CHAPTER - I

INTRODUCTION

“Too often we underestimate the power of a touch, a smile, a kind word, a listening ear, an honest compliment, or the smallest act of caring, all of which have the potential to turn a life around”.

-Leo Buscaglia

“Challenges are what make life interesting and overcoming them is what makes life meaningful”

-Joshua J. Marine

1. Pediatric Intensive Care Unit

Advances in pediatric especially in the field of intensive care have drastically improved the prognosis for the critically ill children. Numerous conditions that were previously fatal are now treatable, & many children who previously would have sustained a permanent disability now recover completely. The current evidence suggests that the sickest subgroups of critically ill children are less likely to die if treated in pediatric intensive care unit in a tertiary care hospitals.

1.1 Overseas History of Pediatric Intensive Care

The development of Pediatric Critical Care followed the development of adult & neonatal intensive care. Florence Nightingale established the concept of Critical Care in 1863, who grouped postoperative patients into a common area, which reported significant reduction in the postoperative morbidity & mortality. During the epidemic of poliomyelitis in Copenhagen, it was recognized that children had higher mortality than adults in these poliomyelitis cases; so, the Pediatric Intensive Care was first established in 1950s in Sweden & Stockholm. In United States the first PICU was established in 1967 with the help of Mr. Downes. The Society of Critical Care medicine was established in 1968, & the pediatric section of the SCCM (Society of Critical care
Medicine) was established in 1984. Then slowly the pediatric critical care developed in other parts of the world, like Europe & Australia.¹

1.1.2 History of pediatric critical care in India

Though there were many centers taking care of the critically ill children, these children were treated in adult intensive care unit. Though we accept the principle that the common denominator is not the age of the patient or which service he or she originates from, but rather the round the clock availability of pediatric oriented intensive care specialists. There are two specific objections to combine adults & children. The first is that children come in all different size & shapes and are not small people but different people. The second objection is that of potential of psychological trauma to a small child in a busy unit managing adults & children. So, with that in the mind the first organized Pediatric Intensive Care Unit was established in 1991 at Kanchi Kamakoti Childs Trust Hospital Chennai, with seven beds with separate team of doctors & nurses, with the pediatric anesthesiologist as the in charge of the unit.

The first organized pediatric Advanced Life Support course recognized by the American Heart Association, American Academy of Pediatric & the Indian Academy of Pediatrics was conducted in Chennai by Dr N Janakiraram. The PALS course is being conducted regularly in India, which has created a lot of awareness & enthusiasm among the pediatricians in the concepts ‘Critically ill Children can be saved’. In 1997 the intensive care group of Indian Academy of Pediatrics was formed. The first National congress of pediatric critical care was held at Nagpur lead by Dr.Deopujari in 1998. In 1999, the pediatric section of the Indian Society of Critical Care medicine was established.³

1.1.3 Personnel

In maintaining a pediatric intensive care unit one must understand that it is doctors & nurses who care for patients & not the machines. In United States, in establishing PICU, 80% of the investment is for the personnel & 20% for the rest like equipment’s. But, in India it is the other way round. To take up the profession of pediatric critical care, they must have personalities different from the most other medical fields. The aspect of critical care is a ‘complex dynamic world’. These aspects are that it is event driven dynamic & tightly complex, uncertain & risky. The qualities of the intensivist should have strong commitment, possess knowledge, good
judgment, adaptability, must have clinical skills, with good communication skills & leadership qualities.  

1.2 Assisted Mechanical Ventilation

Assisted ventilation has revolutionized the outcome of sick newborns and children in the developed world in the last two decades. Mechanical ventilation is an invasive life support with multiple adverse effects on the cardiopulmonary system, if not undertaken with utmost care and expertise even in skill hands. It is an expensive and complex technique and a large investment in terms of money, time, skill and labor is needed to reap the benefits.

Mechanical ventilation in our country got started only few years ago and presently we lack the infrastructure, equipment and even trained personnel. To improve the existing scenario of mechanical ventilation in our country we need to train our personnel especially the nursing staff.

Mechanical ventilation is required when there is prolonged apnea or acute respiratory failure inspite of administration of 100% oxygen or CPAP. The ventilator is used to control mechanically and support breathing in order to maintain arterial pH & blood gases within the normal range. The arterial PCO2 of > 60mmHg and PO2 of < 60mmHg while receiving 100 % oxygen indicates acute respiratory failure.

