CHAPTER 1

“Health is like money,
we never have a true idea
of its value until we lose it.”

By Josh Billings.

1.1) INTRODUCTION:

Abraham Maslow’s describes the physiological needs as the first level of needs in his ‘Hierarchy of Human Needs’. In the physiological needs air is the first need to be met. Unless you fulfill your physiological needs you can’t address to higher needs, so maintain patent airway for patient on mechanical ventilator becomes important.

Optimizing airway function in the critically ill patients requires a detailed understanding of airway devices used as well as current airway management practices. Utilizing research based protocol as part of a hospital based quality improvement programme is one important way in which critical care nurses and others may contribute to improve overall patients care and outcomes. In this way primary goal of reducing or avoiding potential complications associated with airway devices may be achieved.

The primary task of nursing research is to contribute to the scientific base of nursing practices. Studies are needed to determine the effectiveness of nursing intervention and nursing care. Through research efforts, the science of nursing will grow and a scientifically based rationale for making changes in nursing practice will be generated. As the patients’ needs become more complex in the critical care setting nurses with increased expertise are needed to expand the research based knowledge and apply existing knowledge in practice setting. For example the knowledge and correct practices of suctioning is very important for nurses because improper suctioning can lead to hypoxia, cardiac arrhythmias, hypotension, increased respiratory work, unexplained cardio vascular collapse and sudden death.

Research is needed to refine suction technique to identify patients at greatest risk for adverse response to suctioning. so also with other procedure that need to be performed skillfully in the intensive care unit (ICU) A researcher recommended that research should be done to assess the teaching strategies which should be used effectively
to yield most beneficial results and to determine what skills nurse need to perform independently to improve the condition of the patient in ICU.

Researcher while working in clinical area had come across many situations where staff nurses lacked knowledge in using correct techniques in endotracheal suctioning. The researcher observed that many patients receiving ventilator support needed re intubation because of blocked tubes due to thick mucus plug blocking the endotracheal tubes, nurses pushing the catheter up and down the endotracheal tube, which leads to blood stained aspiration of secretions, no kinking of catheter before insertion, allow prolonged stay of catheter in the endotracheal tube, the tip of the catheter touching outside and getting contaminated etc. Ventilated patients developed pneumonia and other complications which could be prevented.

So the nurses need to improve the knowledge and skills in endotracheal suctioning. The researcher was motivated to conduct this study and to provide staff nurses a structured protocol with teaching programme to improve their knowledge and skills regarding care of patient on ventilator.

**History of Ventilators**

➤ **Early History of Ancient times :-**

Ancient writings by the Egyptians and Greeks described theories of respiration. In the Old testament it is mentioned that Prophet Elisha inducing pressure breathing from his mouth into the mouth of a child The Hippocrates in (460-375 BC) wrote the first description of endotracheal intubation in his book – ‘Treatise on Air’ here it was mentioned regarding introduction a cannula into the trachea along the jaw bone so that air can be drawn into the lungs. Later Paracelsus (1493-1541) used ‘Fire Bellows’ connected to a tube inserted into patient’s mouth as a device for assisted ventilation. This was the first study (1550) which credited him with the first form of mechanical ventilation. Vesalius in (1543) performed ventilation via a tracheostomy in a pig. Hook (1667) used bellows via a tracheostomy in a dog. John Fathergill in 1744 reported a successful case of ‘mouth to mouth’ resuscitation.
John Hunter developed double bellows for resuscitation in 1775 - one for blowing air in and the other for drawing bad air out. Draeger designed an artificial breathing device “Draeger Pulmoter” in 1911 that was used by fire and police units. 4

Negative Pressure Ventilators

From the mid 1800-1900s a large number of devices were invented that applied negative pressure around the body or thoracic cavity – these devices became known as negative pressure ventilators or 'iron lungs'. Two successful designs became popular; in one, the body of the patient was enclosed in an iron box or cylinder and the patient’s head protruded out of the end. The second design was a box or shell that fitted over the thoracic area only (chest cuirass). Patients with chronic paralytic disorders were successfully ventilated on this type of ventilators at home for 25-30 years.

