Effect of Problem-Solving Educational Program on Decision-Making Skills among Nurses in critical care units

Aziza Zakaria Farmawy Ali [1], Shaimaa Mohamed Nageeb [2]

Lecturer of Nursing Administration, Faculty of Nursing, Benha University, Egypt [1]

Lecturer of mental Health Nursing, Faculty of Nursing, Zagazig University, Egypt [2]

Abstract: **Problem-solving is at the center of nursing practices, hence, effective problem-solving educational program and decision making skills based on a powerful basis of knowledge are behaviors expected from nurses. Therefore, nurses need to improve their problem-solving to increase their decision-making skills. Aim of the study: This study aimed to examine the effect of problem-solving educational program decision-making skills among nurses in critical care units. Research Design: A Quasi-experimental (pre/post-test) design was utilized to achieve the aim of the current study. Study Setting: The study conducted in the critical care units at Benha University Hospital, Egypt. Study Sample: Convenience sample of staff nurses (158) from the total number (229) nurses. Tools of data collection: Three tools utilized; namely, problem solving knowledge assessment Questionnaire, the problem solving Inventory (PSI) Questionnaire, and nurse's decision-making scale. Results: There was a highly statistically significant improvement in the level of problem-solving among staff nurses where (75%) of them had a high level of problem-solving post-program compared to preprogram scores (7%). While that there was a highly statistically significant improvement in the level of decision-making skills among nurses where (79%) of them had a high level(intuitive) of decision making skill post-program compared to preprogram scores (10%).and there was a highly statistical positive correlation between the total score of problem-solving and total score nurses' decision-making skill throughout the program phases Conclusion: The study concluded that there a highly statistical positive correlation between the total score of problem-solving and total score staff nurses' decision-making skill throughout the program phases. Recommendations: Problem-solving skills should be addressed in the nursing curriculum philosophy and objectives and should be integrated into the application of the nursing process in clinical experiences.**

Keywords: **Problem solving, educational program, Decision making, nurses. Critical care unit.**

1. INTRODUCTION

Nowadays, in the healthcare field, the nurse is confronted with progressively multifarious disputes and circumstances. Currently, the decision making fragment of problem solving has developed progressively complicated and demands (*Guerrero*, **2019**).

Critical care nurses have to face many problems in the implementation area. One of the most important factors to determine the safety and quality of the care delivered by nurses is the skills of problem solving. It expected from the nurses who have to work with individuals with different problems in the clinical environment, to have high skills of problem-solving (*Barutcu*, **2017**).

Critical care nurses need to make accurate and appropriate decisions promptly in situations where there is a great degree of stress and uncertainty and when patients possess little physiologic reserve. Besides, the intensive care unit is an ethically charged environment; life and death decisions are made daily, in acute, highly emotional situations that often involve legally incompetent patients and their families. Decisions to admit or discharge a patient are often not only

medical decisions. Non-medical aspects, such as pressure from managers or patients, may play a role in the decision-making process Diagnostic decisions in acute care disciplines often commit patients to therapeutic strategies that can be harmful if not correct. The practice of critical care often includes the need to make rapid decisions in high-risk and dynamic situations*. (Oerlemans, Sluisveld & Leeuwen, 2015).*

(Durmaz, Serin, & Polat, .2018) defined the problem as "an undesired situation". On the other hand, Problem-solving skills include assessment, analysis, outcome identification, planning, implementation, and evaluation**.** The assessment used to recognize the existence of the problem, collect and recognize data. The analysis used to define the problem clearly, establish priorities and develop a list of all possible strategies that could resolve the problem. Outcome identification used to establish the desired outcome, and predict the likelihood of each outcome occurring**.** Planning used for developing a list of resources, preparing a list of desired actions and preparing a schedule. The implementation used to implement the solution and give clear directions to involved personnel. The evaluation used to monitor the response to the strategy and modify ineffective actions *(Osman, 2010).*

Problem-solving ability is a nursing care provider's proficiency in quickly and accurately mediating the health problems a patient face, even if it is the nursing care provider's first patient this is because problem-solving ability can improve individual critical and creative thinking; it is a core skill to identify and solve the health problems of patients in complex nursing environment. Moreover, the problem-solving ability has been reported to be an effective factor in nursing performance *(Kim and Sohn 2019).* Therefore, the nurse's problem-solving ability is important to function to identify the patient's needs and to solve the patient's health problem. Problem-solving skills have been used internationally as a strategy for better nursing care. To give nurses a key role in the health care system and activate them in developing, planning, and making policy in health care *(Ancel, 2016).*

