



National

Intensive Care Unit (ICU)

Quality Improvement (QI) Framework



Quality Improvement Secretariat

HEU, Health Service Division, MOHFW
www.qis.gov.bd



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Zahid Maleque, MP
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Message

Bangladesh stands out as a country that has taken giant steps in healthcare and has made a significant improvement in the health sector, which makes it an example for other developing countries even though being a resource-poor country. Over the last decades, key health indicators such as life expectancy and coverage of immunization have improved notably, whilst infant mortality, maternal mortality and fertility rates have dropped significantly.

The Government of Bangladesh is politically committed to meet the UN-sponsored SDGs. But challenges are there. Quality of care is one to mention. MOHFW has instituted Quality Improvement Secretariat (QIS) with its main mandate to improve quality in all spheres of health services. QIS has rightly underpinned the ICU, a very important and sensitive unit of a hospital where deaths are commonly encountered.

Historically, in 1950, anesthesiologist Peter Safar established the concept of "Advanced Support of Life", keeping patients sedated and ventilated in an intensive care environment, where many patients required constant ventilation and surveillance. In 1980, the first ICU in Bangladesh was established in NICVD. Thereafter, ICUs have been opened in many Govt. and private hospitals which are being unregulated, established without following standardized requirements and not being monitored.

I would like to thank QIS and all the specialists & experts who had been involved in developing this very important document. The document has clearly classified, categorized and specified the requirements of ICU. It is thus removed all the ambiguities making the ICU concept and structure understandable and useful for assessment & monitoring. This sort of document on ICU was a long required instrument which will have a great impact on improving the care of seriously ill patients.

I hope this work will remain as a great landmark in quality improvement of critical care in Bangladesh.

Joy Bangla, Joy Bangabandhu

Long live Bangladesh.


Zahid Maleque



Dr. Md. Murad Hassan, MP
State Minister
Ministry of Health of Family Welfare
Govt. of the People's Republic of Bangladesh

Message

Bangladesh government committed to providing better care to all its citizens. The government is therefore bringing new technologies and services at the hospitals in the country. In the meantime, the Government has established intensive care units (ICU) at all the major hospitals in the country and has a plan to expand it up to secondary level hospitals.

Intensive Care Unit (ICU) in a hospital is important to manage the critically ill patients, injuries and complications. ICU is a sophisticated area in a hospital which requires specially trained providers and supportive equipment to manage patients. Care in ICU is naturally very expensive. For effective utilization of resources and quality of care, it requires specific guideline and protocols for admission and care in ICU. I am happy that the Quality Improvement Secretariat has taken the leadership to develop the SOP for ICU management. This is an important national document not only to ensure the quality of care at ICU but also for efficient use of limited resources.

This document has been developed by the professional experts who have practical experience in ICU management in the country. I would like to thank all the contributors who have contributed to this document. My special appreciation is to the QIS for taking the lead and bringing in new innovations for improved quality of care. I hope this document would be used at all the hospitals for the management of ICU patients and ensure the quality of care.

Joy Bangla, Joy Bangabandhu

Long live Bangladesh.


Dr. Md. Murad Hassan, MP
24/5/19



Md Ashadul Islam
Secretary
Health Service Division
Ministry of Health of Family Welfare
Govt. of the People's Republic of Bangladesh

Message

Maintaining an intensive care unit (ICU) and ensuring the proper care to the patients who need the service is a task of paramount difficulty specially in a resource poor setting as it requires huge personnel, technology, and material resources. The complexity of the care processes involved, and the fluctuation in the number of patients needing intensive care at a specific time, makes managing intensive care resources more challenging. Having too many facilities can be unaffordable and can also lead to an inappropriate use of ICU beds, while having too few ICU resources prevents timely admission of patients, increases the risk of poor outcomes, and may paradoxically increase costs by unnecessarily prolonging patients' stay in the ICU. Optimizing the whole patient care process—including the pre-ICU, ICU, and post-ICU phases—has the greatest potential for efficient resource use and improved outcomes. In fact, the challenges of ICU management are nothing new and the main management areas of discussion are architecture and design of ICUs, organization, staffing, and training of doctors and nurses.

