Dissertation Title

"Assessment of quality level in ICU of Paras Hospitals"

A Dissertation Proposal for

Post Graduate Diploma in Health and Hospital Management

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Assessment of quality level in ICU of Paras Hospitals

A dissertation submitted in partial fulfillment of the requirements for the award of

Post-Graduate Diploma in Health and Hospital Management

by

Name
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May, 2010

Certificate of Internship Completion

Date:……..

TO WHOM IT MAY CONCERN

This is to certify that Mr./Ms./Dr. Anubhuti Singh has successfully completed his 3 months internship in our organization from February 1, 2010 to April 30, 2010. During this intern she has worked on "Assessment of quality level in ICU" under the guidance of me and my team at Paras Hospitals , Gurgaon

We wish him/her good luck for his/her future assignments

(Signature)
_____(Name)
_____Designation

Certificate of Approval

The following dissertation titled "**ASSESMENT OF QUALITY LEVEL IN ICU OF PARAS HOSPITALS .**" is hereby approved as a certified study in management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Post- Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

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This is to certify that **Dr. Anubhuti Singh**, a participant of the **Post- Graduate Diploma in Health and Hospital Management**, has worked under our guidance and supervision. She is submitting this dissertation titled "**Assessment of quality level in ICU of Paras Hospitals** " in partial fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management**.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

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Dr. Anubhuti Singh

ABSTRACT

Dr. Anubhuti Singh

Medicine suggests a relation between ICU volume and quality of care for mechanically ventilated patients. After adjustment for severity of illness, demographic variables, and characteristics of the ICUs (including staffing by intensivists), higher ICU volume was significantly associated with lower ICU and hospital mortality rates

Ensuring the safety of patients and personnel and improving quality have become important objectives for hospitals. There is some research into local team projects which shows that "continuous quality improvement" approaches can be effective. There is also research indicating the conditions needed to support and encourage these approaches Total quality management (TQM) and continuous quality improvement (CQI): TQM is a set of principles and methods applied in many different ways, originating from organization-wide industrial quality programmes. This strategy focuses on attention of personnel and on providing the best patient experience and outcomes. Quality tools are used by multidisciplinary teams of workers to make changes, and the approach is generally thought to require strong management leadership. It is based on a view that quality problems are more often due to poor organization than to individual faults .

The project undergone is about analysis of quality level in ICU of Paras Hospitals. Various indicators are used and compared with the standard benchmarks. The objective of the study is to improve care through quality improvement program in ICU of Paras Hospitals.

Methodology used is both prospective and retrospective study. Sample size considered are the patients admitted in ICU in the months of January 2010 to March 2010. On assessing the quality of pt. care delivered in ICU it was revealed that the standard benchmarks for various indicators are met except in few areas. Since the time frame selected for study is short, hence it is suggested that a comprehensive study should be carried out for continuous quality improvement program.

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LIST OF ABBREVIATIONS

MICU	**-**	**Medical Intensive Care unit**
SICU	**-**	**Surgical Intensive care Unit**
CCU	**-**	**Cardiac care unit**
NSICU	**-**	**Neurosurgical Intensive care unit**
NICU	**-**	**Neonatal Intensive care unit**
HDU	**-**	**High dependency Unit**
Pt.	**-**	**Patient**
ALOS	**-**	**Average length of stay**
HAD	**-**	**High alert drug**
HAP	**-**	**Hospital acquired pneumonia**
HAI	**-**	**Hospital acquired infection**
VAP	**-**	**Ventilator associated pneumonia**
CR-UTI	**-**	**Catheter related- Urinary Tract Infection**
BSI	**-**	**Blood stream infection**

INTERNSHIP REPORT

INTRODUCTION TO INTERNSHIP REPORT –

The internship period lasts from February 1 , 2010 to May 1 , 2010. The internship has been carried out in Paras Hospitals, Gurgaon. During this period, various departments in hospitals have been visited . Major includes

- Wards
- ICU (MICU, CCU, SICU, NSICU, HDU, NICU)

The internship in Paras Hospitals have been carried out under Dr. Shankar Narang who is the General manger of the Hospital. The dissertation carried out in the hospital is done under Quality manager Mr. Neetu Maltiar. The profile of the organization is as follows:

Introduction of the hospital

PARAS HOSPITALS



Paras Hospital is a state-of-the-art **multi super specialty** hospital providing a depth of expertise in the complete spectrum of **advanced medical & surgical interventions** with a

comprehensive mix of inpatient and outpatient services. The hospital is dedicated to provide competitive, accessible and affordable world-class healthcare services

The 250-bed Paras Hospitals has 55 specialty departments

Focus Areas

Paras Hospitals started with focus on-

1. Neurosciences
2. Joint replacement
3. Mother & child care

Climbing ladder-

- The department of renal sciences was started in November 2006 with six dialysis machines,
- **Uro-flowmetry** etc. Interventional **Cardiology and oncology** with radiotherapy started in early **2008**.
- The first **Surgery-Neuro surgery was done in July 2006**.
- The hospital started with **cardiac centre with state-of-the-art Cath lab and CCTVs OT** in March 2008 with an average of more than 50 procedures per month.

There are **55 specialty departments** including internal **medicine, minimal invasive surgery, gynecology and obstetrics, ophthalmology, dermatology and cosmetic surgery and plastic surgery,** apart from the super specialties

. "**Paras hospitals was the first corporate hospital in Gurgaon with complete facilities under one roof," says Dr Nagar**.

- In a short span of 18 months, the hospital commenced operations with neurosurgical cases.
- The hospital is still growing in popularity and the **OPD numbers are increasing with every passing month**
- In September 2007, the average OPD numbers per day were 250. Currently the average number of footfalls in the **OPD is 280-300 per day**

The hospital is approved **by "National accreditation board for hospital". (NABH)**

Inviting IT

The hospital has totally computerized systems except for the clinical modules. All the activities in the hospital are routed through a **central Hospital Information System (HIS),** which provides an **accurate and on-time reflection of the functioning of the hospital.** The management team utilizes different reports from the HIS for strategizing and achieving its business goals. All functions of healthcare **delivery services such as surgeries, OT bookings, radiological and pathological tests, billing, appointments, finance and accounting, purchase, stocks and marketing are through the HIS.** All the departments have conditional access to HIS and IT provides the foolproof mechanism for information flow and feedback.

Open to Medical Tourism

The hospital is fully **geared up to tap the medical tourism segment of healthcare.** The hospital has a separate medical tourism patient department, which provides end-to-end solutions for both national and international patients, which includes pick-up and drop to the airport or railway station, currency conversion, visa assistance, providing package prices, local accommodation and more. We are getting quite a number of patients from foreign countries. They are especially from Middle East, South East Asian countries and African nations.

Socially Active

Paras Hospitals has taken a **dispensary from the Government of Haryana,** which provides facilities like free consultation and free distribution of medicines from the dispensary. The dispensary gets a lot of patients from the adjoining village areas and they are benefited a lot with the availability of specialist doctors and free medicines**. "Doctors from the Paras hospital give free consultation to poor patients and free medicines ".**

MISSION OF THE HOSPITAL



- The mission of **"Paras Hospitals" is to provide competitive, innovative and accessible medical care** to the patients .

- To facilitate improving the **health of the patient by providing quality service through professionals that is affordable** and delivered.
- **Compassionately**
- **Appropriately**
- **Responsibility**
- **Efficiently**

- To exhibit **stewardship and creativity in the management of all available resources** for patient care.

- To ensure the delivery of services enabling patient, families, guests, healthcare professional, their associates to make the best use of facilities and environment

consistent with their philosophy and commitment of the patient care, health education and strategic initiative.

- To provide excellent **family centre healthcare to the entire family and children** in an environment that meets or exceeds the expectation of those they serve.



VISION OF HOSPITAL

- To become preferred health care provider for all.
- Partnership in caring & curing.
- Providing excellent medical care to customers through faith in values, integrity, respect, teamwork, & innovation to achieve complete patient satisfaction

PARAS HOSPITALS QUALITY POLICY

- Paras Hospitals believe in partnership with the communities they serve.
- Paras Hospital provides uniform patient treatment & care, use of evidence based medicine & excellence in clinical outcomes.
- Knowledge Enhancement for staff, clinicians & patients.

- Delivering superior customer service & complying with statutory regulations.
- Paras Hospital has been recently accredited by NABH National Accreditation Board for Hospital /NABL National Accreditation Board for laboratories **NABL CERTIFICATE**

SR. EXECUTIVE (OPERATIONS)-

WARDS-

REPORTING STRUCTURE

Daily Reports:

- Patient Status Report
- Admission/Discharge Status

Weekly reports:

- Patient Complaint and Feed Back evaluation

Monthly Reports

- Patient Complaint and Feed Back evaluation
- Pending files and reports

ROLES AND RESPONSIBILITY

As a senior executive operation :

1. In Wards
2. As night administrator

In Wards-

1. Co- ordinating with nursing staff ensuring pt. care
2. Solving all billing /Pharmacy related issues of pts.
3. Ensuring smooth & timely discharges of pts.
4. Ensuring all new admissions have been visited by RMOs & investigations sent.
5. Co- ordinating with consultants regarding any pt. care management
6. Ensuring all timely Investigations of pts admitted
7. Ensuring timely reporting of all investigations
8. Taking pt. rounds & ensuring all operational issues to be solved

(II) AS A NIGHT ADMINISTRATOR

9. Ensuring presence of all staff at their respective position
10. Ensuring all the pts. Have been visited by doctors & condition assessed
11. Ensuring all investigations sent in day have been completed
12. Making a OT plan for coming morning
13. Follow up of all the admissions from emergency
14. All the admissions to be managed effectively by RMOs
15. Taking a minimum of 3 rounds- 9pm/2am/7am.
16. Preparing night log sheet (Report)

DISSERTATION

INTRODUCTION

Medicine suggests a relation between ICU volume and quality of care for mechanically ventilated patients. After adjustment for severity of illness, demographic variables, and characteristics of the ICUs (including staffing by intensivists), higher ICU volume was significantly associated with lower ICU and hospital mortality rates

Ensuring the safety of patients and personnel and improving quality have become important objectives for hospitals. There is some research into local team projects which shows that "continuous quality improvement" approaches can be effective. There is also research indicating the conditions needed to support and encourage these approaches Total quality management (TQM) and continuous quality improvement (CQI): TQM is a set of principles and methods applied in many different ways, originating from organization-wide industrial quality programmes. This strategy focuses on attention of personnel and on providing the best patient experience and outcomes. Quality tools are used by multidisciplinary teams of workers to make changes, and the approach is generally thought to require strong management leadership. It is based on a view that quality problems are more often due to poor organization than to individual faults.

CQI is the same as TQM in most literature, although it sometimes refers to a concentration on multidisciplinary project teams analyzing work processes and using repeated cycles of testing small changes

Quality orientation is an integral part of patient care. Best possible care at the institutional level is not considered adequate in the present competitive environment. It should be visible, appreciated and comparable. Total Quality Management therefore, is essential to judge the appropriateness and effectiveness of medical care. Quality of service offered, result of intervention and treatment, undesirable outcomes, and other managerial and treatment related processes can be analyzed to define the scope of improvement. Quality indicators help in achieving these objectives. Health care is becoming transparent and customer focussed. Patients and their relatives have the right to know the standard of care and its cost.

It is therefore becoming more and more mandatory for the institution to monitor quality indicators/parameters and compare their performance level with the national standard or international bench marks. It gives an opportunity to the individual institution to improve its quality of care through standardization of processes, procedures and treatment protocols. Unfortunately, due to variety of reasons, performance levels are not monitored in India and therefore a national data base does not exist for a meaningful comparison. Dependency on the international data base, however not logical for Indian scenario, becomes inevitable in our strategic planning of the service.

GENERAL OBJECTIVE-

To assess the quality of patient care in ICU of Paras Hospitals.

SPECIFIC OBJECTIVE S

1. To understand the quality driven standards in ICU
2. To recognize the benchmarks for quality standards in health care industry
3. To compare various quality indicators with standard benchmarks
4. To suggest important initiatives to bridge the gap between levels offered & benchmark levels as per need.

SCOPE OF THE STUDY-

The scope of the study includes the pts. admitted in different ICU of Paras hospital in the month of January, February & March.Number of cases managed in different ICU are studied. Various quality indicators are analyzed to determine the quality level. The quality indicators chosen are basically Operational or Process indicators. The quality level determined is further compared with the benchmark in the healthcare industry.

PROCESS

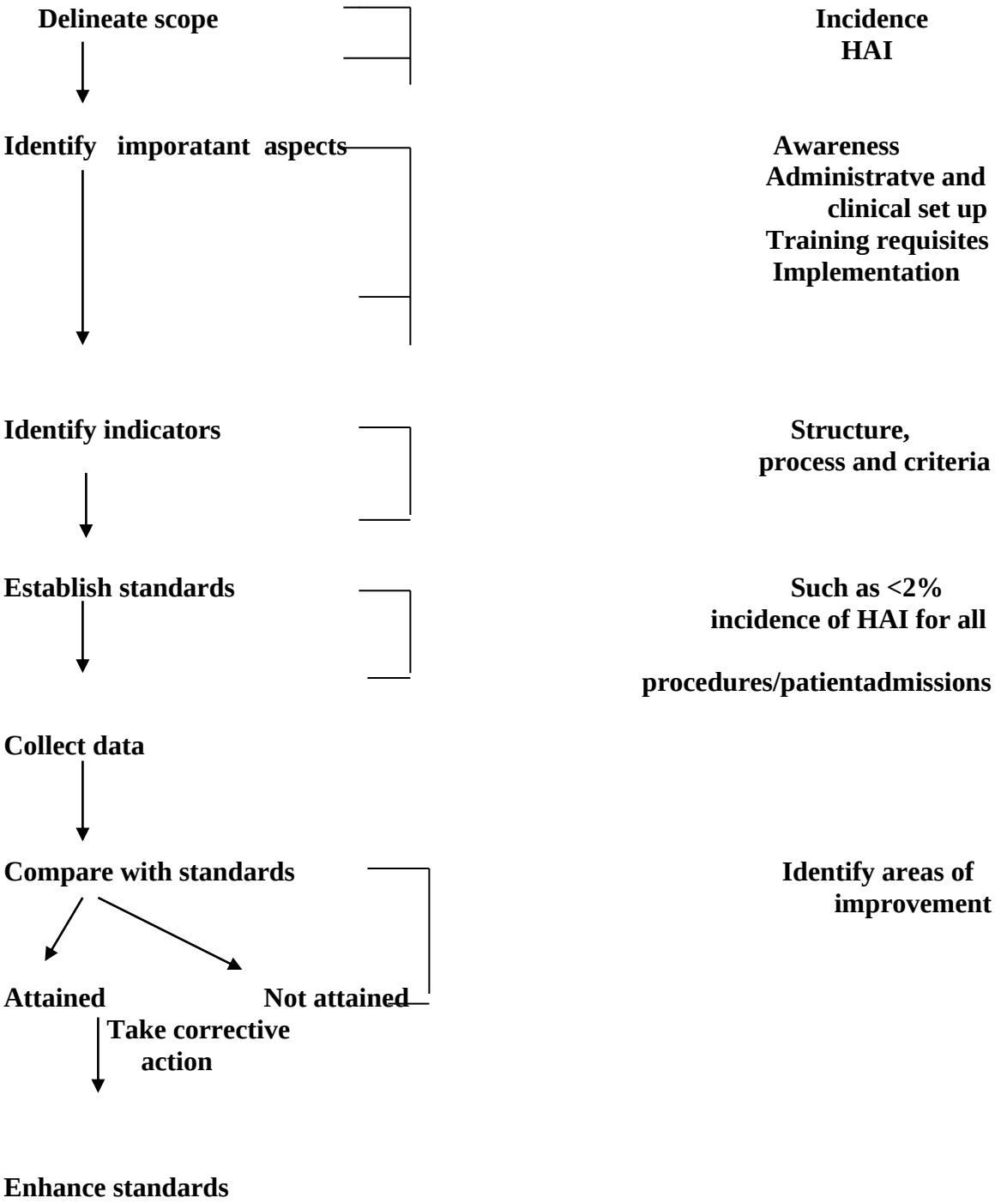


Figure- 17

LITERATURE REVIEW

Intensive care medicine or **critical care medicine** is a branch of medicine concerned with the provision of life support or organ support systems in patients who are **critically ill** and who usually require intensive monitoring

Patients requiring intensive care may require support for hemodynamic instability (hypertension/hypotension), airway or respiratory compromise (such as ventilator support), acute renal failure, potentially lethal cardiac arrhythmias, or the cumulative effects of multiple organ system failure. They may also be admitted for intensive/invasive monitoring, such as the crucial hours after major surgery when deemed too unstable to transfer to a less intensively monitored unit.

Intensive care is usually only offered to those whose condition is potentially reversible and who have a good chance of surviving with intensive care support. Since the critically ill are so close to dying, the outcome of this intervention is difficult to predict. Many patients, therefore, die in the intensive care unit.[*citation needed*] A prime requisite for admission to an Intensive Care Unit is that the underlying condition can be overcome.

Medical studies suggest a relation between intensive care unit (ICU) volume and quality of care for mechanically ventilated patients.[1] After adjustment for severity of illness, demographic variables, and characteristics of the ICUs (including staffing by intensivists), higher ICU volume was significantly associated with lower ICU and hospital mortality rates. For example, adjusted ICU mortality (for a patient at average predicted risk for ICU death) was 21.2% in hospitals with 87 to 150 mechanically ventilated patients annually, and 14.5% in hospitals with 401 to 617 mechanically ventilated patients annually. Hospitals with intermediate numbers of patients had outcomes between these extremes.