A number of ventilators have been designed especially for use in infants and small children. Ventilators primarily used for adults have enough functional flexibility and they can be used in adolescent age group children. Some ventilators are designed in such a way that they provide all features and can be used in all age groups.

The idea of airway management and artificial ventilation progressively developed and two steps are considered the most important. The first took place in 1880 when MacEwen reported the first successful relief of upper airway obstruction by means of intubation. Specifically, in the July 24 1880 volume of the British Medical Journal, MacEwen reported about 3 patients who were intubated: intubation was performed to relieve diphtheria upper airway obstruction. The second step was in 1887, when George Fell, Professor of Physiology & Microbiology in the USA, described a system in which bellows were attached to the endotracheal tube for the purpose of
providing positive pressure ventilation to a patient experiencing ventilatory failure from an opiate overdose.⁶

In 1885, O’Dwyer et al. employed a wide caliber endotracheal tube through which gas was introduced into the lungs and through which exhaled gases exited the lung. This technique was called ‘inhalational endotracheal anesthesia’. An alternative strategy, called ‘insufflation’, was first used by Barthelemy & Dufour in 1907 and more fully developed by Melzer & Auer in 1909.⁷

The goal of pediatric critical care medicine since its inception in the 1950s has been surveillance & support of the vital system function in critically ill or injured infants, children & adolescents, & their eventual restoration to health. Pediatric critical care medicine, a subspecialty of pediatrics & of critical care medicine, has complex origin in many areas of medical sciences & practice. Pediatric critical care medicine has matured dramatically over the past two and a half decades. Knowledge of the pathophysiology of life-threatening processes and the technological capacity to monitor and treat pediatric patients suffering from them has advanced rapidly over this period.

Along with the scientific and technological advances there has been evolution of the pediatric intensive care unit (PICU), where the special needs of the critically ill or injured children can be met by pediatric specialists.⁵

Mechanical ventilators have been developed to reduce operator fatigue and to allow long term treatment, to reduce irregularity in artificial breathing and support ventilation not only during anesthesia but also in all contexts in which respiratory failure is present, including emergency and intensive care.

At present, mechanical ventilators are very sophisticated machines allowing regulation of pressure, tidal volume, flow and time of each breath. Moreover, they allow PEEP application and patient support in assisted and controlled ventilation, with the possibility for the patient to breathe spontaneously in a circuit in which positive end-expiratory pressure is applied (CPAP).
New modes of ventilation are possible using advanced mechanical ventilators. Technical development is progressing according to clinical needs and improved scientific knowledge translating into real benefits for the ventilated patients.\textsuperscript{8}

The care of the mechanically ventilated patients is at the core of nurse’s clinical practice in the pediatric intensive care unit. Mechanical ventilation is indicated for numerous clinical and physiological reasons. The nursing management of the mechanically ventilated patients is challenging on many levels, from the acquisition of highly technical skills; expert knowledge on invasive monitoring; and implantation of interventions to care for the patients. Each critically ill patient brings the clinical rationale for mechanical ventilations and additional complexities associated with their illness.\textsuperscript{9}

The mechanically ventilated patients present many challenges for the intensive care nurse. Nursing care and management of the critically ill mechanically ventilated patients is demanding and necessitates an expert understanding of technological issues underpinned with a patient focused approach.

Children have to be protected, and adults have a responsibility to protect them from harm at all times in every environment where children and young people are cared for or look after there should be a commitment to developing a ‘safeguarding culture’ that puts the needs of the child/young person as paramount in underpinning that are infants and small children cannot be independent of adults, they need to be looked after to meet their basic needs, these needs become greater when children are sick and most vulnerable. Health care system and processes, policies and procedures need to be in place to support health care professionals practice in safeguarding children.\textsuperscript{10}

Ventilators are the lifesaving machines that help the child to breathe in case of various diseases like diseases of the lungs, of the brain, where the child is not able to breathe. The inability to breathe voluntarily could be because of the disease itself, or the treating physicians could have stopped the child from breathing to avoid the patient from struggling too much. Therefore mechanical ventilators are of great importance.\textsuperscript{11}
1.2 NEED FOR STUDY

“Life is not measured by number of breaths we take, but by the moments that take away our breath”

-Hillary Cooper.

