 nurses) of total sample (130) nurses to test the study process & evaluate applicability of the study and validity of the tools and all research process steps to find the possible obstacles that might be faced during data collection. This sample is included in total study sample.

### **Field Work:**

Data was collected over seven-month period for pre& posttest, beginning in February 2022 and ending in August 2022 then after 3 months for follow up tests for two months, from the beginning of November 2022 to the end of December 2022 until the total sample was obtained. Data is collected in three phases: assessment, implementation, and evaluation.

Nurses' performance (knowledge & practice) regarding assisted reproductive technology (IVF and artificial insemination) were assessed 3 times by using tool I and tool II , before, immediately post implementation and 3 months after implementation of educational guideline and comparison was done to assess its effect on nurse's performance regarding assisted reproductive technology.

### **(1) Assessment phase:**

- After obtaining the official approval for data collection, data has been collected from 4 nurses per week for seven months for pretest, intervention and posttest, then after three months for two months for follow up at the Ain Shams Maternity Hospital, IVF unit.

- At the beginning of the interview, the researcher explains the aim of the study to the nurses who met the inclusion criteria; confidentiality of the information was ensured, and oral consent was obtained. Then, the researcher met 2 nurses together for each

session and used two data collection tools, the first interviewing questionnaire which was used to assess the nurse's personal data and her knowledge regarding ART (IVF and AI). Also, the 2<sup>nd</sup> tool "check list," was used to assess nurses' practice related to ART (IVF and AI).

- The researcher assigned 1 day for assessing 4 nurses knowledge pre & post intervention by the questionnaire and providing and explaining the guideline. Each participant spent 10 minutes filling out the questionnaire for each test.

- the researcher appointed with the same four nurses for the next sessions for practice regarding sessions of AI and IVF procedures, flow rate and schedule of cases per week for observing 4 nurses' practice with at least 4 clients for each nurse and documenting by observational checklist pre and post intervention.

### **(2) Implementation phase:**

- Researchers conducted two instruction sessions with participants based on the nurses' needs after revising data collection tools at the baseline assessment.

- At the day assigned for assessing knowledge, the researcher had interviewed with 4 nurses per day with previously mentioned sample criteria, 2 for each session.

At the beginning of two instruction sessions, supporting material (an Arabic booklet with coloured pictures) was distributed to each nurse.

Then, the researcher had provided brief explanation about the guideline aim and content which was divided to two parts:

- 1- Knowledge related to ART, IVF and AI
- 2- Role of nurse pre, during and post procedures of IVF & AI.

- 1- **1<sup>st</sup> session** was concerning "knowledge related to ART (IVF and AI) as:

- ART definitions and types
- IVF and artificial insemination (definition, indications, lab investigation, steps, hazards, danger signs, and follow-up).

This teaching session ranged from 20 to 30 minutes. The researcher used different teaching methods, such as visual aids "pictures"

and group discussion. The major of nurses during this session reported that, knowledge which provided was simple, clear and needed.

2- **2<sup>nd</sup> session**, at days assigned for nurses' practice, was related to practice (nurse role) pre, during and post IVF and AI procedures. This session ranged from 30 to 40 minutes with 2 nurses for each session. The researcher explains the steps of IVF and AI nursing procedures as:

- Preparation of couples, environment and equipment.
- Pre and post every session's instructions for couples.
- Helping doctor during every step.

In this session, demonstration, redemonstration, and role-play have been used as teaching methods regarding nurses' roles pre, during, and post IVF & AI procedures.

#### Evaluation phase:

After implementing educational guidelines, the intervention's effect was assessed immediately through the post-test. The researcher recorded the name and phone number of included nurses to contact with them later. Three months later, using tools 1 and 2, the effect of educational guidelines on nurses' performance regarding assisted reproductive technology (IVF and AI) was evaluated.

#### Statistical Design:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean ( $\bar{X}$ ) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test ( $\chi^2$ ) between the groups during the two visits and during the three visits were assessed by Friedman test. Different between the groups during the two visits were assessed by paired t test and different between the groups during the three visits were assessed by repeated measures ANCOVA. In addition, r- test was used to identify the correlation between the study variables.

Degrees of significance of results were considered as follows:

- P-value > 0.05 Not significant (NS)
- P-value < 0.05 Significant (S)
- P-value  $\leq$  0.001 Highly Significant (HS).

