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Effect of implementing mental imagery strategy on nursing students performance, satisfaction and self confidence regarding neonatal endotracheal suction procedure

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Abstract
Mental imagery strategy is an effective educational tool to enhance skill performance especially where real practice is limited.

Aim of the study: Was to determine the effect of implementing mental imagery strategy on nursing students, performance, satisfaction and self-confidence regarding neonatal endotracheal suction procedure. Quasi experimental research design was used.

Subjects and Method: Eighty pediatric nursing students at the third year, Faculty of Nursing, Tanta University.

Four Tools: Were used to collect data: Students knowledge regarding endotracheal suctioning, betts' questionnaire mental imagery vividness of mental imagery scale, student satisfaction and self-confidence in learning scale and airway suctioning observational checklist.

Results: Revealed that the total scores of students' knowledge and practice for majority of study and control groups were unsatisfactory before teaching interventions and improved for both groups immediately and 2weeks after teaching intervention with higher scores for study than control group.

Conclusion: It can be concluded that students studied with mental imagery strategy showed a significant improvement on knowledge, practice, satisfaction and self-confidence in relation to endotracheal suctioning than students studied with traditional learning method.

Recommendation: Clinical nursing education programs should integrate mental imagery strategy in parallel with physical practice for the curriculum development to enhance skill performance.

Keywords: Mental imagery strategy, performance, satisfaction, self confidence neonatal endotracheal suction

Introduction
Clinical nursing skills are considered the heart of nurses' professional practice. Therefore, the mastery of fundamental clinical skills is the core element in academic nursing programmes competence leading to graduation. In the nursing field "doing" is important and clinical training in a nursing environment requires mastering of technical skills followed by the development of experience [1, 2].

Clinical nursing practice in the clinical environments is intellectually, emotionally challenging and considered reality shock for undergraduate nursing students especially the care of high risk neonate because it requires quick judgments and responses to life threatening conditions as desaturation of neonate on mechanical ventilation and urgent endotracheal intubation followed by suction of secretion from it [3].

Endotracheal Suction (ETS) is a vital airway intervention used to clear pulmonary secretions and maintain patent endotracheal tube for mechanically ventilated neonates [4]. Approximately 50% of neonates admitted to neonatal intensive care require the insertion of an Endotracheal Tube

(ETT) to facilitate mechanical ventilation and they receive up to forty times of ETS procedures per episode of mechanical ventilation [5]. Atelectasis, impaired gas exchange, hypoxia, airway trauma, decreased lung compliance and Ventilator-Associated Pneumonia (VAP) are the most common complications of endotracheal suction can lead to prolonged neonate's length on mechanical ventilation and subsequent survival [6, 7].

Upper Egypt particular in Neonatal Intensive Care Unit (NICU) of Assiut University Children Hospital, The frequency of ventilator associated pneumonia (VAP) from April 2018 to March 2019 was 27.2%. The most common risk factors of VAP were very low birth weights, prematurity, longer duration of ventilation and bad performance of endotracheal suction procedure with hospital mortality rates in VAP were 65% compared with 25% in non-VAP groups [8].

Essential component in preventing ETS complications such as VAP is application of evidence-based ETS practices and competent clinical nursing skills. [6] One such way to develop clinical nursing skills through the use of mental

simulation and often termed mental imagery. Mental simulation technique is the reproduction of the essential features of a real-life situation. Mental imagery enables experiential learning in a safe environment. It demonstrates a significant improvement in undergraduate nurses' performance and knowledge of clinical skills. Mental imagery has approved to be popular and effective in many educational programmes as medicine, music and physical education [9].

Mental imagery is defined as the process of representation of mutli sensory perceptual information in the mind in the absence of sensory input. Mental imagery enhances psychomotor skill performance based on functional equivalence principle which postulates that action execution and mental simulated action share similar neural processes. It is thought that this neuronal co-activation serves to facilitate the learning of skills through imitation [10].

Mental imagery enhance nursing student's psychomotor skill performance and increases their preparedness before real physical practice with the clinical settings because it helps them to be more comfortable during imaging experience and better identification of performance defects [11]. It improves self-confidence of nursing students' in their abilities and clinical judgment and bridge the gap between theory and practice before real physical practice occurrence [12].

The most effective models of imagery is PETTLEP model. It is an approach used to apply mental imagery strategy through seven items (Physical, Environment, Task, Timing, Learning, Emotion, and Perspective). Holmes and Collins (2001) developed this model which aimed to address the concerns and conflict surrounding traditional imagery methods and presented as an empirical approach based on cognitive neuropsychology. [13] PETTLEP includes the five senses during imagery experience in order to achieve vivid imagery. It encourages participants to imagine in the actual performance environment with their equipments. It demonstrated a significant improvement in novice surgeon' performance of clinical skills with using it [14].

Significance of the Study
Nursing students face many challenges during their training in clinical setting especially Neonatal Intensive Care Unit. These challenges turn around the following: shortage of nurse educators, increased students enrollment, limited fields of clinical practices, perceived complex technology, spending less time in the hospital and Neonatal Intensive Care Unit directors refused the students 'participation in providing nursing care for high risk neonates while they were in the practical training which can hinder their clinical practice and experience [2].

Despite of all of the previous challenges in conjunction with appearance of many benefits of mental imagery in nursing education, little researches has been published on applying of PETTLEP model in nursing settings. The significance of the study lies in showing the effect of mental imagery strategy (PETTLEP model) on performance, self-confidence and satisfaction of nursing students regarding neonatal endotracheal suction procedure.

The aim of the study: was to determine the effect of implementing mental imagery strategy on nursing students' performance, satisfaction and self-confidence regarding neonatal endotracheal suction procedure

Research hypotheses
1-Nursing students who implementing mental imagery strategy are expected to improve their total performance, satisfaction and self-confidence than those who do not implement mental imagery strategy.

Subjects and Method
Research design: Quasi experimental research design was used in this study.