Between July-December of 1952, in Copenhagen, 2722 patients with poliomyelitis were treated in the Community Disease Hospital of which 315 patients’ required ventilatory support. Many principles of Intermittent Positive Pressure ventilator (IPPV) were defined during that time – including the use of cuffed tubes, periodic sigh breaths and weaning by reduction of assisted breaths. Towards the end of the epidemic a few positive pressure ventilators were invented.

After polio epidemics, the 1960’s became an era of respiratory intensive care. Positive pressure ventilation with use of an artificial airway replaced the bulky and cumbersome negative pressure technology of respiratory support. Two types of ventilators and two modes of mechanical ventilation evolved during this period; the first type of ventilator was pressure cycled ventilator (PCV). Two ventilators commonly used for PCV in the 1960’s and 1970’s were the Bird Mark 7 and the Bennet PR2. The second type of ventilator that evolved from a historical perspective is the volume cycled ventilator (VCV). The first fluidic ventilator utilizing moving streams of liquid or gas for sensing, logic, amplification and controls was designed for the US army in 1964 by Barila and the first commercial versatile fluidic ventilator “Hamilton standard PAD” appeared in 1970. The term ‘weaning’ was used to explain various techniques to test the quality of patient’s spontaneous ventilation before extubation.4

Present history of ventilators.
A mechanical change of substantial importance in the late 1960’s and early 1970’s that shaped the present era was the introduction of Positive End Expiratory Pressure (PEEP). Two modes of ventilation Assisted Ventilation (AV) and Controlled Mechanical Ventilation (CMV) came together in a single piece of equipment and the modern era of multiple choice respiratory supports was born. The introduction of intermittent mechanical ventilator (IMV) permitted spontaneous respiration in the midst of substantial respiratory failure which paved the way for a means of weaning i.e. synchronized intermittent mechanical ventilation (SIMV), positive pressure ventilation (PSV) proved to be an addition to IMV that facilitated spontaneously breathing patients.5

- **Intensive care Unit**

An intensive care unit (ICU), also known as a critical care unit (CCU), intensive therapy unit or intensive treatment unit (ITU) is a special department of a hospital or health care facility that provides intensive care medicine. Intensive Care Units cater to patients with the most severe and life-threatening illnesses and injuries; that require constant, close monitoring and support from specialist equipment and medication in order to maintain normal bodily functions. They are staffed by highly trained doctors and critical care nurses who specialize in caring for seriously ill patients.6

- **History of Intensive care Unit**

In 1854, Florence Nightingale left for the Crimean War, where triage, used to separate seriously wounded soldiers from the less-seriously wounded, was observed. It was reported that Nightingale reduced mortality from 40% to 2% on the battlefield, her experiences during the war formed the foundation for her later discovery of the importance of sanitary conditions in hospitals, a critical component of intensive care. In 1923, Dr Walter E Dandy opened a special three-bed unit for the more critically ill postoperative neurosurgical patients at the Johns Hopkins Hospital in Baltimore, MD, USA, using specially trained nurses to help monitor and manage them. In 1930, Dr Martin Kirschner designed and built a combined postoperative recovery / intensive care ward in the surgical unit at the University of Tubingen, Germany. Other surgical units followed these examples, such that by 1960 almost all hospitals had a recovery unit attached to their operating rooms.5
During the Second World War, specialized shock units were used to provide efficient resuscitation for the large numbers of severely injured soldiers. In the 1950s, several large polio epidemics, notably in Copenhagen, led to the opening of respiratory units for the many patients requiring mechanical ventilation. In 1958, Dr Max Harry Weil and Dr Hebert Shubin opened a four-bed shock ward in LA County - USC Medical Center, Los Angeles, CA, USA to improve the recognition and treatment of serious complications in critically ill patients. That same year, Dr Peter Safar opened a multidisciplinary ICU at Baltimore City Hospital. In the 1960s, the importance of cardiac arrhythmias as a source of morbidity and mortality in myocardial infarctions (heart attacks) was recognized. This led to the routine use of cardiac monitoring in ICUs, especially after heart attacks.\(^5\)