Quality Improvement Secretariat of Ministry of Health & Family Welfare has developed a ICU QI framework for improvement of the ICU services and ensuring the Quality of care. I hope that it will be of great help for improvement of ICU services in Bangladesh.

Md Ashadul Islam



Prof Dr Abul Kalam Azad
Director General
Directorate General of Health Services

Message

An intensive care unit (ICU), also known as an intensive therapy unit or intensive treatment unit (ITU) or critical care unit (CCU), is a special department of a hospital or healthcare facility that provides intensive treatment medicine. Intensive care units cater to patients with severe and life-threatening illnesses and injuries, which require constant, close monitoring and support from specialist equipment and medications in order to ensure normal bodily functions.

They are staffed by highly trained doctors and nurses who specialize in caring for critically ill patients. ICUs are also distinguished from normal hospital wards by a higher staff-to-patient ratio and access to advanced medical resources and equipment that is not routinely available elsewhere. Common conditions that are treated within ICUs include acute (or adult) respiratory distress syndrome (ARDS), trauma, multiple organ failure and sepsis.

Development of Quality Improvement framework for Intensive care Unit (ICU) by Quality Improvement Secretariat (QIS) is a commendable job that has been outlined its standards and requirement level-wise, thus cleared its functions, roles and responsibilities.

With the rapid development of ICUs both in Govt. and Private hospitals without following a defined structure and processes including levels and types have been created a messy situation where this framework is a good solution.

I extend my thanks and gratitude to all the experts and specialists (Clinical and public health) for engaging themselves in producing this appreciable document. I expect a big progress in the field of critical care and will greatly facilitate to regulate and monitor the services.

I firmly believe that this well crafted ICU quality improvement framework will be useful for hospital administrators, managers and providers as a ready reference and resource.

Prof Dr Abul Kalam Azad



Md Shahadt Hossain Mahmud
Director General (Additional Secretary)
Health Economics Unit

Message

Intensive Care Units (ICUs) look after patients whose conditions are life-threatening and need close monitoring and constant support from equipment and medication in order to maintain normal bodily functions. As a result ICU are usually provided with higher levels of monitoring and treatment equipments, specially trained doctors, specialists, critical care nurses, etc in caring for the most severely ill patients.

Intensive Care Medicine presents an interesting paradox. Broad inspection of the research literature suggests that most gains are to be made from interventions which facilitate earlier diagnosis and treatment to minimize the harmful effects of organ support, enhance communication and promote a proactive system-wide approach to the care of patients at risk of critical illness. The art of intensive care therefore lies more in integrating multi-professional care and complex interventions over time, across locations and between teams, than in the delivery of any single treatment. Consequently, intensivists must be systems experts, both in terms of physiology and of healthcare delivery.

ICUs should be fully equipped with bio-medical equipment's such as mechanical ventilators to assist breathing through an end tracheal tube or a tracheotomy tube, cardiac monitors including those with external pacemakers, defibrillators, dialysis equipment for renal problems, equipment for the constant monitoring of bodily functions, a web of intravenous lines, feeding tubes, nasogastric tubes, suction pumps, drains and catheters and a wide array of drugs to treat the primary condition(s) of hospitalization.

Critical care medicine is the direct delivery of medical care by a physician to a critically ill or critically injured patient. Critical illness or injury acutely impairs one or more vital organ systems and this creates a high probability of imminent or life-threatening deterioration in the patients' condition.

Care of these patients can take place anywhere in the inpatient hospital setting, although it typically occurs in the ICUs. Critical care involves highly complex decision making to assess, manipulate, and support vital system functions, to treat single or multiple vital organ system failure, and/or to prevent further life-threatening deterioration of the patients' condition. Intensive care has emerged as a distinct specialty in the world over the last 3-4 decades.

The QI framework developed by QIS will help the ICU services to improve Quality of Care which is at present very challenging for health service delivery in Bangladesh.

