A Quasi-Experimental Study to Assess the Effectiveness of Computer Assisted Teaching Programme on Knowledge Regarding Care of Patient on Mechanical Ventilator Among Staff Nurses in Selected Hospitals of District Mohali, Punjab

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ABSTRACT

The present study was conducted with the purpose to assess effectiveness of computer assisted teaching programmne on knowledge regarding care of patient on mechanical ventilator among staff nurses. The conceptual framework of the study is based on Modified Imogene M. King Goal Attainment Theory (1981). Pilot study was conducted in the month of March 2016, on 10 subjects (5 in experimental group and 5 in control group). This method was done to ensure the reliability of tool and feasibility of the study. The actual data collection was carried out in the month of March 2016. Sixty subjects (30 in experimental group and 30 in control group) were selected by convenience sampling technique. The samples were taken from two different hospitals of District Mohali, Punjab. The tool comprised of demographic profile and computer assisted teaching programme to assess the knowledge of staff nurses regarding care of patient on Mechanical ventilator. After obtaining formal permission from higher authorities and written informed consent from subjects, pretest was conducted from both groups and computer teaching programme regarding care of patient on mechanical ventilator was administered to each subject in experimental group only. After 7 days, posttest was conducted from both groups to assess the posttest knowledge to evaluate the effectiveness of computer assisted teaching programme regarding care of patient on mechanical ventilator among staff nurses. After posttest CAT programmer was administered to control group also. The gathered data were analyzed by using descriptive and inferential statistics in term of calculating mean, standard deviation, frequency and percentage, Chi square, t-test, and ANOVA. Study findings depicted that in control group, majority of subjects in pretest (57%) had average knowledge and in posttest (63%) had average knowledge, whereas in experimental group, majority of subjects (63%) had average knowledge in pre- but in posttest mostly had good (83%) knowledge regarding care of patient on mechanical ventilator. The significant level was checked on p-value 0.001,0.01 and <0.05. Hence, it can be concluded that the computer assisted teaching programme Regarding care of patient on mechanical ventilator was effective in enhancing the knowledge in experimental group. The study findings concluded that the computer assisted teaching programme regarding care of patient on mechanical ventilator was effective in increasing the knowledge level in experimental group.

Keywords: care of patient on mechanical ventilator, computer assisted teaching programme, effectiveness, knowledge, staff nurses

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INTRODUCTION

Medical devices are vital for safe and effective prevention, diagnosis, treatment and rehabilitation of illness and disease. Mechanical ventilator is such a device, advent of which has revolutionized the

health care across the globe. It has given a possibility of survival to number of people with otherwise fatal diseases [1]. Advanced technology is a major part of the ICU and mechanical ventilation (MV) is one of the most commonly used treatment modalities in the care of the critically ill patient. Up to 90% of patients globally require mechanical ventilation (MV) during some or most part of their stay in the ICU [2]. Mechanical ventilation (MV) is a key component in the care of critically ill and injured patients [3]. Mechanical ventilation is a beneficial modality for patients who are unable to sustain the level of ventilation necessary to maintain the gas exchange functions. Mechanical ventilation may be indicated in conditions due to physiologic changes, disease states, medical/surgical procedures, as well as many other conditions leading to ventilator failure (or) oxygenation failure [4].

Mechanical ventilator is a breathing device that can maintain ventilation and oxygen delivery for a prolonged period. Breathing needs the movement of air into and out of the lungs. This is normally completed by the diaphragm and chest muscles. A various types of medical conditions can impair the ability of these muscles to accomplish this task, including muscular dystrophies, motor neuron disease, including ALS damage to the brain's respiratory centers, myasthenia gravis, myopathies affecting the respiratory muscles, scoliosis, multiple injury, comma, neuro muscular disorder, lung cancer etc. These conditions require the use of the mechanical ventilator [5].

Mechanical ventilator was traditionally classified according to the method by which they supported ventilation. The two common categories are negative pressure and positive pressure ventilators. Negative pressure ventilators (e.g., iron lungs, chest cuirass) are older modes of ventilator support that are rarely utilized today. Commonly used now days are positive

pressure ventilators, which are further classified by the method of ending the inspiratory phase of respiration volume cycled, pressure cycled, and high frequency oscillatory support. The fourth type, non-invasive positive pressure. Volume cycled (inspiration is terminated after a preset tidal volume has been delivered by the ventilator. The ventilator delivers a preset tidal volume and inspiration stops when the preset tidal volume is achieved) Pressure cycled ventilator (in which inspiration is terminated when a specific airway pressure has been reached. The ventilator delivers a preset pressure, once this pressure is achieved, end inspiration occur) high frequency oscillatory support (use a small tidal volume (1 to 3 ml/kg)at frequencies greater than 100 beats/min. a high frequency ventilator would be used to achieved lower peak ventilator pressure, and by lowering the risk of Barotrauma.)The fourth type is noninvasive positive pressure ventilation does not require intubation i.e. CPAP. Different ventilator modes are used for patients as per their condition which refers to how breath is delivered to the patient. The most commonly used modes are continuous mandatory, assist-control, intermittent mandatory ventilation, synchronized intermittent mandatory ventilation, and airway pressure release ventilation [6].

Caring for a patient on mechanical ventilator has become an integral part of nursing care in critical care or general medical surgical units, extended care facilities, and the home. Nurses and other health care team members must understand each patient's specific pulmonary needs and work together to set realistic goals. Positive patient outcomes depend on an understanding of the principals of mechanical ventilation and the patient's care needs as well as open communication among members of the health care team about the goals of therapy, weaning plans,

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and the patients, tolerance of changes in ventilators settings [7].

A patient on mechanical ventilator presents a major challenge and consequent reward to nursing. The nurse should provide vital individualized care directed towards the survival of the patient. Each individual nurse is responsible to take appropriate measures to save the life of the patient under her care. The number of patients on mechanical ventilator is rapidly increasing. These patients may be conscious or unconscious. The nursing staffs have to assist or perform the various activities of living until the patient fully regains consciousness [8]. The nurse coordinates efforts of the health care team, teaches and supports the client and the family, monitors the client's response to ventilation, intervenes to maintain oxygenation and ventilation and ensures that the client's complex needs are met. In order to provide a better comprehensive care to the mechanically ventilated patient, the nurse should have good working knowledge regarding the mechanical ventilation and also have the practical skills to provide better care to those patients [7].

Nurses need to assess the patient on various parameters including cardiac and respiratory functions, maintain a clear and patent airway, maintain a therapeutic environment free from infection, provide basic care to patient, meet his nutritional needs, maintain fluid and electrolyte balance, administer medications and provide psychological support and facilitate communication to patient on mechanical ventilator. Nurses also play an important role in weaning the patient from mechanical ventilator [8].

Although mechanical ventilation is essential to maintain ventilation and oxygenation, it can cause adverse effects.

Patients on mechanical ventilation are prone to develop complications. Most common complications can be divided into those resulting from endotracheal intubation, from mechanical ventilation itself, or from prolonged immobility and inability to eat normally [8]. Mechanical ventilation is often life-saving procedures, but constitutes an expensive treatment modality which is associated with iatrogenic complications such as ventilator-associated pneumonia (VAP) and ventilator-induced lung injury, which can lead to the development of the Acute Respiratory Distress Syndrome (ARDS) and increased mortality and morbidity. These complications can be prevented to a great extent by providing skilled and good quality nursing care, i.e., by assessing the endotracheal tube position through marking the point, cuff inflating pressure, using proper suctioning technique, mobilize secretions through chest physiotherapy, etc. So, it becomes essential for staff nurses to be skillful and knowledgeable regarding care of patient with mechanical ventilator [9].

Caring of mechanically ventilated patient requires that, the crucial knowledge is essential understand the Patho physiology of pulmonary conditions that necessitate the ventilator therapy as well as how to monitor & intervene when appropriate knowledge of ventilation parameters and mode, in conjunction with the use of capnography – respiratory wave form monitoring, is essential. As a nurse it is essential to know about knowledge regarding various aspects like airway management, positioning, nutritional therapy, medication, communication, weaning of the patient and prevention of complication about care of patient on mechanical ventilator is more essential of provide safe nursing care [10].

Need of the Study
Mechanical ventilation (MV) is one of the core components of supportive therapy for

critically ill patients and is often lifesaving [11]. Caring for a patient who needs MV requires sound knowledge of MV and pulmonary physiology. Mechanical ventilators have now been in use since decades and have come a long way. Mechanical ventilation for acute respiratory failure was started in Copenhagen during the 1952 polio epidemic (Ibsen 1952). Although modern ventilators since the 1950's have worked by intermittent positive pressure ventilation (IPPV), breathing air into the patient, the spatial metaphor still lingers in the Danish language, "the patient is in the respirator" [12].

The nurse should provide vital individualized care directed towards the survival of the patient. Each individual nurse is responsible to take appropriate measures to save the life of the patient under her care. The nurse coordinates efforts of the health care team, teaches and supports the client and the family, monitors the client's response to ventilation, intervenes to maintain oxygenation and ventilation and ensures that the client's complex needs are met [13]. She also in order to provide a better comprehensive care to the mechanically ventilated patient, so the nurse should have good working knowledge regarding the mechanical ventilation and also have the practical skills to provide better care to those patients. So, we can use the computer assisted teaching programmes to teach nurses.

According to WHO, 8.7% of patients Hospital acquired infection with mortality rate as high as 50%. Ventilator associated pneumonia is the most common Hospital acquired infection among mechanically ventilated patients worldwide, is a major clinical concern, associated with high incidence rates, mortality and costs. In Europe, United states, and Asia Ventilator associated pneumonia rates range from 9 to 40%, and as high as 78% [14].