Over the next decade or so, ICUs began to be created in hospitals across Europe, the USA, and Australasia. In other countries, ICUs are a more recent development - for example, the first ICU in China was established in 1982. Early ICUs were somewhat isolated, slightly mysterious, and rather frightening places; staff and visitors (when allowed) were often gowned with protective shoe covers, even masks - adding to the sense of anxiety for the patient and their families. Patients were often heavily sedated to facilitate mechanical ventilation and in the belief that this approach would reduce patient agitation and discomfort. Visiting hours were highly restricted to avoid any increase in physiologic stress for the patient, any interference with the provision of care, and to limit the spread of infection in these vulnerable patients.

Many of the initial critical care units were staffed by physicians whose primary specialties were in anesthesiology or internal medicine. Often hospitals had separate surgical and medical ICUs, and some, particularly in the USA, also developed specialty respiratory, cardiac, and neurosurgical ICUs. The majority of units were open, with patients managed by their primary admitting physician, so that different patients on a single ICU would be managed by different physicians. Later, it was realized that many ICU patients had similar problems, regardless of the reason for their critical illness, and that closed units, in which patients were managed by a team of specially qualified intensive care physicians and nurses, provided patients with better care and were associated with improved outcomes. The important role of the intensivist in maximizing patient outcomes...
was also recognized, and specialist training programs began to develop as intensive care medicine became a specialty in its own right.

As ICUs began to expand and ever-sick patients were being admitted and observed, the quantity of critical care research being conducted also increased and understanding of the mechanisms of critical illness progressed rapidly. With continuing developments in technology came more sophisticated life-support and invasive monitoring techniques. Management of the intensive care patient was increasingly interventional. Invasive monitoring systems, notably the pulmonary artery catheter, were widely used. Fluid administration, blood transfusions, oxygen administration, and vasopressors became essential parts although the use of these interventions was often supported by relatively little sound clinical evidence.

❖ Types of Intensive care Unit
  - Hospitals have ICUs that cater to a specific medical specialty
  - Neonatal intensive care unit (NICU)
  - Pediatric intensive care unit (PICU)
  - Psychiatric intensive care unit (PICU)
  - Coronary care unit (CCU): Also known as Cardiac Intensive Care Unit (CICU)
  - Post-anesthesia care unit (PACU): Also known as the post-operative recovery unit, or recovery room, the PACU provides immediate post-op observation and stabilization of patients following surgical operations and anesthesia. Patients are usually held in such facilities for a limited amount of time, and must meet set physiological criteria before transfer back to a ward with a qualified nurse. Due to high patient flow in recovery units, and owing to the bed management cycle, if a patient breaches a time frame and is too unstable to be transferred back to a ward, they are normally transferred to a high dependency unit (HDU) or post-operative critical care unit (POCCU) for closer observation.
  - High dependency unit (HDU): Many hospitals have a transitional high dependency unit (HDU) for patients who require close observation, treatment and nursing care that cannot be provided on a general ward, but whose care is not at a critical enough level to warrant an ICU bed. These units are also called step-down, progressive and intensive recovery units and are utilized until a patient's conditions stabilize enough to qualify them for discharge to a general ward.
- **Surgical Intensive Care Unit (SICU):** A specialized service in larger hospitals that provides inpatient care for critically ill patients on surgical services. As opposed to other ICUs, the care is managed by surgeons trained in critical-care/trauma.

- **Critical care at present**

  Improved communication with patients and their families is now part of daily practice and the importance of involving the patient and family in decision-making, especially at the end of life, is also stressed, replacing the more paternal approach of the past. The need for a multidisciplinary approach to patient care is also recognized, and increasingly nutritionists, physiotherapists, pharmacists, infectious disease consultants, and members of other relevant specialties are regularly included in patient rounds. Large hospital-wide infection prevention schemes, focusing largely on increased awareness and improved hand-hygiene, have also been established to limit development of nosocomial infections.  