HISTORY –

The ICU's roots can be traced back to the Monitoring Unit of critical patients through nurse Florence Nightingale. The Crimean War began in 1854 when Britain, France and Turkey declared war on Russia. Because of the lack of critical care and the high rate of infection, there was a high mortality rate of hospitalized soldiers, reaching as high as 40% of the deaths recorded during the war. Nightingale and 38 other volunteers had to leave for the Fields of Scurati, and took their "critical care protocol" with them. Upon arriving, and practicing, the mortality rate fell to 2%. Nightingale contracted typhoid, and returned in 1856 from the war. A school of nursing dedicated to her was formed in 1859 in England. The school was recognized for its professional value and technical caliber, receiving prizes throughout the British government. The school of nursing was established in Saint Thomas Hospital, as a one year course, and was given to doctors. It used theoretical and practical lessons, as opposed to purely academic lessons. Nightingale's work, and the school, paved the way for intensive care medicine



Figure- 18

Dandy era

Walter Edward Dandy was born in Sedalia, Missouri. He received his BA in 1907 through the University of Missouri and his M.D. in 1910 through the Johns Hopkins University School of

Medicine. Dandy worked one year with Dr. Harvey Cushing in the Hunterian Laboratory of Johns Hopkins before entering its boarding school and residence in the Johns Hopkins Hospital. He worked in the Johns Hopkins College in 1914 and remained there until his death in 1946. One of the most important contributions he made for neurosurgery was the air method in ventriculography, in which the cerebrospinal fluid is substituted with air to help an image form on an X-Ray of the ventricular space in the brain. This technique was extremely successful for identifying brain injuries. Dr. Dandy was also a pioneer in the advances in operations for illnesses of the brain affecting the glossopharyngeal as well as Meniere's syndrome, and he published studies that show that high activity can cause sciatic pain. Dandy created the first ICU in the world, 03 beds, Boston,1926.

Ibsen era

Bjorn Aage Ibsen (1915-2007) graduated in 1940 from medical school at the University of Copenhagen and trained in anesthesiology from 1949 to 1950 at the Massachusetts General Hospital, Boston. He became involved in the 1952 poliomyelitis outbreak in Denmark, where 2722 patients developed the illness in a 6 month period, with 316 suffering respiratory or airway paralysis. Treatment had involved the use of the few negative pressure respirators available, but these devices, while helpful, were limited and did not protect against aspiration of secretions. Ibsen changed management directly, instituting protracted positive pressure ventilation by means of intubation into the trachea, and enlisting 200 medical students to manually pump oxygen and air into the patients lungs. At this time Carl-Gunnar Engström had developed one of the first positive pressure volume controlled ventilators, which eventually replaced the medical students. In this fashion, mortality declined from 90% to around 25%. Patients were managed in 3 special 35 bed areas which aided charting and other management. In 1953 Ibsen set up what became the world's first Medical/Surgical ICU in a converted student nurse classroom in Kommunehospitalet (The Municipal Hospital) in Copenhagen, and provided one of the first accounts of the management of tetanus with muscle relaxants and controlled ventilation. In 1954 Ibsen was elected Head of the Department of Anaesthesiology at that institution. He jointly authored the first known account of ICU management principles in Nordisk Medicin, September 18, 1958: ‘Arbejdet på en

Anæsthesiologisk Observationsafdeling' ('The Work in an Anaesthesiologic Observation Unit') with Tone Dahl Kvittingen from Norway. He died in 2007.

Safar era

Peter Safar, the first Intensivist doctor in the USA,[*citation needed*] was born in Austria as the son of two doctors. He first migrated to the United States in 1949. Safar first got certification as an anesthesiologist, and in the 1950s he started and praised the "Urgency & Emergency" room setup (now known as an ICU)[*citation needed*]. It was at this time the ABC (Airway, Breathing, and Circulation) protocols were formed, and artificial ventilation as well as cardiopulmonary resuscitation became popular.[*citation needed*] These experiments counted on volunteers of its team, and used only minimal sedation. It was through these experiments that the techniques for maintaining life in the critical patient were established.[*citation needed*]

The first surgical ICU was established in Baltimore, and, in 1962, in the University of Pittsburgh, the first Critical Care Residency was established in the United States. It was around this time that the induction of hypothermia in critical patients was also tested

In 1970 the SCCM was formed. (Society of Critical Care Medicine). history reference: Brazilian Society of Critical Care SOBRATI Video:ICU History Historical photos



Figure 19: The iron lung the apparatus used to produce artificial ventilation by producing a negative pressure around the chest and abdomen while the face is exposed to the atmosphere, which helped to draw air to the lungs. Obviously it was difficult to nurse the patients, but nevertheless some patient spends their life within it and they were able to speak, eat and even watch television. {Atkinson history of anesthesia symposium London 1987}(2a, 2b)

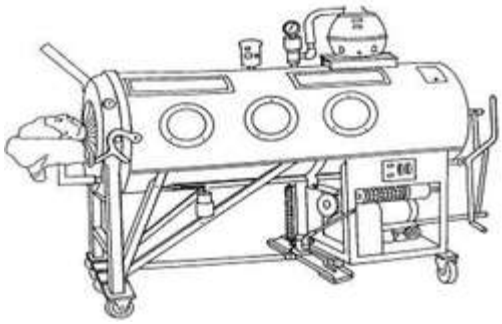


Figure- 20

In the sixties of the 20th century, another development happened when physicians realized that the early preventable death from myocardial infarction was due to the occurrence of arrhythmias. These hearts may survive the initial hyper-excitability stage if the arrhythmia was monitored and treated in time. The purpose of monitoring of myocardial infarction patients during the first 24, 48, &72 hours after the infarct is aimed at looking for these developments. Appreciation of the value of the intensive care setting made it imperative to extend its use to other class of patients and today we can count more than 20 subspecialties.



Figure 21: Various pictures, of modern intensive care unit, showing: (a) the nursing station (b) An intubated patient is ventilated, using modern intermittent positive pressure ventilation method.

Description Of An Intensive Care Unit

These units are special units where the effort is concentrated in one locality in the hospital and where the care of patients who are deemed recoverable but who need supervision and need or likely to need specialized techniques by skilled personnel. Among this specialized technique we can enumerate continuous artificial ventilation, supporting the circulation, management of chock and renal dialysis. The utilization of this unit in the management of critical ill patient improved the outcome by reduction in expected mortality up to 60%. The Units have the following major characteristics: (1) space, equipment and working staff and (2) continuous service and care all around the clock 24 hours [11] including all the following: instantaneous monitoring of cardiovascular parameter, respiratory function, renal function and the nervous system status. These settings are not seen in any other place in the hospital. The patient's categories that can benefit from this unit are

> Patients of myocardial infarction who usually need continuous cardiovascular monitoring. Patients who needs artificial ventilation, cardiovascular support and renal support. Patients with major metabolic disturbances like patient with uncontrolled diabetes mellitus or patient after major abdominal surgeries. Patients with major trauma like patients with head injuries, chest injuries and other multiple injuries. Disaster medicine victims who are affected by multiple injuries.

Space and layout

There is tendency that the space per bed to be nears 20 m^2 and similar space for services totaling 40 m^2. As for cubicles the space should be 30 m^2. There should be adequate light natural white or pink white. There should be central air conditioning and warming[11]. There also feasibility to have some entertainment as soft music or television.

.

Monitoring

Monitoring permits to:

- To monitor the heart electrical activities and other related output.
- To measure various blood pressures from arterial or venous side. In certain situation the calculation of cardiac output and to measure other cardiac indices are performed to guide patient's management.

Ventilation

Beside each bed a separate ventilator capable of working continuously and exclusively on one patient till his recovery and capable of generating all types of mode of ventilation the patient may need during his acute illness.

Staffing

Technical staff is needed. It is composed of two head nurses working in shifts. Medical residents on call should be provided. Consultants are in charge of the ICU to manage and organize consultation between other subspecialties in the hospital and do the patient rounds in the morning and evening. There should be one nurse per bed covering 24 hours shift and there should be a team of respiratory therapists and physiotherapist. There are also needs for laboratory assistant, porters, and other manual workers

Patient management

The patient on intensive care (like any other patient under treatment) has the right to considerate and respectful care. This is guaranteed by most guidelines and consensus opinion in most intensive care professional societies:

The patient should obtain complete current information concerning his/her diagnosis, treatment and prognosis in clear terms. Also to receive information necessary to give informed consent prior to the start of any procedure and/or treatment. The patient may refuse treatment as far as permitted by law, and to be informed of the medical consequences of his/her action. The patient is entitled to complete privacy concerning his/her own medical care program, and that all communications and records pertaining to his/her care should be treated as confidential.

The hospital makes reasonable responses to the requests of a patient, to obtain information about relationship of his/her hospital to other health care and educational institutions insofar as his/her care is concerned and patients should be advised if the hospital proposes to engage in or perform human experimentation affecting his/her care or treatment,

EQUIPMENT-

Common equipment in an intensive care unit (ICU) includes mechanical ventilation to assist breathing through an endotracheal tube or a tracheotomy; hemofiltration equipment for acute renal failure; monitoring equipment; intravenous lines for drug infusions fluids or total parenteral nutrition, nasogastric tubes, suction pumps, drains and catheters; and a wide array of drugs including inotropes, sedatives, broad spectrum antibiotics and analgesics



Figure- 22

Patient monitoring equipment

Patient monitoring equipment includes the following:

- Acute care physiologic monitoring system—comprehensive patient monitoring systems that can be configured to continuously measure and display a number of parameters via electrodes and sensors that are connected to the patient. These may include the electrical activity of the heart via an EKG, respiration rate (breathing), blood pressure, body temperature, cardiac output, and amount of oxygen and carbon dioxide in the blood. Each patient bed in an ICU has a physiologic monitor that measure these body activities. All monitors are networked to a central nurses' station.
- Pulse oximeter—monitors the arterial hemoglobin oxygen saturation (oxygen level) of the patient's blood with a sensor clipped over the finger or toe.
- Intracranial pressure monitor—measures the pressure of fluid in the brain in patients with head trauma or other conditions affecting the brain (such as tumors, edema, or hemorrhage). These devices warn of elevated pressure and record or display pressure trends. Intracranial pressure monitoring may be a capability included in a physiologic monitor.
- Apnea monitor—continuously monitors breathing via electrodes or sensors placed on the patient. An apnea monitor detects cessation of breathing in infants and adults at risk of respiratory failure, displays respiration parameters, and triggers an alarm if a

certain amount of time passes without a patient's breath being detected. Apnea monitoring may be a capability included in a physiologic monitor.

Life support and emergency resuscitative equipment

Intensive care equipment for life support and emergency resuscitation includes the following:

- Ventilator (also called a respirator)—assists with or controls pulmonary ventilation in patients who cannot breathe on their own. Ventilators consist of a flexible breathing circuit, gas supply, heating/humidification mechanism, monitors, and alarms. They are microprocessor-controlled and programmable, and regulate the volume, pressure, and flow of patient respiration. Ventilator monitors and alarms may interface with a central monitoring system or information system.
- Infusion pump—device that delivers fluids intravenously or epidurally through a catheter. Infusion pumps employ automatic, programmable pumping mechanisms to deliver continuous anesthesia, drugs, and blood infusions to the patient. The pump is hung on an intravenous pole placed next to the patient's bed.
- Crash cart—also called a resuscitation or code cart. This is a portable cart containing emergency resuscitation equipment for patients who are "coding." That is, their **vital signs** are in a dangerous range. The emergency equipment includes a defibrillator, airway intubation devices, a resuscitation bag/mask, and medication box. Crash carts are strategically located in the ICU for immediate availability for when a patient experiences cardio respiratory failure.
- Intraaortic balloon pump—a device that helps reduce the heart's workload and helps blood flow to the coronary arteries for patients with unstable angina, myocardial infarction (heart attack), or patients awaiting organ transplants. Intraaortic balloon pumps use a balloon placed in the patient's aorta. The balloon is on the end of a catheter that is connected to the pump's console, which displays heart rate, pressure, and electrocardiogram (ECG) readings. The patient's ECG is used to time the inflation and deflation of the balloon.

Diagnostic equipment

The use of diagnostic equipment is also required in the ICU. Mobile x-ray units are used for bedside radiography, particularly of the chest. Mobile x-ray units use a battery-operated generator that powers an x-ray tube. Handheld, portable clinical laboratory devices, or point-of-care

Analyzers, are used for blood analysis at the bedside. A small amount of whole blood is required, and blood chemistry parameters can be provided much faster than if samples were sent to the central laboratory.

Other ICU equipment

Disposable ICU equipment includes urinary (Foley) catheters, catheters used for arterial and central venous lines, Swan-Ganz catheters, chest and endotracheal tubes, gastrointestinal and nasogastric feeding tubes, and monitoring electrodes. Some patients may be wearing a posey vest, also called a Houdini jacket for safety; the purpose is to keep the patient stationary. Spenco boots are padded support devices made of lamb's wool to position the feet and ankles of the patient. Support hose may also be placed on the patient's legs to support the leg muscles and aid circulation.

Operation

The ICU is a demanding environment due to the critical condition of patients and the variety of equipment necessary to support and monitor patients. Therefore, when operating ICU equipment, staff should pay attention to the types of devices and the variations between different models of the same type of device so they do not make an error in operation or adjustment. Although many hospitals make an effort to standardize equipment—for example, using the same manufacturer's infusion pumps or patient monitoring systems, older devices and nonstandardized equipment may still be used, particularly when the ICU is busy. Clinical staff should be sure to check all devices and settings to ensure patient safety.

Intensive care unit patient monitoring systems are equipped with alarms that sound when the patient's vital signs deteriorate—for instance, when breathing stops, blood pressure is too high or too low, or when heart rate is too fast or too slow. Usually, all patient monitors connect to a

central nurses' station for easy supervision. Staff at the ICU should ensure that all alarms are functioning properly and that the central station is staffed at all times.

For reusable patient care equipment, clinical staff make certain to properly disinfect and sterilize devices that have contact with patients. Disposable items, such as catheters and needles, should be disposed of in a properly labeled container.

Maintenance

Since ICU equipment is used continuously on critically ill patients, it is essential that equipment be properly maintained, particularly devices that are used for life support and resuscitation. Staff in the ICU should perform daily checks on equipment and inform biomedical engineering staff when equipment needs maintenance, repair, or replacement. For mechanically complex devices, service and preventive maintenance contracts are available from the manufacturer or third-party servicing companies, and should be kept current at all times.

Health care team roles

Equipment in the ICU is used by a team specialized in their use. The team usually comprises a critical care attending physician (also called an intensivist), critical care nurses, an infectious disease team, critical care respiratory therapists, pharmacologists, physical therapists, and dietitians. Physicians trained in other specialties, such as anesthesiology, cardiology, radiology, surgery, neurology, pediatrics, and orthopedics, may be consulted and called to the ICU to treat patients who require their expertise. Radiologic technologists perform mobile x ray examinations (bedside radiography). Either nurses or clinical laboratory personnel perform point-of-care blood analysis. Equipment in the ICU is maintained and repaired by hospital biomedical engineering staff and/or the equipment manufacturer.

Some studies have shown that patients in the ICU following high-risk surgery are at least three times as likely to survive when cared for by "intensivists," physicians trained in critical care medicine.

Training

Manufacturers of more sophisticated ICU equipment, such as ventilators and patient monitoring devices, provide clinical training for all staff involved in ICU treatment when the device is purchased. All ICU staff must have undergone specialized training in the care of critically ill patients and must be trained to respond to life-threatening situations, since ICU patients are in critical condition and may experience respiratory or cardiac emergencies.

OBJECTIVES OF PLANNING

ICU should have

- A high standard of asepsis
- Maximum standards of safety for patients and staff from environment, anesthetic, radiology and postoperative hazards.
- Optimum utilization of space and staff-time.
- Optimum conditions of work for the team
- Comfortable treatment of patients.
- Allow more flexibility of use by individual OT's

Location/entry/exit points of ICU in Hospital

- Safe, easy, fast transport of a critically sick patient should be priority in planning its location, therefore, ICU should be located in close proximity of ER, Operating rooms, trauma ward.

- Corridors, lifts & ramps should be spacious enough to provide easy movement of bed/ trolley of a critically sick patient.

- Close/easy proximity is also desirable to diagnostic facilities, blood bank, pharmacy etc.

- No thoroughfare can be provided through ICU.

- There should be single entry/exit point to ICU, which should be manned.

- However, it is required to have emergency exit points in case of emergencies and disaster

ICU Bed Designing and Space Issues-

Space per bed has been recommended from 125 to 150 sq ft area per bed in the patient care area or the room of the patient. Some recommendation has placed it even higher up to 250 sq ft per bed. In addition there should be 100 to 150% extra space to accommodate nursing station, storage, patient movement area, equipment area, doctors and nurses rooms and toilet.

However in Indian circumstances after reviewing and feed back from various ICUs in our country it may be satisfactory to suggest an area of 100 to 125 sq ft be provided in patient care area for comfortable working with a critically sick patient where all the paraphernalia including monitoring systems, Ventilators & other machines like bedside X-ray will have to be placed around the patient. Bedside procedures like Central lines, Intubation, Tracheotomy, ICD insertion and RRT are common.

It may be prudent to make one or two bigger rooms or area which may be utilized for patients who may undergo big bedside procedures like ECMO, RRT etc and has large number Gadgets attached to them.

10 % (one to two) rooms may be designated isolation rooms where immuno- compromised patients may be kept, these rooms may have 20% extra space than other rooms.

The planners may think about, if they are thinking of introducing newer technologies in their ICU like ECMO, Nitric Oxide and Xenon clearance etc. Do they need Lamellar flow for specific patient population in their ICUs. This will be highly specific for High end up ICUs and is not recommended in routine Provisions may be kept open for such options in future.

Partition between two room and maintaining privacy of patients

It is recommended that there should be a partition/separation between rooms when patient privacy is desired which is not unusual.

Standard curtains soften the look and can be placed between two patients which is very common in most Indian ICUs, however they are displaced and become unclean easily and patients privacy is disturbed

Therefore, two rooms may be separated by unbreakable fixed or removable partisans, which may be aluminum, wood or fiber. However permanent partitions takes away the flexibility of increasing floor space temporarily (In Special circumstances) for a particular patient even when the adjoining bed/room may not be in use.

Environmental Requirements-

Heating, Ventilation and Air-conditioning (HVAC) system of ICU

- The ICU should be fully air-conditioned which allows control of temperature, humidity and air change. If this not be possible then one should have windows which can be opened (‘Tilt and turn' windows are a useful design.).

- Suitable and safe air quality must be maintained at all times. Air movement should always be from clean to dirty areas. It is recommended to have a minimum of six total air changes per room per hour, with two air changes per hour composed of outside air. Where air-conditioning is not universal, cubicles should have fifteen air changes per hour and other patient areas at least three per hour.

- The dirty utility, sluice and laboratory need five changes per hour, but two per hour are sufficient for other staff areas.

- Central air-conditioning systems and re-circulated air must pass through appropriate filters.