Setting: The study was conducted at Clinical Skills Lab for third year pediatric nursing students at the Faculty of Nursing, Tanta University and Neonatal Intensive Care Unit of El - Menshawy Hospital which affiliated to The Ministry of Health and Population.

Subjects: Total sample of eighty pediatric nursing students in the third year, Faculty of Nursing, Tanta University. Study subjects were recruited from the total population (n=327) students of female and male gender (n=160) in the first semester and (n=167) in the second semester who were studying pediatric nursing during the academic year (2019-2020). The samples were selected randomly. They were divided into two equal groups as follows:

Group (1): Study group consisted of 40 students who studied with physical demonstration on neonatal doll followed by implementing mental imagery strategy for the steps of procedure.

Group (2): Control group consisted of 40 students who studied by traditional training as lecture and physical demonstration and re-demonstration in pediatric laboratory. The students were allocated to either control or study group by using cluster randomization.

Cluster randomization is a sampling technique in which the total population is divided into groups or clusters and a simple random sample is selected from these groups. It is a type of probability sampling in which sample subjects have known probability of being selected.

Tools of data collection: four tools were used for data collection:

Tool I: Structured Questionnaire Schedule Regarding Students' Knowledge Related to Endotracheal Suction Procedure and Mental Imagery Strategy
It was developed by the researcher after reviewing the related literature to assess the students' knowledge regarding endotracheal suctioning and mental imagery strategy. It was consisted of three main parts:

Frist part: It covered the socio-demographic characteristics of the studied students which include; age, sex, residence, previous performance of neonatal endotracheal suction, attendance of related clinical training courses and the last certificate.

Second part: It covered the students' knowledge regarding the neonatal endotracheal suction procedure. It was designed in multiple choice questions form (MCQ) and it was revised by pediatric nursing experts. Knowledgeable items of neonatal endotracheal suction including, definition,

purpose, assessment, preparation of endotracheal suction, implementation, complications, contraindication and documentation of procedure.

Third part: It covered the students' knowledge regarding mental imagery strategy. It was designed in multiple choice questions form (MCQ) and it was revised by psychiatric experts. Knowledge items was covered the following; definition, benefits, uses of mental imagery in nursing education and component of PETTLEP model. The tool was positively marked with one mark awarded for each correct answer and incorrect answer was given scored (0).

The total score of the students' knowledge equal 100% and according the students' answers was classified as:

Levels scores of knowledge about neonatal endotracheal suction procedure: (ranged from 0- 19)
- High knowledge ≥ 70% means students score range from (14-19)
- Moderate knowledge 60- less than 70% means students score range (12-13)
- Low knowledge: less than 60 % means students score range (0-11)

Levels scores of knowledge about the mental imagery strategy from (0-15): High knowledge ≥ 70% means students score range from (11-15)
- Moderate knowledge 60- less than 70% means students score range (9-10)
- Low knowledge: less than 60% means students score range (0-8).

Levels of total knowledge score ranged from (0-34)
- High knowledge ≥ 70% means students score range from (24-34).
- Moderate knowledge: 60- less than 70% means students score range (21-23).
- Low knowledge: less than 60% means students score range (0-20).

The researcher assessed the students' knowledge three times:
- The first time before teaching sessions (pretest)
- Immediately following sessions (immediate follow up)
- Two weeks later (short term follow up).

Tool II: The Betts' Questionnaire Mental Imagery Vividness of Mental Imagery Scale: A shortened form of Betts' questionnaire was developed by Sheehan (1967) [15]. It was consisted of 35 items; five items within each of seven sensory modalities including visual, auditory, cutaneous, kinaesthetic, gustatory, olfactory and organic, on a seven point likert scale. The students rated the vividness of the mental image for each item produces from " perfectly clear and vivid" was obtained score (1) to "no image present at all "was obtained score (7).

The image aroused by an item of this test may be:
Perfect clear and vivid as the actual experience…………..rating1
Very clear vividness to the actual experience…………… rating 2

Moderate clear and vivid ………………………………rating 3
Not clear but recognizable………………………………...rating 4
Vague and dim…………………………………………….rating 5
So vague and hardly discernible…………………………rating 6
No image present at all…………………………………rating 7

The students were filled out the Bett's questionnaire sheet. After completing all statements a total score was obtained by summation of all the items. The assessment of mental imagery ability took from 35 to 45 minutes.

Scoring system: The Betts' score range from 35-245 where:
- The students who scored 78 or below (indicative of high imaging ability)
- The students who scored 79 or above (indicative of low imaging ability)

Tool III: Student Satisfaction and Self Confidence in Learning Scale: This scale was developed by the national league for nursing (2009) [16]. This scale was used to assess students' satisfaction and self-confidence with mental imagery strategy regarding endotracheal suction procedure immediately after application of PETTLEP model of mental imagery and after two weeks later. It was consisted of satisfaction and self- confidence subscale which include 13 items. The items of scale were answered using a five point likert type scale that ranged from "strongly disagree" to "strongly agree" It was filled out by the students.

Scoring system
- 1= Strongly disagree.
- 2= Disagree.
- 3= Undecided.
- 4= Agree with the statement.
- 5= Strongly agree with the statement.

The total score of the students' satisfaction and self-confidence equal 100% and according the students' answers was classified as:

Student Satisfaction score range from 5-25 where
- Unsatisfied: less than 60% that means students score range from= (5 – 14).
- Satisfied ≥ 60% that means students' score ranged from = (15 – 25)

Self Confidence in Learning Scale score range from 8-40 where
- Un confidence : less than 60% that means students score range from = (8 -23)
- Confidence ≥ 60% that means students' score range from = (24 – 40).

Tool IV: Observational Checklist of Neonatal Endotracheal suction procedure: It used by the researcher to assess the students' practice related to neonatal endotracheal suction. The five categories' practice, assessment, preparation, implementation, Post care and

documentation. The students were performed the steps of procedure on actual pediatric setting in Neonatal Intensive Care Unit to assess their real clinical practice. The observational checklist consisted of (22) items and the total score items were (22) it was filled out by the researcher.