  The use of locally produced or adapted protocols has also been encouraged and these are now present on many ICUs, although the use of checklists, represent a more flexible approach to individual patients, particularly in units with adequate numbers of well-trained staff.

  Many hospitals have begun to spread intensive care beyond the fixed walls of the ICU, with the creation of so-called medical emergency teams or rapid response teams. The primary purpose of these teams of intensive care-trained staff is to attend, assess, and provide treatment for deteriorating patients on the ward before they reach a state where ICU admission is needed, thus hopefully improving outcomes and creating more efficient ICU bed usage.

  Critical care medicine has evolved over the years in terms of structure, process, and outcomes. Fewer and less-invasive interventions, more humane care, earlier diagnosis and treatment, expansion of the service beyond the physical walls of the ICU, and better national and international collaborations with colleagues across the globe are just some of the many changes that we have witnessed since the first ICUs were developed some 60 years ago. Critical care medicine is one of the fastest-growing medical fields in terms of patient numbers, and represents an increasingly important part of healthcare systems in the
developed world. Critical care medicine is also more slowly beginning to have a presence in developing countries, and one of the current challenges is to ensure adequate funding, training, and equipment for these newer members of the critical care arena.  

Common equipment in an ICU includes mechanical ventilators to assist breathing through an endotracheal tube or a tracheotomy; cardiac monitors including those with telemetry; external pacemakers; defibrillators; dialysis equipment for renal problems; equipment for the constant monitoring of bodily functions; a web of intravenous lines, feeding tubes, nasogastric tubes, suction pumps, drains, and catheters; and a wide array of drugs to treat the primary condition(s) of hospitalization. Medically induced comas, analgesics, and induced sedation are common ICU tools needed and used to reduce pain and prevent secondary infections.  

To work in the Cardiovascular Intensive Care Unit, our nurses need to exhibit high levels of professional competency and have the ability to quickly focus and prioritize with an ever-changing environment of complex clinical situations.

1.2) **NEED OF THE STUDY:**

Caring for the most critically ill patients requires a complex system of staffing, infrastructure and steady supply of resources. For this reason critically ill patients are admitted to intensive care units (ICU). Every ICU should have the facility to provide standard care. Critically ill patient requires number of complex procedures, out of which mechanical ventilation is the most lifesaving procedure. Mechanically ventilated patient requires expert nursing care from nurses. If not, the patients are exposed to life threatening problems.  

Ventilation-associated pneumonia (VAP) is the most frequent infection occurring in patients who are mechanically ventilated after admission to the intensive care unit (ICU). In a recent large European observational study, almost 25% of patients developed an ICU-acquired infection, and the respiratory site accounted for 80% of these infections. The attributable mortality of VAP continues to be debated, but VAP can be linked with increased duration of ventilation, ICU and hospital length of stay, and significantly increased costs. Prevention of VAP is possibly one of the most cost-effective interventions
currently attainable in the ICU. This VAP bundle incorporates 6 key actions that are simple, cost effective to implement, and are frequently cited as the most evidenced-based interventions. Three of these care actions; oral hygiene, subglottic aspiration and tracheal tube cuff pressure monitoring are new additions to this current version of the care bundle. Oral hygiene with adequate strength antiseptics has been found to reduce the risk of VAP, as poor oral hygiene is associated with colonization by potential pathogens and lead to secondary pulmonary infection.  

The researcher while reviewing the literature and visiting various hospitals found that standard operating protocols (SOP) are very much helpful and they serve as a guide to the employees working in that unit. The investigator while doing a comparative study among the government hospital and private hospital found that government hospitals lacked standard operating protocols in ICU.

Many government hospitals have ICU’s and nurses working in ICU’s who do not have additional training in intensive care unit. Majority of the nurses are general nurse and midwife (GNM). There is no orientation program for nurses before posting them in ICU hence they tend to provide only basic care to ventilated patients. Advance level of knowledge and skills are lacking in them which affect their level of confidence hence researcher, felt the need to develop standard operating protocols for the nurses working in the intensive care unit.