Decision-making is the most important and risky component of the health profession. Therefore, with this skill, especially among nurses, is crucial. Nurses, in their professional role, should make many critical decisions associated with patients' survival every day of their work. Therefore, clinical decision making is a complicated process (*Heidari and Shahbazi 2016).*

Decision-making is a behavior displayed when selecting and implementing a course of action from among alternatives with the purpose of dealing with a particular situation or problem. Finally, he/she should implement and evaluate the chosen solution. To ensure the success of implementation, there is a need to do two things: plan carefully and be sensitive to those affected. While evaluating the decision made, if the action does not work, one can give it more time, change it slightly, try another alternative, or start over again *(Thabet, Taha, Abood, & Morsy, 2017).*

(Keshk, Qalawa, & Aly ,2018) added that decision making as the ability to solve complex problems for which all standard methods of problem-solving be unsuccessful and the development of decision making is one of the main difficult mechanisms of a human being thinking, as a combination of factors and courses of action interfere with it. In addition, decision making is the interface between a problem that needs to be solved and a person who desires to solve it within a particular environment. This entire process is affected by personal and environmental variables. individuals may make different decisions depending on whether they feel their boss is observing them, on the amount of information they have, or if definite motivations take part in a significant part in their life.

Significance of the study:

Today in the areas of health care, nurses are exposed to ever-changing complicated conditions in health care services, they provide an increasingly faced with issues and situations that are complex and the technology, understanding, and acumen in the social sectors, rising health culture, processes and frequent changes of complex disease traits and morals. Therefore, decision making is extremely complex and constantly every choice's sensitivity is very high, so nurses that are going to decision-making should having the skills of decision-making and problem-solving, in them, Therefore, this study will be conducted to examine the effect of problem-solving educational program on decision-making skills among nurses in critical care units at Benha university hospital.

Aim of the study:

The present study aimed to examine the effect of problem-solving educational program decision-making skills among nurses in critical care units.

Research Hypothesis

1. The nurses who will expose to the problem-solving educational program will have better knowledge after program implementation compared to their pre-intervention level.

2. The nurses who will expose to the problem-solving program will have better problem-solving skills after program implementation compared to their pre-intervention level.

3. The nurse's decision-making skill level will be improved significantly after the implementation of the program compared to their pre-intervention level.

4. There will be a positive correlation between the nurses' problem-solving level and decision-making skills.

2. SUBJECTS AND METHODS

2.1. Research Design

Quasi-experimental (pre/post-test) design used to achieve the aim of the present study. A quasi-experiment is an empirical interventional study used to estimate the causal effect of an intervention on the target population without random assignment. **(Dinardo, J. 2008).**

2.2. Setting

The study was conducted in nine critical care units; at Benha University Hospital, Egypt. This setting selected because it is the most stressful environment and heavy workload, which increases the stress level among critical care nurses, in addition, the critical care nurses have to face many problems in the implementation area. One of the most important factors to determine the safety and quality of the care delivered by nurses is the skills of problem-solving.

Sample:

Convenient sample of all available staff nurses (158) from the total number (229) nurses and working in the critical care units, the staff nurses distributed as following; (23) of them working at (ICU), (21) at (CCU), (13) at cardiothoracic ICU, (17) at chest ICU, (20) at hepatic ICU, (15) at emergency department, (19) at pediatric ICU, (18) at pediatric dialysis unit, and (12) staff nurses working at general dialysis unit.

2.4. Tools of Data Collection

Data for the present study collected by using three self-administered questionnaires:

First Tool: Self-administer Knowledge Questionnaire

This questionnaire was developed by the researchers based on the review of the related literature guided by *[Eskin, Kurt, & Demirkiran, 2012, Erol, Tanrikulu, Dikmen, & Akduran, 2016]* to assess nurses' knowledge level regarding problem-solving through the program. It consisted of two parts.

Part I: Concerned with personal characteristics of nurses such as; age, gender, years of experience and their qualification).

Part II: problem-solving knowledge assessment Questionnaire. It consists of 20 close-ended questions (true and false "10" questions and multiple-choice "10" questions). That grouped under the main four dimensions namely; concepts related to the problem and problem-solving skill (5 questions), identifying and analyzing the problem (5 questions), developing and selecting the best solution (5 questions).