Md Shahadt Hossain Mahmud



Preface

Critical Care is provided within the continuum of primary, secondary and tertiary care, with the majority of services delivered in the secondary-care setting. The report Comprehensive Critical Care recommended that a classification be employed that focused on the level of dependency that individual patients need, regardless of location.

The extent to which any individual hospital provides Intensive Care services should depend upon the skills, expertise, specialties and facilities available within that hospital. The service provided should be based on the principle of providing support to a level appropriate to the complexity of patient-care needs. For some patients, transfer to another hospital where more complex clinical needs can be met. All acute hospitals carrying out elective surgery must be able to provide Level 2 care. Patients with a predicted surgical mortality in excess of 10% should have access to facilities for Level 3 dependency on site. Hospitals admitting emergencies should normally have all levels of care available. A comprehensive Critical Care service must be planned and delivered systematically across any given health system. The characteristic of the modernised service is Integration (a hospital wide approach to Critical Care, with services that extend beyond the physical boundaries of the units that house the relevant beds, sufficient to provide support to and to interact and communicate with the range of acute services including specialist services).

Interaction with 'other services' starts with the multi-professional teams in the Intensive Care unit: doctors, nurses, advanced Critical Care practitioners, physiotherapists, dietitians, infection control and microbiology, and pharmacists; with further input by occupational therapy, speech and language therapy, and clinical psychology. The morning and evening rounds are key opportunities to draw together information about the patients, to establish daily goals and determine main risks and communication tasks, using a standardised data collection sheet or an electronic equivalent. Given the size of the ICU team, and the impact of staff rotations and shift-working, it helps cohesion and flattens hierarchies if the morning round starts with each member introducing themselves by name and rank, including the consultants.

In Bangladesh ICU facilities are becoming available both public and private health facilities but Quality of Care is still challenging. Quality Improvement Secretariat has taken an initiative for development of ICU QI framework which will help to ensure Quality of Care in ICU.

Dr Md Aminul Hasan
Director Hospitals & Clinics, DGHS
& Focal Person
Quality Improvement Secretariat
Ministry of Health of Family Welfare

List of Abbreviations and Acronyms

BP	Blood Pressure
CCU	Coronary Care Unit
CCM	Critical Care Medicine
CNS	Computer Network System
CPOE	Computerized Physician Order Entry
CPR	Cardiopulmonary Resuscitation
CRBSI	Catheter Related Blood Stream Infection
CRRT	Continuous Renal Replacement Therapy
DMCH	Dhaka Medical College Hospital
DVT	Deep Vein Thrombosis
ECG	Electrocardiography
ER	Emergency Room
ET CO ₂	End-Tidal Carbon Dioxide
fc	Foot Candles
HD	High Definition
HDU	High Dependency Unit
HEPA	High-Efficiency Particulate Air
HVAC	Heating, Ventilation and Air-conditioning
ICD	Implantable Cardioverter Defibrillator
ICU	Intensive Care Unit
LED	Light Emitting Diode
LOS	Length of Stay
MV	Mechanical Ventilation
NIBP	Non-Invasive Blood Pressure
NICVD	National Institute of Cardiovascular Disease
QI	Quality Improvement
RR	Respiratory Rate
RRT	Renal Replacement Therapy
SBT	Spontaneous Breathing Trail
SCCM	Society of Critical Care Medicine
SPO ₂	Saturation of Peripheral Oxygen
UHC	Upazilla Health Complex
UPS	Uninterrupted Power Supply
VAP	Ventilated Associated

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Part-1

1.a. Introduction & Background

ICU is highly specified and sophisticated area of a hospital which is specifically designed, staffed, located, furnished and equipped, dedicated to management of critically ill patient, injuries or complications. It is a unit with dedicated medical, nursing and allied staff. ICU provide for patient is that patient need to have chance for potentially recover. ICU treatment is highly expensive and not for terminal care patient. It operates with defined policies; protocols and procedures should have its own quality control, education, training and research programmes. It should have its own separate team in terms of doctors, nursing personnel and other staff who are tuned to the requirement of the specialty.