It is possible to minimize and remove their adverse effects allowing the maximum benefit to be obtained by the patient from the ventilator supports provided.

Critical illness always leads to a traumatic event for both the individual and the family. The admission to ICU signals a threat to life and wellbeing of all who are admitted. A patient who is admitted in an ICU faces a new environment, new persons and new equipment around him and he is also finds himself constantly in the midst of various types of sounds.  

The admission of a family member into a critical care unit can be frightening experience for family members after the combination of patients condition and an initial perception by relatives of a high tech, intimidating area can cause a great deal of stress for
them. Traditionally nurses carry out a wide variety of functions, some of the functions can be seen as primary to nurses role and some are secondary to nurses role named as care and cure function. But today’s concern is “family centered care” where health personnel are in a position to provide care not only to patients but also to family as a whole. If the critical care nurses do not assist visiting relatives they may be ignoring valuable contribution to patient’s recovery.¹⁰

Hence the researcher felt the need to prepare a protocol for the staffs regarding care for the patient who is ventilated in Intensive care unit. Written information in the form of SOP serves as a reference material for the nurses in ICU which will be readily available to them when matter is provided in written the retention of knowledge is better. It also serves as a standard and practices can be compared to it.

1.3) **CONCEPTUAL FRAMEWORK:**

*Introduction*

Conceptual model are interrelated concepts or abstracts assembled together in a rational scheme by virtue of their relevance to common theme, sometimes called as conceptual frame work. It provides a perspective regarding interrelated phenomena. They can serve as spring boards for generating research hypothesis.¹¹

**Imogene King’s Goal Attainment Theory, Interacting Systems Theory**

Imogene King developed a conceptual model for nursing in the mid 1960's with the idea that human beings are open systems interacting with the environment (King, 1981)¹¹ King's work is considered a conceptual model because it comprises both a conceptual framework and a theory. The central focus of King's framework is man as a dynamic human being whose perceptions of objects, persons, and events influence his behavior, social interaction, and health (King, 1971). King's conceptual framework includes three interacting systems with each system having its own distinct group of concepts and characteristics. These systems include personal systems, interpersonal systems, and social systems.¹¹,¹²

King's basic assumption mentioned that nursing is a process that involves caring for human beings with health being the ultimate goal. The three systems that constitute King's conceptual framework provided the basis for the development other Theory of Goal Attainment.
The personal system that King speaks of refers to the individual. The concepts within the personal system and fundamental in understanding human beings are perception, self, body image, growth and development, time, and space (King, 1981). King (1981) viewed perception as the most important variable because perception influences behavior. King summarized the connections among the concepts in the following statement: "An individual's perceptions of self, of body image, of time and space influence the way he or she responds to persons, objects, and events in his or her life. As individuals grow and develop through the life span, experiences with changes in structure and function of their bodies over time influence their perceptions of self".  

Interpersonal systems involve individuals interacting with one another. King refers to two individuals interacting as dyads, three individuals as triads, and four or more individuals as small or large groups (King, 1981). The concepts associated with interpersonal systems are interaction, transaction, communication, role and stress.

The third and final interacting system in King's model is the social system. Social systems are groups of people within a community or society that share common goals, interests, and values. Social systems provide a framework for social interaction and relationships, and establish rules of behavior and courses of action.

Application of Imogene kings goal attainment theory in this study.

In this study on “Development of standard operating protocols for nurses with reference to patients on ventilator”. The concept of interpersonal system of Imogene King’s goal attainment theory is applied by the researcher to assess effectiveness of standing operative protocols on knowledge and practices of nurses regarding care of patient on ventilator. The Interaction between the researcher and the nurse help to identify perception and judgment, based on which mutual goal setting and action is decided. Action leads to reaction, transaction and finally goal attainment. There is communication between the researcher and the nurses working in I.C.U. Nurses with sociodemographic variables such as age, gender educational qualification and years of experience are considered as open system interacting with the environment .The researcher with her interaction through pretest identifies the perception and judgment.
Perception- The training need to care a patient on ventilator is identified by the researcher and the need for upgrading knowledge and practices are expressed by the nurses.