- It is recommended that all air should be filtered to 99% efficiency down to 5 microns. Smoking should not be allowed in the ICU complex.

- Heating should be provided with an emphasis on the comfort of the patients and the ICU personnel.

- For critical care units having enclosed patient modules, the temperature should be adjustable within each module to allow a choice of temperatures from 16 to 25 degrees Celsius.

- A few cubicles may have a choice of positive or negative operating pressures (relative to the open area). Cubicles usually act as isolation facilities, and their lobby areas must be appropriately ventilated in line with the function of an isolation area (i.e. pressure must lie between that in the multi-bed area and the side ward).

- Power back up in ICU is a serious issue. The ICU should have its own power back, which should start automatically in the event of a power failure. This power should be sufficient to maintain temperature and run the ICU equipment (even though most of

the essential ICU equipment has a battery backup). Voltage stabilization is also mandatory. An Uninterrupted Power Supply (UPS) system is preferred for the ICU

- **Negative pressure isolation rooms** (Isolation of patients infected/suspected to be
- Infected with organisms spread via airborne droplet nuclei <5 μm in diameter) In these rooms the windows do not open. They have greater exhaust than supply air volume. Pressure differential of 2.5 Pa. Clean to dirty airflow i.e. direction of the air flow is from the out side adjacent space (i.e.. corridor, anteroom) into the room. Air from room preferably exhausted to the outside, but may be re-circulated provided is through HEPA filter NB: re-circulating air taken from areas intended to isolate a patient with TB is a risk not worth taking and is not recommended
- **Positive pressure isolation rooms** (To provide protective environment for patients at Highest risk of infection e.g. Neutopenia, post transplant)
- These rooms should have greater supply than exhaust air. Pressure differential of 2.5 – 8 Pa, preferably 8 Pa. Positive air flow relative to the corridor (i.e. air flows from the room to the outside adjacent space) . HEPA filtration is required if air is returned. 15 .

LIGHTING

Light in room

Natural Light – Access to outside natural light is recommended by regulatory authorities in USA,

This may improve the Staff Morale and Patient outcome,

Data suggests that synthetic artificial daylight use in work environment may deliver better results for night time workers

It may be helpful in maintaining the circadian rhythm

Natural lighting in the unit can decrease power consumption and the electrical bill which is so relevant to Indian circumstances.

Access to natural light also means one may have access to viewing external environment which may be developed into green and soothing.

Light for Procedures

High illumination and spot lighting is needed for procedures, like putting Central lines etc.

They can descend from the ceiling, extend from the wall/ Panel, or be carried into the room.

Recommended Spot lighting should be shadow free l50 foot candles (fc) strength.

Light required for general patient care-

It should be bright enough to ensure adequate vision without eyestrain.

Overhead lighting should be at least 20-foot candles (fc).

Higher frequency fluorescent lights and coated phosphorus lamps may be good for assessing skin color and tone

Patients may need rest and quiet surroundings during the day, Blackout curtains or blinds or Individual eye may be used, These may be helpful when the staff requires a high level of lighting at the bedside while the patient is resting.

Lights that come on automatically when cupboard doors or drawers are opened are useful.

Floor lighting may be important for safety at the bedside and in the hallways at night and should be about l0fc.

Glare created by reflected light should be diffused

Light switches should be strategically located to allow some patient control and adequate staff convenience.

A second remote control can be turned on/off by the nurses/doctors to observe patients intermittently at night without entering the room and disturbing the patient.

Hall lights controls should subdivided into smaller independent areas and dimmer switches may be desirable

The Illuminating Engineering Society of North America published useful guidelines on this subject.

Noise Control in ICU

The international Noise Council recommends that the noise level in an ICU be under 45 dBA in the daytime, 40 dBA in the evening. and 20 dBA at night (dBA is a scale that filters out low frequency sounds and is more like the human hearing range than plain dB)

Walls – Should meet following criteria:

Durability, ability to clean and maintain, flame retardance, mildew resistance, sound absorption and visual appeal.

It has been very useful to have a height up to 4to5 ft finished with similar tiles as of floor for similar reasons.

For rest of the wall soothing paint with glass panels on the head end at the top may be good choice.

Wooden paneling has also found favor with some architects but costs may go high.

Doorstoppers and handrails should be placed well to reduce abuse and noise to minimum; it helps patient movement and ambulation.

Ceiling

lt is the ceiling surface patients see most often, sometimes for hours on end, Over several days or weeks, In addition, bright spotlights or fluorescent lights can cause eye strain,

Ceiling should be Soiling and break proof due to leaks and condensation.

Tiles may not the most appealing or soothing surface, but for all practical purposes it is easier to remove individual or few tiles for repairs over ceiling in times of need. Ceiling design may be enhanced by varying the ceiling height, softening the contours, griddled lighting surfaces, painting it with a medley of soft colors rather than a plain back ground color, or decorating it with mobiles, patterns or murals, to make it more patient and staff friendly.

It is recommended that no lines or wires be kept or run over ceiling or underground because damages do occur once in a while and therefore, it should be easy to do repairs if the lines and pipes are easily explorable without hindering patient care

Waste Disposal and Pollution Control

This is mandatory and a huge safety issue both for the patient and staff/doctors of the hospital and society at large

It is important that all govt regulations (State Pollution control Board in this particular case) should strictly be complied with.

It is mandatory to have four covered pans (Yellow, blue, Red, Black) provided for each patient or may be one set between two patients two save space and funds. This is needed to dispose off different grades of wastes.

Hand Hygiene and Prevention of Infection

Every bed should have attached alcohol based anti-microbial instant hand wash solution source, which is used before caregiver (doctor/Nurse/relative/Paramedical) handles the patient.

Water basin at all bed side has not proven popular and successful because of poor compliance by one and all and also for reasons of space constraints and maintenance issues.

An operation room style sink with Elbow or foot operated water supply system with running hot and cold water supply with antiseptic soap solution source should be there at a point easily accessible and unavoidable point, where two people can wash hands at a time.

This sink should have an immaculate drainage system, which usually may become a point of great irritation and nuisance in later yrs or months.

All entrants (Irrespective of Doctors or nurses should don mask and cap in ICU and ideally an apron which should be replaced daily)

No dirty/soiled linen/material should be allowed to stay in ICU for long times for fear of spread of bad odor, infection and should be disposed off as fast as possible. Dirty linen should be replace regularly at fixed intervals.
All surroundings of ICU should be kept absolutely clean and green if possible for obvious reasons

Disaster Preparedness

All ICUs should be designed to handle disasters both within ICU and outside the ICU. Outside the ICU may include inside the hospital and in the city or state.

Within ICU may be fire, accidents and Infection or unforeseen incidents.

Similarly outside the ICU there may be major or minor disasters like fire, accidents, Terrorist acts etc.

There must be an emergency exit in ICU to rescue pts in times of internal disaster. There should be provision for some contingency room within hospital where critically sick patients may be shifted temporarily.

HDU may be the best place if beds are vacant.

There should be adequate fire fighting equipment in side ICU and protection from Electrical defaults and accidents.

ICU is location for Infection epidemics, therefore, it is imperative that all protocols and recommendation practices about infection control and prevention are observed and if there is a break out then adequate steps taken to control this and disinfect the ICU if indicated.

Meeting the needs of Care givers, other departments and relatives of Pts

Needs of doctors and Nurses

The space and facilities planned for them are often inadequate. Space is usually scarce and it is tempting to limit the support areas in favour of larger patient rooms.

Multi-purpose rooms may be a solution which may be used for meetings, leisure, lectures, library, lounge and break areas with food services (microwave, coffeemaker, refrigerator),

This is especially useful for night shift staff when the cafeteria is closed, Multipurpose seating, stackable or folding chairs and a wide variety of lighting options can increase flexibility.

This should be in close proximity to the unit (within the same broader complex) and can even have windows with curtains, blinds, or one-way glass to allow those inside to continue to observe unit activity,

Additional space is needed for staff lockers with areas to change clothes and, ideally, shower.

Separate areas are required for men and women.

In Indian situation it is advisable to have separate change rooms for nurses and doctors.

Whether or not lockers are provided, female staff tends to keep purses or bags near them at the bedside, (This should be discouraged like helmets of male staff cannot be allowed in main ICU). This can be addressed by providing a secure place for keeping their belongings in the unit.

A couch with working table and broadband connected computer is quite handy.

Optimum number of journals/books, stationary, view boxes should be provided.

Enough no of restrooms be provided .

It is very important to value family members and take care of their needs.

Many features that ease the stress of facing threat of death because of critical illness may not be necessarily expensive. Identifying these needs by acting as a visitor of a patient in ICU may be useful. Some of these may be as follows:

Signage--Clearly marked and multilinguistic including English and Hindi + Local Language guiding them to correct desired location, Once they reach the unit, it should be easy for them to learn how to gain entry into the unit.

Waiting and seating space

Many guidelines suggest that l-l/2 to 2 seats per patient bed be provided in the waiting area, Despite using this ratio, many admit that their waiting area is still too small.

In rural and semi-urban India, there are large and extended families; This should be reflected in the size of waiting rooms of institutions that commonly serve such populations,

Designers can establish several small areas within a larger space with a variety of seating and lighting options, Large open rooms may be easier to achieve, but they are often noisy and lack the capability to provide areas for privacy, intimacy and rest,

Minimally, a separate small room for grieving or private conferences should be provided near the unit with soothing decor and comfortable seating, This may be used for counseling the family members in times of need.

One large TV should be provided for them

Family members often go through periods when they spend several long hours in the waiting room, ln such cases, recliners or even hideaway beds are greatly appreciated,

Enough number of restrooms should be provided.

Some institutions have their own hotels, motels, or guesthouses /Dharmshalas.

Lockers be provided to families, that can allow them to bring things they need without having to drag them all with them whenever they come and go.

Written information about dining facilities inside and outside the hospital should be available.

Ideally, a café or tea counter with refrigerator, microwave, sink and/or vending machines can be provided in or near the waiting area,

An information shelf having booklets or videos on diseases relevant to critical care are helpful.

Pamphlets for the consumer on critical care and on advanced directives may be very useful.

Trained volunteer or social workers can help families cope and to reduce their anxiety, keep them updated with compassion about condition, progress, procedures, expenses about the patient.

HDU

It is the area where patient care level is intermediate between ICU and Floors. It is usually located near the ICU complex or within ICU complex. The staff is also almost similar to ICU culture.

Following type patients may be kept here

- Patients recovered from Critical Sickness.

- Patient who are less sick like single organ failure not requiring invasive monitoring or invasive MV

- Patients requiring close observation that are strong suspects of getting deteriorated.

- Size of such units should be at least 50 % of the main ICU.

- Doctor/Pt ratio and Nurse/Pt ratio may be much more relaxed

- 1/3 of these Beds may be used as palliative unit for patients who are terminally sick and DNAR is being observed.

- There are conflicting reports suggesting usefulness of such units. But in Indian circumstances and surveys indicate that HDU has helped in our circumstances. Possibly in following ways

- Cutting costs of patients and health service provider requiring close observation and not needing ICU

- Allows close observation of potentially critically sick patients both who are transferred from and to ICU

- Psychological relief to the family and patients that he is being observed meant for lesser sick patients.

- It may be handy to public hospitals where there is always shortage of ICU beds.

LOCATION OF ICU AT PARAS HOSPITAL

The location of the **ICU of PARAS HOSPITAL** is on first FLOOR

- Free from **general traffic**
- Free from **noise and other disturbances**
- Free from **contamination and possible sources of infection**
- Protected from **solar radiation, wind and dust**.
- Conveniently placed in relation to **surgical wards, ICU**

Types of ICU in Paras Hospital:

Specialized types of ICUs include:

- Neonatal intensive-care unit (**NICU**)
- Special Care Nursery (**SCN**)
- Coronary care unit (**CCU**) for heart disease
- Medical intensive-care unit (**MICU**)
- Surgical intensive-care unit (**SICU**)
- Neuroscience/Neurotrauma intensive-care unit (**NICU)**
- Neurointensive-care unit **(NICU)**
- High dependency unit **(HDU)**

ESSENTIAL SERVICES

1. **Light** should to be between 2000-10,000 lux

.

2. **Air –conditioning** the temperature should to be 17-21'C

3. **Ventilation** should have positive pressure ventilation. The pressure grading should to be highest in sterile zone.

QUALITY IN ICU

Quality orientation is an integral part of patient care. Best possible care at the institutional level is not considered adequate in the present competitive environment. It should be visible, appreciated and comparable. Total Quality Management therefore, is essential to judge the appropriateness and effectiveness of medical care. Quality of service offered, result of intervention and treatment, undesirable outcomes, and other managerial and treatment related processes can be analyzed to define the scope of improvement. Quality indicators help in achieving these objectives. Health care is becoming transparent and customer focussed. Patients and their relatives have the right to know the standard of care and its cost.

It is therefore becoming more and more mandatory for the institution to monitor quality indicators/parameters and compare their performance level with the national standard or international bench marks. It gives an opportunity to the individual institution to improve its quality of care through standardization of processes, procedures and treatment protocols. Unfortunately, due to variety of reasons, performance levels are not monitored in India and therefore a national data base does not exist for a meaningful comparison. Dependency on the international data base, however not logical for Indian scenario, becomes inevitable in our strategic planning of the service.

Indian Society of Critical Care Medicine (ISCCM) had taken the initiative in the year 2008 in its executive body meeting to identify quality indicators for the ICUs which will help intensive care units in India to judge their performance level and also compare with the national data base.

Research problem and research question-

Monitoring of quality indicators is done to identify level of care provided on a time scale. Trend analyses of such data helps in quantifying the standard of care offered in the same setup and compare the same with selected bench marks. Improvement initiatives are subsequently taken, to bridge the gap between the levels offered and bench mark levels, as per need.

To improve quality of care, we must measure our performance. This study suggests that it is feasible to implement a broad set of ICU quality measures in Paras hospitals. By improving performance on these measures, we may realize reduced mortality, morbidity, and ICU length of stay. The quality level in various ICU needs to be studied for continuous quality improvement.

RESEARCH METHODOLOGY

Methodology used is to make the study effective and non–biased. A prospective and retrospective study done

SAMPLE AREA-

Patients admitted in ICU (All types of specialized ICU of hospital)

SAMPLING METHOD:

Purposive sample (non-probability) sampling technique

DATA COLLECTION TECHNIQUE:

1. PRIMARY DATA-

- By direct observation

2. SECONDARY DATA

-By using files

-By using previous data

DATA ANALYSIS TECHNIQUE

Based on the objective of this report**,** common parameters with their international bench marks have been selected to address different aspects of patient care operational issues and human resource development. Certain basic data, which as such do not reflect patient care but when used as denominators to the selected parameters, make the parameter more sensitive and meaningful. Example of these denominators are: number of admissions , total patient days in the unit(occupancy), ventilatory days, etc. In order to avoid confusion and ambiguity of interpretation, it is essential that purpose and usefulness of selected parameters must be understood by the care providers. All the selected parameters, therefore, are described under certain sub headings as given in the table no. along with explanation-

Indicator	**Explanation**
Description	What does the parameter mean
Rationality	Why should it be monitored
Formula for calculation	How it should be calculated
Patient population	For whom the parameter is collected
Source of data	Where from the input will be collected
Type of parameter	Linkage of parameter with the type of quality
Bench mark	Common national or international standard
References	Literature back up for the bench mark and background information for the selected parameter

SELECTION OF INDICATORS –

It is practically not possible to select all the parameters. Therefore, while selecting the performance measures certain basic principles had been kept in mind.

1) Evaluate varieties of parameters that cover the dimensions of ICU performance.

2) Select performance measures that are primarily relevant or that have a proven relationship with the primary objective of the unit.

Current level of performance and bench mark data help in deciding the future targets.

Operational Or Process Parameters

Indicator

Length of Stay (LOS)

Description –

Total hours and days patients managed in the unit with midnight bed occupancy are more accurate than the number of calendar days a patient spends in the ICU. Arithmetic mean overestimate LOS, as outliers both ways influence the mean LOS very adversely. **Median** of LOS can circumvent this problem. LOS is also influenced by factors such as the availability of a intermediary care, discharge practices, and mortality rates. LOS properly stratified on the basis of diseases and conditions and properly analysed could be a sensitive parameter throwing up deficiency in process and technique in ICU.

Rationality-

ICU beds are limited in any hospital. Rationalized use for needy patients therefore is necessary. LOS is therefore used to assess quality of care and resource utilization.

Patient population -

All admitted patients in the unit.

Type of parameter –

Outcome measure

Benchmark – 2.4 days

References

1. Tracy R. McMillan, MD; Robert C. Hyzy, Bringing quality improvement into the intensive care unit Crit Care Med 2007; 35[Suppl.]:S59–S65).
2. Peter J. Pronovost ,Accelerating Change Today (A.C.T.)for America's Health.. Editor Patricia Q. Schoeni © 2002 by the National Coalition on Health Care and the Institute for Healthcare Improvement.

COMPLIANCE TO PROTOCOL INDICATOR-

Description –

Selected guidelines , protocols, treatment bundles in the unit to improve patient care, resource utilization, and reduce iatrogenic complications.

Rationality –

Compliance to protocols, guidelines and treatment bundles are expected to improve patient care. Compliance to protocol could be absolute non compliance, partial or full (correct).

Patient population –

A sample size of 100 pts. was selected which included admitted pts. in all ICU.

Type of parameter-

Process parameter

Benchmark- 90%

References

1. Tracy R. McMillan, MD; Robert C. Hyzy, Bringing quality improvement into the intensive care unit Crit Care Med 2007; 35[Suppl.]:S59–S65).
2. Peter J. Pronovost .Accelerating Change Today (A.C.T.)for America's Health.. Editor Patricia Q. Schoeni © 2002 by the National Coalition on Health Care and the Institute for Healthcare
Improvement.

ICU RE- ADMISSION RATE INDICATOR

Description –

Readmission to the ICU within 24 hrs of transfer during a single hospital stay.This is an indicator of post ICU care**.**

Rationality –

A zero readmission rate reflects more *defensive* approach by ICU team which increases LOS in ICU causing risk of nosocomial infection, iatrogenic complications, and non availability of bed for the deserving patients Higher mortality rate of 1.5 to 10 times that of controls and higher length of stay at least twice that of control patients had been documented .A higher readmission rate indicates premature decision to shift out.