The ICU's roots can be traced back to the Monitoring Unit of critical patients The Crimean War began in 1853 when Britain, France, and the Ottoman Empire (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.

Dandy created the first ICU in the world, 03 beds in Boston in 1926. Bjørn 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 three 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 Anesthesiology at that institution. He jointly authored the first known account of ICU management principles in *Nordisk Medicine*, 18 September 1958. The first surgical ICU was established in Baltimore. In 1962, in the University of Pittsburgh, the first Critical Care Residency was established in the United States.

In 1980, The first ICU in Bangladesh was established in NICVD. NICVD has three intensive care units, A 12-bedded Coronary Care Unit (CCU) for cardiac patients needing intensive care, A 24 bedded surgical ICU for surgical patients. A 8 bedded pediatric intensive care unit (PICU) for pediatric patients below 12 years old and needs intensive care. In addition one 8 bedded high dependency units and a 12 bedded second CCU for cardiac patients will start functioning soon. Then in 1992 , Combined military hospital, Dhaka established the ICU, in 1986, ICU established in DMCH and in 1992 BSMMU has established the ICU.

1.b. Objectives

Ensuring the Quality of care is one of the challenging area for effective ICU management. Regarding development of ICU Quality tools it has considered the Structure, Process and Outcome level indicators. (Donabedian's structure-process-outcome quality of care model).

1.b.1. General Objectives

- ❖ To Standardized the ICU development, service and its management.
- ❖ To Provide management protocols of ICU.
- ❖ To Develop QI indicators/ tools for ensuring the Quality of Care in ICU.

1.b.2. Specific Objectives

- ❖ To provide constant and regular monitoring of equipments and maintaining of SOP at the patient bed side and make necessary recommendations to the doctor in-charge.
- ❖ To inspect, test and calibrate various ICU equipment so as to ensure they are in proper operating condition at all-time.
- ❖ To clean and carry out disinfection/ sterilization procedure.

1.c. Organizational Policy

- ❖ Decision to admit the patient to the intensive care unit should be made by the Anesthetist in case of general ICU (with the consultation of the specialist on the admitting unit) and by relevant specialists in case of specialized ICU. These are patients who suffer from serious illnesses which are potentially reversible.
- ❖ Patients who are terminally ill particularly with the involvement of multi organ system should not be admitted into ICU
- ❖ Patients who have been diagnosed as brain death should not be admitted into ICU. However, before diagnosing brain death patients can be admitted in to ICU.
- ❖ The relevant specialist after consultation with the anesthetist vice versa, needs to decide on the priorities for admission in ICU.
- ❖ On discharge from ICU, the patient is sent to the admitting unit/ referred hospital after notifying the respective unit/hospital.
- ❖ The administrative and clinical head will be the specialized anesthetist (Head of ICU) or intensive care medicine specialist.
- ❖ The day to day management of the unit will be carried out by the trained physicians, who is directly responsible to the head of ICU.

1.c.1. Level of ICU

- ❖ Level-1 Primary level ICU –Essential monitoring and Emergency treatment
- ❖ Level-2 Secondary level ICU or HDU- Essential monitoring & Single organ support.
- ❖ Level-3 Tertiary level ICU –Extensive monitoring with multi organ support.

1.d. Structure

- ❖ 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 according to level wise of ICU.
- ❖ There should be single entry/exit point to ICU, which should be manned.
- ❖ Location/entry/exit points of ICU in Hospital (Structure demarcation of RED) Where patient will stay and only for service provider YELLOW (Only for service provider) GREEN (Only for visitor) area.

1.d.1. ICU area/design

- ❖ 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.
- ❖ After reviewing and feedback 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 and other newer techniques.
- ❖ It is recommended that there should be a partition/separation between patient 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.