Judgment- From the pre-test analysis the gap between the knowledge and practices of the nurses is identified by the researcher. The nurses also realize that they have inadequate knowledge and needs to be improve their skills to care a patient on ventilator. Based on the perception and judgment both researcher and nurse move towards mutual goal setting.

Mutual goal setting- Mutual goal setting between the researcher and the nurses is to improve knowledge and skills of the nurses while caring a patient on ventilator. Based on mutual goal setting action is decided.

Action- Researcher first develops the protocol on care of patient on ventilator based on the identified gap in knowledge and practices, prepares a teaching module. The researcher plans to teach while the nurse shows readiness in learning. Teaching is done and protocols are given for reference. Researcher plans to do Post-test – I on 5th day Post-test –II on 30th day for knowledge assessment She also plans to observe practices from 5th day to 7th day and after 29th day to 31st day. She plans to obtain self-reported practices on fifth day. Action leads to reaction and transaction

Reaction- Reaction is the change in knowledge and practices of nurses regarding care of patient on ventilator which will be assessed using structured knowledge questionnaire on care of patient on ventilator and observation checklist and inventory checklist.

Goal attainment: Final goal is improvement of patient care. However in this study the researcher limits her study upto the i.e. change in the knowledge and practices.

Feedback— there is continuous feedback from the environment to the system i.e. from goal attainment and reaction feedback is given to interaction.
Pre assessment of knowledge and practices of nurses on care of pt. on ventilator

**Perception**: - perceives the need for developing standard operating protocols (SOP) for nurses to care a patient on ventilator

**Judgment**: - Identified the gap between the knowledge & Practices nurses while caring the pt. on ventilator.

**Action**: 1) Development of Protocols on care of patient on ventilator
2) Demonstration of skills and Teaching

**Reaction**
Change in the knowledge
Post test-by Knowledge questionnaire P1, P2 & Observation of practices P1, P2, P3, P4 by observation and inventory Checklist

**Mutual Goal setting**
Improvement in knowledge & practices of the nurses regarding care of patient on ventilator

**Feedback**
Improvement in knowledge & practices of the nurses regarding care of patient on ventilator

**GOAL ATTAINMENT**
Improvement in Patient care

**Not included in the study**

**FIG-3.1 Conceptual framework - Effectiveness of standing operative protocols on knowledge and practices of nurses s regarding care of patient on ventilator based on Imogene Kings Goal Attainment Theory. (1981)**
1.4) **STATEMENT OF THE PROBLEM:**

A Study to develop and assess the effectiveness of Standard Operating Protocols on knowledge and practices of nurses regarding care of patients on ventilator in an intensive care unit at selected government hospitals in the state of Maharashtra.

1.5) **OBJECTIVES OF THE STUDY:**

1. To develop and validate the standard operating protocols regarding care of patient on ventilator.

2. To assess the knowledge of the nurses before and after teaching and implementation of the protocols and teaching.

3. To assess the practices of the nurses before and after teaching and implementation of the protocols and teaching.

4. To find the association of sociodemographic variables with the knowledge and practices of the nurses before and after teaching and implementation of the protocols.

5. To find out the correlation between the knowledge and practices of the nurses regarding care of patient on ventilator.

1.6) **OPERATIONAL DEFINITIONS:**

**A. Develop:-**

- In this Study it means to prepare guidelines for caring of a patient on ventilator.

**B. Effectiveness:-**

- In this study effectiveness means the change in the mean scores of Knowledge and practices before and after implementation of protocols.

**C. Standard Operating Protocol:-**

In this study Standard Operating protocol means the written instructions of the steps of procedures to be performed by the nurses while providing care to a patient on ventilator.
> The Standard Operating protocol contains the following procedures.
  a) Handing over and taking over at the time of change of shift.
  b) Communication in the ICU by Nurses with-
     - Patients.
     - Relatives or significant others.
  
