

SELF LEARNING VERSUS TRADITIONAL LEARNING FOR NURSING STUDENTS REGARDING SAFETY MEASURES IN EMERGENCY UNIT

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Abstract

*Self-directed learning necessary for effective lifelong learning and many skills of students are expected to improve. Traditional learning methods are ineffective and passive instructional method. Students' nurses need to be educated and periodically reinforce their knowledge through seminars and workshops to ensure high understanding of how to prevent communicable diseases transmission.. Aim of study: evaluate the self-learning versus traditional learning regarding safety measures in emergency unit. Research Design: A quasi -experimental design was utilized. Setting: The study will be conducted in nursing schools at Abbasiya district (Dar El Shifa School and psychiatric health school). Study sample: A purposive sample was collected; it consisted of 120 students nurses, first class, both genders, Tools: three tool was used pre/post in this study: 1- Structured Interviewing Questionnaire to assess characteristic and knowledge of studied students 2- Observation checklists to assess students, performance post implementation of two learning methods. 3- Students, opinion sheet to assess student's satisfaction regarding self-learning and traditional learning method assess the environment of the school lab. Results: there was a highly statistically significant differences in relation to knowledge about safety in the emergency unit items between pre and post program in self-learning group ($P = < 0.001$).while, no statistically significant differences in traditional learning group Moreover, there was a positive highly statistically significant correlation between total knowledge and total practices among studied students in self-learning and traditional-learning groups in the post program. **Conclusion:** In conclusion Implementation of nursing student intervention had positive effect on knowledge, and practices for two groups (self-learning& traditional learning) regarding safety measure in emergency unit. **Recommendation:** developing educational programs for enhancing students' awareness about safety measures in emergency unit should be a priority in nursing schools to ensure early protective from infection. Raise nursing student's awareness regarding safety measures by using self-learning.*

Keywords: Self-Learning, Traditionl Learning, Safety Measures, Emergency.

INTRODUCTION

Nurses operate in a complex health care environment where social, technological and medical changes present them with challenges, and nurse education has a vital role to play in ensuring that they can adapt and respond to these challenges. Traditionally didactic methods of teaching have predominated in nurse education. However, it is no longer satisfactory to teach in this manner, and current nursing programs increasingly place an emphasis on adult education, including self-directed learning (Saad & Srour, 2019).

Every day while caring for patients, nursing students are at risk for exposure to blood borne pathogens which results in infections. Study was aimed to assess the knowledge and Practices of Universal Precautions among Nursing Students and Find out association between Universal Precautions and students. **(Aaronson et al., 2019)**.

Self-directed learning is a way of turning individuals into lifelong learners. Lifelong learning focuses on knowledge and skills needed by everyone regardless of age. One of the main aims of lifelong learning is to equip individuals with skills and competencies that enable them to learn by themselves. According to this belief, self-directed learning is both the meaning and the outcome of lifelong learning self-direction is a dimension of lifelong learning and facilitates it through formal and informal learning **(Curran et al., 2019)**.

Traditional Learning refers to a setting where a teacher communicates with a group of students in a typical brick and mortar classroom set-up. The students attend the class for fixed time duration and learn about specific topics and subjects, and they often get hands-on experience for a job. Although many schools/institutions make use of technology, the teaching-learning process still involves hand-written notes, assignments, tests, etc. The curriculum follows a standardized pattern using textbooks approved by the government and the education board. Moreover, the students are completely dependent on the teacher for acquiring knowledge of the subject **(AlKhaibary et al., 2020)**.

As member of the health care team, the nurses play an active role in promotion of health, prevention of disabilities, curtail of illness and rehabilitation of deformities. It is widely acknowledged that nurses are crucial components in health care system. In their roles, nurses are regularly confronted with a variety of biological, physical and chemical hazards during the courses of performing their duties. The safety of nurses themselves, and subsequently that of their patients, depends directly upon the degree to which nurses have mitigating those hazards **(Shayamano, 2020)**.

Significance of the study:

The student nurses are potentially more exposed to contact infections disease at work. This risk becomes true if the universal precautions are not utilized and the students don't work according to the standard protocol. The students begin their clinical training without the right knowledge **(Milind Kale., et al., 2019)** Hospital acquired infection HAI rates in Egypt 28 hospitals contributed to 474,544 patient days and 2,688 HAIs. Of these, 30% were bloodstream infections, 29% were surgical site infections, 26% were pneumonia, and 15% were urinary tract infections **(Talaat., et al., 2021)**.

Improvement in the performance of students nurses is an important aspect of infection control in the health care settings. Student nurses are more exposed to infections during clinical training so they need to improve their performance related to safety measures **(Mcguire-Wolfe, 2021)**.