Scoring system:

Nurses' responses were measured by giving a score of (1) for the correct answer and (zero) for the incorrect answer. For each domain of knowledge, the scores of the items were summed up. Total and subtotal summation was done for each domain of knowledge and the maximum possible total score was 20; the total scores were converted into percentages. The total level of knowledge was considered adequate if the percent score was 60% or more and inadequate if less than 60%.

Second Tool: The Problem Solving Inventory (PSI) Questionnaire.

It was developed by **Paul**, **Heppner, and Petersen** *(1982)*. It consists of 32 items, under three dimensions. *First*: Problem-Solving Confidence PSC (11 items) to assesses self-perceived confidence, belief, and self-assurance in effectively solving problems (e.g., "I am usually able to think up creative and effective alternatives to solve a problem."). Higher scores on PSC are associated with lower levels of problem-solving confidence. *Second:* Approach-Avoidance Style (16 items) to assesses whether individuals tend to approach or avoid problems (e.g., "When a solution to a problem was unsuccessful, I do not examine why it didn't work."). Higher scores reflect a style of avoiding rather than approaching problems. *Third:* Personal Control (5 items) to assesses elements of self-control on emotions and behavior (e.g., "I make snap judgments and later regret them."). Higher scores on PC reflect a more negative perception of personal control on one's problems.

Scoring system:

All items are scored on a six-point Likert scale, ranging from 1 = Strongly Agree to 6 = Strongly Disagree. A total score can be calculated as a general index of problem-solving appraisal that ranges from 32 to 192. Lower scores on each factor and on the total Problem-Solving Inventory PSI score are considered more functional. Responses regarding problem solving level classified as follow; high <50%, average 50-75%, and low >75%.

Third Tool: Nurses Decision-Making scale

This tool was developed by (*Lauri and Salanterä, 2002)* to assess the level of clinical decision making for nurses to determine whether nurses make more analytic or intuitive or quasi-rational decisions. It consisted of a 24-item describes four main stages of clinical decision-making; every stage was including six items as follow:

Stage 1: Data collection includes items 1-6.

Stage 2: Data processing and identification of the problem include items 7-12.

Stage 3: Plan of action includes items 13-18.

Stage 4: Implementation, monitoring, and evaluation include items 19-24.

Scoring system:

The subject response was measured by five points Likert Scale ranged from always (5) to never (1). The score for all the odd items is reverse scored. The total scores were calculated by summing of all categories where a high level of decision making >78 indicates an intuitive level of decision making, moderate level of decision making 68-78 indicates quasi-rational flexible decision making/ both analytical and intuitive and low level of decision making < 67 indicate analytical nurse.

Content Validity

The tools' contents were developed and tested for its content and face validity by an expert panel of different nursing departments. Seven academic staff from different faculties of nursing in Egypt namely; Benha faculty of nursing, El Monofia faculty of nursing, and Helwan faculty of nursing. The validity of the tools aimed to judge its clarity, simplicity, accuracy, comprehensiveness, and relevance. All items were reviewed and accepted by the jury committee.

2.8. Reliability

Cronbach's alphas were (r= 0.91, 0.87, and 0.89) for Self-administer Knowledge Questionnaire, 'The Problem Solving Inventory (PSI) Questionnaire, and Nurses Decision-Making scale.

2.9. Approval

Official permission was obtained from the hospital authorities in the identified setting to collect the data and implement the program after explaining its purpose.

2.10. Pilot study

A pilot study was carried out on 10% of study subjects that included 16 staff nurses before starting the actual data collection to ascertain the clarity and applicability of the study tools and the feasibility of the research process. It also needed to estimate the time necessary to fill in the questionnaires of data collection. It takes about 20-25 minutes to fill in the questionnaire. The results obtained from the pilot study were included in the study because no modification was done in the study tools.

2.11. Ethical consideration

The agreement for participation of the nurses was taken after the aims of the study have been explained to them, they were allowed to refuse to participate, and they were assured that the information collected would be treated confidentially and used for the research purpose only.