> Assisting for Intubation of the patient.
  a) Purpose
  b) Policy regarding the procedure
  c) Preparation of articles.
  d) Role of a nurse when procedure is being performed by the doctor.
  e) Use of Twill Tape
  f) Use of adhesive tape.
  g) Monitoring the patient.
  h) Care of endotracheal tube
  i) Common problems.

> Monitoring the patient on ventilator.
  a) Ventilator parameters
  b) Hemodynamic values
  c) Vital signs
  d) Respiratory assessment findings
  e) Unexpected outcome.

> Suctioning of endotracheal tube
  a) When required
  b) Policy
  c) Equipments required
  d) Procedure
  e) Recording
  f) Complications
  g) Prevention of complication
Meeting the hygienic needs of the patient.
   a) care of mouth
   b) change of twill tape and site of ET tube
   c) care of back and pressure points.

Assisting for Weaning off from ventilator
   a) Purpose
   b) Policy
   c) Preparation of equipment
   d) Role of the nurse in ‘T’ piece trial and pressure support ventilation
   e) Checklist for weaning parameters.
   f) Monitoring
   g) Common problems associated.

Assisting for Extubation of the patients.
   a) Purpose
   b) Policy
   c) Equipment
   d) Nurses role in the Procedure
   e) Recording of the procedure and patient’s condition
   f) Monitoring of patients condition after extubation – i.e. vital signs, respiratory status, secretions, cough.
   g) Care of patient - deep breathing exercise, chest physiotherapy.

Assisting for Arterial blood gas collection and its interpretation
   a) When it is required
   b) Preparation of articles.
   c) Procedure for collection
   d) Monitoring site after collection
   e) Steps for interpreting ABG result
      i) Examine PH
      ii) Examine PaCO2
      iii) Examine HCO3.
Meeting the nutritional needs of the patient.

Protocol for enteral feeding
a) Assessing gastrointestinal function
b) Taking nutritional history
c) Calculation of daily requirement of a patient
d) Insertion of Ryle’s tube.
e) Administration of enteral feeding.

D. Knowledge:-

In this study knowledge means the correct responses given by nurses regarding care of patient on ventilator which will be elicited using structured knowledge questionnaire. Each correct response is given a score of 1. Obtained score is converted into percentage. This is arbitrarily graded as follows.

- 0 – 18 score (0-25%) - (Poor),
- 19 – 37 score (26-49%) (Average),
- 38 – 56 score (50-75%) (Good),
- 57 – 75 score (76-100%) (Excellent).

E. Practice:-

In this study it means the action taken by a nurse for the purpose of caring for a patient who is on ventilator. This was observed with the help of an observation check list and inventory checklist. Each correct step done was given a score of one and not done was given a score of zero. The obtained score was converted into percentage and arbitrarily graded as follows.

The following practices will be observed using observational checklist.

a. Maintaining routine work in Intensive Care unit that is handing over and taking over in intensive care unit. Total score - 20
b. Communication skills of nurse with the patient. Total score - 14
c. Communication skills of nurse with the patient’s relatives. Total score - 14
d. Performance of nurses in carrying out endotracheal suctioning. Total score - 50
e. Performance of nurses in changing of Endotracheal Tube Tie. Total score - 20
f. Practices of Nurses in maintaining oral hygiene of the patient on ventilator. Total score - 22

g. Practices of Nurses in giving back massage and taking care of pressure points for the patient on ventilator. Total score - 22

h. Practices of Nurses during enteral feeding for the patient on ventilator. Total score - 18

The overall score of 180 of the above observation checklist was graded as follows as

0 – 45 score (0-25%) (Poor),
46 - 90 score (26-50%) (Average),
91 - 135 score (51-75%) (Good),
136 – 180 score (76-100%) (Excellent).

The following reported practices will be observed using inventory checklist.

a. Assisting in Endotracheal Intubation. Total score- 44

b. Monitoring patient on ventilator. Total score- 24

c. Assisting in weaning the patient from ventilator. Total score- 30

d. Assisting in Extubation. Total score- 34

e. Assisting in ABG (Arterial blood gas) collection. Total score- 22

The overall score of 154 of the above inventory checklist was graded as follows as

0 - 38 score (0-25%) (Poor),
39 - 76 score (26-50%) (Average),
77 - 115 score (51-75%) (Good),
116 - 154 score (76-100%) (Excellent).