According to WHO 140 million children are born in every year, of which 5 million children die in the 1st month of life in the developing countries. The nursing care of children has changed dramatically in recent decades due to advances in medical knowledge.

Monitoring is the activity of continuously, or nearly continuously evaluating the physiologic function of a patient. Intermittent measurements of physiologic parameters on the other hand provide information at only one point of time. The fluctuating status of critically ill children makes real time monitoring more desirable. The goals of any monitoring system are to aid in diagnosis & prognosis, guide & assess therapy, alert caregivers to alterations in status & early detection of complications. It is important to remember that unlike the advanced intensive care units it becomes difficult to ignore the need for continuous close observation of vital parameters by the caregivers. Clinical monitoring is equal or perhaps more important in the intensive care units because of the cost constraints of the monitoring systems & lack of monitor trained personnel involved in the care of sick children.\(^{11}\)

1.2.1 Problems faced in India

The children with life threatening illness are admitted to various hospitals providing different levels of care. There of two major categories of care, one is private & the other is public. There are conflicting roles of physicians. The consumers are poorly informed. Lack of proper insurance coverage makes middle class family unable to afford the treatment in the pediatric intensive care. The training for exclusive pediatric critical care is limited in our country. With all these limitations in our country, the branch of pediatric intensive care is growing slowly & steadily.

1.2.1 Factors for the development of PICU in India
There are many factors, which led to the development of pediatric critical care in India. One of the important factors is the growth of super specialties like pediatric cardiac surgeries & pediatric neurosurgeries & many complicated procedures being done by pediatric surgeons. It was observed that the children had higher mortality. Critical care is more & more equipment oriented & the liberalization of import of equipment’s by the Government of India helped very much in the development of PICU. The concept “Most of the sick babies are ventilated, most of the sick babies die so why should we ventilate the babies” has gone. The introduction of PALS course in India by Dr. N Janakiraman in 1991 is one of important landmarks for the development of Pediatric Intensive Care in India.\textsuperscript{12}

1.2.2 Misconception about the PICU in India

1. In poor large country like India, the encouragement of pediatric critical care is a misdirected effort.

2. Basic primary health care is lacking & ordinary hospital facilities in most of the country are inadequate in there need for PICU.

3. The tendency to use an intensive care unit as the last halt or ‘stopping station’

4. Most of the sick babies are ventilated, most of the sick babies die, so most of the ventilated babies die.

5. The difference between intensive care now & ten years ago is that we can keep seeing children alive longer, but still they die.

All this raises a question do we need PICU, yes we do need PICU, even if a small percentage of the people can afford & these children can be saved, it is our duty to save the children whatever the cost may be ‘No child should knock in vain’. There is definite evidence from the overseas experience & our own experience that the death of the child yester years become a rarity these days. We are able to save many children who otherwise would have died for want of acute pediatric care. General pediatrics at present & in the next century will be limited only to vaccinations, viral fever & PUO as immunization has wiped off most of the infectious diseases, while ORS has wiped off the admissions due to diarrhea. So now days there are more percentage of critically ill children getting admitted in the hospitals.\textsuperscript{13}
1.2.3 Mechanical ventilation in children

Appreciation of the therapeutics of mechanical ventilation requires an implicit understanding of the respiratory physiology & ICU technology. Despite the variety of ventilators & ventilation technology the fundamental physical chemistry & physiology of oxygen & carbon dioxide are unchanged, so at one level one can still expect the novice to handle all devices appropriately. The choice of mode of ventilation is decided on basis of age, diagnosis, available respiratory physiological information significance of cardiovascular & hemodynamic implications of IPPV & the ventilator capabilities.

Once the patient is attached to the ventilator, adequacy of ventilation is immediately assessed clinically through observation of chest movement, color, perfusion & auscultation of the chest. A minimum standard monitoring required for typical & acutely ventilated patients include continuous pulse oxymeter, ECG monitoring, an alarm that detects failure of cycling (circuit disruption), an alarm that detects airway occlusion. For older children there is historical preference of volume-controlled ventilation with high pressure alarms. There are other triggering technology that has come to practice like thoracic impedance technology & abdominal movements. With this modern ventilator technology we are keeping the child more & more on spontaneous mode thus reducing the need for prolonged sedation or paralysis and reduce the number of days on the ventilation.14