Assessment of the students' practice regarding neonatal endotracheal suction procedure. Each item of practice was evaluated as follow:
- Done correctly was scored (1).
- Not done or wrong done was scored (0).

The total score of the students' practice equals 100% and according to the actual students' practice were classified as
- Satisfactory practice: ≥ 60% ranged from (14 – 22)
- Unsatisfactory practice: less than 60% ranged from (0 – 13)
- The researcher assessed the students' practice two times during the study:
- Immediately following sessions (immediate follow up)
- Two weeks later (short term follow up).

Method
1-An official permission to conduct the study was obtained from the responsible authorities, Dean of Faculty of Nursing, Tanta University and Neonatal Intensive Care Unit of El - Menshawy Hospital which affiliated to The Ministry of Health and Population to obtain their approval and cooperation to conduct the study after clarifying the purpose of the study and setting the time for begining the study.
2-Ethical approval was obtained from the research ethics committee of the Faculty of Nursing, Tanta University in (1-3-2019). Informed consent was taken from nursing students to participate in this study after explaining the aim of the study and reassured them that the information obtained was used only for the purpose of the study and wouldn't contribute to their grades or affect their academic progress.
3-Four tools were used for data collection.
4-Reliability of developed tool was tested through internal consistency. The value of Cronbach's alpha coefficient was = 0.890.
5-Content validity: The tools were presented to a jury of five experts in the field of pediatric nursing, psychiatric health nursing to check content validity, clarity, relevance, comprehensiveness, understanding, applicability and ease for implementation. Content validity index =98.6%.
6- Pilot study was carried out on 10% of sample size (8) students enrolled in pediatric nursing department at the second term of pediatric nursing course (February 2019) to ensure the clarity and feasibility of the tools and identify problems and measures may hinder data collection to overcome it. Necessary modification was done accordingly. Some questions were added and others were omitted. Those students were excluded from the study sample.

Phases of the study
The study was conducted throughout three phases
I. Assessment phase: It was carried out by the researcher for all study subjects to collect baseline data of students' knowledge about neonatal endotracheal suction (Tool I) and to assess the mental imagery ability of the students by using the betts' Questionnaire mental imagery scale (tool II).

II. Implementation Phase included the following steps
Setting objective: The content in knowledge section part I consisted of definition, purpose, indication, contraindication, complications and principles of airway suction. The principle section includes information about assessment need, preparation, implementation, post care and documentation for endotracheal suction.
- The second part of knowledge consisted of definition, benefits and uses of mental imagery in nursing education.
- Practice section consisted of endotracheal suctioning procedures which were classified into assessment, preparation, implementation, post care and documentation.

The preparation phase: during this phase the researcher was prepare herself, the content, and students as follows.
a) **Researcher preparation:** The researcher reviewing recent researches in order to be knowledgeable about the application of mental imagery strategy with PETTLEP model in neonatal endotracheal suction procedure.
b) **Content preparation:** Booklet and two video were prepared for the study, the first video as introduction about definition of mental imagery, benefits, uses and theories of mental imagery. The second video about neonatal endotracheal suction procedure using PETTLEP model as mental imagery strategy was developed by the researcher. The researcher a signed these videos to you tube channel and sent link to the study group in what up groups.
c) **Students' preparation:** the researcher met the students of each cluster group according their clinical rotation one day before clinical section. The researcher started to explain aim of the study and took informed consent from the students to participate in the study.

Study group
The students in the study group were studying using face to face lectures for knowledge section and demonstration and remonstration plus using mental imagery strategy for performance section in pediatric nursing lab. The guided mental imagery strategy for teaching neonatal endotracheal suction was conducted in two stages.

The first stage
The researcher performed neonatal endotracheal suction procedure in front of students through physically demonstration on the pediatric doll.

Second stage
The researcher asked the students to perform physical re-demonstration on neonatal doll after each student performed physical demonstration. The researcher begun to explain mental imagery strategy to the students through two videos it consisted of power points supported by researcher sound prepared before included definition of mental imagery, benefits, uses, theories of mental imagery as general and PETTLEP specifically this step took about 30-45minutes.

Then the researcher asked students to follow the following steps:

- Set in a comfortable position in the seat beside incubators.
- Allow yourself to find a position in which you can relax and focus for about five minutes.
- Let your eyes close and shift your attention inward.
- Notice the areas of tension in your body and allow them to relax.
- Release any tightness or tension you are feeling.
- Now concentrate on your breathing. Take three deep, slow breaths that will fill your lungs and chest with air, breathe in........... and breathe out................ breathe in................. breathe out............Good, your mind is relaxed, and ready to start our imagery session.

The researcher begin to guided mental imagery session for the neonatal endotracheal suction in all steps using verbal cues to help students to more engaged in mental imagery session such as

- Hear crepitation sound during respiration.
- See the skin color of neonate.

Instead of assess crepitation sound during respiration and the skin color of neonate. These steps took approximately 20-30 minutes. After mental imagery session had ended. The researcher distributed structured questionnaire sheet include the knowledge sheet to assess students' knowledge about endotracheal suction and mental imagery (Tool I) and satisfaction and confidence scale (Tool III) immediately after mental imagery session.

After the students completed the questionnaire sheet, the researcher instructed them to repeat mental imagery strategy three times per week for 2 weeks guided by booklet and videos assigned to what up groups for them. The researcher created whats up groups for the study group and monitor their compliance to the session through what up groups in the date of session day by day.

The second day of clinical rotation: the student do actual practice of endotracheal suction for the neonate in neonatal intensive care unit (NICN) and the researcher assessed clinical practice of the students by observational checklist.

Control group: The researcher followed the same session with the control group excepts the mental imagery sessions. Mental imagery ability of the students was measured using the betts' questionnaire vividness of mental imagery scale tool II and student's knowledge related to endotracheal suction was measured for students before, immediately after and after 2 weeks of performing endotracheal suction using tool (I). Students' satisfaction and self –confidence was measured immediately after and 2weeks after using traditional method of teaching using tool III.