- ❖ There should be Gas outlet, Suction outlet, O2 port, Power panel, Compressed air in each bed but Gas line not mandatory in all level or not all area.
- ❖ But Suction Outlet will be needed in all level (In level 1: it might be for every alternative bed)
- ❖ Oxygen cylinder will be needed for all level, more than 1 (If central line is failed in port than can be used O2 concentrator)
- ❖ Compressed air should be in Level 2 & 3 but in Level 2, it might be for every alternative bed.
- ❖ Head wall Panel: Free standing systems (power columns) usually from the ceiling each can be fixed or moveable and flexible can be on one or both sides of the patient.
- ❖ Flexibility is usually desirable,
- ❖ Panels on head wall systems allow for free movements Adaptable power columns can move side to side or rotate, Mounts on power columns are also usually adjustable,
- ❖ Flexible systems are expensive and counterproductive if the staff never move or adjust them,
- ❖ Head wall systems can be oriented to one side of the patient or to both sides, Some units use two power columns, one on each side of the patient,
- ❖ Other units use a power column on one side in combination with some fixed side wall options on the opposite side,
- ❖ Ceiling mounted moveable rotary systems may reduce clutter on the floor and make a lot of working space available; However, this may not be possible if the weight cannot be structurally supported
- ❖ Bed side should be designed to accommodate portable bedside x-ray, Ultrasound and other equipment such as ventilators and IA Balloon pumps; in addition, the patient's window view (If available) to the outside should be preserved.
- ❖ Height of Monitoring System: Excessive height may be a drawback to the way monitoring screens are typically well above eye level and display more parameters. Doctors and nurses may have chronic head tilting leading to cervical neck discomfort and disorders, Therefore, the levels of monitors should be at comfortable height for doctors and nurses

- ❖ Keep Bed 2 ft away from Head Wall: A usual problem observed in ICU is getting access to the head of the bed in times of emergency and weaving through various tangled lines. And at the same time patient also should not feel enclosed and surrounded by equipment and induced uncalled for fear

1.d.2. 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 cutter 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 5microns.
- ❖ 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 sideward).
- ❖ 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

- ❖ Separate ICU (Negative Pressure) for infectious patient should be established.
- ❖ Positive pressure isolation rooms/ Isolation room (To provide protective environment for patients at Highest risk of infection e.g. Neutropenia, 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.

1.d.3. LIGHTING

- ❖ 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.

1.d.4. 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 150 foot candles (fc) strength.

1.d.5. 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 colour 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 10fc.

1.d.6. 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 be subdivided into smaller independent areas and dimmer switches may be desirable

1.d.7. 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), Standards are:

- ❖ A watch ticks at about 20 dBA,
- ❖ A normal conversation is at about 55 dBA. A vacuum cleaner produces -about 70 dBA A garbage disposal-- about 80 dBA.
- ❖ Noise level monitors are commercially available.
- ❖ If the unit noise exceeds that level, a light comes on or flashes to remind the staff to decrease the noise level.

1.d.8. Furniture

- ❖ The counters and furniture should be tough to withstand a lot of heavy use. Easy to clean and maintain,
- ❖ Connections should be made of metal—to—metal fasteners
- ❖ Surfaces for counters should be solid, non-porous and stain resistant,
- ❖ Fabrics should be durable, color fast and flame and static resistant if possible
- ❖ Bedside clocks, calendars and bulletin boards help the conscious patient well oriented and in better moods
- ❖ Providing the patient with a place to keep a few small personal items of their own make the environment more familiar and personalized.
- ❖ Some finishing touches like some art work/décor/ sculpture may change the ICU atmosphere a great deal and has been recommended by the SCCM.

1.d.9 Chairs number and types

- ❖ Individual units should decide about the number, usually enough number to accommodate the care giving staff/doctors and Nurses and additional chairs may be stored and used whenever needed.
- ❖ Individual Units should decide whether they want to allow the relative to sit by the side (Short or long time) of the patient in the ICU.
- ❖ However, a chair/sofa type chair on wheels with safety belt or vault is recommended for mobilizing the patient. and making him sit during recovery
- ❖ Provisions must be made to accommodate an obese patient

1.d.10. Floor

- ❖ The ideal floor should be easy to clean, non slippery, able to withstand abuse and absorb sound while enhancing the overall look and feel of the environment,
- ❖ Carts and beds equipped with large wheels should roll easily over it.
- ❖ In Indian context Vitrified non-slippery tiles seem to be the best option which can be fitted into reasonable budgets, easy to clean and move on and may be stain proof

- ❖ Vinyl sheeting is another viable option, It can be non-porous, strong and easy to clean, However, the life of Vinyl flooring is not long and a small damage in one corner may trigger damage of entire flooring and make it accident prone. It may require frequent replacement making it to be inconvenient choice.