1.2 Nursing Care Activities for children on Ventilators

As it is known that mechanical ventilators are the lifesaving machines that help the person to breathe in case of various diseases of the lungs & also diseases of the brain where the person is not able to breathe. The inability to breathe voluntarily could be because of the disease itself, or the treating physicians could have stopped the person from breathing to avoid the patient from struggling too much. This sedation will be removed & the patient taken off the ventilator once the other systems have adequate function. The article written by Jo Justin (2010) lists the various aspects that are developed for children who are on ventilator and the selected nursing care activities such as:

1. Maintenance of airway & breathing: - The airway needs to be maintained so that the breathing is possible. There are many times when the child is in an epileptic
attack or when the child has swallowed something & choking, breathing is not possible. In these situations, the maintenances of the airway & also the breathing are very important.

2. Monitoring of ventilator parameters: - The ventilator is one of the modern machines and that has a lot setting on it. Though these setting are present, it needs a human to actually monitor the parameters. This is an important function of the nurse as she has to take care and make sure that the various parameters are all right for that patient.

3. Monitoring of vital signs: - the vital signs should be monitored because on the ventilator can have sudden changes in the status. These sudden changes should be regularly identified and once there are some changes in the vital signs for the worse, the person should be monitored more carefully. On the other hand, if the change is for the better, the patient should be slowly weaned off the ventilator.

4. Monitoring & care of invasive lines: - All the invasive lines that are on the patient should also be monitored very carefully. There are some times when the person who is on ventilator can be very restless and this can cause the invasive lines to be removed and that should be monitored very carefully. In case these lines are removed by the patient, they should be restored as soon as possible for the person to have comprehensive treatment.

5. Maintenances of fluid & electrolyte balance: - The electrolyte and the fluids should also have adequate balance in the body. This will help to maintain the health of the person. This is because if the fluids are the maintenance are not balanced, that can cause the worsening of the health of the individual.

6. Administration of drugs: - Administration of the drugs is also a very important aspect of the monitoring as there are various kinds of drugs that need to be monitored. Some drugs may need to be reduced in dose progressively and so if the monitoring is good, then the patient will be able to recover faster. This is the reason for the importance being accorded to the various activities for a patient who is on ventilator.15
1.2.4 Volume support ventilation

Volume Support Ventilation is a new means of assisting spontaneous breathing which avoid the disadvantages deriving from Pressure Support Ventilation. The ventilator, breath by breath, adapts the inspiratory pressure support to the changes in the mechanical properties of the lung & the thorax in order to ensure that the lowest possible pressure is used to deliver the pre-set tidal volume that remains constant. The inspiratory pressure is constant & the flow is decelerating. In cases of apnea the ventilator automatically switches to PRVC. The initial values of tidal & minute volume should be set, as should all parameters to be used to PRVC in the presence of apnea ventilation.

1.2.5 Ventilator Support in Pediatric Intensive Care Unit

In pediatric intensive care unit, ventilator support is most frequently provided by intubation of the trachea, with placement of an endotracheal tube (ETT). The ETT adapter, which attaches to the ventilator tubing, is considered the airway opening. During inspiration, airway opening pressure is greater than alveolar pressure, thereby driving gas into the lungs and inflating them. Exhalation is usually passive and occurs because, at the end of inspiration, alveolar pressure becomes greater than airway pressure.

When children are sick & hospitalized, they are treated by using various types of equipment’s including mechanical ventilators, especially when they are admitted in the intensive care unit. The mechanical ventilator plays a vital role to save the life of the children. The children are not able to adequately ventilate their lungs because of various disorders which results in respiratory insufficiency or failure. These children require immediate intervention, including the establishment of an artificial airway & mechanical lung ventilation with a positive pressure ventilator. Mechanical ventilation allows the children to inhale high percentage of oxygen. When children are initially placed on mechanical ventilator, they must be closely observed so that effectiveness of the therapy can be evaluated & occurrence complications can be prevented.16

Mechanical ventilation is an invasive life support procedure with many effects on the cardiopulmonary system. The goal is to optimize both gas exchange & clinical status at
minimum FiO2 & ventilator pressures/tidal volume. The ventilator strategy employed to accomplish this goal depends partly, on the child’s disease process & the nursing care provided on the ventilator.