According to Indian statistical analysis, ventilator associated pneumonia was 24 out of 51 cases. The mortality in the Ventilator Associated Pneumonia group was 37% [15]. According to Bangalore Statistical analysis incidence of Ventilator associated pneumonia was 8.3% of the total number of patients on ventilatory support. These complications can prevent by good nursing care [16]. The most common reasons for initiation of MV are described as follows: pneumonia/acute lung injury (33.2%), chronic obstructive pulmonary disease (9.7%), cardiogenic pulmonary edema (5.2%), neurological emergencies (16.9%), postoperative complications (24%) and cardiopulmonary arrest (11%) [17] and the first study with information about the incidence of mechanical ventilation in a large population of patient admitted to the ICU. These authors reported that 49% of the 3884 patients included in the APACHE III database had received mechanical ventilation, bus also noted that a significant percentage (64%) of these patients were in the postoperative period and therefore need mechanical ventilation for less than 24 hours. In contrary, an observational study performed in 48 Spanish medical surgical ICUs found that 46% of patients were mechanically ventilated at least for 24 hours. In 1996, a one-day point prevalence study was carried out with 4,153 patients admitted in 412 ICUs from 8 countries, showing that 39% of patients required mechanical ventilation recently, it has been reported, in a prospective study including 15, 757 patients from 20 countries, that 5183 patients (33%) required mechanical ventilation [18].

Maria R, Kaur D (2015) conducted a quasi-experimental study comparing the Video Assisted Teaching (VAT) and the Self Instructional Module (SIM) regarding care of patients on ventilator on the knowledge and practices of the staff nurses. Then group I was shown video while group II received SIM. Posttests

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conducted after 7 days; analysis revealed VAT & SIM were equally effective in improving the knowledge as well as practices. However, upon comparison mean knowledge scores between the two group (21.97, ±2.141 & 26.57, ±1.382) were highly significant while mean practice scores (43.33, ± 3.977 and 43.83, ±4.136) were non-significant leading to conclusion that SIM was more effective in enhancing the knowledge and of staff nurses as compared to VAT, being a useful handy tool, in the clinical setting [19].

Sedwick and Smith (2012) conducted this study, using evidence-based practice to prevent ventilator associated pneumonia. Adherence to practices included in the bundle increased. Consent rates were greater than 98% for prophylaxis for peptic ulcer disease and deep-vein thrombosis, interruption of sedation, and elevation of the head of the bed. The consent rate for the oral care protocol increased from.

76% to 96.8%. Readiness for extubation reached at least 92.4%. Rates of ventilator-related pneumonia decreased from 9.47 to 1.9 cases per 1000 ventilator days. The decrease in rates formed an estimated savings of approximately $1.5 million. Strict adherence to bundled practices for preventing ventilator-associated pneumonia enhanced accountability for initiating protocols, use of a feedback system, and interdisciplinary collaboration improved patients' outcome and produced marked savings in costs [20].

So, knowledge and good practice are very important in the field of nursing. Nurses should have good skills while caring the clients. Nurses who are working should possess good practice of taking care of client with ventilator. It is important that nurse can prevent the complication which arises during the care of mechanical ventilator. Nurses should know the purpose and understanding of mechanical ventilator as well as the precautions while giving caring to the client on ventilator [21]. Various studies done to assess the knowledge and practice of staff nurses regarding care of patients on mechanical ventilator showed that the nurses have inadequate knowledge in this area. The studies also showed that there is significant association between knowledge score and age of staff nurses, years of experience and exposure to special training program.

In light of above facts and with researchers own personal experience, the nurses must know about taking care of critically ill patient when they are posted in intensive care unit as they are facing difficulties and not having adequate knowledge in care of patient supported in mechanical ventilator. So, researcher has planned to conduct a study to assess the effectiveness of computer assisted teaching programme on knowledge regarding the care of patient on mechanical ventilator. This will improve the quality of nursing care in the hospitals.

Statement of the Problem
A Quasi-Experimental Study to Assess the Effectiveness of Computer Assisted Teaching Programme on Knowledge Regarding Care of Patient on Mechanical Ventilator among Staff Nurses in Selected Hospitals of District Mohali, Punjab.

Aim of study
The aim of the Study is to Assess the Effectiveness of Computer Assisted Teaching Programme on Knowledge Regarding Care of Patient on Mechanical Ventilator among Staff Nurses.

Objectives
- To assess and compare the pretest knowledge score of experimental and control group regarding care of patient with mechanical ventilator.

- To develop and implement the computer assisted teaching on care of patient with mechanical ventilator in experimental group.
- To evaluate the effectiveness of computer assisted teaching programme by comparing the posttest knowledge score regarding care of patient on mechanical ventilator in experimental and control group.
- To find on association between posttest knowledge score of subjects regarding care of patient on mechanical ventilator and their selected demographic variables.

Operational Definitions

Effectiveness – It refers to the extent of knowledge gain regarding care of patient on mechanical ventilator as evidenced by difference in pretest & posttest knowledge score.

Computer assisted teaching programme – In this study it refers to systematic face to face teaching regarding care of patient on mechanical ventilator, which will be provided through the use of computerized technology.

Care of patient on mechanical ventilator – It refers to the activities or actions of care to be implemented by staff nurses on patient with mechanical ventilator.

Staff nurses – It refers to individual who have passed diploma, degree or master degree in nursing and registered in particular state nursing council and are providing direct care to the patients in selected hospitals of District Mohali, Punjab.

Hypothesis

Null hypothesis (H_0) – There will be no statistically significant effect of computer assisted teaching programme on knowledge of staff nurses regarding care of patient on mechanical ventilator.

Research hypothesis (H_1) – There will be significant effect of computer assisted teaching programme on knowledge of staff nurses regarding care of patient on mechanical ventilator.

Conceptual Framework

A conceptual framework present logically constructed concept to provide general explanation of the relationship between the concepts of the research study.

The conceptual framework used for the present study was based on – modified Imogene king's Goal attainment theory (1981) [22]. In the goal attainment theory, two people, who are stranger come together in a health care organization to help and be helped to maintain role functioning. In the study, the investigator and the staff nurses come together and interact with each other to achieve a specific goal.

The purpose of the study to assess the effectiveness of the computer assisted teaching programme on knowledge regarding care of patient on mechanical ventilator among staff nurses. This process describes the importance of mutual participation in interaction that focuses on the needs and welfare of the staff nurses and of verifying perception while planning and activities to achieve goal are carried together.

In the study, there is communication between investigator and staff nurses to develop mutual understanding that will lead to goal attainment. The major concept in Imogene king's goal attainment theory is given below.

Perception

It is the import and transformation of the energy and processing storing and exporting information. Perception is each person's and representation of reality. In the study, investigator perceive that

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knowledge on care of patient with mechanical ventilator is necessary for the staff nurses. Staff nurses perceive that knowledge is essential for caring of

patients with mechanical ventilator to promote easy recovery and prevent life threatening complications.
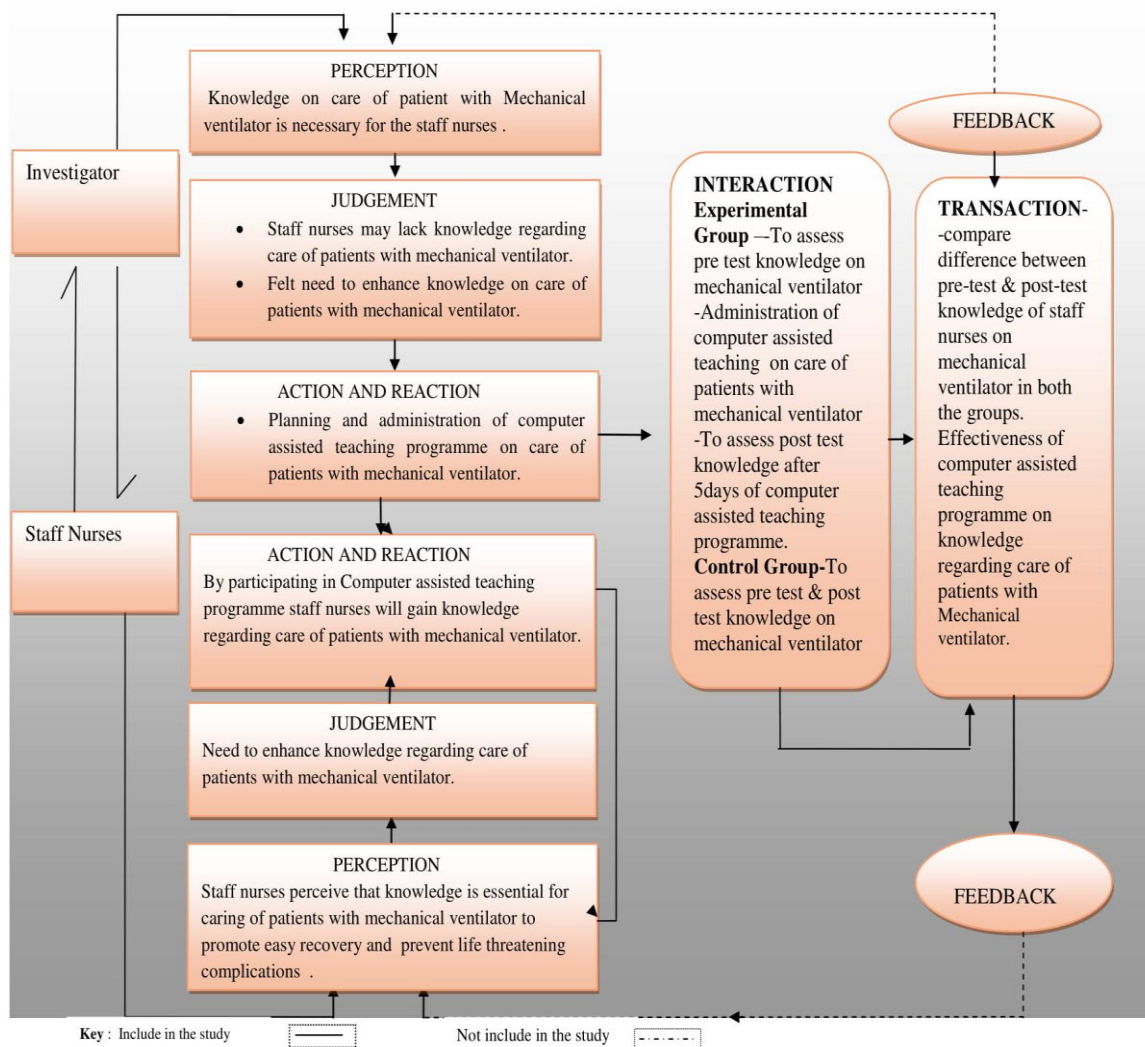
Fig. 1. Conceptual framework based on modified Imogene M. king goal attainment theory (1981).