#### Results:

**Table (1):** revealed that 94.2% of the studied nurses were aged between 20 - 30 years; with the Mean $\pm$  SD of age is 34.77 $\pm$  5.18 years. As regard to education level, 40.8% of them have technical institute of nursing. Also, 39.2% of them have <5 years of experience with the Mean $\pm$  SD is 8.41 $\pm$ 4.05 years. Moreover, 53.8% of them live at rural areas.

**Table (2):** indicates that there is a marked improvement in all knowledge items related to artificial insemination immediate post and three months after implementation of educational guideline compared to pre intervention with a highly statistically significant difference ( $P = < 0.001$ ). As evidence 90.0% and 80.8% of the studied nurses have complete correct answer about the definition and steps of artificial insemination, respectively post implementation of educational guideline and 85.4% and 77.7%, respectively after three months of implementation.

**Table (3):** shows that, there is a marked improvement in all knowledge items related to in vitro fertilization immediate post and after three months implementation of educational guideline compared to pre intervention with a highly statistically significant difference at ( $P = < 0.001$ ). As evidence, 93.1% and 87.7% of the studied nurses have complete correct answer about the definition and indications of in vitro fertilization, respectively post implementation of educational guideline and 86.9% and 80.0%, respectively after three months of implementation.

**Figure (1):** shows that, 88.5% of the studied nurses have good level of total knowledge about in vitro fertilization and artificial insemination post implementation of educational guideline, compared to 84.6% after three months of implementation.

**Figure (2):** shows that, 19.2% of the studied nurses were competent regarding in vitro fertilization and artificial insemination pre implementation of educational guideline. While



changed to 87.7% post implementation of educational guideline and 83.1% after three months.

between nurses' knowledge and their practice at pre, post and follow-up implementation of educational guideline at ( $P < 0.01$ ).

**Table (4):** revealed that there is high a significant statistical positive correlation

**Table (1):** Number and percentage distribution of the studied nurses according to their general characteristics (n=130).

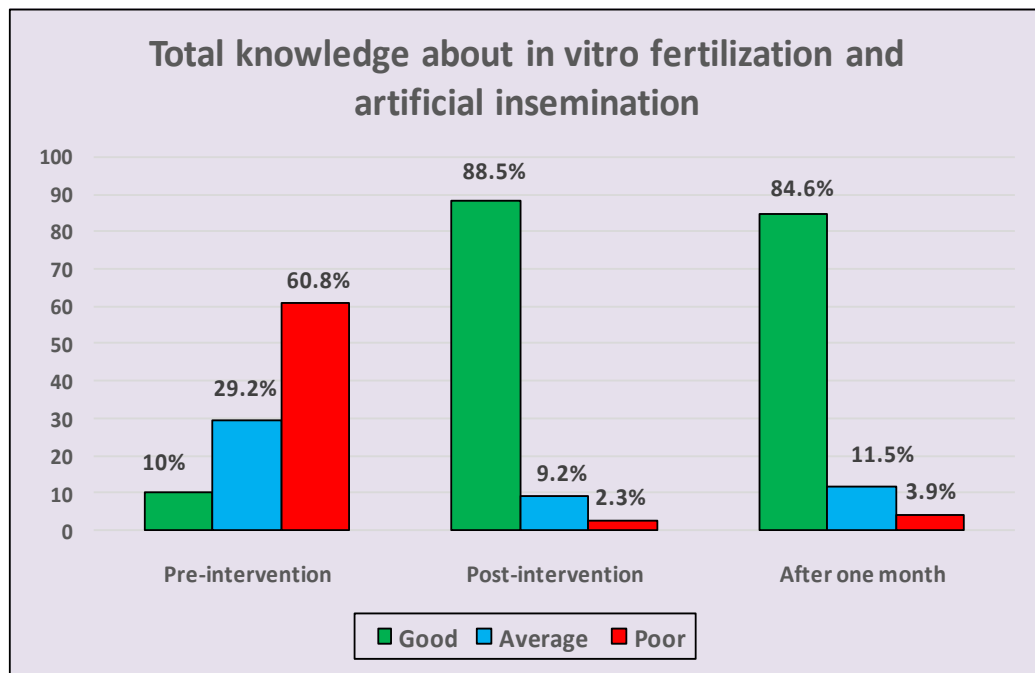
Items	No.	%
<b>Age (Years)</b>		
20 – 30	55	42.3
31- 40	50	38.5
41 -< 45	25	19.2
<b>Mean ± SD</b>	<b>34.77± 5.18</b>	
<b>Education level</b>		
Diploma of nursing	40	30.8
Technical institute of nursing	53	40.8
Bachelor of Nursing	28	21.5
Postgraduate studies	9	6.9
<b>Years of experience/ years</b>		
<5	51	39.2
5 - 10	42	32.3
>10	37	28.5
<b>Mean ± SD</b>	<b>8.41±4.05</b>	
<b>Attending training courses about IVF &amp; AI</b>		
Yes	6	4.6
No	124	95.4
<b>Residence</b>		
Urban	60	46.2
Rural	70	53.8