Fieldwork

The study was carried out from the beginning of April 2018 to the end of November 2018. As the following sequence:

- **Pre implementation phase:** It was carried out from the beginning of April 2018 to the mid of May 2018. Preparation of tools for data collection and the teaching sessions for the problem-solving educational program based on a review of national and international related literature using journals, textbooks, internet and theoretical knowledge of the various aspects concerning the topic of the study. The content of the program **include**:

First session (first phase): General directions, the ability to identify the problem and accept it as a natural, potentially manageable phenomenon, belief in the efficacy of the problem-solving framework in dealing with the problem, high perceived self-efficacy in completing all the stages of the model, and forming the habit of pausing and thinking before taking action to solve a problem

Second session (second phase): Defining and formulating the problem, collecting all available information, discriminating between facts and hypotheses requiring further research, analyzing the problem, and determining real goals

Third session (third phase): Developing alternative solutions, suggesting a variety of possible solutions, and selecting the most effective solution

Fourth session (fourth phase): Decision-making and predicting the possible outcomes of each action and the benefits of each outcome

Fifth session (fifth phase): Implementing the selected solution

Sixth session (sixth phase): Revision and evaluation

Implementation phase (intervention): This phase carried out through the following sequence:

• *First*: Staff nurses were divided into (12) small groups (13-14 nurses) according to their units. The pre-program test carried out from the mid of May 2018 to mid of June 2018. The preprogram questionnaires were filled by the nurses before the beginning of the program. Self-administer Knowledge Questionnaire, The Problem Solving Inventory (PSI) Questionnaire, and Nurses Decision-Making scale took from 20-25 minutes to be completed for all tools. This preprogram pretest was conducted to let the researchers collect a baseline assessment for nurses regarding problem-solving knowledge, level of problem-solving, and level of decision-making. The data collected from nurses 2 days/week in the morning and afternoon shift.

• *Second:* Implementation of the program sessions started after the questionnaires were completed, the program implemented by the researchers. The time plan of the program implemented over the period from the mid of June 2018 to the end of July 2018. The program has taken 6 hours for each group to cover the sessions, distributed as the following; 6 sessions, 1hour/session, 2 sessions/day, 6 days/week in the morning and afternoon shift, At the beginning of the program sessions, an orientation to the program and its purpose took place, and the staff nurses were informed about the time and place of sessions that were carried out at the newly established training center or available suitable setting according to collaboration between nursing directors, researchers and studied nurses. Each session started by setting objectives and an overview of the new topic. At the end of each session, the nurses' questions discussed and answered to ensure

understanding. The same teaching strategies, available resources, and relevant content, for each session, utilized to implement the program by the researchers according to their collaboration. Methods of teaching used like the following; lecture, group discussion, role-play, and brainstorming. Teaching and instructional media included the following; hand out and PowerPoint presentation.

Evaluation phase: (post-program evaluation) during this phase, the effect of the program was evaluated; by using the same format of tools used before the program implementation.

The post-program test: was carried out 3 months after the program implementation and took one month started from the end of October 2018 to the end of November 2018.

Statistical Design

The collected data organized, tabulated and statistically analyzed using statistical package for social science (SPSS) version 25 for windows, running on IBM compatible computer. Descriptive statistics were applied (e.g. frequency, percentages, mean and standard deviation). Test of significance, Chi-square "X2" to compare the studied nurses' adequate knowledge regarding problem-solving thorough the program and correlation coefficient (r) was used to assess Correlation between Problem Solving and decision-making skill among studied nurses. A significant level value was considered when $p < 0.05$ and a highly significant level value was considered when $p < 0.001$. No statistically significant difference was considered when $p > 0.05$.

3. RESULTS

Table 1: Frequency and percentage distribution of studied nurses according to their personal characteristics.

Personnel characteristics	Staff nurses (158)	
	No	**%**
Age in years		
< 25	22	14%
25-<35	100	63%
35- <45	36	23%
Mean ±SD	28.37±5.17	
Gender		
Male	25	16%
Female	133	84%
Years of experience of the current job		
2-<5	22	14%
5 -< 15	27	17%
15-<25	93	59%
≥ 25	16	10%
Mean ±SD	22.44±4.39	

Table 1: Shows the total number of nurses was 158 and the majority (63%) of them were aged 25-<35 years old, as far as the majority (84%) of them were females. Regarding their years of experience (59%) of nurses had 15-25 years of experience.

Table 2: Comparison of the studied nurses' adequate knowledge regarding problem solving thorough the program (n=(158).