Aim of the Study

The aim of this study to evaluate the self-learning versus traditional learning regarding safety measures in emergency unit through:

- Comparing between the performances of nursing students exposed to self-learning versus traditional learning regarding safety measures in emergency unit.
- Assessing nursing student's satisfaction on using self-learning versus traditional learning regarding safety measures in emergency unit.
- Designing and implementing training program for improving the students nurses performance toward infection injury precaution and safety measures.

- Evaluating the effectiveness of training program for improving the nurse's performance toward injury precaution and safety measures.

Research hypotheses:

Student exposed to the self-learning program will have positive effect on their performance regarding safety measure in emergency unit.

SUBJECT AND METHODS

Research Design:

Quasi experimental one group pre-/post-test design

Research setting:

This study was conducted in nursing schools at Abbasiya district (Dar El Shifa school and psychiatric health school) at Cairo Governorate, this schools consist of third classes (first – second – third), the number of students in every class is 30 student, the total number of students in the schools is (120) student.

Research subject:

A purposive sample was used in this study. The total number (120) of students nurses (first class) from the two schools with inclusion criteria were male &female, their age ranged between 15 to 18 years old, first class only and first year student (fundamental department), and willing to participate in the study. The data was collected in two different learning methods for two group of student; the first group applies traditional learning method and the second group was applying self-learning method.

Tools of data collection:

The tools used in the study was designed after reading related literature and taking expert's opinion, it was written in Arabic language, data was collected through using the following tools:

Tool I: Pre designed structured interview questionnaire sheet were used pre, post implementing the two learning methods. It consisted of the following two parts:-

Part 1: it was related to socio-demographic characteristic of students nurses including age, sex, class, was included from (Q1-Q3).

Part II: Pre self-learning& traditional learning test and posttest to assess students, knowledge regarding safety measure in emergency unit were included (10 items) about infection in emergency, (4 items) regarding precaution for infection control, (5 items) regarding hand washing , (4 items) regarding wearing protective mask, (3 items) regarding face mask and eye protection, (4 items) regarding precaution with needle and Sharpe instrument, (4 items) regarding contaminated sheets, (3 items) regarding waste supplies, (2 items) regarding body fluids, and (3 items) about contaminated service.

Scoring system:

The studied nurses' answered were compared with model key answers; where scored as complete correct or important answer had scored (2), incomplete correct or less important answer had scored (1) and incorrect or unimportant answer had scored (0). Total knowledge scores ranged from (0- 42) points. In this respect the level of nursing student' knowledge was classified into two categories as the following:

Satisfactory level of knowledge ($\geq 60\%$) was ranged from (22-42) degrees. **Unsatisfactory level of knowledge** ($< 60\%$) was ranged from (0-21) degrees.

Tool II: Observational checklist (pre& post): to assess students' performance was used pre and post implementation of two learning methods were included **6 checklist** about; hand washing (11 steps), IV therapy administration (20 steps), insertion of peripheral intravenous catheter (23 steps), changing the bed sheets (16 steps), waste handling (10 steps), spills of blood and body fluids (7 steps).

Scoring system:

The studied nursing Students' performance was assessed individually by the researcher against the checklist, scored as the following: done scored (1), and not done scored (0). The total scores were ranged from (0 to 87) degrees and according to level achieve their total practice were classified into two levels:

Competent level to 60% and more

Incompetent level less than 60%

Tool III: It was designed by the researcher to assess Students' opinion (Appendix III). It consisted of the following two parts:

Part 1: Assessing nursing student's satisfaction regarding self-learning and traditional learning method. It will include effectiveness of different learning strategy, effectiveness of the course, time consuming, and usefulness of materials, financial cost, and the barriers inhibiting learning 8 questions. (Q1 include 2 item), (Q2 include 3 items), (Q3 included 7 items), Q4 included 7 items- Q5 included 4 items- Q6 included 5 items- (Q7 included 3 items), (Q8 included 1 item).

Scoring system:

Statements are represented in five rating and classified into: 5 point scale (excellent to very weak). A score was given for each response (5 = excellent, 4 = very good, 3 = good, 2 = weak, 1 = very weak). The scores of the items summed up and the total score is 32 grades and equal 100%. The score was categorized into two category satisfied > 75 and unsatisfied < 75 .

Operational design:

The study to be completed passed through different phases included: preparatory phase, pilot study and field work phase.

Preparatory phase:

The researcher reviewed the related literature and theoretical knowledge of various aspect of the study using books, articles, internet periodicals and magazines to develop tools for data collection.