**Table (2):** Comparison between the studied nurses regarding to their knowledge about artificial insemination at pre, post and follow-up implementation of educational guideline (n=130).

Knowledge items	Pre-intervention			Post-intervention			Follow-up			Test of Sig. (P <sub>1</sub> )	Test of Sig. (P <sub>2</sub> )	Test of Sig. (P <sub>3</sub> )
	Complete correct answer %	incomplete correct answer %	Incorrect %	Complete correct answer %	incomplete correct answer %	Incorrect %	Complete correct answer %	incomplete correct answer %	Incorrect %			
Definition of artificial insemination	11.5	74.6	13.8	90.0	10.0	0.0	85.4	13.8	0.8	X <sup>2</sup> =13.66 P=.000**	X <sup>2</sup> =0.866 P=.516	Fr=36.16 P=.000**
Indications of artificial insemination	13.1	53.8	33.1	90.0	7.7	2.3	66.2	30.8	3.1	X <sup>2</sup> =23.06 P=.000**	X <sup>2</sup> =0.866 P=.106	Fr=36.60 P=.000**
Investigations before artificial insemination and IVF	15.4	70.0	14.6	82.3	17.7	0.0	65.4	30.8	3.8	X <sup>2</sup> =23.63 P=.000**	X <sup>2</sup> =1.362 p=.323	Fr=40.26 P=.000**
Steps of artificial insemination	4.6	53.8	41.5	80.8	15.4	3.8	77.7	22.3	0.0	X <sup>2</sup> =21.13 P=.000**	X <sup>2</sup> =0.574 p=.744	Fr=43.32 P=.009**
Follow-up appointment after IVF	11.5	50.8	37.7	66.2	30.8	3.1	53.8	42.3	3.8	X <sup>2</sup> =22.06 P=.000**	X <sup>2</sup> =12.36 p=.039*	Fr=37.01 P=.000**
Risks of artificial insemination	6.2	67.7	26.2	79.2	20.8	0.0	49.2	50.8	0.0	X <sup>2</sup> =23.83 P=.000**	X <sup>2</sup> =15.03 p=.005**	Fr=39.23 P=.000**
Causes of failure of artificial insemination	14.6	37.7	47.7	60.0	38.5	1.5	53.8	42.3	3.8	X <sup>2</sup> =19.14 P=.000**	X <sup>2</sup> =12.54 p=.204	Fr=52.44 P=.000**