1.d.11. 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 4 to 5 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.

1.d.12. Ceiling

- ❖ It 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 eyestrain,
- ❖ Ceiling should be Soiling and break proof due to leaks and condensation.
- ❖ Tiles may not be 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 colours rather than a plain back ground colour, or decorating it with mobiles, patterns or murals, to make it more patient and staff friendly.
- ❖ Two beds should be specially designated for RRT (HD/CRRT-may be optional) where outlets should be available for RO/de-iodinated water supply for HD machines. Self-contained CRRT machines are also available (Cost may be high)

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

1.d.13. Isolation Rooms

10% of beds (1 or 2) rooms may be used exclusively as isolation cases like for burns, serious contagious infected patients .

Alarms, music, phone etc

- ❖ Each group should decide if they want to provide the patient access to music (audio), telephone etc.
- ❖ However an alarm bell which has both indicators by sound and light must be provided to each patient and he be taught about it, how to use it when needed

1.d.14. Storage

It is important to decide what is to be stored by the bedside, at the Nursing station, at the Nursing stores & Remote central store. Those supplies used repeatedly and in emergencies should be readily available and easy to find, Storing a large inventory can be costly, but so is wasting personnel time,. Making supplies more available may increase their use. Some over cautious or clever staff may decide to hoard or hide them. Cost effective and efficient designs are needed.

1.d.15. Numbering can be done instead of symbol

- ❖ Staff nurses can always give useful ideas about improvement of systems, which they develop while working with patients. Their opinion can be invaluable.
- ❖ Bedside supply carts that are stocked for different subsets of patients can make storage in the room more efficient, For example, surgical, medical, trauma patients, cardiac patients where needs are different. Staff nurses may be specifically trained for such care and work
- ❖ Determining what supplies are placed near but not at the bedside is based on the size of the unit, the grouping of patients and the patterns of practice, although many units organize supplies by the department that restocks them (central services, nutrition, pharmacy, respiratory therapy, etc.)
- ❖ It is worth considering grouping supply by activity, like Chest tray, Central line tray, skin care tray, catheterization tray , Intracranial pressure tray etc. They may be labeled by name or color code.

1.d.16. Central Nursing Station & Storage

- ❖ This is the nerve centre of ICU, despite lots of development, the old standard of a central station is still holds good and endorsed by most guidelines and regulations regardless of today's practice needs.
- ❖ All/near-all monitors and patients must be observable from there, either directly or through the central monitoring system. Most ICUs use the central station, serving six to twelve beds arranged in an L or U fashion,
- ❖ Patients in rooms may be difficult to observe and therefore may be placed on remote television monitoring, These monitors may satisfy regulatory requirements but do not really provide adequate patient safety if the clarity of the picture is poor.
- ❖ Some ICUs have unit pods of about four or five beds, each served by a separate workstation, Nurses assigned to patients in the pod form at eam,
- ❖ A monitor technician is required,
- ❖ The unit Nursing clerk and the supervising nurse will usually work together to oversee the efficient interaction among the staff and with support services,
- ❖ Careful consideration of what level or type of activity will occur in the central station will insure adequate space planning, new equipment purchased over the next decade will probably increase the amount of desk and shelf space required.
- ❖ At times of high use the number of people in the central station can increase several fold. Having enough space and chairs to meet needs during such times should be provided for.
- ❖ The space should accommodate computer terminals and printers. A large number of communication cables may be required per bedside to connect computers and faxes to other departments, as well as to other institutions and offices,
- ❖ Adequate space for charting on the platform is absolutely important.
- ❖ Patients must be easily visible from the charting area whether the nurse is sitting or standing, taller chairs are often necessary.
- ❖ In case of space constraint, Collapsible desktops or shelves that can flip up off the wall can be planned
- ❖ Space allotted for storage of the previous charts of patients currently in the unit should also be provided