Tools Validity and reliability:

Content validity: It was ascertained by a panel (5) of the experts in community nursing and medical fields; to test the content validity by reviewing the tools clarity, relevance, comprehensives, and simplicity; their opinions elicited regarding the format, layout, consistency, accuracy, completeness and minor modifications were done; reliability was tested statistically.

Content reliability: The tool was tested to ensure that an assessment tool produces stable and consistent result overtimes reliability of the study tools used Alpha Cronbach test for knowledge of self-learning group $= 0.869$. Reliability for practices of self-learning group $= 0.912$. Reliability for knowledge of traditional learning group $= 0.863$. Reliability for practices of traditional learning group $= 0.896$.

Ethical Considerations:

The research approval was obtained from scientific research ethical committee in Faculty of Nursing at Ain Shams University before starting the study. The researcher explained the aim of the study. Oral approval was obtained from the student's nurses. They assured that the information collected treated confidentially and that it used only for the study. Students were informed that they allowed choosing to participate or withdraw from the study at any time.

Pilot study:

The pilot study was carried out on 10% (12 students) the purpose of this pilot was to test the eligibility of the field. The pilot has also served to estimate the time needed for each subject to fill in the questions. According to the results of the pilot, some corrections and omissions of items were performed as needed. The pilot participants were not included in the main study sample.

Field work:

- The study field work done throughout a period of 6 months from beginning of September 2021 to the end of March 2022 to be accomplished preparation for assessment took three month for developing the data collection tool obtained from literature review Data collection and filling of questioners took three months.
- Data were collected from students by individual interviews in the school class and school lab using the pre constructed tools. Each interview took a time of about one hour.
- After introducing, explain the purpose of the subjects and the written consent from every participant to share in the study.

The intervention construction was conducted in three phases:

Assessment phase:

A review of recent, current, national and international related literature in various aspects of the problems to design the study tools, then assessment was done to determine the nursing students' health needs by using pretest based the data about the collected nursing students' knowledge and their performance. The nursing students interviewed in the school lab and classes, 3 days / week, from 10 am, to 11pm were used for data collection (pretest), which was carried out through three months; the average time consumed to fill tools was 45 minutes.

Planning phase

Based on data obtained from pre-test assessment and relevant review of literature the researcher developing and implementing the nursing intervention in order to improve nursing student's level of knowledge and their performance.

The Study general objective was evaluated the nursing student's intervention will improve the students nursing performance on applying injury precaution and safety measures and detection of barriers to apply injury precaution and safety measures.

Program description:

The program was designed to evaluate the of nursing students intervention regarding safety measures in emergency unit through; assessing the knowledge and performance of nursing students related to safety measures, assessing hospital infection regarding emergency unit, planning& implementing intervention program based on their safety measures, and evaluating the intervention on knowledge, performance and safety measures in emergency unit.

Specific objectives:

At the end of the program the nursing student will be able to:

- Improve basic knowledge regarding hospital infection and factors leading to source of infection, method of transmitted as the following: Meaning of infection, sterilization, cleaning & disinfectant.
- Clarify for the student's importance knowledge to raising their knowledge toward infection control.
- Demonstrate technique universal precautions which include (hand washing, uses of personal protective equipment, re-use of machinery, assistance in insertion of peripheral intravenous catheter, preparation of IV fluids and medication, linen management, waste management and cleaning medical instruments. dealing with the furniture and sheets, environment
- Encourage students for apply gained knowledge into performance.
- Implementing training program for improving the students nurses performance toward infection injury precaution and safety measures.

Improving the students nurse's performance toward injury precaution and safety measures

Applying the slandered of precaution and safety measure: including, the compliance of students nurses in school with universal precautions which include (hand washing, uses of personal protective equipment, re-use of machinery, assistance in insertion of peripheral intravenous catheter, preparation of IV fluids and medication, linen management, waste management and cleaning medical instruments. dealing with the furniture and sheets, environment .

Increase the nursing students' awareness towards meaning of injury, precaution, safety, methods of transmitting infection, universal precaution of infection control, disinfection, sterilization and isolation.

Program content:

The program content helps nursing student in (Dar El-Shifa and Abbasiya nursing school) to gain the basic knowledge, applying ideal practices related to safety measures. Student nurses were divided in two groups; each group contains 60 nursing students. The program sessions were contained one hour theory and four hours practices. Teaching methods were done lectures, group discussion and role playing. Teaching material was Arabic Booklet and audio visual materials.