Judgement
Based on perception, investigator make a judgement that staff nurses may lack knowledge regarding care of patient with mechanical ventilator and felt need to enhance knowledge on care of patients with mechanical ventilator. while staff nurses need to enhance knowledge regarding care of patients with mechanical ventilator.

Action and Reaction

Action is a sequence of behavior involving mental and physical action and reaction is not specified, but might be considered as included in the sequence of behaviors described in action. In the study, investigator planned and administrated of computer assisted teaching programme on care of patients with mechanical ventilator. Staff nurses by participating in computer assisted teaching programme staff nurses

will gain knowledge regarding care of patients with mechanical ventilator.

Interaction
It is represented by verbal and non-verbal behaviors that are goal directed. In the study, investigator in experimental group to assess pretest knowledge on mechanical ventilator-administration of computer assisted teaching on care of patients with mechanical ventilator to assess posttest knowledge after 5 days of computer assisted teaching programme, and in Control Group-To assess pre- and posttest knowledge on mechanical ventilator.

Transaction
It is purposeful interaction leading to goal attainment in the study investigator compare difference between pre- and posttest knowledge of staff nurses on mechanical ventilator in both the groups and effectiveness of computer assisted teaching programme on knowledge regarding care of patients with mechanical ventilator.

Feedback
It is the return of information about the result of activity. After completion of study, the computer assisted teaching programme on care of patients with mechanical ventilator among staff nurses was given to control group also. But it is not included in the study.

Summary
This article dealt with background of the study, need of the study, statement of problem, operational definitions of some terminologies and conceptual framework.

REVIEWS ON MECHANICAL VENTILATOR
Literature for the present study has been reviewed and organized as following:

Sunita and Elizabeth (2015) [23] conducted a study on effectiveness of structured teaching program regarding care of infants on mechanical ventilator at Krishna institute of nursing sciences, Karad. The result of study indicated that the student nurses had inadequate knowledge regarding care of infants on mechanical ventilator. In pretest majority 42(58.3%) of student nurses had average knowledge, 15(20.8%) had poor knowledge, and 15(20.8%) had good knowledge, where as in posttest 37(51.4%) had average knowledge, 32(44.4%) had good information, and 3(4.2%) had poor knowledge in total knowledge score of the study. Pretest mean knowledge score and standard deviation of the student nurses' regarding total knowledge score of care of infants on mechanical ventilator was 12.47 ± 2.43, which was increased in posttest to 24.05 ±1.18. The study concluded that structured teaching program was effective in increasing knowledge of students' nurses regarding care of infant on mechanical ventilator.

Yazdani et al. (2015) [24] conducted a comparative study of teaching clinical guidelines for prevention of ventilator associated pneumonia in two ways: face to face workshop training on the knowledge and practices of nurses in intensive care unit. In this tentative randomized clinical trial, the knowledge and practice of nurses in ICUs were studied in two groups: face to face training (35 nurses) and workshops (40 nurses) by using clinical guidelines in avoidance of VAP in one of the hospitals of Shiraz University of Medical Sciences. The level of knowledge and practice in each group was evaluated by self-report questionnaire, knowledge questionnaire and also direct observation of practice, before and after training. Data were examined with descriptive statistics, paired t-test, independent t-test, McNemar test, Fisher's exact, sign and Chi-square test, using SPSS. The study result revealed that both methods of face to face training and workshop were very effective. The incidence of inappropriate pressure of cuff in the tracheal tubes and tracheostomy

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tubes was significantly reduced after training (p=0.001). But by comparison of these two procedures and the relationship between the variables revealed that no significant difference was found between the two groups of face to face training and workshop.

Mohamed and Ramadan (2015) [25] conducted quasi experimental study to assess the Impact of in-Service Training Program for Nurses on Nursing Management for Children with Pneumonia Under Mechanical Ventilation at Ahmad Gasim Hospital, Khartoum, Sudan. The sample (50) nurses presented during the research period extended from December 2013 to July 2014 (pre- and posttraining program). The data collected by using a questionnaire and an observational checklist for the purpose of the study was collected by the researcher before and after the training program. The educational program is designed to study. The data were investigated consuming the Statistical package for social sciences (SPSS) and the results showed that the nurses were acquired knowledge after intervention specially participant's knowledge and practical regarding mechanical ventilation supportive their correct and wrong (88%, 79%, and 90%). The result indicated that the nurse practical skills improved after program. The relation between total knowledge and level of practice as (46%) for good (34%) fair (20%) poor (75–100 good, 50–74 fair, less than 50 poor). The study suggested education and training programs on an ongoing basis to provide high quality nursing care and also circulating a protocol for how to handle a patient with pneumonia disease under mechanical ventilation. The study determined that the nurses information about pneumonia in children has improved and mechanical ventilation have evolved dramatically among nurses.

Kelly and Kutney (2014) [26] conducted a study on impact of critical care nursing on 30 day mortality of mechanically ventilated older adults. The patient sample included 55,159 older adults on mechanical ventilation admitted to the study hospitals. Patients in critical care units with improved nurse work environments experienced 11% lower odds of 30-day mortality than those in worse nurse work environments. Furthermore, each 10% point increase in the proportion of ICU nurses with a bachelor's degree in nursing was associated with a 2% reduction in the odds of 30-day mortality, which involves that the odds on patient deaths in hospitals with 75% nurses with a bachelor's degree in nursing would be 10% lower than in hospitals with 25% nurses with a bachelor's degree in nursing. Critical care nurse staffing did not vary significantly across hospitals. Staffing and nurse experience were not related with mortality after accounting for these other nurse characteristics. Patients in hospitals with improved critical care nurse work environments and higher proportions of critical care nurses with a bachelor's degree in nursing experienced significantly lower odds of death.

Rose et al. (2014) [27] conducted a scoping review of qualitative studies on weaning from mechanical ventilation. Here, two investigators independently screened 8350 publications and extracted data from 43 studies. The study sample contained of nurses in 15 studies, nurses and patients in 1 study, various health care providers in 11, patients in 10, and physicians in 4. Categories recognized were as follows: for nurses, role or scope of practice, informing decision making, and influence on weaning outcome; for health care providers, factors influencing weaning decisions or use of protocols, role or scope of practice related to weaning, and organizational structure or practice environment; for patients, experience of

mechanical ventilation and weaning, experience of the intensive care environment, psychological phenomena, and supporting success in weaning; and for physicians, tools or factors to facilitate weaning decisions and perceptions of nurses' role and scope of practice. It is concluded that important issues identified were perceived importance of interprofessional collaboration and communication, need to combine subjective knowledge of the patient with objective clinical data, balancing of weaning systematization with individual needs, and gratitude of the physical and psychological work of weaning.

Suhara and George (2013) [28] conducted this study on assessment of knowledge regarding mechanical ventilator among staff nurses working in selected hospital, Mangalore with the view to develop an information Pamphlets. Results shown that majority of the subjects 33(66%) were having poor knowledge, 16(32%) subjects were having average knowledge and only one subject (2%) had good knowledge regarding mechanical ventilation. The findings convey the need to update the knowledge of nurses by providing an information pamphlet on mechanical ventilation.

Janson and Kyngas (2013) [29] conducted a study on the effectiveness of educational programme in ventilator bundle implementation; a systematic review. They reviewed studies published between 2003 and 2012 listed in seven multidisciplinary databases (Ovid MEDLINE®, the Cumulative Index to Nursing and Allied Health Literature, Cochrane Library, Scopus, Web of Science, Medic and Academic Search Premier). Educational programs were linked to significant improvements in the overall adherence to VBs and a significant decrease in adverse clinical outcomes such as the incidence of VAP, monthly use of sedatives, duration of mechanical ventilation and

hospitalization costs. Educational programs about V B's can promote adherence to evidence based guidelines and thus reduce the incidence of VAP. However, they are often incoherently developed, implemented and evaluated. There are need for both effective educational programs and a universal method for evaluating their outcomes.

Gomes (2010) [30] conducted a knowledge of intensive care nurses on evidence-based guidelines for prevention of ventilator associated pneumonia. The knowledge of 83 nurses employed in ICU from two hospitals of the private health sector and one hospital of the public health sector in Gauteng was tested using the data assemblage instrument validated by ICU nursing experts. Information of ICU trained and non-ICU trained nurses working in ICUs of the three hospitals was found to be lacking in the evidence-based guidelines for prevention of ventilator associated pneumonia. Of the 83 participants, 18 (21.69%; CI 95% 13.4%; 32.1%) achieved a pass mark of 70% on the multiple-choice part of the questionnaire and were considered to have adequate information on the evidence based guidelines for prevention of VAP. The mean score of participants was 4.25 (S Results revealed that majority of the subjects 33(66%) were having pD 1.537 CI 95% 3.92; 4.59) on nine questions. The alteration in the mean average score of ICU trained nurses and non-ICU trained nurses were very similar demonstrating no statistically significant difference in the knowledge of the two groups of nurses. A weak relationship between years working in ICU and knowledge was found, but this correlation may be clinically insignificant. Recommendations to report this lack of knowledge of ICU nurses were given for clinical nursing practice, nursing education as well as for nursing research.