- ❖ It is also important that a storage space is provided for equipment, linen, instruments, drugs, medicines, disposables, stationary and other articles to be stored at the Nursing station must be provided. All these cupboards should be labelled
- ❖ The latest generation of monitoring systems allows access to patient data from any bedside; This means that the doctor who is busy caring for one patient can monitor others without leaving that bedside.

1.d.17. Consultation room

- ❖ Consoles can be programmed to automatically display critical events from one bedside at several sites without personnel calling for it. There is need for more effective alarming system with less noise, which can send signals to CNS as well as remote pager carried by the caregiver.
- ❖ The CNS has in charge nursing, duty doctors/s, clerk/computer guy, machines, store attached and monitors and spare machines/spares, linen and other ancillaries
- ❖ Waste Disposal and Pollution Control management- National Guideline
- ❖ 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.

1.d.18. Hand Hygiene and Prevention of Infection Management protocol

- ❖ 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 bedsides 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 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.
- ❖ All surroundings of ICU should be kept absolutely clean and green if possible for obvious reasons

1.d.19. 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 practises 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.

1.d.20. 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, and 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.
- ❖ 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
- ❖ Nurses Rest room should be placed within the red zone and Doctor's rest room should remain the outside red zone.

1.d.21. HDU: Level 3 (Tertiary level) and level-2 (secondary level)

High Dependency Units (HDUs), also called step-down, progressive and intermediate care units. HDUs are wards for people who need more intensive observation, treatment and nursing care than is possible in a general ward but slightly less than that given in intensive care. The ratio of nurses to patients may be slightly lower than in intensive care but higher than in most general wards. People spend varying lengths of time in HDU, depending on the nature of their illness and the demands on the unit.

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
- ❖ 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 bed.

1.d.22. Waiting area for ICU visitor:

It must be away from ICU and must indicate another area for waiting. 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 bangla 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.

1.d.22.1. Waiting and seating space:

- ❖ Many guidelines suggest that 1-1/2 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 andrest,
- ❖ 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, In 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.

1.d.22.2. Communication /counseling

A central communication area is also needed for unit, committee and hospital-wide announcements; newsletters and memos: and announcements of outside events and meetings. Bulletin boards are necessary but often unsightly. It is better to plan them because they may be added after the fact in a less effective or appealing manner.

Schedule of Communication with the patient's relative should be maintained regarding patient update (2 times and as per needed within 24 hour) in a specific place. The medium of communication will be face to face, via e-mail, sms & notice according to the situation of the patient.

Part-2

Facilities

2.a. List of Equipment (12 Bedded ICU and 8 Bedded HDU):

TERTIARY LEVEL ICU/ Level -3

Sr. No.	Name of equipment	Number	Specification
1	Bedside Monitors (For ICU)	One per Bed In cases of 5 bedded ICU need 1 extra machine	Must have multi parameter monitor (Tertiary level ICU) which have Modular - Invasive BP(alternative bed or 1 machine per 3 bed) , SPO2,NIBP, ECG, RR, Temp Probes with trays and ET CO 2, - If ET CO 2 not possible than 1 number per 2 bed
2	Ventilators Large LED monitor for visualization with alarm system 1portable ventilator	In cases of 5 bedded ICU need 1 extra machine	With pediatric and adult provisions, invasiveand Non- Invasive Modes
3	Syringe Pumps	6 per bed in ICU	With recent up gradation
4	Defibrillator	1 for 5 patients	Adult and pediatric pads (with Transcutaneous pacing facility
5	ICU Beds (Shock Proof) (Fibre) Bed facility	One for each bed	Electronically Maneuvered with all positions possible with mattress. Now beds are available which give lateral positions also All position X-ray facilities CPR facilities In case of power failure have the facilities for manual CPR
6	Over Bed Tables	One for each Bed	ALL SS with 6 to 8 cupboards in each to store Drugs Medicines, side tray for x-rays, BHT, on wheels