When children are not attempting to breathe spontaneously, the ventilator completely controls the respiratory pattern. For these children who can attempt to breathe, the degree to which a ventilator is able to synchronize with the patient’s own respiratory efforts may have significant clinical effects. Patients whose lung disease is improving and who thus are receiving less sedation in an attempt to wean them from ventilator support may find that when they need to, they are unable to draw a breath, thereby experiencing dyspnea. Patients also experience anxiety as gas is pushed into their airway while they are trying to exhale. This dyssynchrony often necessitates pharmacologic interventions with sedation or paralytic agents which may result in prolonged intubation and ventilation.¹⁷

Most children receive ventilatory support for few days only; however, a small number require mechanical ventilation for prolonged periods. After starting mechanical ventilation, subsequent adjustments are made after evaluating the child’s disease status, spontaneous effort, and ABGs.

Weaning is basically the process of liberation from the ventilator. As the child improves, its health conditions the need for ventilatory support decreases. A child’s condition has to be carefully followed so that our support keeps pace with the child’s decreasing support earlier than indicated imposes greater work of breathing while delaying this would delay extubation.¹⁸

The nurses promote the effectiveness of ventilation by suctioning, positioning, ensuring that adequate humidification is provided, also providing support & reassurance to the child & the family.

Mechanical ventilation is an essential lifesaving technology. There’re however numerous associated complications that influence the morbidity & mortality of the children receiving intensive care. Therefore it is essential to set up safest & the most effective form of ventilation for the shortest possible duration.¹⁹
Ventilator associated pneumonia is the second most common hospital acquired infection in children with mechanical ventilation although frequently lifesaving it can cause complications if improperly used.\textsuperscript{20}

Fenstermacher D & Hong D (2004) reports that mechanical ventilation is the second most frequently performed therapeutic intervention in intensive care unit today. They say that as life expectancies increase & people with chronic illnesses survive longer, artificial support with mechanical ventilation is also expected to rise. In this survey, over half of senior internal medicine residents reported on their training on mechanical ventilation as inadequate, whereas the majority critical care nurses reported having received no formal education on its use.\textsuperscript{32}

Mechanical ventilator support is an integral component in the delivery of critical care in children. Increasingly, pediatric critical care nurses face the challenge of caring for children who require mechanical ventilation. Irrespective of the location in which care is to be provided, it is important that the nurses caring for such children understand the fundamental principles related to mechanical ventilation, implication on their respiratory functions associated complications & specific nursing care measures.

A mechanical ventilator is a machine which generates a controlled flow of gas into patient’s airway. Oxygen and air are received from cylinders or wall outlets. The gas is pressure reduced and blended according to the prescribed inspired oxygen tension (FiO2), accumulated in a receptacle within the machine, and delivered to the patients using one of many available modes of ventilation.\textsuperscript{23}

The pediatric ventilator should be easy to operate and should incorporate safety alarms and backup ventilation. Microprocessor controlled integrated should be suitable for neonates and child ventilation.

Ventilators are the lifesaving machines which help the child to breathe in case of various diseases like diseases of the lungs, of the brain, where the child is not able to breathe. The inability to breathe voluntarily could be because of the disease itself, or the treating physicians could have stopped the child from breathing to avoid the patient from struggling too much. Therefore mechanical ventilators are of great importance.\textsuperscript{24}
Although some management protocols have been developed for pediatric mechanical ventilation, they have not been extensively validated, nor have they gained acceptance. Most have been translated from the adult – based ARDS network guidelines for VT, without considering key difference between adult & pediatric practice. Given the variability in the mode of ventilation not only between adults & pediatric practices but also within pediatric. Explicit protocols should be developed for different modes of ventilation.

A critically ill child presents a major challenge and consequent reward to nursing. The nurse should provide essential individualized care directed towards the survival of the patients. Each individual nurse is accountable to take appropriate measures to save the life of the children under her care. The number of children on mechanical ventilator is rapidly increasing.\textsuperscript{25}

The nurse coordinates effort of the health care team, teaches and supports the client and the family, monitors the clients’ response to ventilation, intervenes to maintain oxygenation and ventilation and ensures that the clients’ complex needs are met. In order to provide a better comprehensive care to the mechanically ventilated patient, the nurse should have good knowledge regarding the mechanical ventilation and also the practical skills to provide better care to those patients.