Outline of the program contents:

Educational component:

- Define meaning of infection.
- Meaning of injury.
- Meaning of precaution and safety measures.
- Identify method of transmitting infection universal precaution of infection control
- Meaning of disinfection, sterilization and isolation
- Demonstrate process of hand washing technique.
- Recognize personal protective equipment's.
- Demonstrate process of uses personal protective equipment's

- Demonstrate process of re-use of machinery technique
- Demonstrate process of insertion of peripheral intravenous catheter technique
- Demonstrate process of preparation of IV fluids and medication technique.
- Explanation linen management technique
- Explanation waste management technique.
- Demonstrate process of cleaning medical instruments.
- Recognize ways for dealing with the furniture and sheets
- Recognize dealing with the environment

Teaching methods:

Illustrated session supplemented by audiovisual aids encouraging the students to interrupt the researcher for questions, comments and clarification and this through: group discussion, demonstration and re-demonstration.

Audiovisual aids: Pictures, handouts (Booklet), slid presentation and data show

Evaluation phase:

Formative evaluation: was carried out using the previously mentioned tools, pre and post test was done regularly throughout the program through: ongoing questions and answers and re-demonstration.

Summative evaluation: was done at the end of intervention program (post-test) to assess the students' knowledge acquired, while comparing regarding self-learning versus traditional learning was tested after 3 months from the end of the program (post-test).

Administrative design:

Ethical consideration:

Approval was obtained from ethical scientific research committee at faculty of nursing, Ain shams University, and then written official letter sent to the director of (Dar El Shifa nursing school and psychiatric health nursing school), include the title and purpose of study was submitted from concerned authorities in nursing schools to get approval for data collection to conducted this study.

Prior to the study, a permission from student to conduct the study has be taken, they were informed about, aim, methods, anticipated benefits and absence of potential hazards had to be explained to assure students about the safety of the study, and to let them obtain real participation in the research process and to inform them about their rights to with draw from the study at any time.

Statistical analysis:

The collected data organized, tabulated and statistically analyzed using Statistical Package for Social Science (SPSS) version 25 for windows. Descriptive statistics were applied (numbers, percentages, mean and standard deviation).Test of significance, Chi-square test (χ^2) this test used to compared for qualitative variables and correlation coefficient (r) were done for assessment of inter relationship among quantitative variables that were normally distributed or when one of the variables is qualitative, these tests were applied to test the study hypothesis. Reliability of the study tools was done using Cronbach's Alpha. A highly significant level value was considered p - value < 0.001 , significant level value was considered when p - value < 0.05 and no statistical significance difference was considered when p - value > 0.5 .

RESULTS

Table (1): frequency distribution of studied students (self-learning and traditional learning groups) regarding their personal characteristics (n=120).

Personal characteristics	Self-Learning group (n=60)		Traditional Learning group (n=60)		X ²	P-value
	No	%	No	%		
Age/ years					0.430	0.512
15 < 16	45	75.0	48	80.0		
16 < -17	15	25.0	12	20.0		
Mean ±SD	15.21±0.64		15.31±0.57			
Sex					0.301	0.583
Female	33	55.0	30	50.0		
Male	27	45.0	30	50.0		
Class level					0.686	0.408
First	51	85.0	54	90.0		
Second	9	15.0	6	10.0		

Table (1) clarifies that, 75% & 80% of both self-learning group and traditional learning group respectively in age group 15 years to less than 16 years with a mean age of 15.21±0.64 years and 15.31±0.57 years respectively. Also, 55% & 50.6% of both self-learning group and traditional learning group were female respectively. Concerning level of education, 85% & 90% of both self-learning group and traditional learning group were in first class level respectively. Additionally there was no statistical significance difference between study and control groups regarding socio demographic characteristics.

Table (2): percentage distribution of studied students (self-learning and traditional learning groups) regarding their total satisfactory knowledge about safety measures emergency unit (n=120).

Items	Self-learning (n=60)		Traditional L. (n=60)		X ² (1) P-value	X ² (2) P-value
	pre	post	pre	post		
Infection in emergency unit	35.0	73.3	18.3	31.7	17.757 .0000	2.844 .0917
Standard precautions for infection control	10.0	60.0	8.3	20.0	32.967 .0000	3.358 .0669
Wash hands	31.7	96.7	11.7	35.0	55.125 .0000	9.130 .0025
Wearing protective masks, gown and apron	16.7	75.0	15.0	20.0	41.119 .0000	0.519 .4711
Face mask and eye protection	18.3	85.0	20	23.3	53.393 .0000	0.196 .6576
Precautions with needles and sharp materials	21.7	88.3	16.7	30.0	53.872 .0000	2.981 .0842
Contaminated sheets	33.3	91.7	13.3	40.0	43.556 .0000	10.909 .0010
Refills contaminated waste	15.0	86.7	8.3	18.3	67.669 .0000	2.569 .1071
Liquid waste (vomit - blood - feces) disposed	6.7	65.0	8.3	15.0	37.215 .0000	1.294 .2553
Permanent tools (kidney basin, scissors...) cleaned	11.7	85.0	6.6	11.7	64.605 .0000	0.901 .3426
Contaminated surfaces cleaned	36.7	90.0	10.0	35.0	36.746 .0000	10.753 .0010