III. Evaluation phase

The evaluation was done for mental imagery ability of the students before teaching intervention by tool I and assess students' knowledge before, immediately after and 2weeks after teaching intervention by tool II. Satisfaction and Self-confidence was measured for both study and control groups using tool (III) immediately and after 2 weeks later. Both study and control groups practice was assessed using observational checklist of endotracheal suction (tool IV) to

evaluate the difference between their practice immediately and after 2 weeks later.

Statistical analysis

Collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 23, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describes a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups and more was done using Chi-square test (χ2). For comparison between means of two groups of parametric data of independent samples, student t-test was used. For comparison between more than two means of parametric data, F value of ANOVA test was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance adopted at $P<0.05$ for the interpretation of results of tests of significance [17].

Result

Table (1) shows percentage distribution of studied students related to their socio –demographic characteristics. It was observed that more than half of both study group and control groups (57.5% and 52.5%) their age were 20 and 21 years old respectively. Also, the mean age of both study and control groups were 20.525 ± 0.505 and 20.500 ± 0.640 respectively.

Regarding gender; the results shows that three quarter and more (75% and 77.5%) were female in the study and control groups respectively. This table also reveals that more than two third (67.5%) of the study group from rural areas compared to 60% of the control group.

Concerning to the last certificate; it was noticed that three quarter and more (75% and 82.5%) of the study group and control groups had secondary school. Also more than half (52.5%) of the study group performed endotracheal suction previously compared with 85% of the control group while all of them performed adult endotracheal suction.

Table (2) represents total knowledge of studied students' knowledge regarding neonatal endotracheal suction and mental imagery strategy before, immediately after and 2 weeks follow teaching intervention. Concerning total scores of studied students' knowledge, it was observed that all of the studied students of both study and control group were poor knowledge before teaching intervention while all of nursing students were high knowledge immediately and 2 weeks after teaching intervention for study group compared to only 5% and 0% immediately and 2 weeks after for the control group respectively Also there were highly statistical significant differences between both groups immediately and 2 weeks after teaching intervention(χ^2 =72.381, P=0.0001 and χ^2 =65.455, P=0.0001) respectively. Figure (1) shows mean scores of the studied nursing students of both study and control group regarding betts' questionnaire mental imagery. It was observed that the mean scores of the study group were (64.325) compared to (64.750) of the control group of the nursing students.

Table (3) shows the total score of studied students' satisfaction about learning scale immediately and two weeks after teaching intervention. It was noticed that all of nursing students of the study group were satisfied with learning

scale compared to 85% and 70% of the control group were satisfied immediately after and after 2 weeks respectively. It can be seen that there were statistical significant and highly statistical significant differences (χ^2 = 6.486, P=0.011 and χ^2 = 14.118, P= 0.0001) among both groups immediately and after 2 weeks of teaching intervention respectively.

Table (4) shows the total score of studied students' self-confidence in learning scale immediately after and after 2 weeks of teaching intervention. It was observed that all of nursing students of the study group had confident level with learning scale compared with 90% and 75% of the control group immediately after and after 2 weeks respectively. There were statistical significant and highly statistical significant differences among both groups immediately after 2weeks.of.teaching.intervention (χ^2 = 7.671, P=0.022 and χ^2 = 24.918 P=0.0001).

Table (5) shows the total score of studied students practice about neonatal endotracheal suction immediately after and 2 weeks after of teaching intervention. It was presented that all of nursing students of the study group were satisfactory of practice compared to the majority (97.5% and 90%) of the control group immediately after and after 2 weeks of teaching intervention respectively. Also the mean scores of practice of the study group were (24.400 ± 1.61 and24.850 ± 0.948) compared to mean scores (22.150 ± 2.03and 20.07 2.57) immediately after and after 2 weeks of teaching intervention respectively. Finally there were highly significant differences among both study and control groups immediately after and after of 2 weeks of teaching intervention (χ^2 =5.483, P=0.0001 and χ^2 =13.306, P=0.0001) respectively.

Table (6) shows relation between studied students' knowledge, satisfaction, self-confidence and practice in teaching strategy related to neonatal endotracheal suction procedure immediately after and after 2 weeks of teaching intervention. It was observed that all of studied students of the study group had satisfaction and high knowledge compared to 5% of control group immediately after and 0% after 2 weeks of teaching intervention respectively. Also, there were statistical significant differences among both study and control groups immediately after 2 weeks of teaching intervention (χ^2 = 10.81, P=0.013 and χ^2 = 11.142, P=0.0001) respectively.

Additionally the results presented that all of the nursing students of the study group had confidence and high knowledge compared to 5% of the control groups immediately after and no one had confidence and high knowledge after 2 weeks teaching intervention. Also, there were statistical significant and highly statistical significant differences among both the study and control groups immediately after and after 2 weeks of teaching intervention (χ^2 =8.018, P=0.017 and χ^2 = 12.982 P= 0.0001) respectively.

Regarding relation between total practice and total knowledge the table was presented that all of nursing students of the study group had satisfactory practice and high knowledge compared to compared to 5% of control group immediately after and 0% after 2 weeks of teaching intervention respectively. There were statistical significant differences among both the study and control groups immediately after and after 2 weeks of teaching intervention (χ^2 =6.089 P=0.035 and χ^2 = 5.354 P=0.001) respectively.

Discussion

Endotracheal suction is an important procedure in airway management of mechanical ventilated neonates' required careful assessment, effective preparation, proper implementation and accurate documentation. However, it is associated with many complications [18]. Therefore, pediatric nurses need to have a high level of performance and competency in it. High performance level begins from the under-graduation stage in which there is an integration of knowledge and practice to prepare nursing students to become highly qualified nurses after graduation [19]. Effective preparation of nursing students is an essential precursor to high performance which includes knowledge and practice. The use of mental imagery strategy is a common method of achieving it in many practical fields as surgical education but little in nursing education. Mental imagery offers an alternative and supplementary approach to physical practice [20].