Patient population –

All patients discharged from ICU in a time frame.(exclusion : death)

Type of parameter-

Process

Benchmark – 5-6%

References

1 Tracy R. McMillan, MD; Robert C. Hyzy, Bringing quality improvement into the intensive care unit Crit Care Med 2007**;** 35[Suppl.]:S59–S65).

2. Maria Cruz Martin Delgado, Lluis Cabre Pericas, Javier Ruiz Moreno et al. Quality indicators in critically ill patients. SEMICYUC work groups. First edition May 2005. ISBN 609- 5974

Infection Control:

Nosocomial infection has both outcome and financial implications. Approximately 1.7 million infections, 99,000 deaths, and higher estimated annual expenditure of

$4.5 billion had been reported by centers for disease control and prevention in 2007. 4 additional ref

Most commonly monitored three variables : a) ventilator associated pneumonia , b) blood stream infection and c) urinary tract infection rate were selected as quality indicators for this report. NNIS surveillance 2002 shows that out of overall 13.04 overall infection rate / 1000 patient days in adult and children intensive care unit , pneumonia, BSI and UTI rates were represented as 3.33

, 2.71 and 3.38 respectively. SSI (0.95) and others (2.67) represented the rest. Percentage wise

UTI, BSI, and Pneumonia incidence were 32, 14, 15 in the 2002 survey.

Ventilator associated pneumonia (VAP): VAP is an important cause of morbidity and mortality 6,7additional ref but difficulties encountered in diagnosis of VAP makes bench marking a difficult proposition. Therefore its advantage as quality indicator is limited. Still hospitals in United States report ventilator-associated pneumonia rates as an indicator of quality of care and also for benchmarking due to the collective demand of legislators, tax payers, and advocates of quality-of-care across .

Endotracheal aspirates with nonquantitative cultures had been advocated as the initial diagnostic strategy. Common clinical criteria (e.g. fever, leukocytosis, purulent secretions, new or changing radiographic infiltrate) have high sensitivity but suffer from relatively low specificity level. They are most useful for initial screening for VAP and for selecting patients for invasive procedures, such as BAL, that have sensitivities and specificities in the region of 80%.For ease of application clinical and radiological diagnostic criteria are given in this report.

OBSERVATIONS AND DISCUSSIONS -

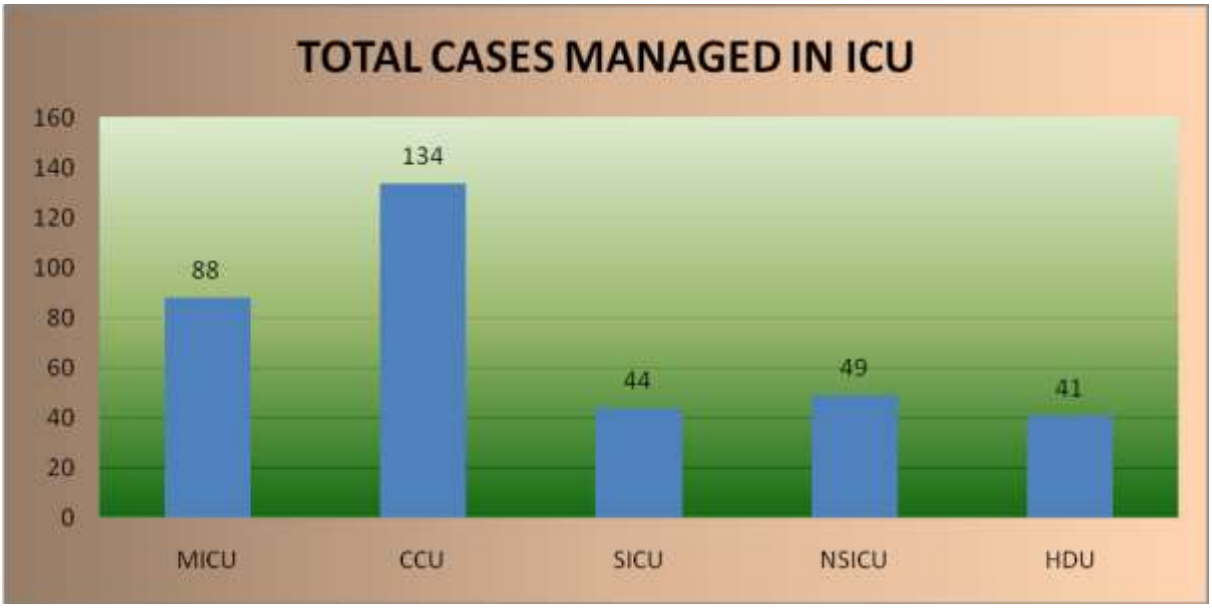


Figure – 1: Total no. of cases managed in ICU

All the pts. admitted in various ICU of Paras Hospitals in the month of January, February & March are tabulated. The data revealed different no. of pts. being managed in different ICUs. The average no.of pts. were tabulated and graph generated.

Please refer table no. 1(Appendix no. 1)

The graph depicts the average total no. of cases managed in different ICU of Paras Hospitals. Maximum number of cases are managed in CCU which are 134 and minimum in HDU which accounts 41 patients. MICU closely follows CCU and managed 88 patients.

AVERAGE LENGTH OF STAY OF PATIENTS



Figure- 2–Average length of stay in months of Jan, Feb, March

The graph shows the average length of stay of pts. In the month of January, February & March. In January, the ALOS accounts upto 3.3 days, in February it is 5.0 days whereas it is minimum in the month of March which is 2.1 days.

Please refer table no- 2 (Appendix no- 1)

This is in accordance with the standard benchmark . The Alos was increased in the month of February as compared to benchmark

BENCHMARK - 4.36 days in General ICU

2.43 days in Vascular ICU

ICU RE- ADMISSION RATE INDICATOR

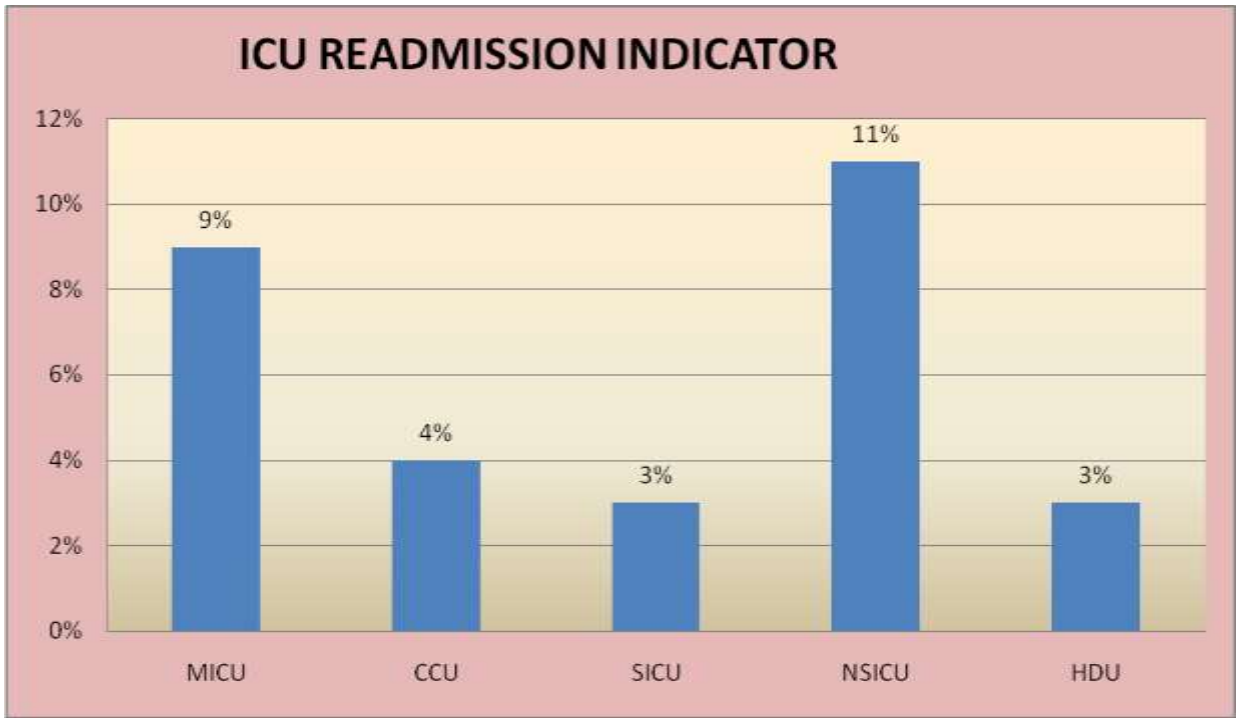


Figure- 3: ICU Re- admission Indicator in different ICU

The graph depicts that maximum re- admissions of patients in NSICU which accounts upto 11% and minimum re- admissions of patients in SICU and HDU. MICU closely follows NSICU amd accounts upto 9 %. CCU re- admissions are 4 %..

Please refer table no. – 3 (Appendix- 1)

The re- admissions is increased in NSICU (11 %) and MICU (9 %) as compared with the benchmark.

BENCHMARK- 5 - 6%

COMPLIANCE TO PROTOCOL INDICATOR

1. ADMISSION PROTOCOL

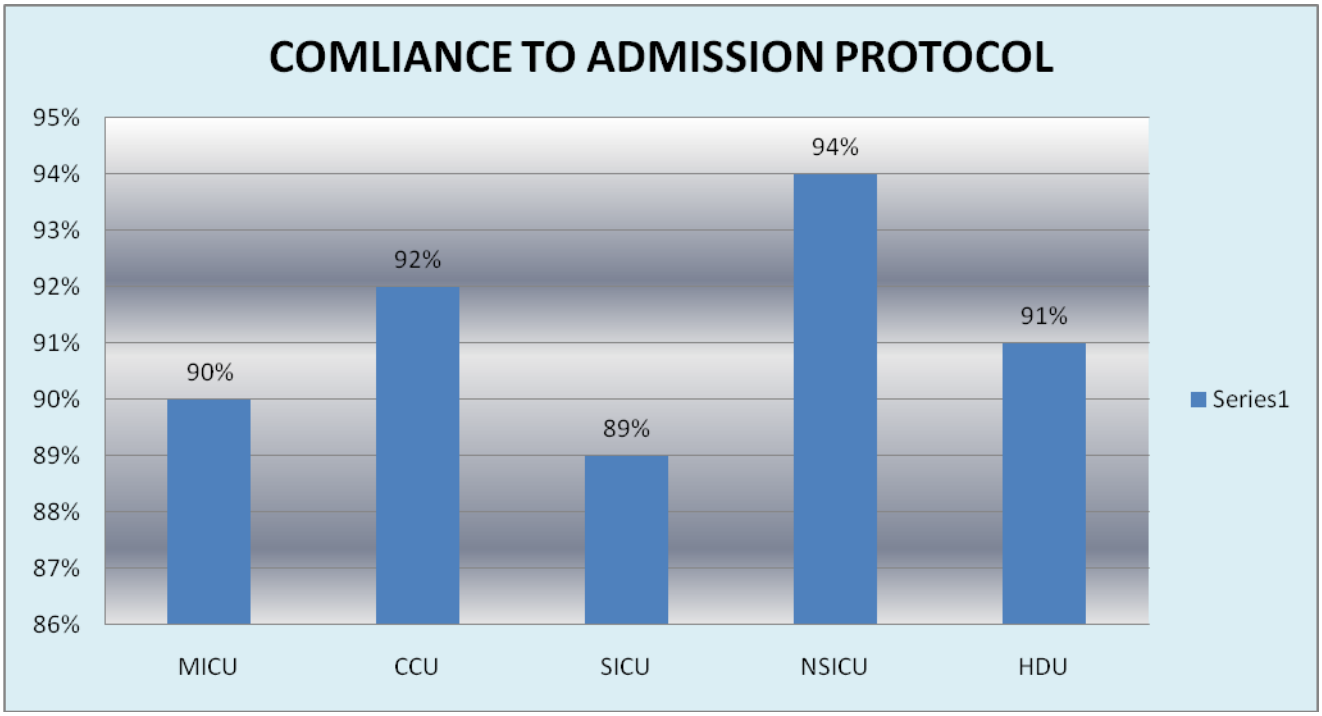


Figure- 4 : Compliance to admission protocol

This graph interprets compliance to admission protocol. All the standard protocol are complied upto 94% in NSICU. 92% compliance is observed in CCU. MICU and HDU observes 90% and 91% admission protocol compliance. Minimum compliance is observed in SICU.

Please refer Table no- 4(Appendix no- 4)

The compliance to admission protocol is in accordance with the benchmark.

BENCHMARK - 90 %

COMPLIANCE TO PROTOCOL INDIATOR

2. DISCHARGE PROTOCOL

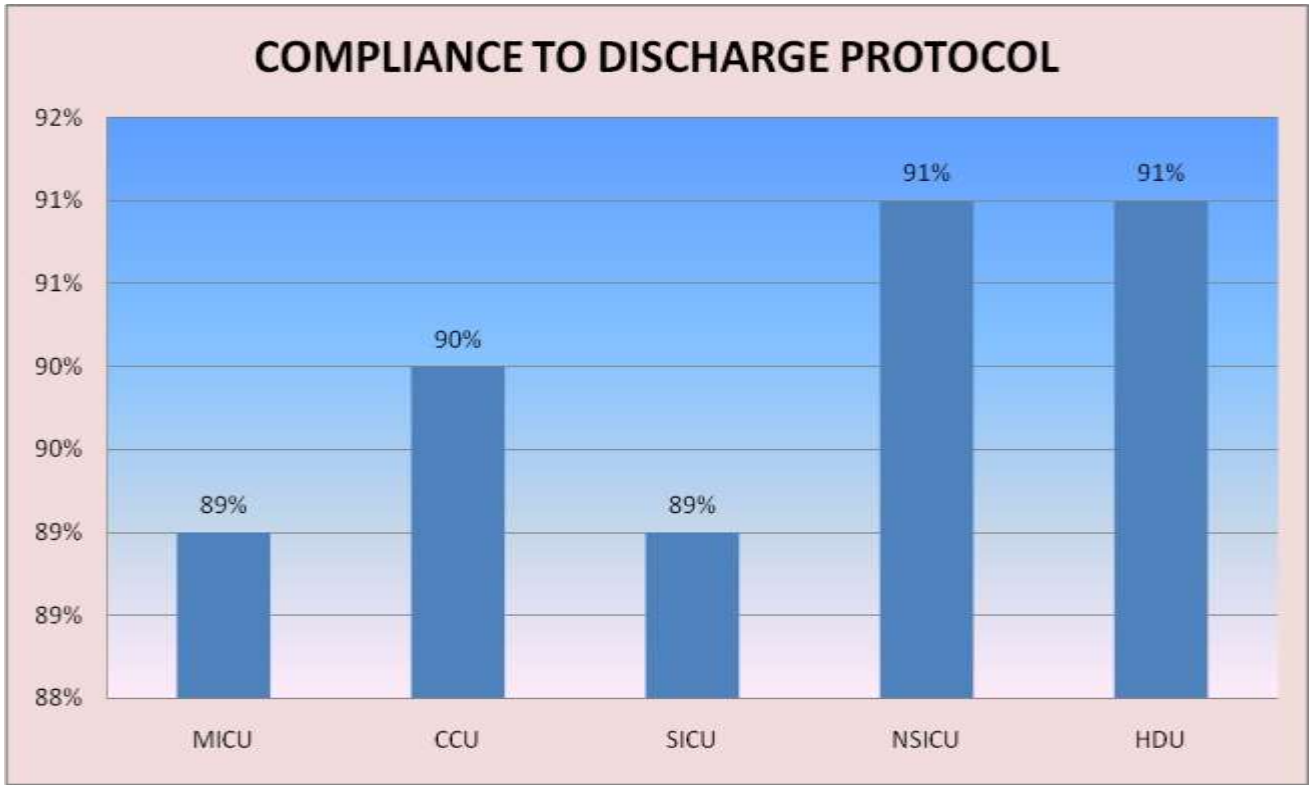


Figure- 5: Compliance to discharge protocol

The graph shows that NSICU and HDU , maximum discharge protocol compliance is observed which is 91%. CCU closely follows accounting upto 90% compliance . Both MICU and SICU accounts upto 89%.

Please refer Table no- 5 (Appendix no -1)

The compliance to discharge protocol is inaccordance with benchmark . MICU & SICU compliance is slightly less (89%)

BENCHMARK- 90%

COMPLIANCE TO PROTOCOL INDICATOR

3. DOCUMENTATION PROTOCOL

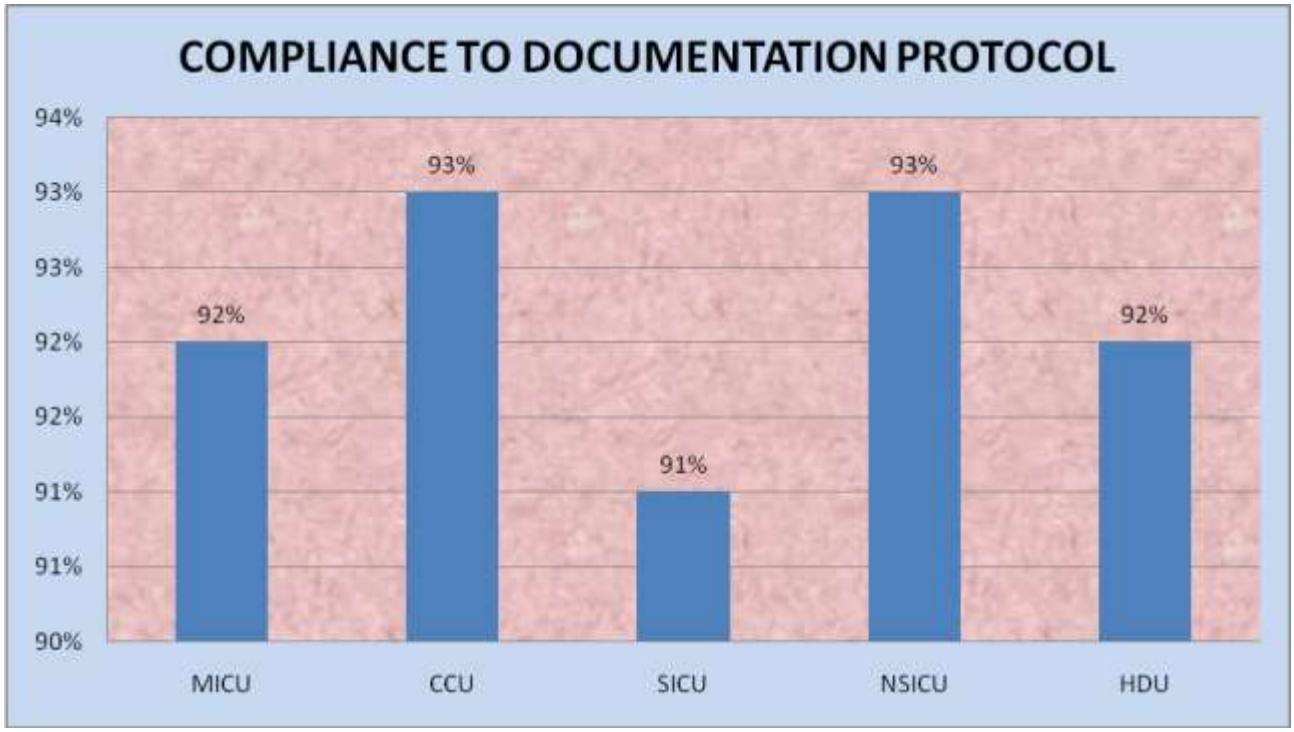


Figure- 6 : Compliance to documentation protocol

The graph shows compliance to Dcumentation protocol. NSICU & CCU accounts maximum at 93% . MICU & HDU are at 92% wheras SICU observes 91% compliance to documentation.