It is been witnessed that there is a rapid growth of several well-equipped and staffed neonatal intensive care units (NICUs) in India over the last one and a half decades – a finest example of dedication by pediatrician in Indian medical history. Establishment of formal training programs in neonatology forum in accreditation of neonatal care unit has made a beginning towards standardization of delivery of neonatal intensive care. Organizing the care of critically ill older children has, however, lagged behind. There are only handfuls of PICUs in private or public sector. Even these are often managed on an ad hoc basis by physicians who may not have expertise in varied aspects of pediatric critical care. Some of important limiting factors in development of pediatric intensive care are high cost, lack of trained personnel, lack of infrastructure, etc. Initiatives have been started by Indian Academic of Pediatrics as Seminars on pediatric critical care medicine are being organized regularly in small scale.\textsuperscript{28}

The head nurse of the PICU is a professional nurse responsible for assisting the supervisor in planning, administrating, coordinating and evaluating a program of high quality nursing care in
PICU. The head nurse is also responsible for aiding in professional growth and development of all employees of the area. The PICU supervisor is professional nurse who is responsible for the effective organization & management of the PICU. The supervisor has 24 hours responsibility for quality of care and supervision. The supervisor is also responsible for the promotion and fostering of personnel growth and employee satisfaction.29

Children have special medical needs therefore it is appropriate, that critical care is provided to them in units dedicated exclusively to children where care is provided by pediatric specialist. The recent explosion of knowledge in the field of critical care medicine, along with the technology advances in patients monitoring, therapy and improved transport facilities have significantly altered the nature of critical care. The special needs of critically ill children require high level of expertise provided by a team of physicians, nurse and ancillary personnel in special units with a wide variety of special equipment.

Survival among mechanically ventilated patients depends not only on the factors present at the start of mechanical ventilation, but also in the development of complications in children's management in the PICU. So the nurse should take precautions to prevent complications when a child receives continuous mechanical ventilation.

Studies have shown that endotracheal suction-induced hypoxia can be reduced by applying interventions like hyper-oxygenation and hyperinflation. The occurrence rate of suction-induced hypoxia was 30% lower when any intervention was applied.29

In order to prevent all these complications and improve the prognosis of the patients on ventilator the nurses in pediatric intensive care units should provide a safe and competent care. Therefore it is very essential that nurses working in the PICU must be skilled in providing comprehensive care to the children required ventilated support.

1.2.6 Standard Operating Protocol

The standard operating protocols are specific set of practices that are required to be initiated & followed. Now-a-days medicines, clinicians are familiar with standard operating protocols. The SOP’s therefore, help bridge the gap between evidence-based medicine, clinical practice
guidelines, & the local realities at the point of care besides this the SOP’s ensures a higher standard of medical attention in serious situation.\textsuperscript{133}

The study conducted by Camila Balsero Sales, Andrea Bernardes, Carmen Silivia Gagrial, Maria De Fatima Paiva Brito, Andre Almeida De Moura etal (2018) the study was to evaluate the use of standard operating protocols in the professional practice of the nursing team, a total 247 nursing professionals participated in the study & reported changes in the way the interventions were performed. The study concluded that the SOP’s needed to be reassessing in order to improve the quality of care provided. Beside this it was also seen that protocols based care was a mechanism to facilitate professional nursing practice & to standardize care provided.\textsuperscript{134}

A descriptive & quantitative study was carried out in Brazil in the year 2016; the data was collected from three hospitals the aim of the study was to verify the existence & use of standard operating protocol by nursing teams on 261 nursing professionals. The findings of the study revealed that 56.7\% of the nurses used standard operating protocol only when they had doubts; 54.02\% nursing technicians & auxiliaries & 62.86\% of nurses did not believe that the procedures are being complied with, therefore the study concluded that there is a need for continuing training on standard operating protocol use & compliance by all professionals with a view to improving of nursing care.\textsuperscript{135}

The researcher while reviewing the literature & visiting various hospital found that standard operating protocols (SOP) are very helpful and they serve as a guide to the employees working in that unit. The investigator conducted an exploratory study to assess the practices of the nurses on care of children on ventilator and identified that there was no uniformity in carrying out the procedure hence the researcher felt the need to prepare a protocol for the staffs regarding care of children on ventilator in Pediatric Intensive Care Unit. Written information in the form of SOP serves as a reference material for the nurses in PICU besides this there is a standard uniformity in performing various procedures on the other hand it will be readily available to them. When matter is provided in written the retention of knowledge is better.
1.3 Conceptual framework

A conceptual framework of a model is the made up of concepts which are the mental images of the phenomenon. These concepts are linked together to express the relationship between them. A model is used to denote the symbolic representation of the concept.²¹

Imogene King’s goal attainment theory is based on the personal & interpersonal system including interaction, perception, communication & transaction.