Mental imagery is the ability to construct or reconstruct an image in the mind using all of the senses in the absence of physical practice. It is an innovative active simulation and student-centered approach. The main function of imagery is to aid in self-regulation of negative thoughts, feelings and behaviors that is a main factor of successful performance [21]. Therefore, it was a necessity to ask to what extent mental imagery improves nursing student's level of knowledge, practice, self-confidence and satisfaction in relation to the traditional methods of teaching.

Regarding socio-demographic data of the studied third year pediatric nursing students, regarding age of students involved in this study, it was observed that more than half and nearly half of students in the study and control group their age were 20 years respectively. This is the normal age is according to the years of educational progression without any academic delay. Elsayed (2017) [7] and Gamal Eldin (2015) [22] who agreement with the finding of the current study and reported that nearly half of the study group was aged 20 yeas .

In relation to sex, the present study revealed that three quarters and over of students in the study and control group were females. This is due increased number of females who are admitted to the faculty and males are newly admitted in few numbers. This result is in agreement with the study of Kusi (2019) [23] in which over three quarters of the studied students were females .Concerning to residence, the present study demonstrated that two third and more of the students in the study and control group from rural areas. This is because enrollment in nursing collages is a regional distribution and the regions surrounding Tanta University are rural regions. Elsayed (2017) [7] and Gamal Eldin (2015) [22] who were in accordance with the finding of the current who reported that the majority of the studied students in the study and control from rural areas.

Evidence based knowledge is a primary base in any under-graduated nursing programme for decision-making, clinical judgment, critical thinking and lifelong learning to achieve high quality nursing performance. Concerning the acquisition of knowledge about neonatal endotracheal suctioning and mental imagery, the result of the present study revealed that, the students in both groups had low level of knowledge. There were no significant difference between two groups before teaching interventions and there

were quiet homogenous between them related to age, previous experience, educational levels and the same groups studied of adult airway suction in the previous years.

Low level of knowledge about neonatal endotracheal suction may be explained by students' knowledge deficit about special principles for preterm neonate on mechanical ventilation such as appropriate size of suction catheter and appropriate suction pressure. In addition to unaware of unpredicted complications of the procedure for neonates and how to deal with it. Also low knowledge about mental imagery because it is a novel, modern, innovative and new learning strategy in nursing education in Egypt, so students' knowledge about it is low. Elsayed (2017) [7] who was in accordance with the finding of the current who reported that there were no statistically significant differences between both groups regarding airway suction before teaching intervention .

The finding of the present study illustrated that students who used mental imagery achieved higher scores of knowledge suction than in case of traditional teaching methods at immediate after and two week follow up. This may attributed to the students in the study group take the advantage of mental imagery strategy that helps in preparing and easy recalling the stored information of procedure in their mind in anywhere which enable them to keep and refresh their knowledge continuously.

Kraishan (2015) [24] who was in the same line with the finding of the present study and found that students had increase level of knowledge in physics with the use of mental imagery as teaching strategy and noted the functions of mental imagery and its relation with thinking which is a companion of memory. Also his results concluded that mental imagery technique assisted the participants to recall word, facilitate the process of storing information, keep knowledge in long-term memory, and serve creativity and problem solving.

Mental imagery is a skill acquired to produce the desired effect of performance but it may be affected by several variables such as the imagery ability of the participants. This suggests that individuals with higher imagery ability use imagery more often than those with lower ability and gain greater benefits from the technique of mental imagery [25]. Result of the present study showed that there was no significant difference between the two groups with regard to the imagery ability scores of the students before the intervention and all of them had high mental imagery capacity.The two groups were quite homogenous and the researcher illustrate that this result may be due to the colleges of nursing accepts elite students in high secondary school with high mental capabilities, including the ability to mental imagery. Shehata (2018) [26] who was congruent with the present result and stated that all studied nursing student in both groups had high imagery ability.

In the nursing training context the learner's satisfaction and self-confidence are variables that allow us to identify and evaluate the effectiveness of the teaching and learning strategies used during the training [27]. Regarding satisfaction in learning method, current study finding clarified that there was statistical significant difference in most items of satisfaction learning scale among both groups immediately after and two weeks follow up. From the researcher point of view positive clinical environment

provided by mental imagery strategy achieved student – centered approach through individualization, involvement, task oriented and personalization. It's subsequently reflected in increase students' satisfaction with mental imagery as a method of teaching. Windle (2020) [28] who was in the same line with finding of the present study and reported that nursing students were satisfied with guided imagery teaching experience and it is achieved valuable personal and professional benefits.

Concerning the effect of mental imagery strategy on the student's self-confidence the present study found that there was significant difference between the study and control immediately after teaching intervention and highly significant difference between them after two weeks follow up of teaching intervention. The justification of the researcher toward these results may be due mental imagery strategy through PETTLEP model helps students to create vivid clinical experience mimic to the real practice. Consequently, incorporating mental imagery before real action execution enables the students to prepare and plan for a movement by accessing and strengthening it is mental representation. So with repeated successful imagery practice of procedure from the start to the end with positive successful imagery experience keep the students feel more comfortable and confident in their abilities.

Riggs (2020) [29] who was in agreement with the finding of the current study and reported that mental imagery practice was effective way to increase health care provider self confidence in the donning and doffing of personal protective equipment's when opportunities for physical practice are limited as with pandemic covid 19.Yalcin (2020) [30] who was finding in the same line with the finding of the current study and mentioned that there was a positive correlation between self-confidence and repeated mental imagery use by the football players.

Mental imagery strategy as a productive and cost effective method of teaching and enhancing professional performance is a widely accepted in medical field particularly in a surgical procedures but its application in nursing education is rare. Regarding total score of clinical practice, the finding of the current study revealed that there was highly significant difference between both groups immediately after and two weeks after teaching intervention. The current finding from the researcher point of view due to mental imagery strategy directed students towards a relaxed positive state can result in increased concentration, decrease stress and control anxiety which are requests for higher practice. In addition to the researcher in the current study allow the students to do physical practice of the procedure in doll followed by mental imagery session day by day for two weeks. The integration of two methods reflected to satisfactory level of practice and neonatal safety.