Norvedt et al. (2008) [31] had conducted an explorative, descriptive study to explore

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experience of being relatives of ventilated and sedated patient in ICU among eight relatives through structure questionnaire method. The result showed relatives interviewed seemed to go through various phases that were specially connected to the actual situation in the ICU. The main characteristic of these phases was a pattern in which participants gradually become active caregivers for the patients. Relatives wanted to be involved in discussions about treatment. The study concluded that relatives wants to be included as caregivers when patient are under sedation in ICU and also relatives are participating and assist the nurse for giving best care the appropriate level of sedation for a patient in ICU.

Saint et al. (2008) [32] had conducted preventing ventilator associated pneumonia in united states: a multicenter mixed methods study among 86 staff members in six hospitals. The study revealed 72–83% of responding using semi recumbent position was used to prevent ventilator associated pneumonia and 21% responding using subglottic secretion drainage was used to prevent ventilator associated pneumonia. It is concluded that semi recumbent position was commonly used to prevent ventilator associated pneumonia and subglotic drainage, was used far less often. We need to understand better how evidence related to prevention practices is identified, interpreted, used to ensure that research finding is reliably translated into clinical practices.

Presneill et al. (2007) [33] conducted a prospective cohort study about the decision made by critical care nurses during Mechanical ventilator and weaning. A total of 3986 ventilator and weaning decision were made by health team members. Within 3986 decision: (1) 2538 decision 64% were made by nurses alone, (2) [693] 17% by medical staff and 3) [755] 19% by nurses and staff in

collaboration. So, it is concluded that critical care nurses have high level of responsibility for autonomy in the management of mechanical ventilator and weaning.

Apisarnthanarak et al. (2007) [34] conducted a quasi-experimental study on effectiveness of an educational program to reduce ventilator associated pneumonia in a tertiary care center in Thailand. A 4-year controlled, prospective, quasi-experimental study was conducted in an MICU, surgical ICU (SICU), and coronary care unit (CCU) for 1 year before the intervention (period 1), 1 year after the intervention (period 2), and 2 follow-up years (period 3). The SICU and CCU served as control ICUs. The educational program involved respiratory therapists and nurses and included a self-study module with preintervention and postintervention assessments, lectures, fact sheets, and posters. The study result revealed that, before the intervention, there were 45 episodes of VAP (20.6 cases per 1000 ventilator-days) in the MICU, 11 (5.4 cases per 1000 ventilator-days) in the SICU, and 9 (4.4 cases per 1000 ventilator-days) in the CCU. After the intervention, the rate of VAP in the MICU decreased by 59% (to 8.5 cases per 1000 ventilator-days; $P = .001$) and remained stable in the SICU (5.6 cases per 1000 ventilator-days; $P = .22$) and CCU (4.8 cases per 1000 ventilator-days; $P = .48$). The rate of VAP in the MICU continued to decrease in period 3 (to 4.2 cases per 1000 ventilator-days; $P = .07$), and rates in the SICU and CCU remained unchanged. Compared with period 1, the mean duration of hospital stay in the MICU was reduced by 8.5 days in period 2 ($P < .001$) and by 8.9 days in period 3 ($P < .001$). The monthly hospital antibiotic costs of VAP treatment and the hospitalization cost for each patient in the MICU in periods 2 and 3 were also reduced by 45%–50% ($P <$

.001) and 37%–45% (*P* < .001), respectively.

Chinna (2006) [35] did a study to evaluate the effectiveness of a planned teaching programme, on care of babies on mechanical ventilator, in terms of knowledge of staff nurses working in neonatal intensive care unit. The sample consisted of 30 staff nurses working in the neonatal intensive care unit. The study findings revealed that, staff nurses had inadequate knowledge regarding care of babies on mechanical ventilation before the introduction of the planned teaching programme. The mean knowledge scores of the staff nurses were increased to 78.22% from 40.66%, after the administration of a planned teaching programme. The study concludes that the planned teaching programme was effective in enhancing the knowledge of staff nurses regarding care of babies on mechanical ventilator.

Kelley et al. (2005) [36] conducted study on nutritional adequacy in patient receiving mechanical ventilation who are fed enterally. A forthcoming, descriptive design was used to study 60 patients receiving enteral feedings at target or goal rate. Energy necessities were determined for the entire sample by using the Harris–Benedict equation; energy requirements for a subset of 25 patients were also determined by using indirect calorimetry. Energy established via enteral feeding and reason and duration of interruptions in feedings were recorded for 3 consecutive days. The study result revealed that mean estimated energy requirements (8996 kJ, SD 1326 kJ) and mean energy intake received (5899 kJ, SD 3058 kJ) differed significantly (95% CI 3297–3787; P < .001). A total of 41 patients (68.3%) received less than 90% of their vital energy intake, 18 (30.0%) received within +/–10%, and 1 (1.7%) received more than 110%. Experiences of diarrhea, emesis, large residual volumes, feeding tube replacements, and interruptions for procedures accounted for 70% of the variance in energy received (P<.001). Procedural interruptions alone accounted for 45% of the total variance. Estimated energy requirements determined via indirect calorimetry and mean energy received did not differ. It is concluded that most critically ill patients receiving mechanical ventilation who are fed enterally do not receive their energy requirements, primarily because of frequent interruptions in enteral feedings.

Mol (2004) [37] conducted a study on assessing the knowledge of staff nurses regarding use and care of endotracheal and tracheostomy tube cuffs, Bloemfontein 112 qualified nurses, working in 11 different ICUs were asked to complete an anonymous questionnaire regarding endotracheal/tracheostomy tube cuffs. The study result revealed that following three areas of concern: (1) there was an overall misconception in 38% of the respondent that the function of the cuff was to secure the tube in position in the trachea to prevent self-extubation; (2) accurate regulation of cuff pressure was not routine practice in any of the ICUs, and (3) only half of the respondents felt their training regarding cuff care management was sufficient. The study concluded that critical care nursing needs to emphasis the use of current techniques, discourages routine cuff deflation, and encourage collaboration with ICU physician on standards of care. A protocol that could be used in the ICUs regarding the use and care of an endotracheal/tracheostomy tube cuff is proposed.

In Joseph et al. (2004) [38], adequacy of care provided by nursing personnel in selected areas of nursing care given to patients on mechanical ventilation was done in Vellore. The sample included 60 critically ill patients from medical and neurology ICUs. A non-participatory observational check list was used for collecting data. Care carried out was given

a score ₌1′ and not carried out ₌0′. Practice was assessed in terms of airway maintenance, fluid and electrolyte balance, hygiene, elimination, comfort, safety and infection prevention. The findings showed that overall care was moderately adequate below the score of 75% and identified the areas neglected especially airway maintenance (58.79%), elimination (58.1%), comfort (60.58%), and safety (51.3%).

Rose et al. (2004) [39] investigated on the role of critical care nurses in the management of mechanical ventilation. A 3 month, prospective cohort study was performed on 474 patients who received mechanical ventilation. The study findings revealed that decisions for weaning made purely by the nurses gave a positive outcome (64%). Majority of extubations where decisions made by the doctors had some complications and needed reintubation. The study concludes that nurses if properly trained can manage patients effectively on mechanical ventilator.

Crocker (2002) [40] has done a study on nursed led weaning from ventilatory and respiratory support. A retrospective audit revealed that patients were ventilated for more than 16 days in one intensive care unit. Initially there were no weaning protocols. Later when weaning protocols were used, nurse led weaning was initiated. Following this, monthly statistics were collected and it revealed that the weaning time had reduced to 10 days. The study concluded that lack of knowledge and lack of weaning guidelines prolong duration of ventilator requirement. So, if nurses are educated they can provide quality patient care.

Beveridge (2001) [41] states that weaning a patient from mechanical ventilator and then to extubation is a challenge for critical care nurses. Critical care nurses play a vital role in assessing a patient's readiness for weaning and managing the weaning trials. Traditionally, a critical care nurse performs this process only under the direction and supervision of the doctor. This team work is important, but it lead to delays. The author cites that with a protocol, which provides a valid frame work, the critical care nurse can perform weaning and unnecessary delays can be avoided.