Please refer table no. 6(Appendix no- 1)

This is in accordance with the benchmark

BENCHMARK – 90%

COMPLIANCE TO PROTOCOL INDICATOR

4. HIGH ALERT DRUG PROTOCOL

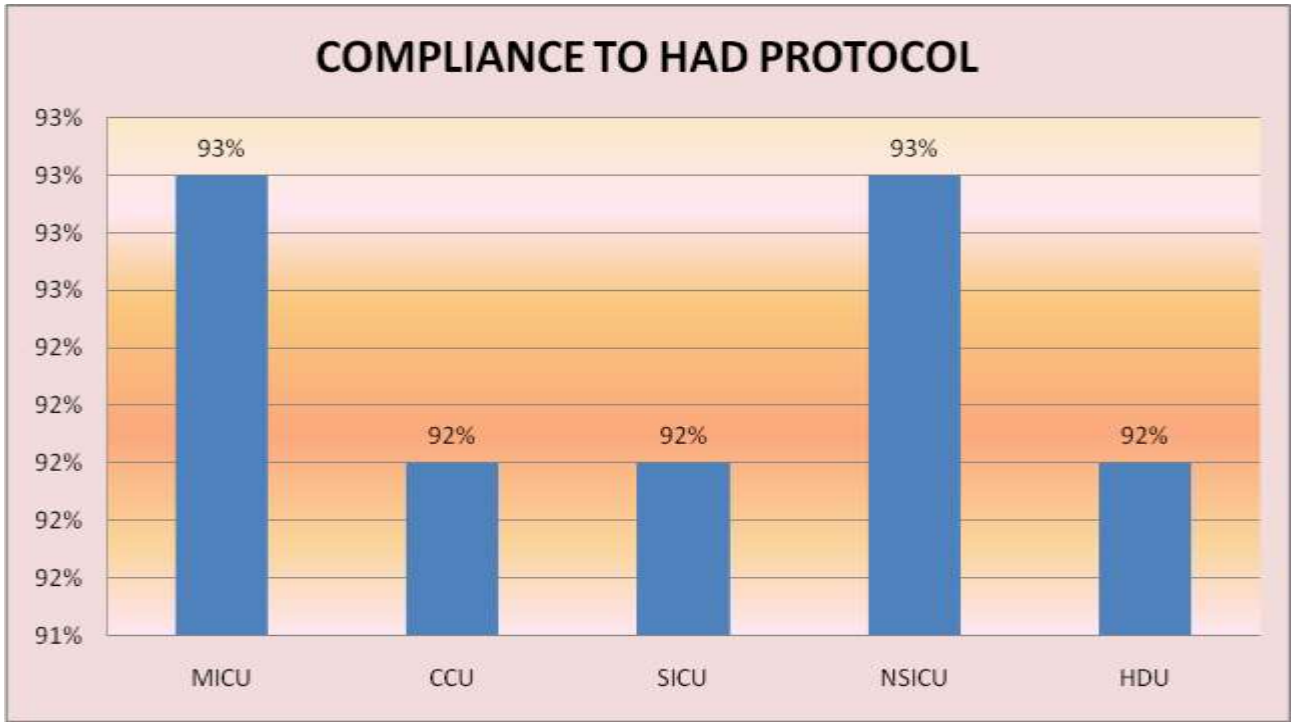


Figure- 7: Compliance to HAD Protocol in different ICU

The graph shows compliance to High alert drug compliance. Maximum compliance is observed in NSICU & MICU – 93%. SICU , CCU & HDU observes 92% compliance.

Please refer Table no- 7 (Appendix no- 1)

The HAD protocol is in accordance with the benchmark

BENCHMARK - 90%

COMPLIANCE TO PROTOCOL INDICATOR

5. NARCOTIC DRUG COMPLIANCE

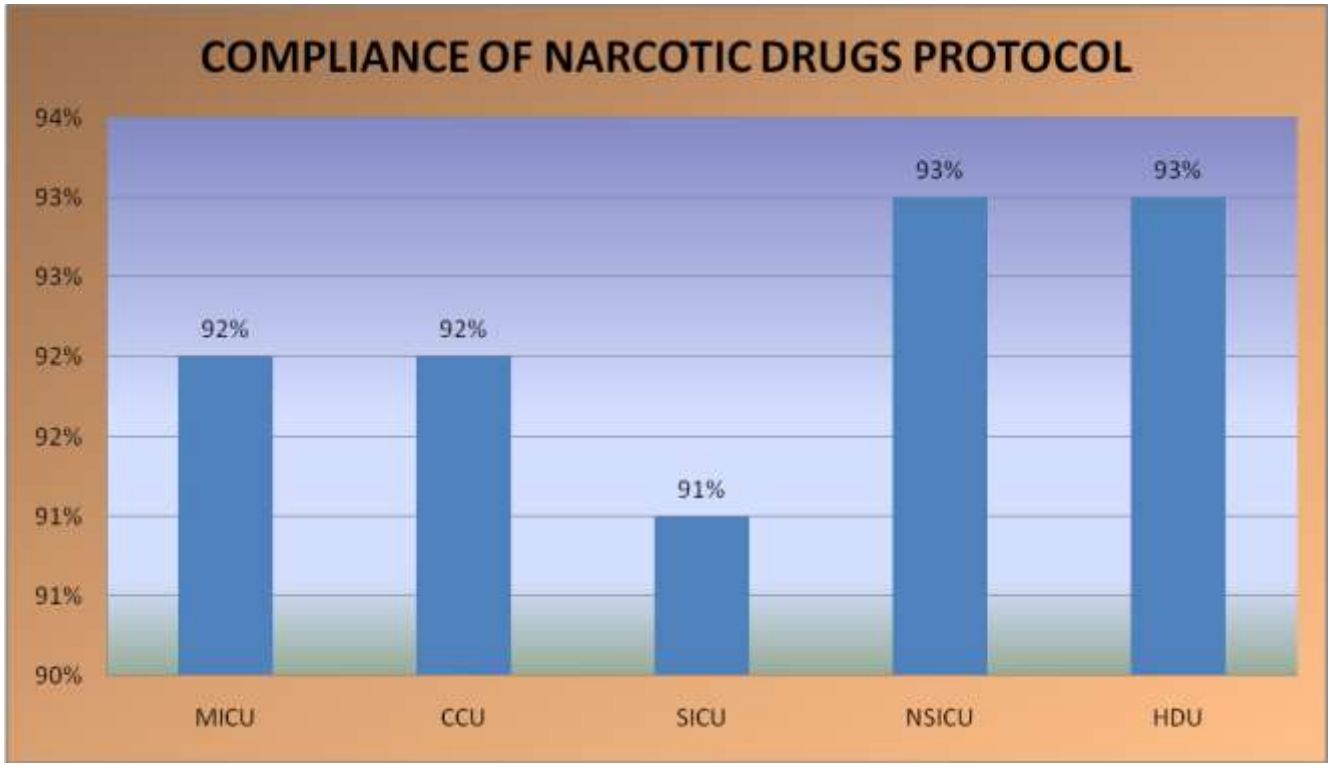


Figure – 8: Compliance to Narcotic Drugs Protocol in different ICU

The graph shows compliance to Narcotic drugs compliance. NSICU & HDU observes maximum compliance of 93% . MICU & CCU sees 92% wheras SICU observes 91% compliance.

Please refer Table no- 8(Appendix no- 1)

The Narcotic drug protocol is in accordance with the benchmark.

BENCHMARK – 90%

COMPLIANCE TO PROTOCOL INDICATOR

6. CLINICAL PROTOCOL

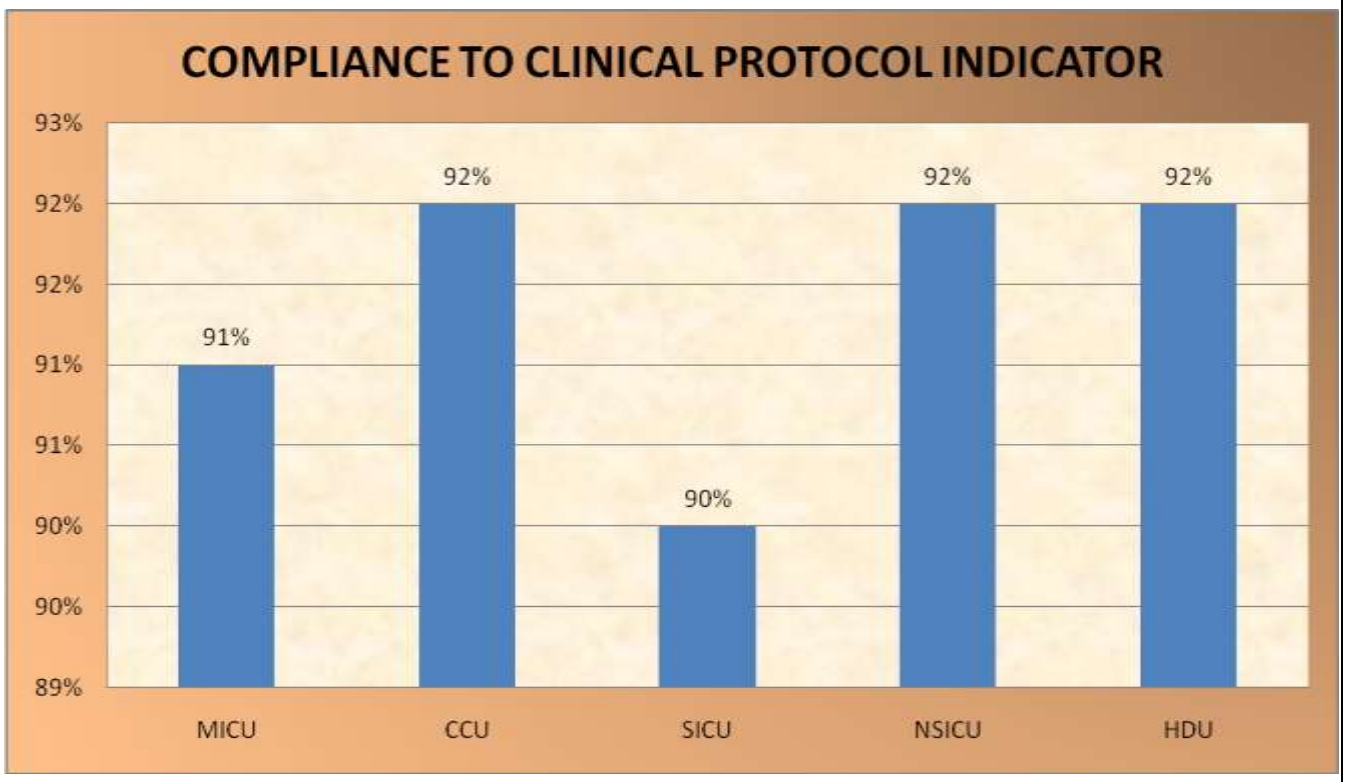


Figure- 9: Compliance of clinical protocol in different ICU

The graph shows compliance to clinical protocol. CCU, NSICU & HDU observes 92% compliance . MICU observes 91% whereas minimum compliance is seen in SICU – 90%

Please refer Table no- 9 (Appendix no. -1)

The benchmark standards are met

BENCHMARK – 90%

HOSPITAL INFECTION CONTROL INDICATOR

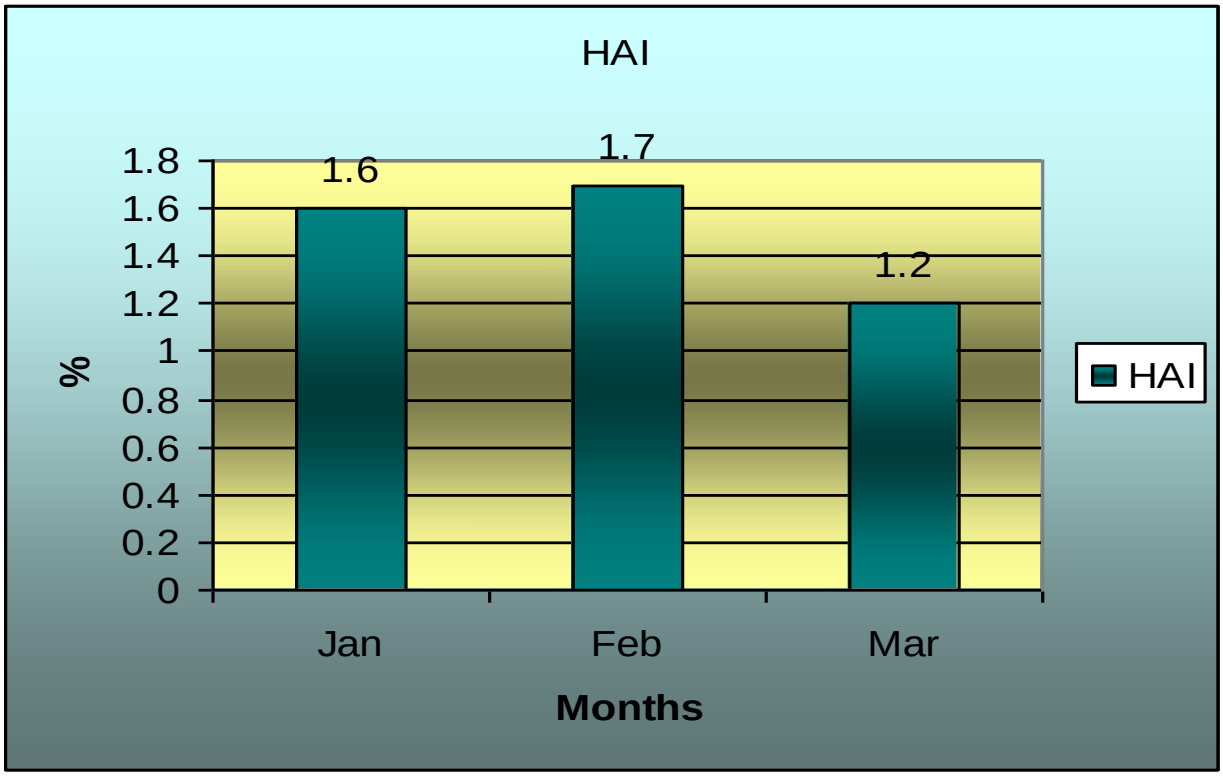


Figure- 10: HAI in ICU for different months

The average HAI is maximum in the month of February which is 1.7%. Minimum HAI is observed in the month of March – 1.2 %

Please refer Table no- 10(Appendix no- 1)

The months of January & February did not comply with benchmark standards & is increased.