X² (1) between pre/post in self-learning group, X² (2) between pre/post at traditional group

** Highly significance p<0.001 * significance p<0.05

Table (2) reveals that, there were highly statistically significant differences in relation to knowledge about safety in the emergency unit items between self learning groups ($P < 0.001$). 73.3% of studied students self learning had total satisfactory knowledge about infection in emergency unit compared to 31.7% of students in traditional group. As regards standard precautions for infection control 60% of them had total satisfactory knowledge in self learning group compared to 20% of them in traditional learning group. Concerning hand wash 96.7% of studied student had total satisfactory knowledge in self learning group compared to 35% of them in traditional learning. In addition, 75% of studied students self learning had total satisfactory knowledge about wearing protective masks, gown and apron and 20% in traditional learning. Regarding face mask and eye protection 85% of studied self learning student had total satisfactory knowledge. As regards precautions with needles and sharp materials 88.3% of studied self learning student had total satisfactory knowledge while, 30% of them in traditional learning. Furthermore, the majority (91.7% & 86.7%) of students self learning had total satisfactory knowledge about contaminated sheets and refills contaminated waste respectively. Also, 65% of students self learning had total satisfactory knowledge about liquid waste disposal. Finally 85% & 90% of students self learning had total satisfactory knowledge about permanent tools cleaned & contaminated surfaces cleaned.

Figure (1): percentage distribution of studied students' total knowledge (self-learning and traditional learning groups) regarding safety measure in emergency unit pre and post program (n=120)

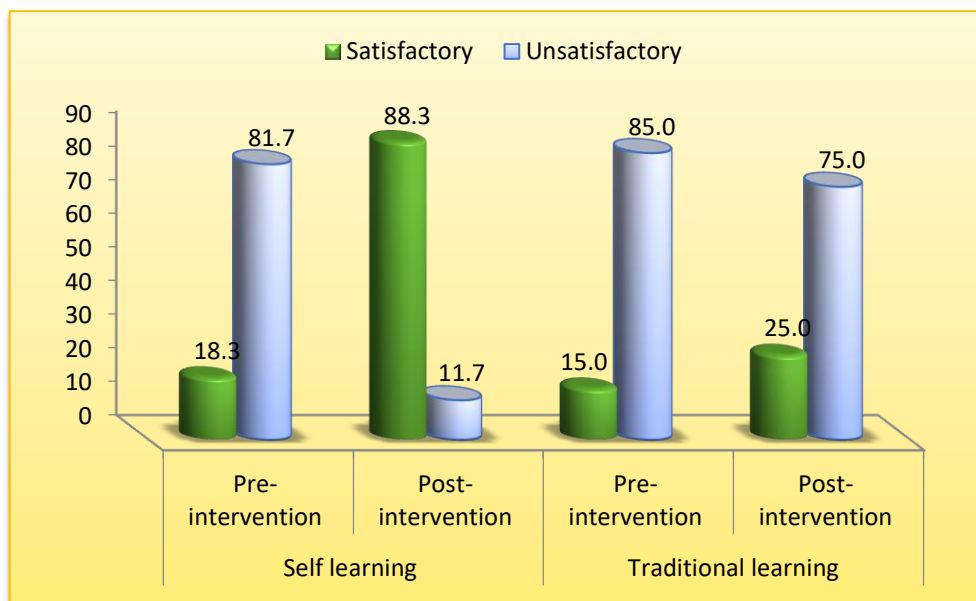


Figure (1) illustrates that, 18.3% of self learning group nursing students had satisfactory total knowledge regard safety measure in emergency unit at pre program and increased to 88.3% of them post program. While 15% of traditional learning group nursing students had satisfactory total knowledge regard safety measure in emergency unit pre program compared to it to 75% of studied students at post program.

Table (3): percentage distribution of studied students (self-learning and traditional learning groups) regarding their total competent practices about safety measures emergency unit (n=120).