Kollef (2000) [42] has done a randomized controlled trial of protocol directed versus physician directed weaning from mechanical ventilator. The objective of the study was to compare the practice of protocol directed weaning from mechanical ventilation implemented by nurses with the traditional physician directed weaning. The study was done on 357 patients requiring mechanical ventilation (n= 179 received protocol directed weaning and n=178 received physician directed weaning). The study findings demonstrated that patients who received protocol directed weaning performed by the nurses had significantly shorter duration of mechanical ventilation and higher success rate of weaning when compared to patients who received physician directed weaning.
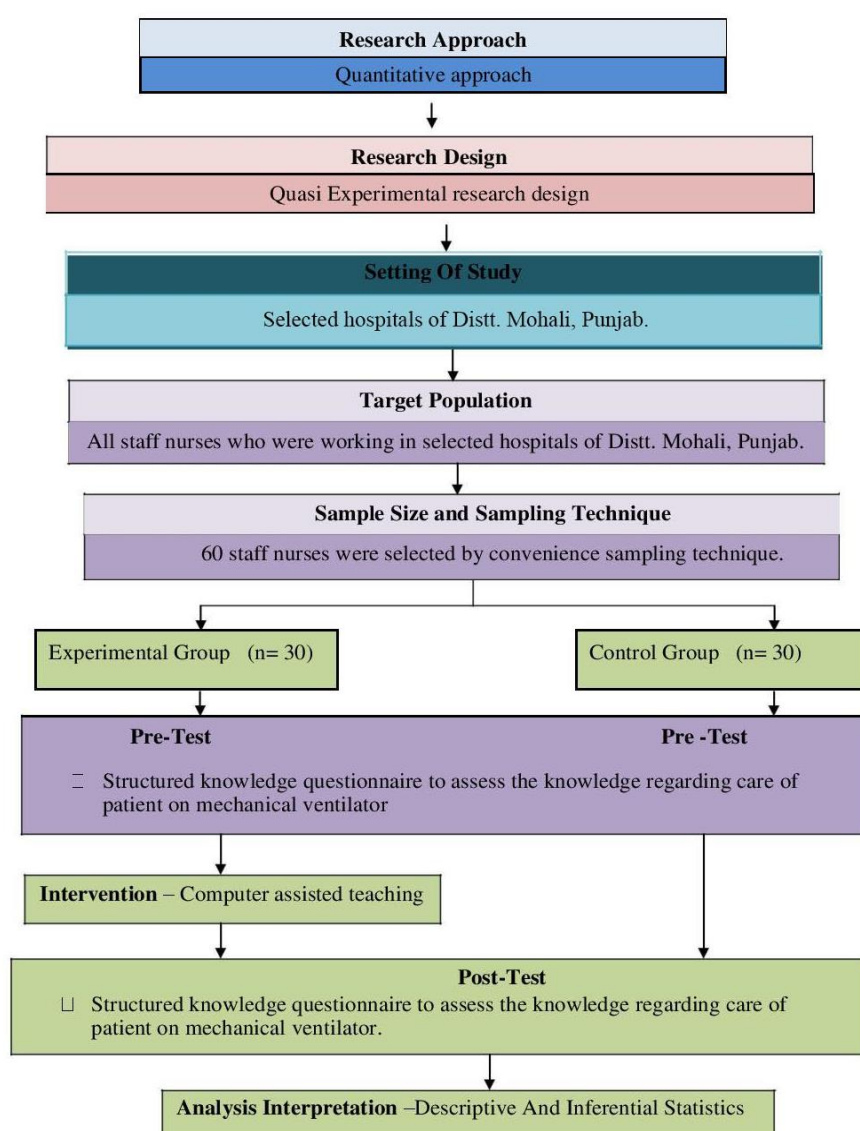
In Boegner (1990) [43], a study conducted on knowledge and practice on nursing care of patients on mechanical ventilator, among staff nurses working in pediatric intensive care unit and neonatal intensive care unit (n=40) in selected hospital, Chennai. The outcome showed that 72.5% of staff nurses had adequate knowledge, 25% had moderate knowledge and only 2.55 had inadequate knowledge regarding nursing care of patient on mechanical ventilation. The result showed that 52.5% of staff nurses had moderate practice level and 47.5% had adequate practice level.

METHODOLOGY

Methodology of research indicates the general pattern of organization of procedure, together with the valid and reliable data for investigation.

This chapter deals with
- Research approach
- Research design
- Research setting
- Variables under study
- Target population
- Sample and sampling technique
- Selection and development of tool
- Description of tool
- Development and description of self-instructional module
- Content validity
- Reliability of tool
- Pilot study
- Data collection procedure
- Ethical considerations
- Plan of data analysis
- Summary

Research Approach
Quantitative approach

Research Design
Quasi Experimental research design

Setting Of Study
Selected hospitals of Distt. Mohali, Punjab.

Target Population
All staff nurses who were working in selected hospitals of Distt. Mohali, Punjab.

Sample Size and Sampling Technique
60 staff nurses were selected by convenience sampling technique.

Experimental Group   (n= 30)   Control Group   (n= 30)

Pre-Test   **Pre -Test**
Structured knowledge questionnaire to assess the knowledge regarding care of patient on mechanical ventilator

Intervention – Computer assisted teaching

Post-Test
Structured knowledge questionnaire to assess the knowledge regarding care of patient on mechanical ventilator.

Analysis Interpretation –Descriptive And Inferential Statistics

***Fig. 2.** Schematic representation of the research methodology.*

Research
Research Approach

It involves the description of the plan to investigate the phenomenon under study.

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The choice of the appropriate research approach depends upon the purpose of the study. Quantitative research Approach was adopted to accomplish the objectives of study that is to assess the effectiveness of computer assisted teaching programme regarding care of patient on mechanical ventilator among staff nurses working in selected hospitals of Distt. Mohali, Punjab.

Research Design

A research design is a plan of how, when and where data are to be collected and analyzed. In this study the investigator

intension was to evaluate the effectiveness of computer assisted teaching. The quasi experimental research design includes three features like convenience assignment; manipulation and control group. In the present study all the features were present. So, pre- and posttest two group design (before and after design) was adopted to accomplish the main objective of the study.

Experimental group	R O1 X O2
Control group	R O1..........O2
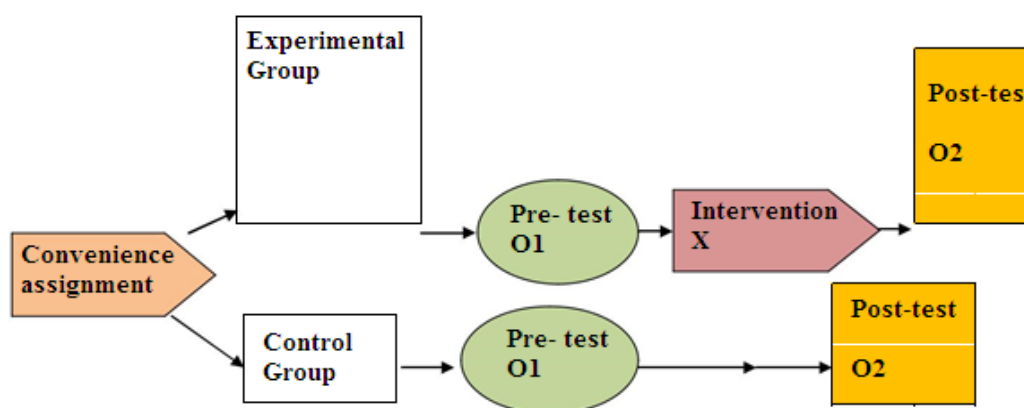
The symbols are described as follows:
C – Convenience assignment
O1 –Pretest
X – intervention (computer assisted teaching on knowledge regarding care of patient on mechanical ventilator)
O_2 – Posttest

Setting of Study

The study was conducted in two different fields including, one for experimental group and one for control group to prevent contamination. The rationale for selecting these setting for the study was the researcher's familiarity with the setting, geographical proximity and availability of data.

Variable Under Study

(1) Independent variables: Computer assisted teaching on care of patient with mechanical ventilator.
(2) Dependent variable: Knowledge of staff nurses regarding care of patient with mechanical ventilator.

Population

Population is a complete set of persons or objects that posses some common characteristics that are of interest to the researcher.

Target population was the all staff nurses who were working at selected hospitals of Distt Mohali Punjab.

Sample and Sampling Technique

Samples are the representative unit of a target population, which is to be worked upon by the researcher during the study.

Sampling is the process of selecting a representative part of the population.

Convenience sampling technique was used to select 60 subjects (30 in experimental and 30 in control group).
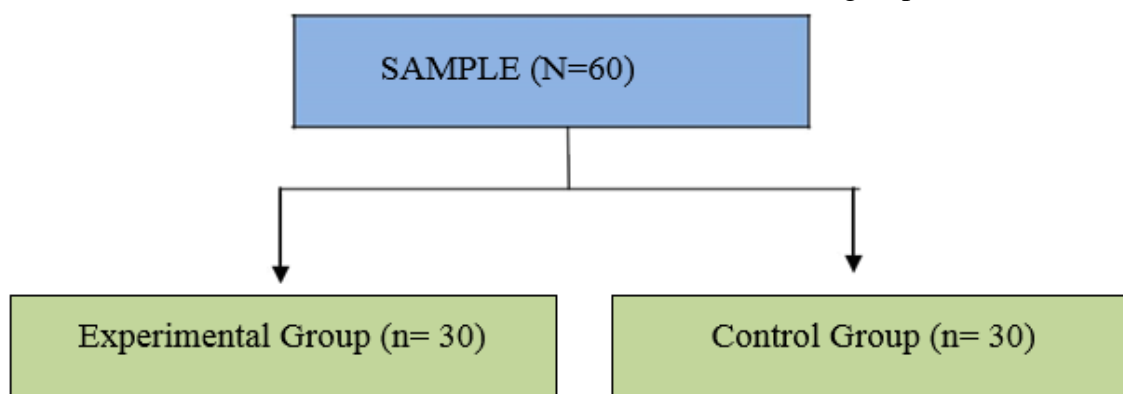
Selection and Development of the Tool
The tools for this study was developed after extensive review of literature, expert's opinion in the field of Medical Surgical Nursing and investigators own experience in the clinical area. In the present study structured knowledge questionnaire was used to assess the knowledge regarding nursing care of patient on mechanical ventilator.

Description of the Tool
Tool consisted of 2 sections.
Section A: Demographic profile.
Section B: Structured knowledge questionnaire to assess the knowledge regarding care of patient with mechanical ventilator.

Section A: Demographic Profile
Demographic profile was used to collect personal information about the staff nurses such as age of the staff nurses, gender, Total year professional experience, work experience in critical care unit, have you ever taken care of patient with mechanical ventilator, and attended any in-service education programme, on care of patient with mechanical ventilator.

Section B: Structured Knowledge Questionnaire

This part consisted of multiple choice questions, each items consisted of 4 options, out of which only one was correct. It included total 40 items of the tool.

Scoring
For each item of correct answer carry maximum score – ONE‖ and wrong answer carry minimum score – ZERO‖. There was no negative scoring.
Maximum score = 40
Minimum score = 0

Criteria measure	
Score	**Level of knowledge**
27–40	Good knowledge
14–26	Average knowledge
0–13	Poor knowledge

Development and Description of the Computer Assisted Teaching
Computer assisted teaching (CAT) was developed according to the planned objectives. The CAT was developed after extensive review of literature, seeking opinion of experts, internet books, Journals and from personal experiences. After that CAT regarding care of patient with mechanical ventilator was given to 9 experts for validity. The CAT consisted of anatomy and physiology of Lungs, introduction and definition of mechanical ventilator, its types, modes, criteria for ventilatory support, mechanical ventilator settings, nursing care of patient with mechanical ventilator.