BENCHMARK – 1.4 %

MONTH WISE DISTRIBUTION OF HAI

FOR THE MONTH OF JANUARY

VAP -

(VENTILATOR ASSOCIATED PNEUMONIA)

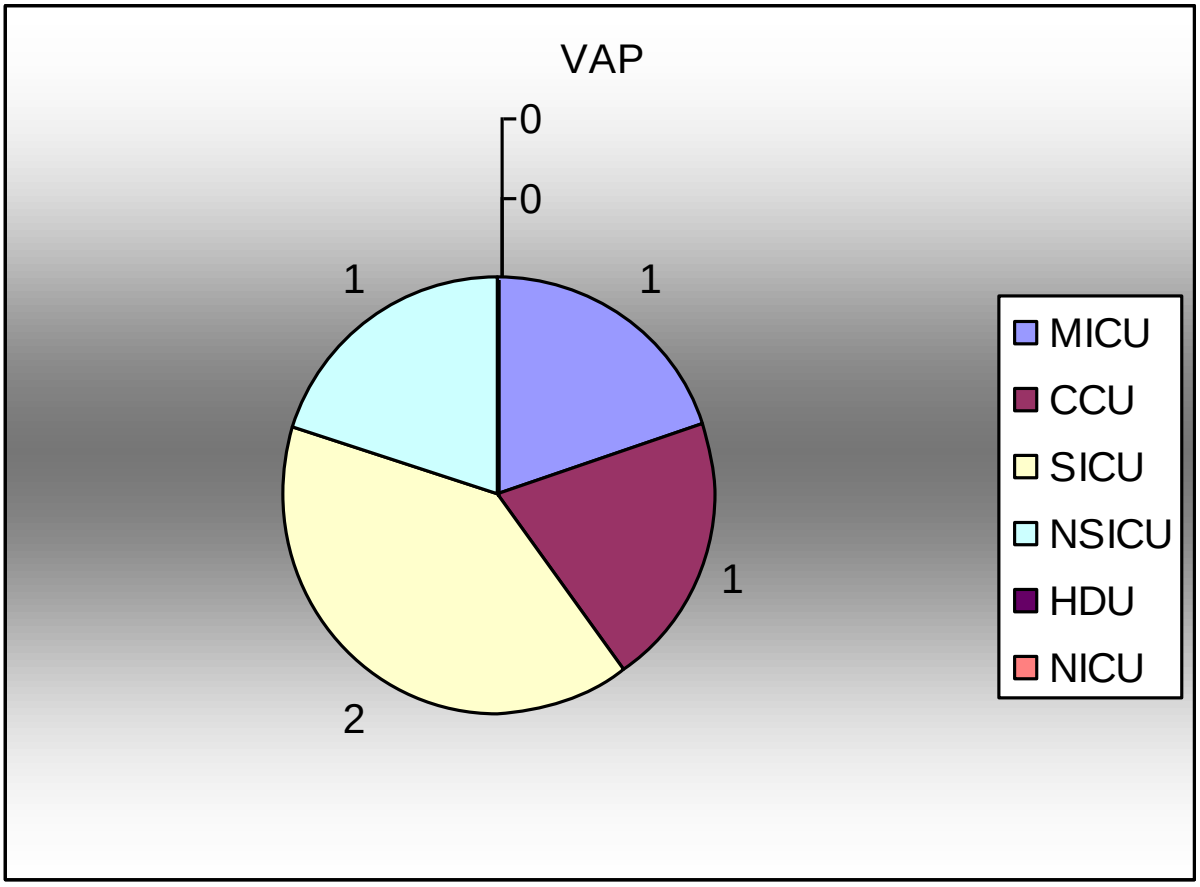


Figure- 11: VAP in the month of Jan for different ICU

The graph in figure -11 shows that-

In the month of January 1 infection was found in MICU, NSICU , & CCU. SICU had 2 infections whereas HDU & NICU , no infection was found. Please refer Table no- 10(Appendix no- 1)

HOSPITAL AQUIRED INFECTION

CR- UTI

(CATHETAR RELATED – URINARY TRACT INFECTION)

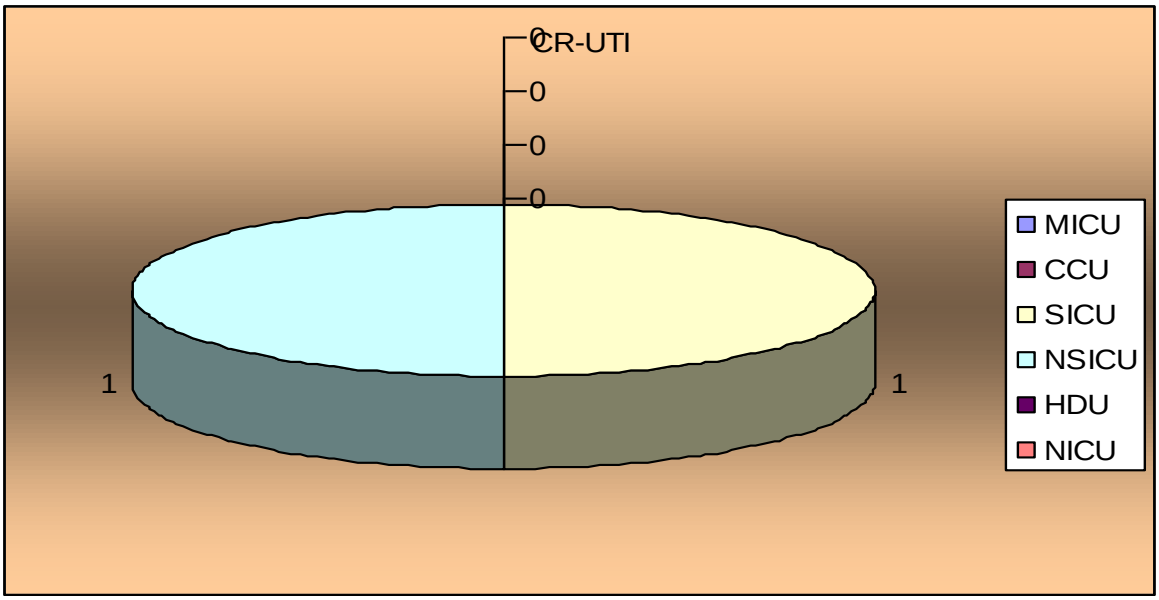


Figure- 12: CR- UTI in the month of Jan For different ICU

The pie- chart shows amount of CR- UTI in the month of January in various ICU. NSICU & SICU observed 1 infection whereas no infection was found in MICU, CCU, HDU & NICU. Please refer Table no- 10 (Appendix no- 1)

HOSPITAL AQUIRED INFECTION

HAP-

(HOSPITAL AQUIRED PNEUMONIA)

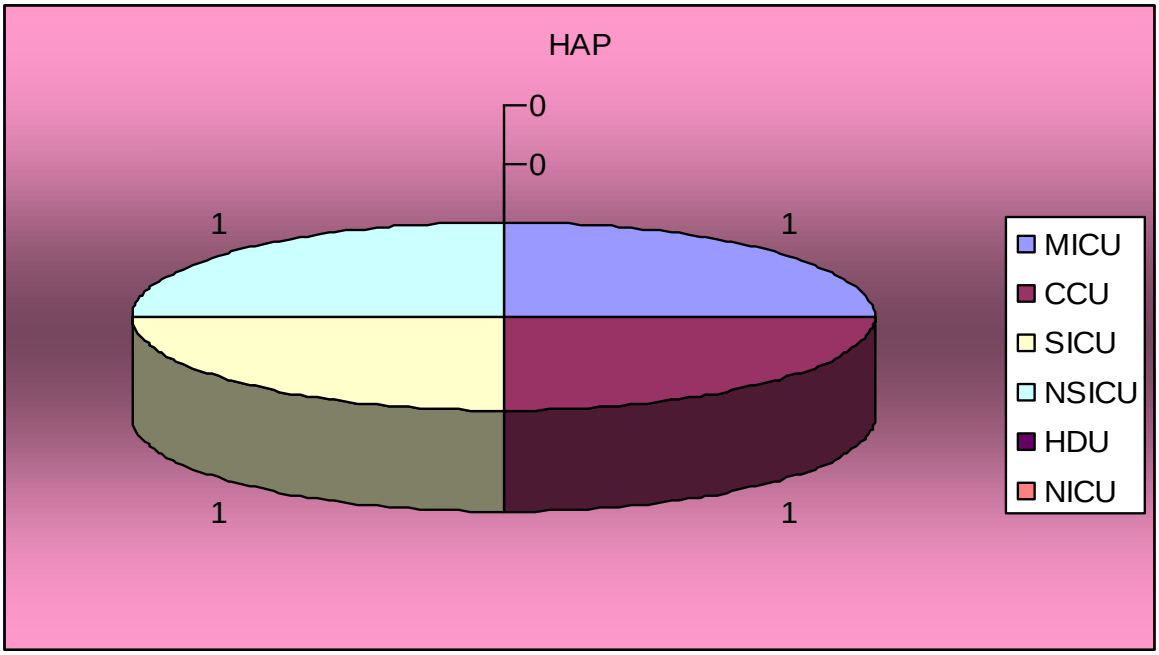


Figure- 13: HAP in the month of Jan for different ICU

The pie- chart describes amount of HAP found in various ICUs. 1 infection was noticed in SICU, CCU, MICU & NSICU, whereas no infection was found in HDU & NICU.

Please refer Table no- 10 (Appendix no- 1)

FOR THE MONTH OF FEBRUARY

VAP-
(VENTILATOR ASSOCIATED PNEUMOIA)

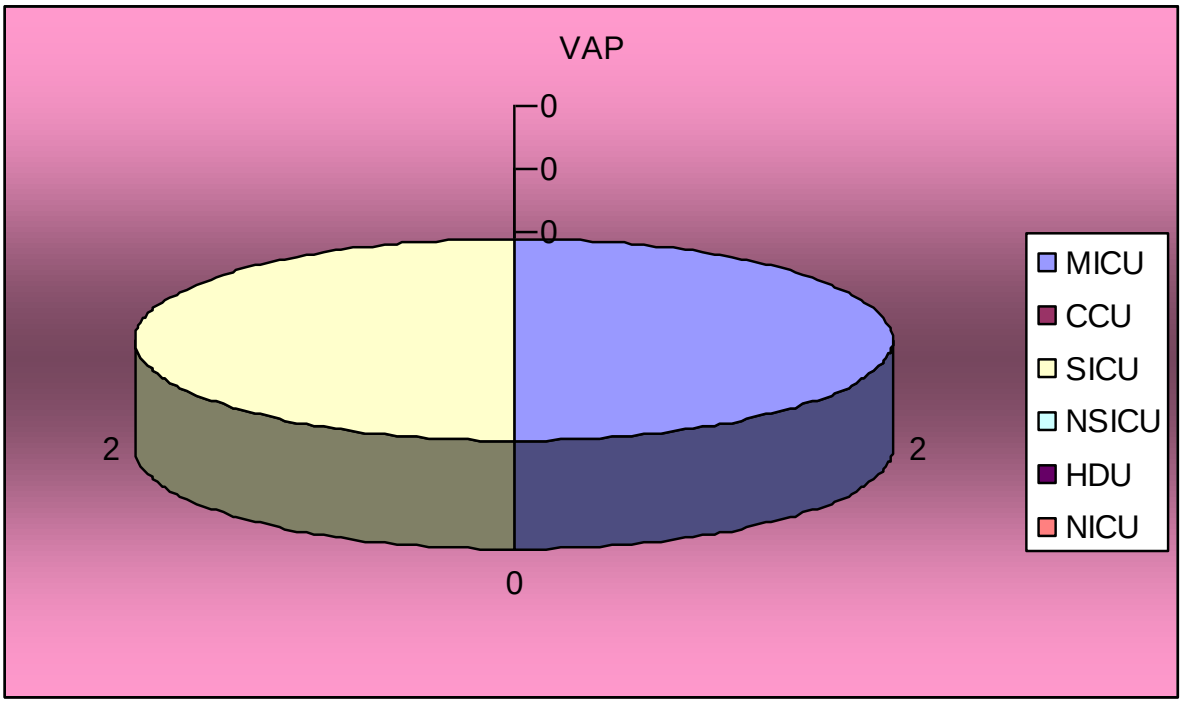


Figure- 14: VAP for the month of Feb in different ICU

In the month of February, VAP infection was increased as compared to the month of January. 2 pts were found infected in both MICU & SICU. No infection was found positive in NSICU, CCU, HDU & NICU.

Please refer Table no- 11(Appendix no- 1)

HOSPITAL AQUIRED INFECTION

HAP-

(HOSPITAL AQUIRED PNEUMONIA)

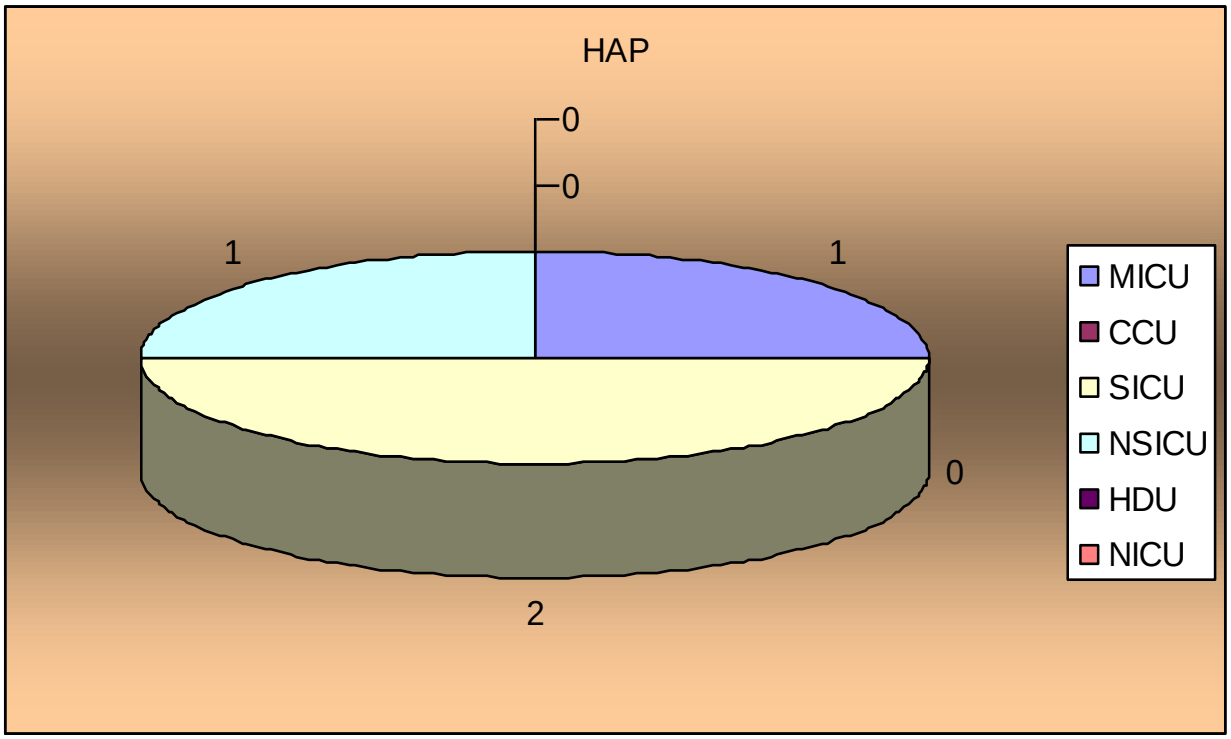


Figure- 15: HAP for the month of Feb in different ICU

The chart clearly depicts that 2 pts. were found positive for HAP in SICU. 1 infection was found in MICU, & NSICU.

Please refer Table no- 11 (Appendix no- 11)

PATIENT SATISFACTION INDICATOR

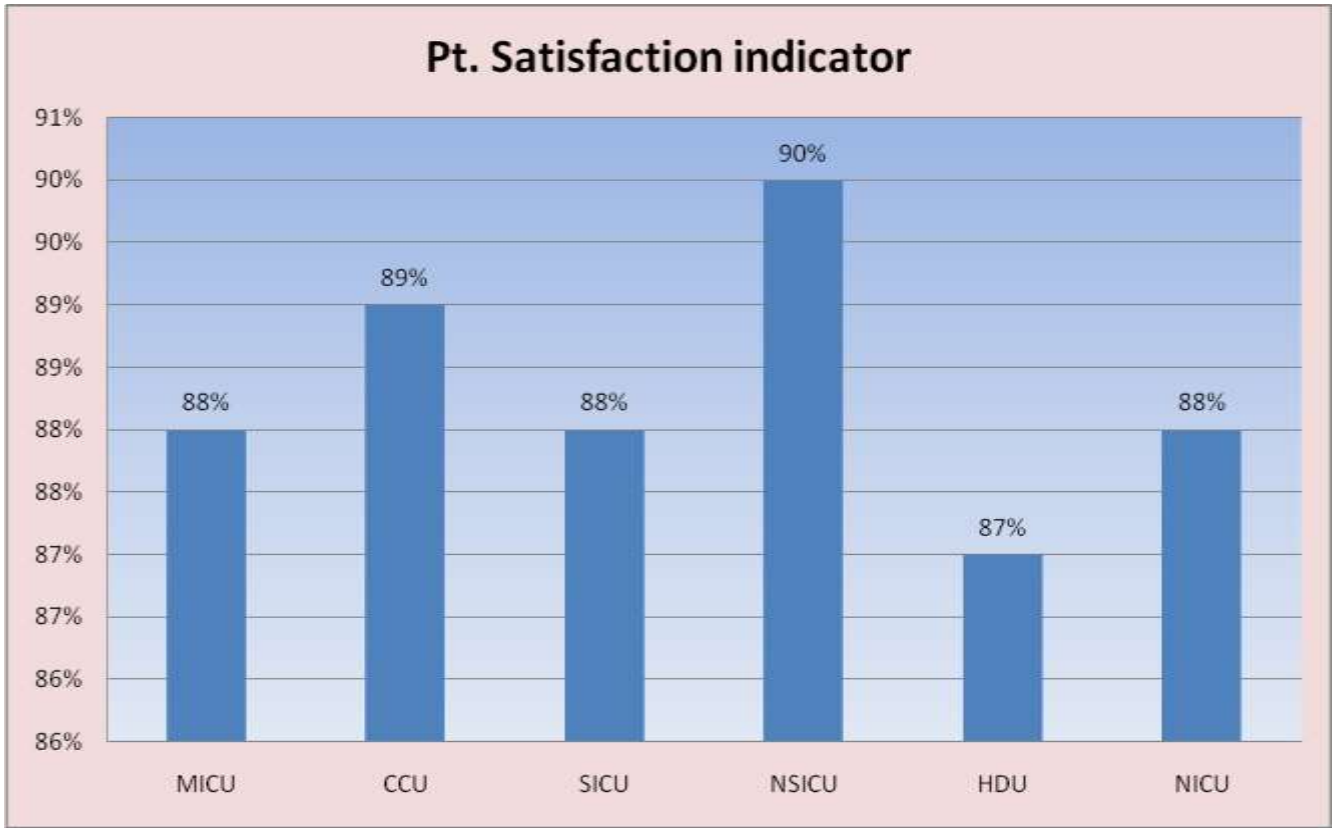


Figure- 16: Pt. Satisfaction rate in different ICU

The bar- diagram clearly shows maximum pt. satisfaction in NSICU – 90% which is closely followed by CCU – 89%. MICU & SICU observed 88% wheras HDU observed 87% pt. Satisfaction.

CONCLUSION

As depicted from the discussions above the quality of pt. care in different ICU of Paras Hospitals is in compliance with the standard benchmarks of Health care industry. The gaps noticed between levels offered and benchmark levels are as under –

1. The average length of stay is more in the month of February (5 days)
2. ICU Re- admission in NSICU is 11% and in MICU is 9 % which is more than the benchmark – 5%
3. The HAI in the months of January & February are 1.6% & 1.7 % respectively which is more than the benchmark – 1.4 %

The findings revealed a need of comprehensive study in quality care of pts. admitted in ICU in Paras Hospitals. On analysis of findings , the hospital has decided to introduce few check-lists to decrease HAI and improve compliance rate. The check- lists are attached in the Appendix- 4 of the report.