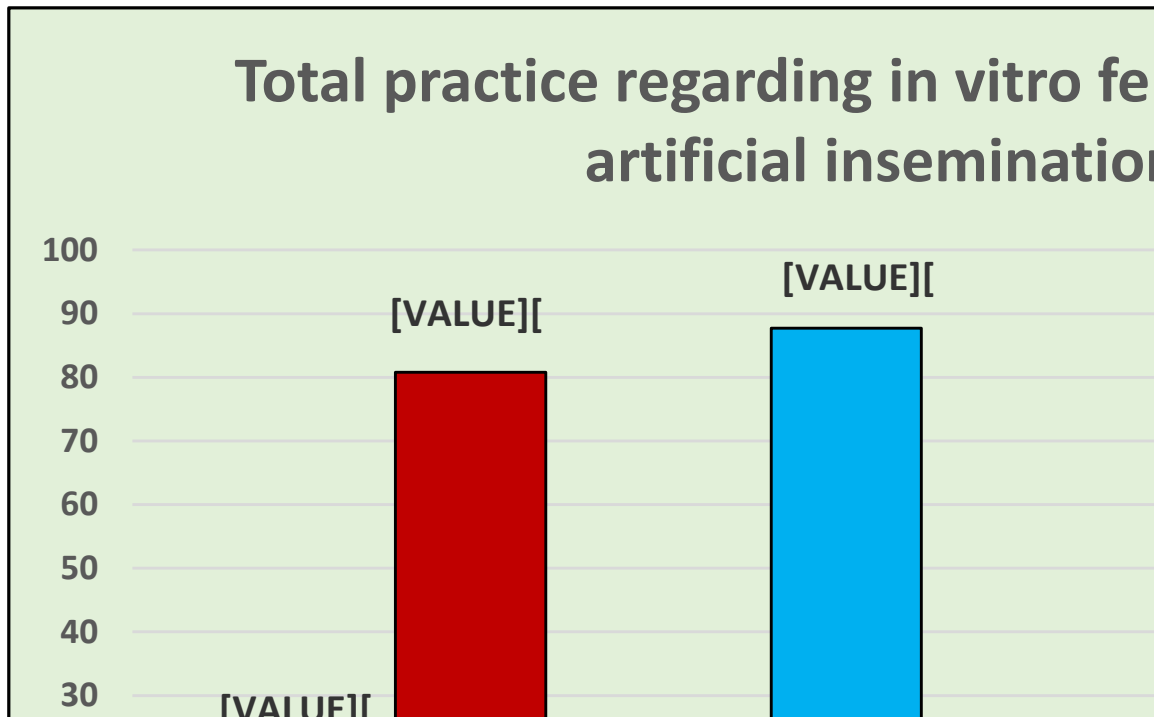
**Table (3):** Comparison between the studied nurses regarding to their knowledge about IVF at pre, post and follow-up implementation of educational guideline (n=130).

Knowledge items	Pre-intervention			Post-intervention			Follow-up			Test of Sig. (p <sub>1</sub> )	Test of Sig. (p <sub>2</sub> )	Test of Sig. (p <sub>2</sub> )
	Complete correct answer	Incomplete correct answer	Incorrect	Complete correct answer	Incomplete correct answer	Incorrect	Complete correct answer	Incomplete correct answer	Incorrect			
Definition of IVF	11.5	69.2	19.2	93.1	6.9	0.0	86.9	13.1	0.0	X <sup>2</sup> =41.26	X <sup>2</sup> =1.444	Fr=41.04
Indications of IVF	13.1	61.5	25.4	87.7	12.3	0.0	80.0	15.4	4.6	P=.009**	p=.412	P=.000**
Steps of IVF	7.6	46.2	46.2	82.3	15.4	4.6	80.0	15.4	4.6	X <sup>2</sup> =34.60	X <sup>2</sup> =1.01	Fr=44.24
Risks of IVF	10.8	48.5	40.8	85.4	13.8	0.8	54.6	45.4	0.0	P=.044*	p=.324	P=.000**
Causes of failure of IVF	5.4	43.1	50.8	61.5	38.5	0.0	53.8	42.3	3.8	X <sup>2</sup> =34.22	X <sup>2</sup> =1.491	Fr=44.55
Danger signs after artificial insemination and IVF	8.5	74.6	19.2	66.2	30.8	3.1	86.9	13.1	0.0	P=.000**	p=.414	P=.000**
										X <sup>2</sup> =24.14	X <sup>2</sup> =1.416	Fr=33.99
										P=.000**	p=.209	P=.000**
										X <sup>2</sup> =23.96	X <sup>2</sup> =11.44	Fr=51.24
										P=.000**	p=.000**	P=.000**
										X <sup>2</sup> =21.08	X <sup>2</sup> =15.99	Fr=25.96
										P=.000**	p=.000**	P=.000**



**Figure (1):** Percentage distribution of total nurses' knowledge about in vitro fertilization and artificial insemination at pre, post and follow-up implementation of educational guideline (n=130).





**Figure (2):** Percentage distribution of total nurses’ practice regarding in vitro fertilization and artificial insemination at pre, post and follow-up implementation of educational guideline (n=130).

**Table (4):** Correlation between total nurses’ knowledge and their practice at pre, post and follow-up implementation of educational guideline (n=130).

Variables		Total nurses’ practice		
		Pre	Post	Follow-up
Total nurses’ knowledge	r	0.502	0.715	0.708
	p	0.000**	.000**	.000**

**Discussion:**

IVF and AI are complex series of technologically driven procedures used to treat infertility. The quality of the healthcare received by IVF and AI patients can be greatly affected by the performance of the nurses. Fertility nurses’ performance is being increasingly regarded as a vital component in improving the delivery of quality healthcare among IVF and AI clients (CDC, 2018).