Snelgrove (2020) [31] who was consistent with the finding of the present study and documented that two-thirds of 404 primary studies about the impacts of mental practice on surgical teams in systematic reviews reviewed and concluded that mental practice significantly improves performance of surgeon. Shehata (2018) [26] who was congruent with the finding of present study and mentioned that there was highly statistical significant difference between the study and control group in relation to their clinical performance scores of neonatal cardiopulmonary

resuscitation after applying PETTLEP model of mental imagery. On the other hands Bramson (2011) [32] who disagreed with the finding of the present study and clarified that there was no statistically significant difference in performance between the group receiving additional physical practice and the group receiving guided mental imagery practice.

Nurses 'clinical performance is the core spirit and pillar of the nursing profession and it depends on knowledge and nurses' confidence in their ability to perform their tasks successfully. Based on the present study there was significant relation between knowledge, clinical practice, satisfaction and self-confidence with mental imagery strategy. The main reason for the present results was that mental training technique allows students to organize cognitively and somatically well before facing the procedure from the mental perspective and boost their self-confidence in the management of anxiety faced during the neonate procedure. This is the first research considered to study this point in nursing education but the research of sport psychology was more interested with this point. Surat (2019) [33] who matched with the current finding that mentioned there was significant relationship between the knowledge and the practice of mental training skill with regards to the athletes' mind control and confidence during competitions shows a highly positive and moderate relationship.

Recommendation: Based on the current findings the following recommendation is offered

- Incorporating the use of mental imagery strategy as an adjunct to physical practice or substitute of physical practice when it is limited as in pandemic of covid 19 in an effort to facilitate skill acquisition.
- Encourage nurse educators to use mental imagery with physical training to increase students and staff nurse performance for better outcome.
- Conduct series training workshop to increase awareness and positive attitude of nursing educators about mental imagery strategy as innovative student centered approach method of teaching.

Table 1: Percentage distribution of studied nursing students related to their socio-demographic characteristics

Nursing student characteristics	Study group (n=40)		Control group (n=40)	
	No	%	No	%
Age (years)				
20	23	57.5	19	47.5
21	14	35.0	21	52.5
22	3	7.5	0	0.0
Range Mean±SD	20-2220.500 ± 0.640		20-2120.525 ± 0.505	
Sex				
Male	10	25.0	9	22.5
Female	30	75.0	31	77.5
Residence				
Rural	27	67.5	24	60.0
Urban	13	32.5	16	40.0
Last certificate				
Secondary school	30	75.0	33	82.5
Nursing institute	10	25.0	7	17.5
Previous perform endotracheal suction				
Yes	21	52.5	34	85.0
No	19	47.5	6	15.0
If yes,	(n=21)		(n=34)	
Adult suction	21	100.0	34	100.0
Neonatal	0	0.0	0	0.0

Table 2: The total score of studied students' knowledge regarding neonatal endotracheal suction and mental imagery strategy before, immediately after and 2 weeks follow teaching intervention

Total knowledge	Before (n=80)				χ²P	Immediate after (n=80)				χ²P	After 2 weeks (n=80)				χ²P
	Study group		Control group			Study group		Control group			Study group		Control group		
	No	%	No	%		No	%	No	%		No	%	No	%	
Levels scores of knowledge about neonatal endotracheal suction procedure															
Low knowledge (0 – 11)	38	95.0	39	97.5	0.346	0	0.0	4	10.0	14.119	0	0.0	12	30.0	34.286
Moderate knowledge (12 – 13)	2	5.0	1	2.5	0.556	0	0.0	8	20.0	0.001*	0	0.0	12	30.0	0.0001*
High knowledge (14 – 19)	0	0.0	0	0.0		40	100.0	28	70.0		40	100.0	16	40.0	
Levels scores of knowledge about the mental imagery strategy															
Low knowledge (0 – 8)	40	100.0	40	100.0	--	0	0.0	38	95.0	75.200	0	0.0	40	100.0	80.000

	No	%	No	%		No	%	No	%		No	%	No	%	
Moderate knowledge (9 – 10)	0	0.0	0	0.0		3	7.5	2	5.0	0.0001*	1	2.5	0	0.0	0.0001*
high knowledge (11 – 15)	0	0.0	0	0.0		37	92.5	0	0.0		39	97.5	0	0.0	
Levels of total scores knowledge															
Low knowledge (0 – 20)	40	100.0	40	100.0	--	0	0.0	30	75.0	72.381 0.0001*	0	0.0	36	90.0	65.455 0.0001*
Moderate knowledge (21 – 23)	0	0.0	0	0.0		0	0.0	8	20.0		0	0.0	4	10.0	
high knowledge (24 – 34)	0	0.0	0	0.0		40	100.0	2	5.0		40	100.0	0	0.0	

*Statistically Significant difference at ($P<0.05$).
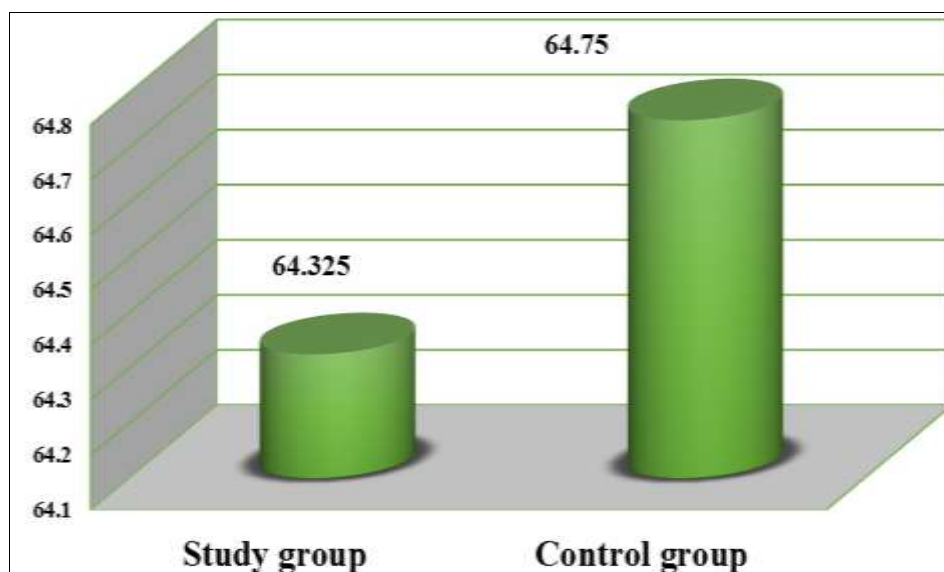**Highly significant difference at ($P<0.00$)