Nurses' problem solving knowledge.	Pre-program No=(158)		Post Program No=(158)		(X2)	P (value)
	No	**%**	**No**	**%**		
Concepts related to problem and problem solving skill (5 items)						
Incorrect	125	79%	22	14%	42.319[a]	0.000**
Correct	33	21%	136	86%		
Identify and analyze the problem (5 items)						

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Incorrect	123	78%	17	11%	39.917[a]	0.000**
Correct	35	22%	141	89%		
Develop solutions and select the best solution (5 items)						
Incorrect	125	79%	24	15%	28.258[a]	0.000**
Correct	33	21%	134	85%		
Implement and evaluate the Solution (5 items)						
Incorrect	120	76%	19	12%	31.215[a]	0.000**
Correct	38	24%	139	88%		
Total knowledge						
Adequate	30	19%	128	81%	41.449[a]	0.000**
Inadequate	144	91%	14	9%		

Adequate knowledge (more than 60%)* * inadequate knowledge (less than 60%)

**A highly statistical significant difference (P ≤ 0.001)   *A highly statistical significant difference (P ≤ 0.05)
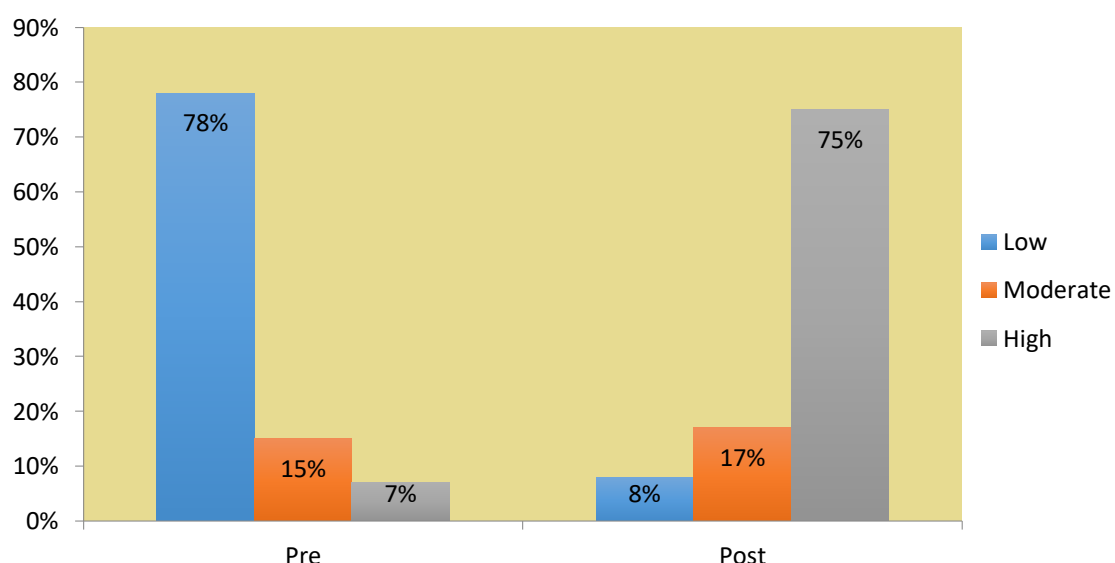
Table 2 Clarifies that there was a highly statistically significant improvement at (P-value≤ 0. 001) of total knowledge regarding problem-solving thorough the program. Also, the majority (81%) of studied nurses have an adequate level of their total knowledge regarding problem-solving post-program compared to 19 % pre-implementation with a statistically significant difference between the two phases.

Table 3: Comparison of studied nurses regarding problem solving thorough the program (n= 158).

| The Problem Solving dimensions	Pre program No=(158) Mean ± SD	Post program No=(158) Mean ± SD	t-test	P value
Problem-Solving Confidence	12.6±1.61	52.11±3.556	19.9	0.00
Approach-Avoidance Style	22.7±1.74	71.95±3.54	25.2	0.00
Personal Control	9.2±2.373	23.21±3.55	7.1	0.00

**A highly statistical significant difference (P ≤ 0.001)   *A highly statistical significant difference (P ≤ 0.05)

Table 3: Clarifies that there was a statistically significant improvement (P ≤ 0.05) of the mean and standard deviation of total problem solving a thorough program. Regarding the dimensions of the problem solving, the highest mean was (71.95±3.54) related to "Approach-Avoidance Style, post-program than preprogram scores as reported by staff nurses. While the lowest mean (9.2±2.373) related to "Personal Control, preprogram than post-program scores as reported by nurses

Figure (1): Total level of studied nurses' level of problem solving thorough program phase.