Little is known about the effect of educational guidelines on nurses’ knowledge and practise regarding IVF and AI, which is required to contribute to a body of research (Ahmad Sindi, 2022). So the present study aimed to assess the effect of educational guidelines regarding assisted reproductive technology on nurses’ performance. This aim

was highly significantly achieved through the present findings within the frame of the hypothesis that educational guidelines will improve nurses’ performance regarding ART.

Regarding the general characteristics of the study sample, it was found that the majority of the studied nurses were aged between 20 and 30 years, (  $\bar{X} \pm SD$  of age of  $34.77 \pm 5.18$  years) and more than one third of them were from technical nursing institutes and had 5 years of experience ( mean  $\pm$  SD of years of experience  $8.41 \pm 4.05$  years).

It’s also been found that about half of nurses live in rural areas. In addition, the minority of nurses participated in similar training courses, with more than two-thirds of them taking courses related to in vitro fertilization the last time from 2–5 years ago,

which the majority of them were commissioned to take by their work organization. That may be due to that assisted reproductive technology isn't one from common knowledge that nurses seeking for it.

These findings partially disagree with those of (Ahmed et al., 2022), who conducted a study in Sohag hospital to evaluate the effect of instructional guidelines on in-vitro fertilization nurses' knowledge and preventive measures regarding ovarian hyper-stimulation syndrome. He discovered that two-thirds of the nurses studied had less than 30 years of experience, with a mean SD of 28.07 3.8; nearly half of the nurses studied were from nursing technical institutes; half of them had at least 5 years of experience in their work; and all of the nurses studied had received no previous knowledge.

The current trends in reproductive health support call for nursing professionals to assume an ongoing, visionary, scientific, and academic approach to advancement. Nurses remain a primary influence on the quality of care and define the future of nursing standards in reproductive health. (Dillard-Wright, 2021)

Concerning nurses' knowledge related to artificial insemination (AI), there is a marked improvement in all knowledge items related to AI, as the majority of the studied nurses have complete correct answers about the definition of AI and steps of AI immediately post implementation of the educational guideline, and the majority of them after three months of implementation of the educational guideline, compared to less than one fifth of them having a complete correct answer about the definition of AI and the minority of them about steps of AI pre intervention. These findings also showed high statistical significance between pre- and post-intervention.

In opinion of this study researcher, the minority of studied nurses about steps of AI pre intervention is caused by less having training courses related to artificial insemination.

These findings agree with Bhuvana, (2019), who conducted a study in Chennai to assess the effectiveness of clinical pathway intrauterine insemination upon the knowledge and practise of nurses and reported that the mean and SD of the level of knowledge of nurses were low in the pre-test ( $M = 14.25$ ,  $SD$

$= 1.63$ ) in comparison to the post-test ( $M = 22.50$ ,  $SD = 0.52$ ). This difference was found to be statistically significant at a level of confidence of 12.92% and can be attributed to the level of knowledge at 99.9%.

The present study's researchers thought that a simple evidence-based guideline regarding intrauterine insemination is a vital need for nurses, so the nurses' response to the guidelines was highly positive.

Regarding nurses' knowledge related to IVF, this study showed a high statistical difference and marked improvement in all knowledge items related to IVF immediately post-intervention and after three months of implementing educational guidelines, which is evidenced by the fact that the majority of them had complete correct answers regarding the definition and indications of IVF, compared to less than one fifth of the studied nurses pre-intervention.

The previous findings are supported by El-Adhamn, (2020), which was carried out at the Fertility Unit at Tanta University on all nurses (45 nurses) and found high statistically significant differences between the studied nurses' basic knowledge immediately post implementation of guidelines, as that the majority of them had complete correct answers about the definition and types of IVF protocols immediately post and nearly four fifths three months post the intervention with a p value of ( $P < 0.001$ ) each.

As regarding total knowledge about IVF and AI, there is a marked improvement in total nurses' knowledge about in vitro fertilization and artificial insemination after the implementation of an educational guideline, with a highly statistically significant difference ( $P < 0.001$ ) between pre, post, and after three months of the implementation of an educational program.

These findings are evidenced by the fact that less than one fifth of the studied nurses have a good level of total knowledge about in vitro fertilization and artificial insemination prior to the implementation of educational guidelines. While changed to that, the majority of studied nurses did so post-implementation and after three months.