Successful ICUs work to establish work environments that embody specific characteristics. The ICU characteristics create an environment that:

- Is patient focused
- Is trusting and open
- Is comfortable, compassionate and caring
- Has strong leadership
- Has everyone on the team involved in rapid cycle improvements
- Has excellent communications
- Has a scientific process of improvement

APPENDIX- 1

TOTAL NO. OF CASES MANAGED IN ICU

TOTAL NO OF CASES MANAGED IN ICU

	JANUARY	FEBRUARY	MARCH	AVERAGE
MICU	86	89	90	88.333333
CCU	119	115	169	134.33333
SICU	34	50	49	44.333333
NSICU	48	48	53	49.666667
HDU	44	36	43	41

Table -1

AVERAGE LENGTH OF STAY

MONTH	ALOS
JAN	3.48
FEB	4.98
MAR	2.28

Table- 2

CALCULATION-

$$\text{LOS} = \frac{\text{TOTAL OCCUPIED BED DAYS}}{\text{NO. OF PTS. IN A MONTH}}$$

ICU RE- ADMISSION INDICATOR

	JAN	FEB	MARCH	AVERAGE
MICU	10%	8%	9%	9%
CCU	4%	3%	4%	4%
SICU	3%	4%	4%	3%
NSICU	12%	10%	10%	11%
HDU	4%	3%	2%	3%

Table- 3

COMPLIANCE TO PROTOCOL INDICATOR

1. ADMISSION PROTOCOL

COMPLIANCE TO PROTOCOL INDICATOR

ADMISSION PROTOCOL

	JANUARY	FEBRUARY	MARCH	AVERAGE
MICU	90%	92%	89%	90%
CCU	92%	92%	92%	92%
SICU	89%	87%	91%	89%
NSICU	94%	92%	95%	94%
HDU	91%	90%	91%	91%

Table - 4

CALCULATION

$$\text{COMPLIANCE} = \frac{\text{NO. OF TIMES FOLLOWED}}{\text{NO. OF TIMES EXPECTED TO FOLLOW}}$$

COMPLIANCE TO PROTOCOL INDICATOR

2. DISCHARGE PROTOCOL

COMPLIANCE TO PROTOCOL INDICATOR

DISCHARGE PROTOCOL

	JANUARY	FEBRUARY	MARCH	AVERAGE
MICU	88%	89%	90%	89%
CCU	90%	91%	90%	90%
SICU	89%	89%	90%	89%
NSICU	91%	92%	91%	91%
HDU	91%	91%	92%	91%

Table- 5

CALCULATION

$$\text{COMPLIANCE} = \frac{\text{NO. OF TIMES FOLLOWED}}{\text{NO. OF TIMES EXPECTED TO FOLLOW}}$$

COMPLIANCE TO PROTOCOL INDICATOR

3. DOCUMENTATION PROTOCOL

COMPLIANCE TO PROTOCOL INDICATOR

DOCUMENTATION PROTOCOL

	JANUARY	FEBRUARY	MARCH	AVERAGE
MICU	92%	91%	93%	92%
CCU	93%	94%	93%	93%
SICU	92%	91%	91%	91%
NSICU	93%	93%	92%	93%
HDU	92%	92%	92%	92%

Table- 6

CALCULATION

$$\text{COMPLIANCE} = \frac{\text{NO. OF TIMES FOLLOWED}}{\text{NO. OF TIMES EXPECTED TO FOLLOW}}$$

COMPLIANCE TO PROTOCOL INDICATOR

4. HIGH ALERT DRUG COMPLIANCE

COMPLIANCE TO PROTOCOL INDICATOR

HIGH ALERT DRUG COMLIANCE

	JANUARY	FEBRUARY	MARCH	AVERAGE
MICU	94%	93%	93%	93%
CCU	92%	92%	93%	92%
SICU	92%	92%	91%	92%
NSICU	93%	93%	93%	93%
HDU	92%	92%	93%	92%

Table- 7

CALCULATION

$$\text{COMPLIANCE} = \frac{\text{NO. OF TIMES FOLLOWED}}{\text{NO. OF TIMES EXPECTED TO FOLLOW}}$$

COMPLIANCE TO PROTOCOL INDICATOR

5. NARCOTIC DRUG COMPLIANCE

COMPLIANCE TO PROTOCOL INDICATOR

NARCOTIC DRUG COMPLIANCE

	JANUARY	FEBRUARY	MARCH	AVERAGE
MICU	93%	92%	91%	92%
CCU	92%	92%	93%	92%
SICU	91%	92%	91%	91%
NSICU	94%	93%	93%	93%
HDU	92%	93%	93%	93%

Table - 8

CALCULATION

$$\text{COMPLIANCE} = \frac{\text{NO. OF TIMES FOLLOWED}}{\text{NO. OF TIMES EXPECTED TO FOLLOW}}$$

COMPLIANCE TO PROTOCOL INDICATOR

6. CLINICAL PROTOCOL COMPLIANCE

COMPLIANCE TO PROTOCOL INDICATOR

ADHERENCE TO CLINICAL PROTOCOL

	JANUARY	FEBRUARY	MARCH	AVERAGE
MICU	92%	90%	90%	91%
CCU	91%	92%	92%	92%
SICU	91%	90%	90%	90%
NSICU	92%	92%	93%	92%
HDU	92%	92%	93%	92%

Table- 9

CALCULATION

$$\text{COMPLIANCE} = \frac{\text{NO. OF TIMES FOLLOWED}}{\text{NO. OF TIMES EXPECTED TO FOLLOW}}$$

HOSPITAL INFECTION CONTROL INDICATOR

JANUARY 2010

ICU/ HDU	VAP	CR-UTI	CR-BSI	HAP	UTI	BSI	Others
NSICU	1	1	0	1	0	0	0
SICU	2	1	0	1	0	0	1
MICU	1	0	0	1	0	0	0
NICU	0	0	0	0	0	1	0
CCU	1	0	0	1	0	0	0
HDU	0	0	0	0	0	0	0
CTVS ICU	0	0	0	0	0	0	0
WARDS	0	1	0	0	0	0	0

Table- 10

No of HAI: 14 (13 ICU'S + 1 WARDS) ; Percentage of HAI's = 1.6 %

VAP rate (ICU's): 21.7 per 1000 ventilator days
CRUTI rate (ICU's): 4.6 per 1000 catheter days

SSI's: 0; Percentage: 0.0%

FEBRUARY DATA 2010

ICU/ HDU	VAP	CR-UTI	CR-BSI	HAP	UTI	BSI	Others
NSICU	0	1	0	1	0	0	0
SICU	2	0	0	2	0	1	1
MICU	2	0	0	1	0	0	0
NICU	0	0	0	0	0	0	0
CCU	0	0	0	0	0	0	0
HDU	0	0	0	0	0	0	0
CTVS ICU	0	0	0	0	0	0	0
WARDS	0	1	0	1	3	0	0

Table- 11

No of HAI: 15 (13 ICU'S + 4 WARDS) ; Percentage of HAI's = 1.7 %

VAP rate (ICU's): 27.2 per 1000 ventilator days

MARCH 2010

ICU/ HDU	VAP	CR-UTI	CR-BSI	HAP	UTI	BSI	Others
NSICU	0	0	0	0	0	0	0
SICU	1	1	0	2	0	0	0
MICU	0	1	0	0	1	0	0
NICU	0	0	0	0	0	0	0
CCU	0	0	0	0	0	0	0
HDU	0	0	0	0	0	0	0
CTVS ICU	0	0	0	0	0	0	0
WARDS	0	2	0	2	2	0	0

Table- 12

No of HAI: 12 (6 ICU'S + 6 WARDS) ; Percentage of HAI's = 1.2 %

VAP rate (ICU's): 7.6 per 1000 ventilator days
CRUTI rate (ICU's): 6.92 per 1000 catheter days

PATIENT SATISFACTION INDICATOR

PT. SATISFACTION INDICATOR

	JAN	FEB	MARCH	AVERAGE
MICU	88%	89%	87%	88%
CCU	89%	90%	88%	89%
SICU	88%	87%	89%	88%
NSICU	90%	88%	87%	90%
HDU	87%	88%	91%	87%
NICU	88%	88%	87%	88%

Table- 13

APPENDIX – 2

MONTH	MICU	SICU	CCU	NSICU	HDU	NICU
1/1/2010-31/01/10	10/28178, Mrs. Madhvi Nanda, 30yrs/F	10/28177, Mr. Abhay Singh, 50yrs/M	10/28185,Mr. Prahlad Singh,70yrs/M	10/28303, Mr. Mulupuru,70yrs/M	10/28182,Mr.Rohit Kr. Singh,25yrs/M	10/28202,Baby of Pramila, 3 months
	10/28190,Mrs. Parvati Devi,66yrs/F	10/28347,Mr. Jagdish Chand, 23yrs/M	10/28186,Mrs. Shanti Devi, 55yrs/F	10/28332,Mr. Bhajan Singh,60yrs/M	10/28247,Master Rian Thakral,11 months	10/28213, Baby Aakriti, 3months
	10/28201,Mr.Aman Gupta,29yrs/M	10/28356,Mrs. Sunita,35yrs/F	10/28191, Mr. Dharamvir Singh,60yrs/M	10/28626, Mr. Jagbir , 36yrs/M	10/28263, Mr. Kishore,32yrs/M	10/28214, Baby Harshita, 3 Months
	10/28229,Mr. Ram Singh,70yrs/M	10/28442, Mrs. Suraj Devi,78yrs/F	10/28203, Mrs. Shakuntla Yadav,27yrs/F	10/28658, Mr. Kashmere, 54yrs/M	10/28269, Mr. Ramavtar,40yrs/M	10/28227,Baby Richa ,3months
	10/28242,Mr. Naval Kishore ,65yrs/M	10/28496, Mr. Sandeep , 25yrs/M	10/28205, Mr. Jagroopv Singh ,70yrs/M	10/29017, Ms. Hayat, 50yrs/F	10/28287,Mrs. Sarita,25yrs/F	10/28325,Baby Of Kavita,3months
	10/28252, Mrs. Kamla Devi,72yrs/F	10/28534,Mr. Manoj , 30yrs/M	10/28216, Mrs. Joginder Kr,60yrs/F	10/29033, Baby Varsha, 5 months/F	10/28295, Mr. Rup Narayan, 53yrs/M	10/28485, Baby of Ravita, 3months
	10/28253, Mrs. Sharmila, 27yrs/F	10/28595, Mr. Sajid, 25yrs/M	10/28219,Mr. Din Bandhu,49yrs/M		10/28327,Mr.Robin,76yrs/M	10/28563, Baby of Sweety, 4 months
	10/28255, Mr. Santosh,20yrs/M	10/28660, Mr. Jai ,83yrs/M	10/28222,Mr. Dhanus, 44yrs/M		10/28376, Mr. Rambir , 61yrs/M	10/28569, Baby of Saumya, 3 months
	10/28277, Mr. Rahul ,44yrs/M	10/28737, Mr. Sunil,25yrs/M	10/28236,Mrs. Indrani,90yrs/F		10/28397, Mrs. Shanti , 81yrs/F	10/28608, Baby of Aparna , 3months
	10/28278, Mrs. Sumarthi,75yrs/F	10/28788, Mr. Vinod ,29yrs/M	10/28245, Mr. Sher Singh,81yrs/M		10/28466, Mr. Zile Singh, 59yrs/M	10/28657, Master Dhruv, 4 months/M
	10/28289, Mr. Manoharlal, 78yrs/M	10/28815, Mr. Santosh , 24yrs/M	10/28246, Mr. Rati Ram, 58yrs/M		10/28489, Mr. Ronit, 01yr 6 months,M	10/28714, Master Om, 7 months

	10/28305,Master Ujjawal,5yrs/M	10/28825, Mr. Kamal, 28yrs/M	10/28251,Mr. Rajiv Gaur,56yrs/M		10/28497, Mrs. Bhanwar,77yrs/F	10/28723, Baby of Sushma, 3 months
	10/28346,Mr.Ishwar,88yrs/M	10/28828,Mr. Ram rattan, 69yrs/M	10/28254,Mr. Vivek Kr, 30yrs/M		10/28516, Mr. Sriniwas, 46yrs/M	10/28724, Baby of Sushma - 2 , 3 months
	10/28362,Mr. Ashok,60yrs/M	10/28871, Mr. Hukum , 72yrs/M	10/28271, Mr. Hari Prakash,56yrs/M		10/28615,Mr. Ramanand, 70yrs/M	10/28741, Baby of Divya, 3 months
	10/28382,Mr. Surender,69yrs/M	10/28877, Mr. Rajbir, 35yrs/M	10/28272, Dr. Charanjit, 70yrs/M		10/28638, Mrs. Santosh ,77yrs/ F	10/28978, Master aitik, 6 months/M
	10/28389, Mrs. Gita, 83yrs/F	10/28895, Mr. Guruprasad, 62yrs/M	10/28283,Mr. Shankar,72yrs/M		10/28641,Mr. Ravinder ,51yrs/M	10/28964, Baby of Renu, 3 month/F
	10/28402, Mrs. Kailash ,85yrs/F	10/28936, Mr. Deepak, 21yrs/M	10/28310,Mr. Shashi Bhushan,49yrs/M		10/28652, Mr. Hari Singh, 26yrs/M	10/28999, Baby Sinjini, 5 months/F
	10/28430, Mr. Hari lal,93yrs/M	10/28975, Mr. Ritesh, 30yrs/M	10/28311,Mr. Kamaljeet Singh,79yrs/M		10/28679, Mrs. Damyanti, 87yrs/F	10/29013, Baby of Sapna, 2 months/M
	10/28439, Mr. Dev Raj, 68yrs/M	10/28998, Mrs. Anju, 28yrs/F	10/28315,Mr. I.C.Tyagi,65yrs/M		10/28836, Master Hiten , 6 months/M	
	10/28440 Mr. Gauri Shankar,25yrs/M	10/29007, Mr. Rajkumar, 42yrs/M	10/28338,Mrs. Savitri,55yrs/F		10/28842, Baby Manya, 5yrs /F	
	10/28450, Mrs. Naseeb,80yrs/F	10/29031, Mr. Rajesh, 38yrs/M	10/28340,Mr. Ishwar ,67yrs/M		10/28886, Mr. Dinesh,22yrs/F	
	10/28454, Mr. Vijay Kapoor, 50yrs/M	10/29034, Mr. Noor, 50yrs/M	10/28345,Mr.Girish Kr,65yrs/M		10/29018, Mrs. S. Baby, 51yrs/F	
	10/28455, Mr. Jitender, 25yrs/M		10/28359,Mr. Basab,43yrs/M			
	10/28456, Mr. Manoj, 43yrs/M		10/28363,Mrs. Nand Jolly,82yrs/F			

		10/28459, Mr. Alok Kr, 69yrs/M		10/28374,Mr. Ramkrishan,62yrs/M			
		10/28743, Mr. Kanwar, 70yrs/M		10/28383, Mrs. Bagwati 70yrs./F			
		10/28475, Master Saksham, 01yr/M		10/28384, Mr. Ram Chander, 71yrs./M			
		10/28480, Mrs. Bimla, 57yrs/F		10/28408, Mr. Sunil Sharma, 32yrs/M			
		10/28508, Mrs. Alha Devi, 48yrs/F		10/28436, Mr. Bhoom Singh,65yrs/M			
		10/28512, Mr. Rajender, 37yrs/M		10/28447, Dr. Pushpa,84yrs/F			
		10/28524, Mr. Krishna, 66yrs/M		10/28453, Mr. Read, 28yrs/M			
		10/28556, Mrs. Anita, 74yrs/F		10/28457, Mrs. Maya Devi, 49yrs/F			
		10/28558, Mrs. Aparna,79yrs/F		10/28465, Mr. Ram Kr., 63yrs/M			
		10/28579, Mr. Surender , 37yrs/M		10/28498, Mrs. Rewal rani, 72yrs/F			
		10/28598, Mr. Hiralal, 31yrs/M		10/28503, Mr. Gulshan, 49yrs/M			
		10/28599, Mr. Dhruv, 19yrs/M		10/28513, Dr. Shashi , 59yrs/F			
		10/28600, Mr. J.P. Rastogi, 63yrs/M		10/28531, Mr. Hari Chand, 65yrs/M			
		10/28623, Master Nishant, 3yrs/M		10/28532 Mrs. Nora, 76yrs/F			
		10/28624, Mr. Ganeshilal, 65yrs/M		10/28533, Mrs. Priti,64yrs/F			

		10/28628, Mr. Saurabh, 25yrs/M		10/28544, Mrs. Saroj, 62yrs/F			
		10/28629, Mrs. Kamla , 70yrs/F		10/28547, Mr. Navjot, 23yrs/M			
		10/28636, Mr. R. B. Mathur, 79yrs/M		10/28562, Mr. Mahipal, 72yrs/M			
		10/28656, Mrs. Shashi Thakur, 46yrs/F		10/28578, Mr. Ganeshi , 61yrs/M			
		10/28675, Mr. Rameshwar, 55yrs/M		10/28582, Mrs. Pramali,81yrs/F			
		10/28683, Mr. Ram Gopal ,69yrs/M		10/28594, Mr. Raj Kr. ,39yrs/M			
		10/28685, Master Arjun, 3yrs/M		10/28605, Mr. Ramesh,40yrs/M			
		10/28717, Master Yash, 6 months /M		10/28613, Mr. Gurdial 75yrs/M			
		10/28725, Mr. Sheetal , 55yrs/M		10/28620, Mrs. Lalwati, 52yrs/F			
		10/28772, Mrs. Susheela, 95yrs/F		10/28631, Mr. Jile , 74yrs/M			
		10/28782, Ms. Archana, 23yrs/F		10/28637, Mr. Karan Singh, 62yrs/M			
		10/28804, Baby Kanak, 7 months/F		10/28639, Mrs. Savitri, 70 yrs/F			
		10/28810, Mr. M. Shrinivasan, 78yrs/M		10/28643, Mr. Om Prakash, 52yrs/M			
		10/28823, Mr. Ashok, 60yrs/M		10/28648, Mr. Ramji, 70 yrs/M			
		10/28824, Mr. Ishwar, 88yrs/M		10/28664, Mr. Shree, 32yrs/M			
		10/28826, Mr. Roop		10/28666, Mr.			