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Figure (1) Illustrates that there was a highly statistically significant improvement in the level of problem-solving among nurses where 75% of them had a high level of problem-solving post-program compared to preprogram scores (7%).
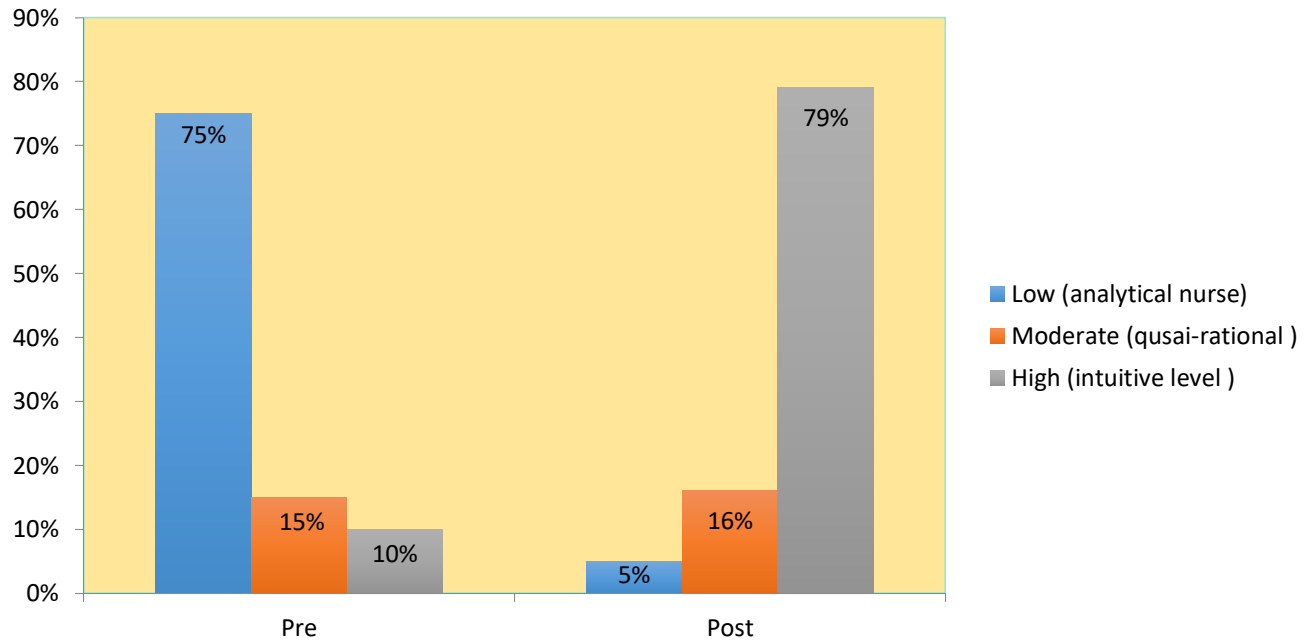
Figure (2): Total level of studied staff nurses' level of decision making skill thorough program.

Figure (2) Illustrates that there was a highly statistically significant improvement in the level of decision-making skills among nurses where 79% of them had a high level(intuitive) of decision-making skills post-program compared to preprogram scores (10%).

Table 4: Correlation between Problem-Solving and Decision-Making skills among studied nurses.

Variables	Decision-Making skill	
	r	P value
The Problem-Solving Skills	0.685	0.000**

**A highly statistical significant difference (P ≤ 0.001) * Statistically significant. (p ≤ 0.05)

(r) * correlation coefficient

Table (4) Shows a highly statistical positive correlation between the total score of problem-solving and total score nurses' decision-making skills throughout the program phases

Table 5: Correlation between Age, years of experience and staff nurses' problem solving skill and decision-making skill.

Personal characteristics	The Problem-Solving		Decision-Making skill	
	r	P-Value	r	P-Value
Age in years	0.509	0.000**	0.251	0.000**
Years of experience	0.425	0.000**	0.428	0.000**

**A highly statistical significant difference (P ≤ 0.001) * Statistically significant. (p ≤ 0.05)

(r) * correlation coefficient.

Table 5: Displays that there was a positive statistically significant correlation between age, years of experience and nurses' problem solving and decision-making skills.