Items	Self learning (n=60)		Traditional L. (n=60)		X ² (1)	2X ² (2)
	Pre	Post	Pre	Post	P-value	P-value
hand washing	36.7	86.7	15.0	20.0	31.727 .0000	0.519 .4711
IV therapy administration	15.0	91.7	8.3	40.0	70.848 .0000	16.415 .0001
insertion of peripheral intravenous catheter	18.3	80.0	6.7	23.3	45.646 .0000	6.536 .0106
changing the bed sheets	11.7	86.7	13.3	23.3	67.519 .0000	2.004 .1569
waste handling	10	75.0	6.7	40.0	51.867 .0000	18.634 .0000
spills of blood and body fluids	6.7	70.0	3.3	41.7	50.905 .0000	25.281 .0000

X² (1) between pre/post in self learning group, X² (2) between pre/post at traditional group

** Highly significance p<0.001 * significance p<0.05

Table (3) reveals that, there were highly statistically significant differences in relation to practices about safety in the emergency unit items between self learning group (P= .000). 86.7% of studied students self learning had total competent practices about hand washing in emergency unit post program compared to 20% students in traditional group. As regards IV therapy administration 91.7% of them had total competent practices in self learning group compared to 40% of them in traditional learning group post program. Concerning insertion of peripheral intravenous catheter 80% of studied student had total competent practices in self learning group compared to 23.3% of them in traditional learning. In addition, 86.7% of studied students self learning had total competent practices about changing the bed sheets and 23.3% in traditional learning post program. Furthermore, waste handling 75% of studied self learning student had total competent practices compared to 40% in traditional group. As regards spills of blood and body fluids 70% of studied self learning student had total competent practices while, 41.7% of them in traditional learning had also competent practices in spills of blood and body fluids.

Figure (2): percentage destruction of studied students (self-learning and traditional learning groups) regarding their total practices level related safety measures in emergency unit pre and post program (n=120).

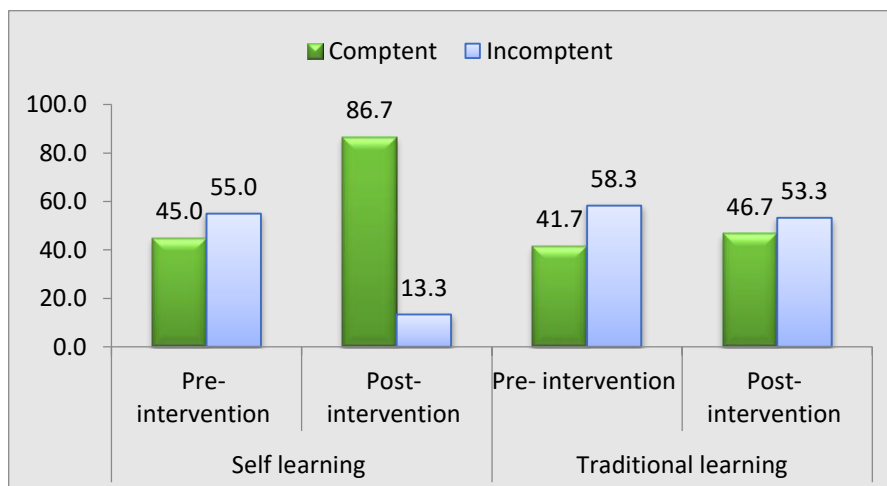


Figure (2) illustrates that, 45% of self learning group nursing students' total practice regard safety measures in emergency unit were competent pre program and increased to 86.7% of them post program. While 41.7% of traditional learning group nursing students' total practice regard safety measures in emergency unit were competent pre program compared to 46.7% at post program

Table (4): frequency distribution of studied students (self-learning and traditional learning groups) regarding their satisfaction post implementation (n=120).

Students' satisfaction	Self Learning group (n=60)		Traditional Learning group (n=60)		X ²	P-value
	No	%	No	%		
Effectiveness of different learning strategy	54	90.0	18	30.0	45.00	.0000
Effectiveness of the course	57	95.0	10	16.7	74.649	.0000
Time consuming	59	98.3	16	26.7	65.742	.0000
Usefulness of materials	54	90.0	14	23.3	45.299	.0000
Financial cost	54	90.0	19	31.7	4.845	.0000
Barriers inhibiting learning	58	96.7	11	18.3	75.328	.0000

X² (1) between pre/post in self learning group, X² (2) between pre/post at traditional

** Highly significance p<0.001 * significance p<0.05

Table (4) reveals that, there were highly statistically significant differences in relation to students' satisfaction post program implementation about self learning versus traditional learning in the emergency unit (P < 0.001). Regarding the effectiveness of different learning strategy, 90% of studied nursing students self learning had satisfaction compared to 30% students in traditional group. 95% of nursing students had satisfaction about effectiveness of the course in self learning group compared to 16.7% of them in traditional learning group. Concerning time consuming 98.3% of studied student had satisfied compared to 26.7% of them in traditional learning. In addition, 90% of studied students self learning had total satisfied respectively about usefulness of materials & financial cost compared to 23.3% & 31.7% in traditional learning. Finally 96.7% of students self learning had satisfied about barriers inhibiting in learning compared to 18.3% in traditional learning.