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The steps involve in the development of the computer assisted teaching were:

- Review of literature
- Preparation of first draft of CAT regarding the care of patient with mechanical ventilator
- Experts validated the content and suggestions were considered
- Preparation of final draft of CAT
- Editing of CAT based on suggestion of experts

Validity of Tool

Validity refers to the degree to which an instrument measures what it is supposed to be measuring. The computer assisted teaching to assess the knowledge regarding care of patient with mechanical ventilator along with objectives was given to 9 experts from the field of medical surgical from various nursing colleges, there were 46 items in questionnaire related to knowledge. Therefore, certain additions and deletions and refinement of the tool was done after the suggestions of experts, 40 items were finalized in tool.

Reliability of Tool

Reliability of an instrument is concerned with how consistently the measurement technique measures the concept of interest. Reliability of the structured knowledge questionnaire was assessed by test re test method using Karl Pearson's correlation coefficient formula. The value of r was found to be 0.89 hence the tool was considered to be reliable.

Pilot Study

Pilot study is referred to a small-scale preliminary tryout of the method to be used in an actually large study, which acquaints the researcher with problems that can be corrected and to assess the feasibility of the study. The pilot study was carried out on 10 subjects (5 in experimental and 5 in control group) in month of February 2016. Experimental group was selected from Sri Sukhmani Multi Speciality Hospital Dera Bassi Distt. Mohali. And control group was Civil Hospital Dera Bassi Distt. Mohali. to find out the feasibility of the study.

Data Collection Procedure

Main data collection was carried out in the month of March 2016. Total 60 subjects were in target population. Out of them 30 subjects were selected from each hospital by convenience sampling technique (30 in experimental group and 30 in control group. Prior permission was obtained from higher authorities of selected hospitals. The researcher developed rapport with the subjects and purpose of data collection was explained to them. After obtaining the written informed consent from the respondents, during the pretest questionnaire were given to each subjects in both groups for 30 minutes to assess the knowledge regarding care of patient with mechanical ventilator. After taking pretest, computer assisted teaching programme was given to subjects in experimental group. No intervention was given to the subjects in control group. After 7 days, posttest knowledge of subjects in both groups was assessed.

Ethical Consideration

Approval was taken from the ethical and research committee. Permission of data collection was taken from higher authorities of different hospitals for experimental group and control group. Written informed consent was taken from the individual subject. Confidentiality of the information was maintained. After the completion of study, computer assisted teaching was administered to the subjects of control group.

Plan of Analysis

The data collected by the researcher was transformed to the master sheet prepared for each section of tool. The descriptive

and inferential statistics are used to achieve the objective of the study. Demographic data related to respondents was analyzed in term of frequencies and percentage. Mean, standard deviation would be calculated from score obtained from staff nurses in both groups i.e. in experimental and control group. Frequency percentage, t-test, and ANOVA were used to find the association between posttest knowledge score with demographic variables.

Summary
This chapter dealt with the research approach, research design, research setting, variables under study, population, samples and sampling technique, inclusion and exclusion criteria, development and description of tool, development and Description of Computer assisted teaching programme, content validity, reliability of tool, pilot study, data collection procedure, ethical consideration, plan for data analysis and summary. This chapter gives direction for the analysis and interpretation of the data.

DATA ANALYSIS AND INTEPRETATION
Analysis and interpretation was done in accordance with the objectives laid down for the study. The purpose of analysis was to reduce the data into an interpretable and meaningful form so that the result can be compared and significance can be identified.

The data was analyze by calculating the score in term of frequency, percentage, mean, standard deviation, chi-square, 't' test and ANOVA.

Objectives
- To assess and compare the pretest knowledge score of experimental and control group regarding care of patient with mechanical ventilator.
- To develop and implement the computer assisted teaching on care of patient with mechanical ventilator in experimental group.
- To evaluate the effectiveness of computer assisted teaching programme by comparing the posttest knowledge score regarding care of patient on mechanical ventilator in experimental and control group.
- To find on association between posttest knowledge score of subjects regarding care of patient on mechanical ventilator and their selected demographic variables.

Plan of Analyzed Data
Analysis and interpretation of data will be done according to the objectives and by using descriptive and inferential statistics. The level of significance at $p<0.05$ and 0.001 level.

Organization of Data for Analysis
The analyzed data were organized according to the objectives and presented under the following sections.

Section I – Socio-demographic profile of study subjects.
Section II – Comparison of pre- and posttest mean knowledge score of staff nurses regarding care of patient with mechanical ventilator.
Section III – Findings related to level of knowledge and effectiveness of computer assisted teaching programme regarding Nursing care of patient with mechanical ventilator.
Section IV – Findings related to association between the posttest knowledge scores of staff nurses regarding care of patient on mechanical ventilator with their selected demographic variables.

Section I
Socio-demographic Profile of Study Subjects
Table 1 depicts the socio demographic profile of study subjects according to age which shows that in experimental group more than half 53.3% of staff nurses

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belonged to age group 26–30 years, 33.3% belonged to 21–25 years of age, 13.3% belonged to 31–35 years of age, Whereas in control group 43.3% of staff nurses belonged to age group 26–30 years, 36.6% belonged to 21–25 years of age, 20% were belonging to age group 31–35 years. All the subjects in both the groups (experimental and control group) were female.

Table 1. *Frequency and percentage distribution of socio demographic characteristics of study subjects in experimental and control groups. N=60.*

Characteristics	Control group (n=30)		Experimental group (n=30)		Chi square	df	P value
	n	**%**	**n**	**%**			
Age (in years)							
21–25	11	36.6	10	33.3	0.7580^{NS}	2	0.6845
26–30	13	43.3	16	53.3			
31–35	6	20	4	13.3			
Gender							
Male	0	0.0	0	0.0	–	–	–
Female	30	100	30	100			
Professional qualification							
GNM	8	26.6	9	30.0	1.0020^{NS}	2	0.6059
B.Sc. nursing	15	50.0	17	56.6			
Post-basic	7	23.3	4	13.3			
Total Professional experience (in year)							
1–5	24	80.0	26	86.6	0.4800^{NS}	1	0.4884
5–10	6	20.0	4	13.3			
Work experience in critical care unit							
Yes	10	33.3	8	26.6	0.3175^{NS}	1	0.5731
No	20	66.6	22	73.3			
If yes then specify (in years)							
1–2	7	70	5	62.5	0.1125^{NS}	1	0.7373
3–4	3	30	3	37.5			
Present area of work							
General ward	5	16.6	8	26.6	0.9915^{NS}	4	0.9111
Medical ward	8	26.6	8	26.6			
Surgical ward	5	16.6	4	13.3			
Emergency	7	23.3	6	20			
ICU	5	16.6	4	13.3			
Having taken care of patient with mechanical ventilator							
Yes	7	23.3	5	16.6	0.4167^{NS}	1	0.5536
No	23	76.6	25	83.3			
Attended in-service education programme							
Yes	0	0.0	0	0.0	–	–	–
No	30	100	30	100			

NS – nonsignificant. p value ≤ 0.05.

According to professional qualification, in experimental group more than half 56.6% of staff nurses had passed B.Sc(N), 30% of staff nurses had passed GNM, 13.3% had passed post-basic whereas in control group half of 50% had passed B.Sc (N), 26.6% had passed GNM, and 23.3% had passed post-basic (N). According to Total year of professional experience in experimental group majority 86.6% of staff nurses were having 1–5 years of experience, 13.3% were having 5–10 years of experience, whereas in control group majority 80% of staff nurses were having 1–5 years of experience, 20% were having 6–10 years of experience. As per work experience in critical care unit, only few of staff nurses had 26.6% experience in experimental group and 33.3% in control group had experience in critical care unit. According to staff nurses who having experience in critical care unit in experimental group 62.5% of staff nurses were having 1–2 years of experience in critical care unit, 37.5% were having 3–4 years of experience in critical care unit, whereas in control group maximum 70% of staff nurses were having 1–2 years of experience in critical care unit, 30% were having 3–4 years of experience in critical care unit. Based on present area of work in experimental group 26.6% were working in General ward and in Medical ward, 20% in Emergency, 13.3% were working in surgical ward, and in ICU, whereas in control group 26.6% were working in Medical ward, 23.3% were working in Emergency, 16.6% were working in General ward, surgical ward and in ICU. According to staff nurses who taking care of patient with mechanical ventilator in experimental group were 16.6% and whereas in control group 23.3%. None of

staff nurses in both the groups (experimental and control group) has ever attended any in-service education programme on nursing care of patient with mechanical ventilator.

Both the groups were found to be homogenous through statistical matching with chi-square (at p≤0.05).

Section II
Comparison of Pre- and Posttest Mean Knowledge Score of Staff Nurses Regarding Care of Patient on Mechanical Ventilator in Experimental and Control Group

Table 2 depicts that there was no statistically significant difference in pretest knowledge scores among experimental (13.7±2.6) and control group (14.36±3.4). However, there was statistically significant difference among posttest knowledge score of experimental group (29.17±3.5) and control group (15.50±3.6) with t = 14.762 (df 58) p= 0.000. Further there was no statistically significant difference among pretest score (14.36±3.4) and posttest score (15.50±3.6) in control group. But there was a statistically significant difference in pretest score (13.7±2.6) and posttest score (29.17±3.5) in experimental group (P= 0.001).

Table 2. Comparison of pre- and posttest mean knowledge score of study subjects regarding care of patient with mechanical ventilator in experimental and control group. N= 60.