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4. DISCUSSION

working in an intensive care unit setting requires that nurses style quick and precise decisions, be well-informed about complex situations and in general have more responsibility. While appropriate and right decisions are the basis of intensive patient care, intensive care unit nurses must style exact and appropriate decisions using critical thinking based on knowledge-specific and theoretical information. (*Yurdanur, 2016*). So, this study aimed to examine the effect of problem-solving educational program decision-making skills among nurses in critical care units.

The present study began by seeking and understanding of whom the participants are, personal data conducted, such as the age, gender, level of education, and the years of experience. Shows the total number of staff nurses was 158 and the majority of them were aged 25-35 years old, as far as the majority of them were females. Regarding their years of experience more than of nurses had 15-25 years of experience.

This result was inconsistent with *Heidari and Shahbazi1 (2016)* who conducted a study entitled " Effect of training problem-solving skill on decision-making and critical thinking of personnel at medical emergencies " and reported that all of the participants in this study were men, the age range of participants was between 23 and 51 years, also, the minimum and maximum job experience of participants in this study stood at 1 and 29 years, respectively.

Concerning nurses' knowledge regarding problem-solving skills, the result of the present study revealed a highly statistically significant improvement regarding problem-solving skills through the program. This might be due to nurses were excited to know about problem-solving skills and they were able to acquire knowledge easily. Moreover, the program was effective as it influenced and increased their knowledge related to concepts related to the problem and problem-solving skills, identify and analyze the problem implement and evaluate the solution. This supported the first hypothesis of this study.

These findings were similar *Abd El-Hay and Abd-Allah (2015)*, who conducted a study entitled" Effect of Problem-Based Learning Strategy on Development of Problem Solving Skills among Undergraduate Nursing Students" and found in their study done on nursing students that There was statistically significant improvement in nursing students` problem-solving skills post-implementation of problem-based learning strategy than pre-implementation. In the same line, *Brown and Klein (2012)* reported improvement in participants' knowledge, perception and in actual performance regarding problem-solving.

Regarding the nurses' total level of problem-solving skills through the study phases, the result of the present study revealed a statistically significant improvement of total problem-solving skill thorough program. Regarding the dimensions of the problem-solving skills, the highest mean was related to "Approach-Avoidance Style, post-program than preprogram scores as reported by nurses. While the lowest mean related to "Personal Control, preprogram than post-program scores as reported by nurses. This is due to increased pressure during the study and the educational program was interactive and were asked to find solutions to actual problems. One goal of the program was to improve the skills of their problem-solving skills using participative, experiential learning, and facilitative teaching. This supported the second hypothesis of this study.

This result goes in the same line with *Eskin, Kurt and Demirkiran (2012)* studies revealed that the problem-solving scores (averages) of nurses improved with problem-solving program.

This result was in agreement with *Kocoglu, Duygulu, Abaan, & Akin, (2016)*, who conducted a study entitled "Problem Solving Training for First Line Nurse Managers" and revealed that the mean scores of problem-solving in problem solving confidence, Approach-Avoidance and overall inventory were found statistically lower in the second evaluation than in the first evaluation. On the other hand, the mean scores in problem solving confidence and overall inventory were higher in the third evaluation than in the second evaluation but lower than in the first evaluation.

Concerning nurses' level regarding the level of problem solving, the result of the present study that there was a highly statistically significant improvement in the level of problem solving among nurses. In the researcher's opinion, an educational program for nurses was effective as it improved their problem solving. The nurses who received problem-solving training had lower scores on the individual subscales and the total problem-solving inventory. Score compared with others. This is not surprising as the study by (**Ginevra, Nota, Heppner, Heppner & Soresi 2015**) also suggests that training improves individual problem-solving appraisals and critical learning strategies.

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These findings were similar **Abd El-Hay and Abd-Allah (2015),** who found in their study done on nursing that there was a statistically significant improvement in nursing` problem-solving skills post-implementation of problem-based learning strategy than pre-implementation

This study is supported by **Osman, (2010),** who found that overall problem-solving skills mean score was significantly improved after implementing learning strategy in the study group nursing students compared with slightly increased among the control group.

Concerning the nurses' level of decision making, this study revealed that there was a highly statistically significant improvement in the level of decision-making skills among nurses. In the researcher's opinion, this was due to the effective educational program for nurses which made an improvement of their problem-solving skills that reflected in the reduction of the level of nurses' making decisions. This supported the third hypothesis of this study.