Table (5): correlation between total knowledge and total performance among studied students using self-learning and traditional learning methods (n=120)

Total practices	Total knowledge	
	Self-learning	Traditional learning
R	0.480	.449
P-value	.006*	.006*

* Significance p<0.05

Table (5): clears that there was a positive highly statistically significant correlation between total knowledge and total performance among studied students using self-learning. Also, a positive statistically significant correlation between total knowledge and total performance among studied students in traditional-learning methods.

DISCUSSION

Nurse educators are being courage to use teaching strategies which enable students to be more responsible for their learning innovative teaching strategies in nursing education are expected to promote nursing students' skills to be actively involved in self-regulating learning, to transform traditional one-way delivery of knowledge and to cultivate patients-centered learning. So, it can be

agreed that one of the primary aims of higher education in today's information technology enabled classroom, is to make nursing students more active in the learning process (**Ghasemi et al., 2020**).

Regarding personal characteristics of the studied students (self-learning and traditional learning groups), the current study revealed that that majority of both studied groups were in age group between 15 to 16 years with a mean age of 15.21 ± 0.64 years and 15.31 ± 0.57 years respectively. This young age can be attributed to this study was conducted in nursing institutes after completion of preparatory level of education. This result was contradicted with **Berga et al., (2021)** who conducted a study about "Blended learning versus face to face learning in an undergraduate nursing health assessment course", in Canada, and found that majority of the studied students' age were between 18 to 24 years old. Also, a study carried out by **Baars, (2019)** entitled "Effects of self-directed learning vs. learning in traditional settings on nursing students' self-efficacy moderated by readiness", in Netherlands reported that the average age of the participants was 21.81 years old (SD = 6.67).

Furthermore, the current study represented that more than half of both self-learning group and traditional learning group were female respectively. This may be related to nursing is a female dominated profession in Egypt. This result was in accordance with **Vallée et al., (2020)** entitled "Blended learning compared to traditional learning in medical education", in France, and stated that the highest percentage of the studied participants were females. Also, a study carried out by **Putri & Sumartini, (2021)** who conducted a study about "Integrating peer learning activities and problem-based learning in clinical nursing education" and found that the majority of the studied nurses were females.

As well, the current study reflected that most of both self-learning group and traditional learning group were in first class level respectively. Additionally there was no statistical significance difference between both groups regarding socio-demographic characteristics. This result was similar to a study conducted **Ahmad & Mohamed, (2018)** about "The effect of peer learning vs. traditional learning on knowledge and clinical performance of critical care nursing students", in Egypt and found that there was no significant difference between the studied groups as regard their personal characteristics. In the same line, a study done by **Alkhaibary et al., (2021)**, entitled "Determining the effects of traditional learning approach and interactive learning activities on personal and professional factors among Saudi intern nurses" in Saudi Arabia, stated that there was no significant difference between the studied groups as regard their demographic data.

Concerning knowledge of the studied students (self-learning and traditional learning groups) about infection in emergency unit pre and post program, the current study showed that there were highly statistically significant differences between pre and post-program in self-learning group, while there were no statistically significant differences between pre and post-program in traditional learning group. This may be related to the significant effect of self-learning on nurses' knowledge about infection in emergency unit as the infectious diseases that can be transmitted directly through blood in the emergency unit and transmitted through the respiratory system.

This result was compatible with a study carried out by **Morsy et al (2021)**, about "effect of computer mediated instruction technique on knowledge and practice of critical care nursing students" in Egypt and found that a statistical significant differences were found between the study and control groups and in the study group afterwards the implementation of computer mediated instruction technique in relation to students' knowledge.

As regard the studied students' knowledge (self-learning and traditional learning groups) about standard precautions for infection control in the emergency unit, the current study revealed that there were highly statistically significant differences between pre and post-program in self-learning group, but there were no statistically significant differences between pre and post- program in

traditional learning group. This can be attributed the positive impact of self learning on improving the students' knowledge about importance of standard precautions for infection control.

In the opposite line, a study conducted by **El-Sayed et al., (2022)** in Egypt about "E-Learning Strategy versus Traditional Learning Strategy on Pediatric Nursing Students' Knowledge, Engagement, and Clinical Performance during COVID 19" and reported that students using traditional method of teaching had more knowledge retention than students using e-learning and a statistically significant difference was found between the two groups in all over the three period of the study. This contradiction may be due to the lack of nursing students' experience in using different E-learning platforms.