Pre/posttest	Control group (n=30)		Experimental group (n=30)		t-test	df	p-value
	Mean	±SD	Mean	±SD			
Pretest	14.36	3.4	13.7	2.8	1.218	58	0.228
					NS		
Posttest	15.50	3.6	29.17	3.5	14.762*	58	0.00
	t-test	df	p-value	t-test	df	p-value	
	0.8530[NS]	29	0.0741	32.7984*	29	0.000	

Significant, NS – nonsignificant.

Hence, it can be inferred that pretest knowledge in control and experimental group was approximately similar. However after implementing computer assisted teaching programme regarding Nursing Care of patient with Mechanical ventilator to the experimental group the value of posttest was significantly higher than the pretest knowledge score, whereas in control group the pre- and posttest knowledge score was similar. So It is concluded that the Computer assisted teaching programme regarding Nursing care of patient with Mechanical ventilator was effective. Therefore, null hypothesis is rejected and research hypothesis is accepted at p≤(0.05).

Section III
Findings Related to Level of Knowledge and Effectiveness of Computer Assisted Teaching Programme Regarding Nursing

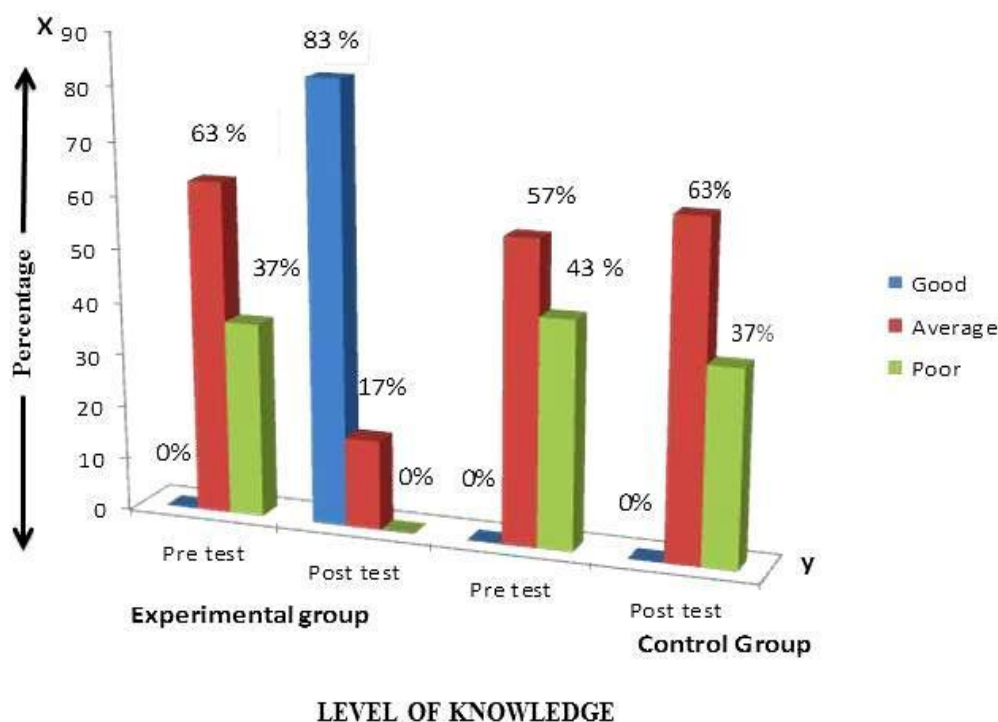*Care of Patient with Mechanical Ventilator*
Figure 3 depicts that in experimental group pretest knowledge score, maximum of subjects (63.3%) had average knowledge, (37%) had poor knowledge and none of them had good knowledge regarding Care of Patient with mechanical ventilator. While during posttest majority (83.3%) had good knowledge, (17%) had average knowledge, none of had poor knowledge regarding care of patient on mechanical ventilator. whereas in control group during pretest more than half of (57%) had average knowledge, (43.3%) had poor knowledge and none had good knowledge regarding care of patient on mechanical ventilator where as in posttest (63.3%) had average knowledge, (36.6%) had poor knowledge and none had good knowledge

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regarding Care of Patient with mechanical ventilator.

Hence, it can be interpreted that in experimental group, majority of subjects (63.3%) had average knowledge during pretest but in posttest mostly had good (83.3%) knowledge regarding care of patient with mechanical ventilator.

Whereas in control group, more than half of (57%) had average knowledge during pretest but in posttest maximum (63.3%) had average knowledge regarding care of patient with mechanical ventilator. Therefore, the computer assisted teaching programme regarding care of patient with mechanical ventilator was effective in enhancing the knowledge of staff nurses.

Fig. 3. Percentage distribution of staff nurses in experimental and control group according to their pre- and posttest knowledge level regarding care of patient with mechanical ventilator.

Section IV
Findings Related to Association Between the Posttest Knowledge Scores of Staff Nurses Regarding Care of Patient with Mechanical Ventilator in Both Experimental and Control Group and Their Sociodemographic Variables
Table 3 depicts that mean posttest knowledge score in experimental group Significant associated with professional qualification (p=0.02) and having taken care of patient with mechanical ventilator (p=0.02).Staff nurses who have done

GNM had higher mean knowledge score (30.2) as compared to B.Sc nursing (29.5) and post-basic (25.0) and those having taken care of patient with mechanical ventilator had higher mean knowledge score (32.4).

Table 3. Association of the posttest knowledge scores of nurses regarding care of patient on mechanical ventilator with their selected demographic variables in experimental group. N=30.

Characteristics	n	Mean	±SD	F/t	df	p-value
Age (in years)						

	n	Mean	±SD	F/t	df	p-value
21–25	10	28.5	2.5	1.8901$^{NS(F)}$	2	0.1674
26–30	16	28.8	3.9		27	
31–35	4	32.2	2.9			
Gender						
Male	0	–		----	---	----
Female	30	29.16	3.5			
Professional qualification						
GNM	9	30.2	3.7	3.9820$^{*(F)}$	2	0.0296
B.Sc. nursing	17	29.5	2.4		27	
Post-basic	4	25.0	4.8			
Total professional experience (in year)						
0–5	26	28.8	3.5	1.8535$^{NS(t)}$	28	0.0744
5–10	4	32.2	29		28	0.0744
Work experience in critical care unit						
Yes	8	36.2	2.8	0.433$^{NS(t)}$	28	0.668
No	22	35.3	4.5			
If yes then specify (in years)						
1–2	5	62.5	3.5	0.5249$^{NS(t)}$	6	0.6185
2–4	3	37.5	6			
Present area of work						
General ward	8	27.1	1.8	1.8703$^{NS(F)}$	4	0.1464
Medical ward	8	28.8	2.4		25	
Surgical ward	4	28.7	7.5			
Emergency	6	30.5	1.6			
ICU	4	32.2	2.9			
Having taken care of patient with mechanical ventilator						
Yes	5	32.4	2.60	2.4219*(t)	28	0.0222
No	25	28.5	3.3			

NS – nonsignificant. Significant p-value =<0.05 t- ‗t′ test is applied. F-ANOVA.

No association was found between posttest mean knowledge score and other demographic variables, such as (age, gender, professional experience, work experience in critical care unit, present area of work at p<0.05).

Table 4 depicts that mean posttest knowledge score in control group was significantly associated with present area of work (p=0.04). Those staff nurses who was working in emergency had higher mean knowledge score (18.8) as compared to others who was working in general ward medical ward, surgical ward, and ICU. Then no association was found between other remaining demographic variables, such as (age, gender, professional qualification, total professional experience, work experience in critical care unit,

having taken care of patient with mechanical ventilator.

***Table 5.** Association between the posttest knowledge scores of nurses regarding nursing care of patient on mechanical ventilator with their selected demographic variables in control group. N=30.*

Characteristics	n	Mean	±SD	F/t	df	p-value
Age (in years)						
21–25	11	14.6	3.5	0.5088$^{NS(F)}$	2	0.6046
26–30	13	16.1	2.8		27	
31–35	6	15.6	5.3			
Gender						
Male	0	–	–	-----	-----	---------
Female	30	29.1	3.5			
Professional qualification						
GNM	8	14.2	3.4	1.2099$^{NS(F)}$	2	0.3101
B.Sc. nursing	15	15.4	3.3		27	
Post-basic	7	17.1	4.3			
Total professional experience (in years)						
1–5	24	13.1	2.3	1.8266$^{NS(t)}$	28	0.0784
5–10	6	16.0	3.7			
Work experience in critical care unit						
Yes	10	14.0	2.7	1.6438$^{NS(t)}$	28	0.1114
No	20	16.2	3.8			
If yes then specify (in years)						
1–2	7	16.8	3.9	0.4647$^{NS(t)}$	8	0.6545
2–4	3	18.3	6.1			
Present area of work						
General ward	5	15.2	4.6	2.7589*	4	0.0496
Medical ward	8	13.5	3.3		25	
Surgical ward	5	14.4	2.4			
Emergency	7	18.8	3.3			
ICU	5	15.4	1.6			

*NS – nonsignificant. *Significant. p-value =<0.05. t-‗t′ test is applied. F-ANOVA.*

Taken care of patient with mechanical ventilator

Yes	7	16.71	4.1	1.0093^{NS}	28	0.3215
No	23	15.13	3.4			

Major Findings
- In experimental group more than half of the subjects (53.3%) belongs to age group 26–30 years, all (100%) subjects were female, more than half (56.6%) had passed B.Sc (N) and majority

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(86.6%) were having 1–5 years of work experience.

- In control group less than half of the subjects (43.3%) belongs to age group 26–30 years, all (100%) subjects were female, half of subjects (50%) had passed B.Sc (N), majority (80%) were having 1–5 years of work experience.
- Both the group i.e. experimental and control were considered homogenous in terms of socio demographic variables.
- There was no statistically significant difference in both the groups in terms of publish knowledge score.