		,19yrs/M		Hukum, 70yrs/M			
		10/28838, Mr. Suraj bhan, 85yrs/M		10/28670, Mr. Passang, 65yrs/M			
		10/28861, Mr. Sher Singh, 45yrs/M		10/28682, Mr. Jai Bhagwan , 42yrs/M			
		10/28896, Mrs. Seema, 34yrs/F		10/28684, Mr. Mohinder, 63yrs/M			
		10/28930, Mr. Shiv Kr., 28yrs/M		10/28688, Mrs. Vidyavati, 82yrs/F			
		10/28933, Mr. Mohit, 34yrs/M		10/28718, Mr. Rajinder, 63yrs/M			
		10/28938, Master Ayush, 2yrs/M		10/28740, Mr. Rajbir, 35yrs/M			
		10/28988, Mrs. Murti, 65yrs/F		10/28746, Mr. Yogesh, 19yrs/M			
		10/29012, Mrs. Shashikanta, 53yrs/F		10/28754, Mr. Ajay, 35yrs/M			
		10/29020, Mrs. Bhateri , 80yrs/F		10/28756, Mr. Praveen, 37yrs/M			
		10/29025, Mrs. Archana, 24yrs/F		10/28757, Mrs. Anita, 23yrs/F			
		10/29026, Mr. Mahmood, 81yrs/M		10/28758, Mr. Prem Mohan Das, 80yrs/M			
		10/29038, Mr. Ishwar, 88yrs/M		10/28770, Mr. Prakash, 81yrs/M			
		10/29041, Mr. Dev ,40yrs/M		10/28785, Mr. Durga , 57yrs/M			
				10/28787, Mr. Iqbal, 59yrs/M			
				10/28789, Mr.			

				Leslie,65yrs/M			
				10/28797, Mrs. Shanti, 65yrs/F			
				10/28798, Mr. Satbir, 50yrs/M			
				10/28837, Mr. Ram prakash, 88yrs/M			
				10/28843, Mrs. Maya, 58yrs/F			
				10/28845, Mr. Roshanlal, 72yrs/M			
				10/28889, Mr. Lala Ram, 70 yrs/M			
				10/28892, Mr. Ram avtar, 42yrs/M			
				10/28906, Mrs. Rameshwari,60yrs/F			
				10/28918, Ms Shaily, 36yrs/F			
				10/28928, Mrs. Fukraj, 78yrs/F			
				10/28937, Mr. Shyam sunder, 72yrs/M			
				10/28944, Mr. Paramjeet, 53yrs/M			
				10/28957, Mr. Lakhi ram, 68yrs/M			
				10/28981, Mr. Suresh chand, 50yrs/M			

				10/28989, Mr. Rohit, 34yrs/M			
				10/28993, Mrs. Phoolwati, 86yrs/F			
				10/28996, Mrs. Meera , 64yrs/F			
				10/29001, Mrs. Rajshree, 37yrs/F			
				10/29014, Mr. Vijay Sharma, 39yrs/M			
				10/29042, Mr. Krishna, 54yrs/M			
				10/29045, Mr. N. C. Prasanna, 64yrs/M			
01/02/10-28/02/10		10/29046, Ms. Dolly, 16yrs/F	10/29080, Baby Anjali, 3yrs/F	10/29050, Mr. Deepak, 64yrs/M	10/29118, Mr. Chanderkant, 22yrs/M	10/29111, Mr. Dalbir, 36yrs/M	10/29136, Baby of Meenakshi, 3 months/M
		10/29068, Mr. Ghanshyam, 60yrs/M	10/29116, Master Sujal, 5months/M	10/29060, Mrs. Sarbati, 54yrs/F	10/29298, Mrs. Ombati, 48yrs/F	10/29144, Mr. Raj kr., 26yrs/M	10/29146 Master Chirag, 2 months, /M
		10/29076, Mr. Jay dayal, 50yrs/M	10/29143,Mr. Sanjay, 25yrs/M	10/29064, Mr. Ahmed, 42yrs/M	10/29406, Ms. Swati ,20yrs/F	10/29135, Mr. Nagender, 23yrs/M	10/29173, Baby Janvi, 4 months /F
		10/29101, Mr. Shivram, 65yrs/M	10/29346, Mr. Veer , 30yrs/M	10/29065, Mrs. Kela devi, 70 yrs/F	10/29439, Mrs. Susheela , 42yrs/F	10/29153, Mrs. Rosy , 27yrs/F	10/29257, Baby of gunjan, 3 months/M
		10/29131, Mr. Law kr., 27yrs/M	10/29350, Mr. Mudit, 22yrs/M	10/29087, Mr. Brahmanand, 62yrs/M		10/29228, Mr. Govind, 55yrs/M	10/29243, Baby of Anupama, 2 months
		10/29137, Mr. Rohtash, 66yrs/M	10/29351, Mr. Saurav , 22yrs/M	10/29102, Mr. Dinesh, 62yrs/M		10/29379, Master Krishna, 2yrs/M	10/29281, Master Achint, 3 months/M
		10/29142, Baby Khushi,	10/29352, Mr. S.	10/29125, Mr.		10/29387, Mr. Jaswant,	10/29364, Baby of

		2month, /F	K. Siraudin, 21yrs/M	Subhash Singh, 42 yrs/M		24yrs/M	Urmila,3 months/F
		10/29147, Mrs. Janak rani, 83yrs/F	10/29357, Mr. Digpal, 56yrs/M	10/29151, Mr. Hari Ram, 68yrs/M		10/29413, Baby Krisha 1yr/F	10/29344, Master Prashant , 3 months/M
		10/29148, Mrs. Shanti, 60yrs/F	10/29380, Mr. Satish , 26yrs/M	10/29157, Mr. Behari, 63yrs/M		10/29443, Mrs. Urmila, 52yrs/F	10/29428, Baby of Kavita, 2months/F
		10/29150, Mrs. Prabha, 81yrs/F	10/29386, Mr. Jagdev, 30yrs/M	10/29161, Mrs. Saroj, 56yrs/F		10/29589, Ms. Ishanya, 2yrs/F	10/29454, Master Jai, 3 months/M
		10/29177, Ms. Shiran , 17yrs/F	10/29408, Ms Julekha, 22yrs/F	10/29165, Mrs. Amita, 30yrs/F		10/29646, Mrs. Tripta, 69yrs/F	10/29607, Baby of Payal, 2 months/M
		10/29194, Mr. Bhagwan , 70yrs/M	10/29442, Master Dinesh, 5yrs/M	10/29184, Mr. Nahar Singh, 40yrs/M		10/29711, Mr. Jeet75yrs/M	10/29665, Baby of Monica, 2 months/F
		10/29214, Mrs. Navis, 83yrs/F	10/29518, Ms. Neha, 20yrs/F	10/29185, Mr. Amit Aggarwal, 36yrs/M		10/29714, Mrs. Minoti, 70yrs/F	10/29760, Baby Anishka, 5 months/F
		10/29227, Dr. Satya, 67yrs/M	10/29564, Mr. Prem , 51yrs/M	10/29189, Mrs. Leela, 70yrs/F		10/29767, Master Dhruv1yr/M	10/29784, Baby of Subhanu, 1 month/M
		10/29241, Mr. Prakash, 81yrs/M	10/29565, Mr. Govardhan, 70yrs/M	10/29206, Mr. Ali, 52yrs/M		10/29785, Master Parth, 7yrs/M	10/29869, Baby of Punam, 1 month/M
		10/29260, Mr. Balram, 67yrs/M	10/29556, Mr. Kapil, 23yrs/M	10/29211, Mr. Om prakash, 85yrs/M		10/29871, Mr. Ajay, 25yrs/M	
		10/29261, Mrs. Rekha, 78yrs/F	10/29573, Mrs. Bimla, 50yrs/F	10/29212, Mr. Daya , 65yrs/M			
		10/29262, Mr. Jai, 42yrs/M	10/29582, Mr. Raj , 30yrs/M	10/29213, Mr. Umed , 54yrs/M			
		10/29263, Mdevender , 59yrs/Mr.	10/29595, Mrs. Kundan, 74yrs/F	10/29218, Mr. L.N. Kassid, 69yrs/M			

	10/29267, Ms. Hasmeet, 25yrs/F	10/29603, Mrs. Sweta, 29yrs/F	10/29225, Mr. Chetan, 65yrs/M			
	10/29297, Master Umesh, 1yr, M	10/29631, Mr. Vaibhav, 30yrs/M	10/29239, Mr. Raj , 48yrs/M			
	10/29322, Mrs. Leela, 85yrs/F	10/29650, Mrs. Tripta, 54yrs/F	10/29276, Mr. Devesh Gupta, 29yrs/M			
	10/29326, Mrs. Rajini, 21yrs/F	10/29680, Mrs. Brij, 66yrs/F	10/29294, Mr. Dayanand, 63yrs/M			
	10/29328, Mrs. Anju, 40yrs/F	10/29688, Mr. Rohit, 34yrs/M	10/29301, Mr. Joginder, 73yrs/M			
	10/29361, Mrs. Kamlesh, 55yrs/F	10/29720, Mr. Ram, 48yrs/M	10/29320, Mr. Shri Krishan, 75yrs/M			
	10/29362, Mrs. Sunita, 44yrs/F	10/29725, Mr. Anshul, 25yrs/M	10/29325 Mr. Amit ,37yrs/M			
	10/29374, Mr. Bhushan, 63yrs/M	10/29738, Mr. Khempal, 39yrs/M	10/29327, Mr. Suresh, 46yrs/M			
	10/29375, Mrs. Sudarshan, 67yrs/F	10/29741, Mr. Om, 54yrs/M	10/29330, Mr. Rajiv, 44yrs/M			
	10/29383,Mrs. Pushpa, 72yrs/F	10/29754, Mr. Surender, 35yrs/M	10/29332, Mr. Nafe, 55yrs/M			
	10/29434, Mr. Ashok , 23yrs/M	10/29757, Master Bhuvan, 8yrs/M	10/29336, Mr. Azad, 30yrs/M			
	10/29449, Mr. Siddharth, 31yrs/M	10/29777, Mr. Ravinder, 25yrs/M	10/29338, Mr. Madan , 85yrs/M			
	10/29486, Master Sorav, 1yr/M	10/29827, Mr. Virender,	10/29396,Mrs. Sunita, 42yrs/F			

			23yrs/M				
		10/29489, Mrs. Krishna, 57yrs/F	10/29828, Mr. Govardhan, 70yrs/M	10/29418, Mr. Abhijeet,27yrs/M			
		10/29501, Mr. Rohan, 24yrs/M	10/29853, Mr. Amit, 18yrs/M	10/29422, Mrs. Sulochana, 62yrs/F			
		10/29524, Mrs. Ram, 77yrs/F		10/29940, Mr. Heera ,76yrs/M			
		10/29537, Mr. Sunil, 24yrs/M		10/29459, Mrs. Sunita, 50yrs/F			
		10/29554, Mr. Manoharlal, 78yrs/M		10/29468, Mrs. Dharamvati, 50yrs/F			
		10/29559, Mr. Dinesh, 26yrs/M		10/29469, Mr. Haji, 50yrs/M			
		10/29568, Mrs. Champa devi, 68yrs/F		10/29472, Mrs. Kusum, 70yrs/M			
		10/29574, Mr. Ankur, 32yrs/M		10/29475, Mrs. Sheela, 60yrs/F			
		10/29579, Mr. Mahender, 60yrs/M		10/29483, Mr. Amine, 55yrs/M			
		10/29591, Mr. Shashi, 34yrs/M		10/29493, Mr. Ran , 70yrs/M			
		10/29601, Mr. Behri, 63yrs/M		10/29508, Mr. Vilas, 64yrs/M			
		10/29627, Mr. Udmiram, 70yrs/M		10/29513, Mr. Prabhu, 82yrs/M			
		10/29628, Mrs. Chameli, 60yrs/F		10/29517, Mr. Inderjit, 57yrs/M			
		10/29648, ,Baby Gauri, 3yrs/F		10/29521, Ms. Sudhir, 38yrs/M			
		10/29649, Mr. Om, 53yrs/M		10/29540, Mr.			

				Bhagwan, 65yrs/M			
		10/29657, Mr. Gopal, 64yrs/M		10/29544, Mr. Ved , 37yrs/M			
		10/29677, Mrs. Reena, 20yrs/F		10/29556, Mr. Akhil, 45yrs/M			
		10/29684, Mr. Jaydip, 40yrs/M		10/29585, Mr. Ved ,50yrs/M			
		10/29687, Mrs. Bakul, 78yrs/F		10/29600, Mr. Shri, 68yrs/M			
		10/29706, Baby Upasana, 1yr/F		10/ 29602, Mr. Krishna, 57yrs/M			
		10/29716, Master Himanshu, 9months/M		10/29604, Mr. Vishnu, 50yrs/M			
		10/29751, Mr. Pramod, 29yrs/M		10/29619, Mr. Sunil , 32yrs/M			
		10/29783, Mr. Raj Singh, 45yrs/M		10/29624, Mrs. Gindori, 75yrs/F			
		10/29794, Mr. Ravi, 45yrs/M		10/29629, Mr. Ramesh, 21yrs/M			
		10/29801, Mr. Ramesh, 71yrs/M		10/29634, Mr. Amresh,60yrs/M			
		10/29819, Master Lovejeet, 4 months/M		10/29643, Mrs. Shanti, 68yrs/F			
		10/29829, Mrs. Indu, 58yrs/F		10/29666, Mr. Rampal, 49yrs/M			
		10/29830, Mr. Hari ram, 70yrs/M		10/29671, Mr. Manpal, 65yrs/M			
		10/29866, Mrs. Anita, 21yrs/F		10/29701, Mr. Abdul, 50yrs/M			
				10/29709, Mr. Jagdev, 62yrs/M			

				10/29730, Mrs. Shobha, 57yrs/F			
				10/29739, Mr. Chote lal, 81yrs/M			
				10/29752, Mr. Bijay, 52yrs/M			
				10/29758, Mrs. Vidya, 53yrs/F			
				10/29772, Mr. Harish, 47yrs/M			
				10/29775, Mr. Durga, 55yrs/M			
				10/29778, Mrs. Sumitra, 42yrs/F			
				10/29779, Mr. Mangat, 60yrs/M			
				10/29791, Mr. Satish,69yrs/M			
				10/29792, Mrs. Asha, 72yrs/F			
				10/29797, Mr. Parmal, 64yrs/M			
				10/29826, Mrs. Urmila, 63yrs/F			
				10/29846, Mr. Bansi, 45yrs/M			
				10/29855, Mr. Ashish, 33yrs/M			
				10/29860, Mr. Sheeshpal, 49yrs/M			
				10/29861, Mrs			

				Anusarita.57yrs/F			
				10/29867, Mr. Dashrath, 54yrs/M			

APPENDIX - 3

SAMPLE

JANUARY	MICU	CCU	SICU	NSICU	HDU	NICU
1	10/28229	10/28191	10/28356	10/28303	10/28247	10/28202
2	10/28255,	10/28219	10/28496	10/28332	10/28269	10/28214
3	10/28305	10/28246	10/28595	10/28626	10/28295	10/28325
4	10/28389	10/28272	10/28788	10/28658	10/28376	10/28563
5	10/28440	10/28315	10/28825	10/29017	10/28466	10/28608
6	10/28456	10/28359	10/28877	10/29033	10/28497	10/28714
7	10/28480	10/28384	10/28975		10/28615	10/28724
8	10/28556	10/28453	10/29007		10/28641	10/28978
9	10/28599	10/28532	10/29031		10/28679	10/28999
10	10/28628	10/28643	10/29034		10/28842	10/29013
FEBRUARY						
1	10/29101	10/29064	10/29143	10/29118	10/29144	10/29146
2	10/29142	10/29125	10/29351	10/29298	10/29153	10/29257
3	10/29150	10/29165	10/29386	10/29406	10/29379	10/29281
4	10/29214	10/29206	10/29564	10/29439	10/29413	10/29344
5	10/29260	10/29218	10/29582		10/29589	10/29454
6	10/29263	10/29294	10/29650		10/29711	10/29665
7	10/29322	10/29327	10/29725		10/29767	10/29784
8	10/29361	10/29338	10/29757		10/29785	10/29869
9	10/29375	10/29940	10/29827		10/29871	10/29364
10	10/29486	10/29475	10/29853		10/29646	10/29173
MARCH						
1	10/30515	10/30526	10/30799	10/30533	10/30523	10/30547
2	10/30529	10/30557	10/30569	10/30580	10/30543	10/30567
3	10/30551	10/30568	10/30596		10/30613	10/30597
4	10/30556	10/30591	10/30617		10/30620	10/30610
5	10/30575	10/30595	10/30626		10/30632	10/30612

APPENDIX - 4

AUDIT CHARTS –

Handwash	Scores	Remarks	
Handwash chart Display ay loctaion			
Availability of Handwash Solution			
Awareness On Duration Of Handwash (15- 20 Secs)			
Knows The Solution Used For Handwash (Microshield/Sterilium)			
Demonstrate The Steps As Per Handwash Chart			

Attire audit check-list

Attire	Scores	Remarks	
Attire Chart display at location			
Dress code complaince as per Attire code			

Total scores-

Universal precautions audit chart

Universal/Standard precautions for Patients	Scores	Remarks	
Awareness of standard precautions for isolation patients			
Use of Gloves,masks,gowns etc			
Disinfection of linen used			
method of taking care of spillage			

Taking care of Cssd sets used			
Total score			

Biomedical waste management audit check-list

	Biomedical Waste Management		
1	BMW Chart Display at location & 4 Color Waste Bins Present		
2	Waste Segregation As Per The Bmw Chart		
3	Sharps Disposal In Puncture Proof Container Filled With 1% Sod. Hypo		
4	Check preparation Sodium Hypochlorite & Labeled With Date		

5	Check nurses& GDAs' knowledge on segregation of BMW		

Total scores-

Cleaning & Disinfectant audit check- list

	Cleaning & Disinfection	Score	Remarks
1	Awareness about chemical to be used		
2	Cleaning Resisters		
3	Availabilty of infection control register and culture reports		

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ORGANIZATIONS

American Association of Critical Care Nurses (ACCN). 101 Columbia, Aliso Viejo, CA 92656-4109. (800) 889-AACN [(800) 889-2226] or (949) 362-2000. http://www.aacn.org .

National Association of Neonatal Nurses. 4700 West Lake Ave., Glenview, IL 60025-1485. (847) 375-3660 or (800) 451-3795. http://www.nann.org .

National Heart, Lung and Blood Institute. Information Center. P.O. Box 30105, Bethesda, MD 20824-0105. (301) 251-2222. http://www.nhlbi.nih.gov .

National Institutes of Health, U.S. Department of Health and Human Services, 9000 Rockville Pike, Bethesda, MD 20892. (301) 496-4000. http://www.nih.gov .

Society of Critical Care Medicine. 701 Lee St., Suite 200, Des Plaines, IL 60016. (847) 827-6869. info@sccm.org. http://www.sccm.org .

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