Fig 1: Mean scores of the studied nursing students of both study and control group regarding betts' questionnaire mental imagery

Table 3: The total score of studied students' satisfaction about learning scale immediately and two weeks after teaching intervention

	Immediate after				χ2 P	After 2 weeks				χ2 P
Satisfaction in learning scale.	Study group (n=40)		Control group (n=40)			Study group (n=40)		Control group (n=40)		
	No	%	No	%		No	%	No	%	
Levels of total student satisfaction										
Unsatisfied	0	0.0	6	15.0	6.486 0.011*	0	0.0	12	30.0	14.118 0.0001**
Satisfied	40	100.0	34	85.0		40	100.0	28	70.0	
Mean score of total satisfaction					t-test P					t-test P
Range	20 – 25		11 – 24		8.335 0.0001**	21 – 25		11 – 21		13.278 0.0001**
Mean ± SD	22.875 ± 1.15		17.325 ± 3.16			23.525 ± 1.08		15.625 ± 2.91		

*Statistically Significant difference at ($P<0.05$)
**Highly significant difference at ($P<0.00$)

Table 4: The total score of studied students' self-confidence in learning scale immediately after and 2 weeks after teaching intervention

	Immediate after				χ2 P	After 2 weeks				χ2 P
Self-confidence in learning scale.	Study group (n=40)		Control group (n=40)			Study group (n=40)		Control group (n=40)		
	No	%	No	%		No	%	No	%	
Levels of total self-confidence:										
Not confident	0	0.0	4	10.0	7.671 0.022*	0	0.0	10	25.0	24.918 0.0001**
Confident	40	100.0	36	90.0		40	100.0	30	75.0	
Mean score of total self-confidence:					t-test P					t-test P
Range	33 – 40		19 – 34		7.360 0.0001**	33 – 40		18 – 32		12.382 0.0001**
Mean ± SD	36.925 ± 1.95		27.925 ± 4.17			37.400 ± 1.69		25.050 ± 4.11		

Table 5: The total score of studied students practice about neonatal endotracheal suction immediately after and 2 weeks after teaching intervention

Total practice	Immediate after				χ2 P	After 2 weeks				χ2 P
	Study group (n=40)		Control group (n=40)			Study group (n=40)		Control group (n=40)		
	No	%	No	%		No	%	No	%	
Levels of total practice										
Satisfactory practice.	40	100.0	39	97.5	1.013	40	100.0	36	90.0	4.211
Unsatisfactory practice.	0	0.0	1	2.5	0.314	0	0.0	4	10.0	0.040*
Total mean score of practice					t-test P					t-test P
Range	21 – 27		16 - 26		5.483	24 – 27		15 – 24		13.306
Mean ± SD	24.400 ± 1.61		22.150 ± 2.03		0.0001**	24.850 ± 0.948		20.07 ± 2.57		0.0001**

*Statistically Significant difference at (*P*<0.05)
**Highly significant difference at (*P*<0.00)

Table 6: Relation between studied students' knowledge, satisfaction, self-confidence and practice in teaching strategy related to neonatal endotracheal suction procedure immediately after and 2 weeks after teaching intervention

Total satisfaction and self-confidence in learning scale and practice scores	Total knowledge scores (n=80)																
	Immediate after (n=80)								χ2 P	After 2 weeks (n=80)						χ2 P
	Study group (n=40)		Control group (n=40)							Study group (n=40)		Control group (n=40)				
	High knowledge		low knowledge		Moderate Knowledge		high knowledge			High knowledge		Moderate knowledge		low knowledge		
	No	%	No	%	No.	%	No	%		No	%	No	%	No	%	
Levels of total satisfaction																
Satisfied	40	100.0	24	60.0	8	20.0	2	5.0	10.81	40	100.0	26	65.0	2	5.0	11.142
Unsatisfied	0	0.0	6	15.0	0	0.0	0	0.0	0.013*	0	0.0	10	25.0	2	5.0	0.001*
Levels of total self-confidence																
Confident	40	100.0	26	60.0	8	20.0	2	5.0	8.018	40	100.0	30	75.0	0	0.0	12.982
Not confident	0	0.0	4	10.0	0	0.0	0	0.0	0.017*	0	0.0	6	15.0	4	10.0	0.0001*
Levels of total practice																
Satisfactory practice	40	100.0	29	72.5	8	20.0	2	5.0	6.089	40	100.0	32	80.0	4	10.0	5.354
Unsatisfactory practice	0	0.0	1	2.5	0	0.0	0	0.0	0.035*	0	0.0	4	10.0	0	0.0	0.001*

* Statistically Significant difference at (*P*<0.05.
]**Highly significant difference at (*P*<0.00)