After giving computer assisted teaching programme in the experimental group, the value of posttest was significantly higher than the pretest knowledge score. Whereas in control group the pre- and posttest knowledge was similar. Computer assisted teaching programme Regarding Nursing care of patient with Mechanical ventilator was effective. Therefore, null hypothesis is rejected and research hypothesis is accepted.

- In control group, more than half of subjects in pretest (57%) had average knowledge and in posttest maximum (63%) had average knowledge, whereas in experimental group, maximum of subjects (63%) had average knowledge in pretest but in posttest mostly had good (83%) knowledge regarding nursing care of patient with mechanical ventilator. Therefore, the computer assisted teaching programme Regarding Nursing care of patient with Mechanical ventilator was effective in enhancing the knowledge of staff nurses.
- In control group, the pre- and posttest mean knowledge score were approximately similar, whereas in experimental group, the posttest mean

knowledge score in all area was significantly higher than the pretest. The computer assisted teaching programme regarding Nursing care of patient with mechanical ventilator was effective in enhancing the knowledge of staff nurses in all the area.

- The posttest knowledge score of staff nurses in experimental and control group was not associated with any of the demographic variables regarding nursing care of patient with mechanical ventilator.

Summary
This article deals with the analysis, interpretation of the collected data, descriptive and inferential statistics were used for analysis and interpretation. The bar diagram was also used to show the findings.

DISCUSSION
This article relates the results of the present study with the finding of the studies conducted in the past. Present study finding has been discussed in accordance with previously reviewed literature.

The study revealed that majority of the respondents (100%) were female staff nurses in both group (control and experimental group). In control group 43% of staff nurses and 53.3% in experimental belonged to 26–30 years of age group. Based on professional qualification. Half of staff nurses (50 %) in control group and more than half 56.6% in experimental group were passed B.Sc nursing. As per total professional experience, in control group majority 80%, where as in experimental group 86.6% were having 1–5 year experience. Majority of staff nurses in both groups were having no work experience in critical care unit but just 33.3% in control group and 26.6% in experimental group having work

experience in critical care unit. Maximum of staff nurses 26.6% in control group were working in medical ward where as in experimental group also 26.6% worked in medical ward. Majority of staff nurses (76.6%) in control group and 83.3% in experimental group have no taken care of patient on mechanical ventilator. No staff nurses in both groups had ever attended any in-services education programme on nursing care of patient with mechanical ventilator.

The study findings revealed that in experimental group in pretest majority of subjects (63.3%) had average knowledge, (37%) had poor knowledge and none of them had good knowledge regarding Nursing Care of Patient on Mechanical ventilator. Whereas in control group during pretest (57%) had average knowledge, (43%) had poor knowledge and none had good knowledge regarding care of patient on mechanical ventilator.

These findings are supported by Suhara and George (2013) [28] a similar study in which results shown that majority of the subjects 33(66%) were having poor knowledge, 16(32%) subjects were having average information and only one subject (2%) had good knowledge regarding mechanical ventilation. Hence, the nurses had less knowledge regarding nursing care of patient on mechanical ventilator.

Study also revealed that there was no statistically significant difference among pretest scores of experimental and control group. However, after giving computer assisted teaching programme to experimental group, posttest scores of both the groups differed significantly (p<0.05) and also there was no statistically significant difference among pretest score (14.36$\pm$3.4) and posttest score (15.50$\pm$3.6) in control group. But there was a statistically significant difference in pretest score (13.7$\pm$2.6) and posttest score (29.17$\pm$3.5) in experimental group. This

result showed that computer assisted teaching programme regarding care of patient with mechanical ventilator was effective at p<$\underline{0}$.05).

Similar finding reported by Sunita and Elizabeth (2015) [23] study result showed that student nurse's knowledge level was high as compared to pretest. It was concluded that after implementing the structured teaching programme, posttest knowledge score was high significantly increased than pretest score hence the structured teaching programme was effective.

Another study supported by Maria and Kaur (2015) [19] which concluded that comparing the effectiveness of Video Assisted Teaching (VAT) and the Self-Instructional Module (SIM) on knowledge of staff nurses regarding care of patients on ventilator. The result revealed VAT & SIM were equally effective in improving the knowledge as well as practices.

Another major finding of the study is that mean posttest knowledge score in control group was significantly associated with certain demographic variables (p=0.05) as present area of work, in experimental group it was associated with professional qualification and having taken care of patient with mechanical ventilator. However, in posttest no association was found with knowledge score and their selected demographic variables in both experimental and control group.

Similar the study conducted by Presneill et al (2007) [33] which reported that decision made by critical care nurses during Mechanical ventilator and weaning were statistically significant associated with present area of work.

It can be concluded that the pretest knowledge of staff nurses was inadequate and after administration of computer assisted teaching programme regarding

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nursing care of patient on mechanical ventilator, the knowledge of staff nurses was increased. So that computer assisted teaching programme was effective to improve the knowledge regarding care of patient on mechanical ventilator among staff nurses.

Summary

This article deals with discussion that was done by relating the results of study with the finding of studies conducted in the past.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This article gives a brief account of the present study include conclusion drawn from the findings, limitation, implication of the study and recommendations for the future research.

Summary

The present study was a quasi-experimental study to assess the effectiveness of computer assisted teaching programme on knowledge regarding care of patient on mechanical ventilator among staff nurses. Two group pretest–posttest design was used. Conceptual framework based on modified Imogene M. King goal attainment theory (1981). Pilot study was conducted on 10 subjects (5 in experimental and 5 in control group) in month of March 2016. The data was taken during the month of March 2016. A total of 60 staff nurses were selected for study by using convenience sampling technique. Structured knowledge questionaire was developed to assess the knowledge of staff nurses regarding care of patient on mechanical ventilator. Prior permission was obtained from higher authorities of selected hospitals. The researcher developed rapport with the subjects and purpose and procedure of data collection was explained to them. After obtaining the informed written consent from the each respondent, pretest was taken from the subjects of both groups experimental and control group. In experimental group immediately after pretest computer assisted teaching programme was administered and after 7 days, posttest was conducted from both experimental and control group to find out the effectiveness of computer assisted teaching programme regarding care of patient on mechanical ventilator. The gathered data was analyzed by calculating frequency, percentage, mean, standard deviation, chi square, t-test and ANOVA.

Conclusion

- Staff nurses in experimental and control group had similar pretest knowledge scores regarding care of patient on mechanical ventilator (29.17 ± 3.5) and (15.50 ± 3.6) respectively (p=0.00). But after implementing of computer assisted teaching programme, the posttest knowledge score of experimental group (29.17) and control group (15.50) were significantly different (p=0.00).

- there was no statistically significant difference among pretest score (14.36 ± 3.4) and posttest score (15.50 ± 3.6) in control group. But there was a statistically significant difference in pretest score (13.7 ± 2.6) and posttest score (29.17 ± 3.5) in experimental group. This result showed that computer assisted teaching programme regarding care of patient with mechanical ventilator was effective at p<0.05.

- Hence it is concluded that computer assisted teaching regarding care of patient on mechanical ventilator was effective and posttest knowledge score was not associated with any of the socio demographic variables.

Limitation

- Sample size (60) was small so broad generalization is not possible.
- The study finding could have been effected by Hawthorne effect.

Recommendations

The findings of the study to assess the effectiveness of computer assisted teaching programme on knowledge regarding care of patient on mechanical ventilator among staff nurses suggests many implications for the nursing research, nursing practice, nursing administration and nursing education.

Nursing Research

Research in nursing profession is very important and can lead to important discoveries. Despite the huge increase in research being generated in the nursing profession, the integration of research findings into practice is still poor. Research will not only help nurses in improving their knowledge but also refine their quality of care provided to the patient. The result of present study findings serves as basis for the professionals and students to conduct further studies regarding nursing care of patient on mechanical ventilator. The nurses and the educators can conduct the same study with different variables on a larger sample or in community setting.

- A comparative study can be taken up to compare effectiveness of various teaching strategies which can be used to teach staff nurses about care of patient on mechanical ventilator.
- The similar study can be replicated on a large sample for broad generalization.
- Qualitative study can be conducted on staff nurses to get deep insight into problems faced by them while caring patient on mechanical ventilator.
- A descriptive study can be done to assess the knowledge regarding nursing care of patient on mechanical ventilator.

Nursing Practice

Nursing professionals should be able to render services according to the changing need of the society. The study implies that is staff nurses can use the knowledge which was gained by computer assisted teaching programme for caring out the nursing care in effective manner. Regular teaching sessions should be planned for staff nurses in which computer assisted teaching programme can be used as measure to deliver knowledge effectively. As nurse educator, nurses should organize training programme on nursing care of patient on mechanical ventilator for staff nurses which will be helpful in meeting an emergency situation and save the life of the client.

Nursing Administration

Nursing administrator should encourage and plan for training programme on health education to staff nurses regarding nursing care of patient on mechanical ventilator. Nursing administration should give preference and attention to proper selection, placement and effective utilization of trained nurses who could teach the other staff nurses effectively about nursing care of patient on mechanical ventilator. Teaching media like computer system, LCD projector should be made available in nursing seminar rooms. The nurse educator should take extra care in policy making, planning and organizing the educational session to create awareness on nursing care of patient on mechanical ventilator.

Nursing Education

Learning opportunity should be given to the staff nurses by utilizing computer assisted teaching programme to improve their knowledge regarding nursing care of patient with mechanical ventilator to prevent complications. So that they can implement their knowledge while caring the patient on mechanical ventilator. Staff nurses should be made more aware by

conducting seminars, conferences and workshops on nursing care of patient on mechanical ventilator. Nursing educator can encourage the staff nurses to provide health education to their clients regarding care of patient on mechanical ventilator. Computer assisted teaching programme can also be used in class room teaching to deliver knowledge to students effectively.

Summary

This article deals with summary, recommendations, limitations and conclusion based on the findings of the study.

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