F. Nurse:

➢ In this study it refers to registered nurse working in ICU who had completed general nursing, Post Basic or Basic BSc. Nursing who was involved in providing direct patient care.

G. Intensive care unit:-

➢ In this study :- It means a self-contained section of the building where very thorough, serious attention was given towards a patient to avoid damage to the organ and prevent the risk of complications related to illness.
1.7) ASSUMPTIONS:
1. All the nurses working in the ICU have some knowledge regarding care of patient on ventilator
2. Nurses working in ICU may have developed certain skills.
3. Knowledge and practices may vary from individual to individual.
4. Improvement in Knowledge and practices may improve patient outcome.

1.8) DELIMITATIONS:
1) Study was limited to registered nurses working in the intensive care units.
2) Hospitals that are under directorate of medical education and research will only be taken for the study.

1.9) HYPOTHESIS:
➢ Regarding knowledge – Ho-Null Hypothesis, H – Research Hypothesis

HO\textsubscript{1} - (Null hypothesis). There will be no significant difference between the mean knowledge score of nurses regarding care of patient on ventilator before and after 5 days post test-1 after implementation of protocols and teaching.

H\textsubscript{1} - (Research hypothesis). There will be a significant difference between the mean knowledge score of nurses regarding care of patient on ventilator before and after 5 days post test-1 after implementation of protocols and teaching.

HO\textsubscript{2} - There will be no significant difference between the mean knowledge score of nurses regarding care of patient on ventilator before and after one month post test-2 after implementation of protocols and teaching.

H\textsubscript{2} - There will be a significant difference between the mean knowledge score of nurses regarding care of patient on ventilator before and after one month post test-2 after implementation of protocols and teaching.

➢ Regarding observed practices

H0\textsubscript{3} - There will be a significant difference between the mean observed practices scores of nurses regarding care of patient on ventilator before and after 5 days post test-P1 first observation after implementation of protocols and teaching.
H₃ - There will be a significant difference between the mean observed practice scores of nurses regarding care of patient on ventilator before and after 5 days post test-P1 first observation after implementation of protocols and teaching.

H₀₄ - There will be a significant difference between the mean observed practices scores of nurses regarding care of patient on ventilator before and after 5 days post test-P2 first second observation of implementation of protocols and teaching.

H₄ - There will be a significant difference between the mean observed practice scores of nurses regarding care of patient on ventilator before and after 5 days post test- P2 second observation after implementation of protocols and teaching.

HO₅ - There will be a significant difference between the mean observed practices scores of nurses regarding care of patient on ventilator before and after 5 days post test-P3 third observation after implementation of protocols and teaching.

H₅ - There will be a significant difference between the mean observed practice scores of nurses regarding care of patient on ventilator before and after one month post test-P3 after implementation of protocols and teaching.

HO₆ - There will be a significant difference between the mean observed practices scores of nurses regarding care of patient on ventilator before and after one month post test-P 4 after implementation of protocols and teaching.

H₆ - There will be a significant difference between the mean observed practice scores of nurses regarding care of patient on ventilator before and after one month post test-4 after implementation of protocols and teaching.

➢ Regarding reported practice

HO₇ – There will be no significant difference between the mean reported practice scores before and after five days post test -1 of implementation of protocols and teaching
H7 There will be significant difference between the mean reported practice scores before and after five days post test-1 after implementation of protocols and teaching.

1.10) **SCOPE OF THE STUDY:**
- Prepared Protocols can be used in orienting new staffs in ICU
- It will help in planning for in-service education program for nurses.
- It will serve as guidelines for the newly appointed staff or who comes as relievers or floating staff nurses.
- Nurses will be more skillful in the performance while caring a patient on ventilator.
- It will help in giving standardized care to the patients and reduce the mortality rate in ICU.
- Research can be conducted in future
- Developed protocols will also help in Auditing and Accreditation of the Hospital in future.