References

1. Fukada M. Nursing Competency: Definition, Structure and Development. Journal Yonago Acta Medica. 2018;61(1):1-7.
2. Allari R, Farag M. Nursing Students' Expectations Regarding Clinical Training: A Qualitative Study. International Journal of Nursing Science 2017;7(3):63-70.
3. Williams K, Patel K, Stausmire J. The Neonatal Intensive Care Unit: Environmental Stressors and Supports. International Journal of Environmental Research and Public Health 2018;15(1):60.
4. Maggiore S, Volpe C. Endotracheal suctioning in hypoxemic patient. Journal of the Société de Réanimation de Langue Française 2011;20(1):12-18.
5. Davies K, Bulsara M, Ramelet A. Audit of endotracheal tube suction in a pediatric intensive care unit. Journal Clinical Nursing Research 2017;26(1):68-81.
6. Chang I, Schibler A. Ventilator associated pneumonia in children. Pediatric Respiratory Reviews 2016;20(1):10-16.
7. Elsayed N. Effect of Computer Based Learning Regarding Airway Suctioning On knowledge and Skill Retention of Pediatric Nursing Students. A Thesis for doctoral degree of pediatric nursing. Tanta University. Egypt, 2017, 39-150.
8. Gohr A, El Tayeb A, Shalaby A. An Observational Study on Ventilator-Associated Pneumonia as a Cause for Nosocomial Infection in Mechanically Ventilated Neonates. Annals of Neonatology Journal 2021;3(1): 144-64.
9. Wakefield C, Smith D, Hogard E. Using PETTLEP imagery as a simulation technique in nursing: Research and guidelines. Nurse Education in Practic 2020;43(1):1-6.
10. Hardwick R, Caspers S, Eickhoff S. Neural correlates of action: comparing meta-analyses of imagery, observation, and execution. Neuroscience and Bio Behavioral Reviews 2018;94(1):31-44.
11. Anuar N. Imagery ability in sport and movement. A Thesis for Doctoral Degree of Philosophy. University of Birmingham.2016, 2-4.
12. Boehm L, Tse A. Application of guided imagery to facilitate the transition of new graduate registered nurses. Journal of Continuing Education in Nursing. 2013;44(3):113-19.
13. Holmes P, Collins D. The PETTLEP approach to motor imagery: A functional equivalence model for sport psychologists. Journal of Applied Sport Psychology 2001;13(1):60-83.
14. Quinton M, Cumming J, Gray R. A PETTLEP Imagery Intervention with Young Athletes. Journal of Imagery Research in Sport and Physical Activity 2014;9(1):1-13.
15. Sheehan P. A shortened form of Betts' questionnaire upon mental imagery. Journal of Clinical Psychology

1967;23(1):386-89.

16. Sherrill J, Carol J. High – fidelity simulation: factors correlated with nursing student satisfaction and self - confidence. Nursing Education Perspectives Journal 2009;30(2):74-78.

17. Dawson B, Trapp R: Reading the medical literature: Basic and Clinical Biostatistics. Lange Medical Book/ McGraw –, New York: Hill. Medical Publication Division Co., 3rd ed., Ch. 7-9 161-218, Ch. 13. 2001; 305-14.

18. Heidari M, Shahbazi S. Nurses' Awareness about Principles of Airway Suctioning. Journal of Clinical and Diagnostic Research 2017;11(8):17-19.

19. DeLucia P, Ott T, Palmieri P. Performance in Nursing. Reviews of Human. Factors. And Ergonomics 2009;5(1):1-40. doi:10.1518/155723409X448008.

20. Arora S, Aggarwal R, Sevdalis N. Development and validation of mental practice as a training strategy for laparoscopic surgery. Surg Endosc 2009;24(1):179-Avalible at 87https://doi.org/10.1007/s00464-009-0624.

21. Cumming J, Williams S. Imagery: The Role of Imagery in Performance. In S. Murphy (Ed.),Handbook of sport and performance psychology. New York: Oxford University Co 2012;213-32. Availableat doi:10.1093/oxfordhb/9780199731763.013.001.

22. Gamal El, deen A. Impact of using simulation based learning on nursing students' performance, self-efficacy, satisfaction and confidence during pediatric injection administration. A Thesis of Master Degree, Faculty of Nursing, Tanta University, Egypt 2015, 60-117.

23. Kusi A, Oduro E, Bam V. Nursing students and nurses' knowledge and attitudes regarding children's pain: A comparative cross sectional study.PLoSONE 2019;14(10):1e0223730.https://doi.org/10.1371/journal.pone.0223730

24. Kraishan O, Bajes H. The Relationship between Mental Imagery, Creative Thinking and Academic Achievement of Tenth Grade Students in Physics. Journal of Education and Practice 2015;25(6):155-64.

25. Guillot A, Genevois C, Desliens S. Motor imagery and 'placebo-racket effects' in tennis serve performance. Psychology of Sport and Exercise Journal 2012;13(1):533-540.

26. Shehata Y. Effect of using mental imagery strategy on anxiety level and clinical performance among pediatric nursing student. Published Doctoral Dissertation. University of Alexanderia. Egypt 2018, 1-118.

27. Almeida R, Mazzo A, Martins J, Validation to Portuguese of the Scale of Student Satisfaction and Self-Confidence in Learning. Rev Latino-Am Enfermagem 2015;23(6):1007-13. Available at http∥:dx.doi.org/10.1590/0104-1169.0472.2643

28. Windle S, Berger S. Kim J. Teaching Guided Imagery and Relaxation Techniques in Undergraduate Nursing Education. Journal of Holistic Nursing 2020;2(1):1-8.

29. Riggs J, McGowan M, Petrosoniak A. Mental practice as a novel learning strategy for donning and doffing personal protective equipment during the COVID-19 pandemic. Canadian Journal of Emergency Medicine. 2020;22(5):1-3.

30. Yalcin L, Ramazanoglu F. The Effect of Imagery Use on the Self-Confidence: Turkish Professional Football Players. Journal of Sport Psychology 2020;29(2):57-64.

31. Snelgrove H, Gabbott B. Critical analysis of evidence about the impacts on surgical teams of 'mental practice' in systematic reviews: a systematic rapid evidence assessment. BMC Medical Education Journal 2020;20(1)1-13.

32. Bramson R, Sanders C, Sadoski M. Comparing the Effects of Mental Imagery Rehearsal and Physical Practice on Learning Lumbar Puncture by Medical Students. Annals of Behavioral Science and Medical Education 2011;17(2):3-6.

33. Surat S, Mustafa N, Ramli S. Relationship between knowledge, practice of mental training skill, control and confidence among Malaysian sport school students. Malaysian Journal of medicine and health sciences 2019;15(1):153-59.