Concerning the studied students' (self-learning and traditional learning groups) knowledge about wash hands & wearing protective mask pre and post program respectively, the present study indicated that there were highly statistically significant differences between pre and post- program in self-learning group, while there were no statistically significant differences between pre and post-program in traditional learning group. This may because the effectiveness of self-learning in improving the students' knowledge regarding the important steps of hand washing & wearing protective mask.

As regards the students' (self-learning and traditional learning groups) knowledge about take precautions with needles and sharp materials and contaminated sheets & other items respectively pre and post program, the current study portrayed that there were highly statistically significant differences between pre and post-program in self-learning group, whilst there were no statistically significant differences between pre and post-program in traditional learning group. This may be due to the significant impact of self-directed learning on nurses' knowledge regarding the importance of disposing needles and sharp materials & contaminated sheets. Similarly, this result agreed with a study done by **Tekkol & Demirel, (2018)** entitled "An investigation of self-directed learning skills of undergraduate students" in Turkey and reported that self-directed learning has a positive effect on overall students' academic achievement.

Pertaining the students' (self-learning and traditional learning groups) total knowledge level pre and post program, the present study indicated that nearly one fifth of self-learning group had satisfactory total knowledge safety measure in emergency unit at pre-program phase and it improved to most of them at post program. While less than one fifth of traditional learning group had satisfactory total knowledge at pre-program phase and it increased to only one quarter of them at post program. This can reflect the positive impact of self-directed learning on students' knowledge about safety measure in emergency unit.

Regarding the studied students' (self-learning and traditional learning groups) practices about hand wash, IV therapy, insertion the peripheral catheter pre and post program, the current study revealed that there were highly statistically significant differences between pre and post-program in self-learning group, while there were no statistically significant differences in traditional learning group. This may be due to the effectiveness of self-directed learning in improving the students' practice regarding previous items. Consistently, a study performed by **Chen et al., (2023)** about "Self-directed learning: Alternative for traditional classroom learning in undergraduate ophthalmic education during the COVID-19 pandemic" in China and reported that there were higher performance skills on behave of the self-directed learning group than for the traditional classroom learning group.

According to the of studied students' (self-learning and traditional learning groups) practices about changing the bed sheets, handling the waste and spill body fluids pre and post program, the present study reflected that there were highly statistically significant differences between pre and post-program in self-learning group. There were statistically significant differences between most items related to practice about insertion of peripheral intravenous catheter between pre and post-program

in traditional learning group. This may be related to the effectiveness of self-directed learning in improving the students' practice regarding changing the bed sheets handling the waste and spill body fluids. This result was compatible with **Nazarianpirdosti et al., (2021)** who studied "Evaluation of self-directed learning in nursing students" and reported that there were higher performance skills on behalf of the study group than for the control group.

Pertaining to studied students' total practices level related safety measures in emergency unit pre and post program, the current study result showed that the majority of self-learning group' total practice regard safety measures in emergency unit were competent post program phase compared to less than half of traditional learning group post program. This result reflects the significant impact of self-directed learning on the students' total practices level regarding safety measures in emergency unit compared to the traditional learning. In the same line, a study carried out by **Elsayed et al., (2022)** reported that mean participants' practices in e-learning group was more than the traditional group and highly statistical significant differences were found between the two groups all over the three period of the study.

Pertaining to correlation between total knowledge and total practices among studied students (self-learning and traditional learning groups) regarding pre and post program, the current study highlighted that there was a positive highly statistically significant correlation between total knowledge and total practices among studied students in self-learning group in the post program. While there was a positive statistically significant correlation between total knowledge and total practices among students in traditional-learning groups in pre and post program. This can be interpreted as students who have satisfactory level of knowledge seem to have competent practice. This result follows the logic that increasing knowledge of any topic leads to greater potential of its application.

CONCLUSION

Based to the findings of the current study it was concluded that: Implementation of nursing student intervention had positive effect on knowledge, practices for two groups (self-learning & traditional learning) regarding safety measure in emergency unit

RECOMMENDATION

On light of the present study finding following recommendations are suggested:

- Educational program for nursing students to raise their awareness about safety measures in emergency unit should be a priority in nursing schools to ensure early protective from infection.
- A simplified and comprehensive booklet should be available for all nursing student include a clear, brief and simple explanation about safety measures in emergency unit and how to deal with hospital infection.
- Utilize the internet to present different educational programs to raise nursing student's awareness regarding safety measures.
- Further researches must focus on the optimal learning strategies for improve the nursing students in emergency units in hospitals.

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