According to the theory two people meet in some situation, perceive each other, make judgment about each other, take some mental action & react to each one of those. Since these behaviors cannot be directly observed, one can only make inferences about the same.

The next step in the process is interaction which can be directly observed, one can only make inferences about the same. The last step in this model is transaction, which is dependent upon the achievement of the goal.³¹

The investigator adopt Imogene King’s, Goal Attainment Theory, as a basic framework which aims to give standard operating protocol to the staff nurses in the experimental group from selected hospitals of Pune city, regarding care of pediatric patients on ventilator & to find its effectiveness by assessing the knowledge & practices of the nurses before & after the administration of standard operating protocol. In the control group knowledge & practice is assessed without the implementation of standard operating protocol.

The six major concepts of the phenomenon are as follows:

**Perception:-**

Refers to the persons representation of reality, it is universal yet highly subjective & unique to each person. It is not observable but it can be inferred. Here the investigators perception is needed for:

- Promoting knowledge of nurses regarding care of pediatric patients on ventilator.
- Improving the skills of the nurses while caring the child on ventilator.
- Motivating the nurses to share their knowledge and skill in caring the children on ventilator.
- To evaluate the existing standard operating protocol in hospitals
- To evaluate the existing practices

**Judgment:-**

- The investigator judged the need to assess the effectiveness of standard operating protocol on care of pediatric patients on ventilator among the nurses in the experimental & control group in PICU at selected hospitals of Pune city.

**Action:-**

- It refers to mental or physical activity, the goal which individual perceives, the researcher’s action is to develop & assess the effectiveness of standard operating protocol on care of pediatric patients on ventilator in the experimental & control group.

**Reaction:-**

- In this study investigator & nurses’ reaction are setting mutual goal & researcher plans for assessing nurses’ view regarding standard operating protocol on care of pediatric patients on ventilator in the experimental group.

**Interaction:-**

- Refers to verbal & non-verbal behavior of individual and the environment between two or more individuals. It involves goal directed perception & communication. In this study the investigator interacts with the staff nurses by pre-test questionnaire & observation checklist in the experimental & control group & by giving standard operating protocols to the experimental group.

**Transaction:-**

- It depends upon the attainment of goal. In this stage investigator reassess the knowledge & practices by giving post-test questionnaire & assessing the skill on observation checklist in the experimental & control group.
PERCEPTION
Need to develop a protocol to care the paediatric patients on ventilator

JUDGEMENT
To provide safe & optimum skilled care to the paediatric patients on ventilator

ACTION
To evaluate the existing protocols, to evaluate the existing practices & the development of standard operating protocol

PERCEPTION
Expressed need to be trained because of inadequate knowledge & skill to care the paediatric patients on ventilator in the experimental group

JUDGEMENT
• Participated and responded to questionnaire
• Reported practices in experimental & control group

ACTION
Readiness to receive information and develop skill to practice in experimental group

REACTION
Nurses agreed to learn & practice standard operating protocol

INTERACTION
• Teaching of protocols to nurses
• Implementation of standard operating protocol in experimental group

FEEDBACK

Non improvement in Patient care

Improvement in patient care

TRANSACTION
Enhancement in knowledge score and improvement in skills

Improvement in patient care in experimental group, if there is no improvement, read the SOP

No improvement in patient care in control group, there may be improvement due to personal interest

FIGURE: 1.1
CONCEPTUAL FRAMEWORK: IMOGENE KINGS GOAL ATTAINMENT THEORY (1981)
1.4 Problem Statement:

To develop & assess the effectiveness of the standard operating protocol on the knowledge & practices of the nurses regarding care of paediatric patients on mechanical ventilator in the paediatric intensive care unit at selected hospitals of the Pune city.