**El-Adhamn's 2020** study also support the previous findings and illustrated that almost all of the fertility nurses had a low total level of knowledge before the educational intervention. On the other hand, almost all of them had a high total level of knowledge immediately after the intervention, compared to nearly half of them three months after the intervention. This may be due to the similarity of both groups' characteristics.

The level of knowledge about ART was also assessed among men and women in Hungary by (**Szalma, 2021**), who found low level of self-rated knowledge about ART. He explained that this may indicate that ART is not part of common knowledge.

Assisted reproductive technologies require a cohesive inter-disciplinary team that ranges from reproductive endocrinology and infertility physicians and nurses to the andrology and embryology teams to psychiatric and mental health support. So that assessing nurses' practice as members of the fertility team is a vital step for improving the quality of care provided. (**Gupta et al., 2021**)

Concerning the total practices of studied nurses regarding IVF and AI at pre, post, and follow-up implementation of educational guidelines, there is a marked improvement in the total nurses' practice items about IVF and AI after implementation of the educational guidelines, with a highly statistically significant difference ( $P = < 0.001$ ) between pre, post, and after three months of the implementation of an educational program.

As evidence shows, only nearly one fifth of the studied nurses were competent regarding in vitro fertilization and artificial insemination prior to the implementation of educational guidelines, while changing the majority of them immediately after and three months after the implementation of educational guidelines.

The incompetent pre-guidelines practices score may be attributed to the insufficient and incorrect nurses' knowledge regarding IVF and AI. In addition, there is a lack of education and the inadequacy of learning aids and training programs.

These findings partially agree with **Bhuvana's (2019)**, which is a quasi-

experimental study, conducted in Chennai to assess the effectiveness of the clinical pathway for infertile women undergoing intrauterine insemination based on the knowledge and practice of nurses and patient outcomes. He reported that all nurses had moderate practice in the control group while in the experimental group almost all of the nurses had adequate practice.

This could be justified as the researcher selects the simplest, effective, and easily used tools that encourage and help the nurses understand and apply them.

On the other hand, **Judith et al. (2019)**, who identified and acquired the contextual skills and knowledge for nursing practice in assisted reproductive technology, stated that the research participants lacked knowledge were in great need of specific knowledge related to ART practice, such as treatment protocols, patient instructional guidelines after embryo transfer, and supportive counseling strategies.

In my opinion, educational guideline is an effective method to enhance IVF & AI practice including knowledge, skills and attitudes. This opinion is evidenced by many researches and studies.

One of these studies is the **Abid et al. (2018)**, who assess the effect of implementing nursing guideline on nurses' performance regarding patients undergoing cataract or glaucoma surgery, found that there were high statistically significant differences post-implementation in nurses' knowledge, preoperative practice, and postoperative practice ( $P = < 0.001$ ).

Concerning the correlation between total nurses' knowledge and their practice at pre, post and follow-up implementation of educational guideline, the present study revealed that, there is high a significant statistical positive correlation between nurses' knowledge and their practice at pre, post and follow-up at ( $P = < 0.01$ ).

This correlation was supported by **Sharma, 2022**, who conducted a study to assess the general knowledge and practices regarding fertility and fertility awareness, he report that there is a significant statistically positive

correlation between knowledge and practice at ( $P = < 0.01$ ).

These findings are also supported by the **Faheim et al. (2021)**, who assess the effect of educational guideline on performance and attitude of adolescent students, which revealed that there were significant positive correlations between knowledge and practices regarding acne vulgaris between pre-, post-, and follow-up educational guidelines, which improved after program implementation.

Irrespective of general characteristics, the nurse acquired knowledge and improved their practice, and the quality of care improved after the intervention. This could be attributed to the fact that the importance and effectiveness of training courses in enhancing students' knowledge and practice

#### Conclusion:

**Based on the results of the study, it is concluded that:** The current study's findings supported the present study's hypothesis and aim, which stated that the majority of nurses who received the educational guidelines were competent and had a good level of total knowledge about in vitro fertilisation and artificial insemination after the implementation of the guidelines. Moreover, there was a positive correlation with high statistical significance between the total score of knowledge and the total score of practise regarding artificial insemination and in vitro fertilization.

#### Recommendations:

**In light of the study's findings, the following suggestions are made:** Application of educational guidelines for nurses working at IVF units who offer care for women seeking for assisted reproductive technologies and conducting educational training programmes about role of nurse regarding assisted reproductive technologies (IVF & AI).

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