This study is supported by **Heidari and Shahbazi (2014)** who revealed an increase in decision-making skills among participants of nursing after the education of problem-solving skills.

This study is supported by **Thabet, et al., (2017),** who conducted a study entitled" The effect of problem-based learning on nursing students' decision-making skills and styles" and revealed that the mean scores of decision-making skills in the study group students increased before and after applying problem-based learning with a statistically significant difference (p = .001).

Regarding the correlation between problem-solving and making decision skills. This study illustrated that a highly statistical positive correlation between the total score of problem-solving skills and total score nurses' decision-making skills throughout the program phases This is due to that the development of problem-solving skills is the core ability in nursing practice. In order to expand nurses' abilities in a specialized field, make nurses able to make decisions and apply knowledge to work settings. This supported the fourth hypothesis of this study.

In a study done by **Heidari and Shahbazi1 (2016)** who revealed that decision-making scores in emergency medical personnel are low and problem-solving courses, positively affected the personnel' decision-making skills after the educational program ($P < 0.05$).

This study is supported by **Abd El-Hay and Abd-Allah (2015)** who reported a significant improvement in participants' decision-making skills after applying problem-solving training strategy than before using it.

Moreover, **Al-Drees, Khalil & Irshad (2015)** mentioned that problem-solving training sessions helped students develop their decision-making skills.

this result goes in the same line with the study done by, **Harasym, Tsai and Munshi (2013)** who agreed that problem-solving educational program is the ideal format for refining students' ethical decisions and behaviors.

This study in the same view of, **Sharma (2015)** who approved that problem-solving training program was an effective method to increase the clinical decision making of nursing students.

This study in the same line with **Jonassen (2011),** who suggested that decision-making skills are enhanced through the use of the problem-solving method, in which the nurses can recognize, compare, and weigh the advantages and disadvantages of alternative solutions, then make a choice and decision.

This result was in congruence with **Nango and Tanka (2010)** who agreed that the clinical decision-making of medical students was affected by the using problem-solving training programs

Franklin, Liu, Li, Nguyen, Johnson & Robinson (2011), they examined the way of decision-making among the staff of medical emergency and reported that method of staff's decision-making has a high relationship with the mental processes, cognitive abilities, degree of sensitiveness of decision, power of cognition (judgment), solving problem, and organizational situation of their workplace.

Regarding the Correlation of sociodemographic characteristics and nurses' problem-solving and decision-making skills, this result revealed there was a positive statistically significant correlation between age, years of experience and staff nurses' problem-solving skills and decision-making skill. This might be due to that the nurses' experience increases

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nurses' power degree, confidence level and awareness about the taken decisions and solving any problem. Nurses believed experience as an avital factor influencing the decision-making regarding patient care **(Cioffi, 2012).**

This study agreed with **Salami, Alasad, Saleh, Darawad& Maharmeh (2017),** found that experienced nurses had the power to take some risky non-nursing decisions and the power to question the physicians about their treatment decisions

This study goes in the same line with **Wu, Yang, Liu, & Ye, (2016)** found that the nurses' experience and previous clinical experience would work as a valuable reference for the nurses in the clinical settings

This study goes in the opposite line with **Heidari and Shahbazi1 (2016)** who stated that there wasn't any significant relationship observed between demographic variables and decision-making power ($P > 0.05$).

5. CONCLUSION

The study concluded that the problem-solving educational program for nurses was an effective program on improving nurses' decision-making skills through the following findings**.**

1. The nurses who exposed to the problem-solving educational program had better knowledge after program implementation compared to their pre-intervention level.

2. The nurses who exposed to the problem-solving educational program had a high level of problem-solving skills after educational program implementation compared to their pre-intervention level.

3. Nurses' decision-making skills improved after the implementation of the program compared to their pre-intervention level.

4. There was a positive correlation between the total score of problem-solving skills and total score nurses' decision-making skills throughout the program phases

6. RECOMMENDATIONS

- Seminars and continuous education must be facilitated, and nurses must be encouraging to participate.

- Problem-solving skills should be addressed in the nursing curriculum philosophy and objectives and should be integrated into the application of the nursing process in clinical experiences.

- Further study is needed to clarify the relation between training programs and perceived problem-solving in different samples.

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Conflict of interest: -

The authors declare that they have no conflict of interests. Financial competing Interest

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