1.5 Objectives:

Phase - I

1. To evaluate existing protocol in hospitals.

2. To evaluate existing practices.

3. To develop and validate standard operating protocol.

Phase - II

4. To assess the knowledge of the nurses, regarding care of children on ventilator before & after the administration of standard operating protocol in the experimental and control group.

5. To evaluate the practices of the nurses regarding care of children on ventilator before and after the administration of standard operating protocol in the experimental and control group.

6. To assess the usefulness of the protocol (with the help of semi structure opinionnaire)

7. To correlate the knowledge & practices of nurses regarding care to children on ventilator among the experimental and control group.

8. To compare the knowledge & practice scores with selected demographic variables (age, years of experience, educational qualification and gender.) in the experimental and control group.

1.6 Operational Definition:

1. Effectiveness: - In this study effectiveness refers to the change in the mean score of knowledge and practices of staff nurses on care of children on mechanical ventilator.

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
2. providing care to the patients on ventilator the nursing protocol contains the following procedures:

- Assisting for endotracheal intubation
- Monitoring patients on ventilator
- Suctioning of endotracheal tube
- Assisting for ABG collection and its interpretation
- Assisting for weaning off from the ventilator
- Administration of Intravenous Injections
- Care of invasive lines
- Administration of Enteral feeding
- Maintenance of oral hygiene
- Change of position and back care

3. Knowledge: - In this study knowledge means the correct responses given by nurses for structured knowledge questionnaire which was elicited by the researcher using scoring & arbitrary grading.

0-21 (Poor)
21-43 (Average)
44-65 (Good)

4. Practices: - In this study practice means the action taken by a nurse for the purpose of caring for patients who is on ventilator. This was observed with the help of observation checklist which was elicited by the researcher using scoring & arbitrary grading for checklist in grading was

0-45 (Poor)
46-90 (Average)
91-135 (Good)
136-180 (Excellent)

5. Staff nurses: - In this study staff nurses refers to a nurse who had completed a diploma or graduation program in nursing & those who are working in PICU.
6. **Children:** - In this study it means those children between the age group of 1 year to 12 years.

7. **Mechanical ventilator:** - In this study mechanical ventilation means support that applies positive pressure to the airway.

8. **PICU (Paediatric Intensive Care Unit):** - In this study PICU means a self-contained unit of the building where very thorough serious attention is given toward a child to avoid damage to the organ & prevent the risk of complications related to illness.

1.7 **Assumption:** -

- Staff nurses may have some knowledge regarding the care of children on mechanical ventilator.
- Nursing care protocol may improve the knowledge & practices regarding the care of children on mechanical ventilator among the staff nurses.
- Knowledge may vary from individual to individual.
- Protocol is an established way of imparting information.
- Protocol may influence the knowledge and practices of the nurses.

1.7 **Delimitations:**-

- The study is limited to nurses working in selected paediatric intensive care units, in the city.
- Observation of practices of care of children on ventilator is done on the actual patients who are on ventilator.

1.8 **Hypothesis:**

**Null Hypothesis (H₀):** - There is no significant difference in the mean pre-test & post-test knowledge scores of nurses after the administration of standard operating protocol in the experimental & group.
Alternate Hypothesis ($H_1$): - There is significant difference in the mean pre-test & post-test knowledge scores of nurses after the administration of standard operating protocol in the experimental group.

Null Hypothesis ($H_{02}$): - There is no significant difference in the mean pre-test & post-test knowledge scores of nurses after the administration of standard operating protocol in the experimental group.

Alternate Hypothesis ($H_2$): - There is significant difference in the mean pre-test & post-test knowledge scores of nurses after the administration of standard operating protocol in the experimental group.

1.9 **Scope of the study:**
  - Nursing Education:
    - The knowledge on care of children on ventilator will make the nurses more competent.
  - Nursing Services:
    - They will be more skilful in the performance with care of children on mechanical ventilator.
  - Nursing Administration:
    - The nursing protocol can be used as guidelines by new nurses & used as review or reference by the nurses working in the unit, while caring the on ventilator.
    - It can be used as nursing audit
    - The protocol can improve the quality patient care.

1.20 **Ethical Consideration:**
  - The proposal of the study was presented to the RRC for approval
  - This study commenced after the approval of the RRC (Research Recognition Cell)
  - The permission from concern authority of the selected hospitals was taken in advance
  - Confidentiality of the record was maintained by researcher.