Sr. No.	Name of equipment	Number	Specification
7	Bed side locker	Each for patient	
8	LAB ABG machine ABG Machine with lactate(Optional) Biochemistry Analyzer Electrolytes machine	One+One	facility for ABG and Electrolytes Second one as stand-bye
9	Crash/ Resuscitation trolley (Detail description on last page)	1 for 5 bed	To hold all resuscitation equipment and Medicines
10	Pulse Oxymeter (Transport system (Small Units))	Two	As stand bye units during transportation of patient
11	Freeze	One + One for use of staff and doctors	With deep freeze facility
12	Computers	2 (for ICU)	With laning, Internet facility and printer to be connected with all departments
13.	HD Machines	1 For 5 bed	User friendly so that even a Nurse can Operate
14	CRRT (Optional)	One	High flow /Speed Model
15	Intermittent Leg Compressing Machine	Alternative bed	To prevent DVT
16	Air matrix	All bed	To Prevent Bed sores

Sr. No.	Name of equipment	Number	Specification
17	Video laryngoscope/ Fiber optic laryngoscope(optional)	1	For difficult intubation
18	Glucometer	2	
19	ICU Dedicated Ultrasound with colour doppler	One	With recent advances to look instantly even at odd hours. Vascular filling, central lines, etc
20	Bedside X ray (Portable)	One	
21	Sterilizer	one	
22	Stand	2 per bed	Must be strong attached for syringe pump, Infusion and others.
23	Instrument tray, kidney tray	As much as	Traceostomy tray-(1 for 5 bed) Central Venous line tray(alternative bed)
24	Self Resuscitator bag		Go to resuscitation trolley.
32	I A Balloon Pump	One	Optional
33	Fibroptic Bronchoscope	One	

2.b. List of Equipment:

SECONDARY LEVEL ICU/ Level-2(HDU)

Sr. No.	Name of equipment	Number	Specification
1	Bedside Monitors	One per Bed In cases of 5 beded ICU need 1 extra machine	Must have multi parameter monitor which have - , SPO2, NIBP, ECG, RR, Temp Probes with trays and ET CO 2, - If ET CO 2 not possible than 1 number per 2 bed
2	Ventilators Large LED monitor for visualization with alarm system 1 portable ventilator	3 patients in number	With pediatric and adult provisions, invasive and Non-Invasive Modes
3	Syringe Pumps	2 per bed in ICU	With recent up gradation
4	Defibrillator	1 for 5 patients	Adult and pediatric pads (with Transcutaneous pacing facility) Optional
5	ICU Beds (Shock Proof) (Fibre)	One for each bed	Electronically Manoeuvred with all positions possible with mattress. Now beds are available which give lateral positions also Bed facility All position X-ray facilities 3) CPR facilities
6	Over Bed Tables	One for each Bed	ALL SS with 6 to 8 cupboards in each to store Drugs Medicines, side tray for x-rays, BHT, on wheels
7	Bed side locker	Each for patient	
8	LAB ABG Machine Biochemistry	One+One	facility for ABG and Electrolytes Second one as stand-bye

Sr. No.	Name of equipment	Number	Specification
	Analyzer Electrolytes machines		
9	Crash/ Resuscitation trolley(Details on last page)	One for HDU	To hold all resuscitation equipment and Medicines
10	Pulse Oxymeter (Transport system (Small Units)	Two	As stand bye units during transportation of patient
11	Freeze	One + One for use of staff and doctors	With deep freeze facility
12	Computers	2 (for ICU), One for HDU, One for In charge	With laning, Internet facility and printer to be connected with all departments
13	HD Machines (optional)	1	User friendly so that even a Nurse can Operate
14	Intermittent Leg Compressing Machine	Two	To prevent DVT
15	Air matrix	Per bed	To Prevent Bed sores
16	Glucometer	one for HDU	
17	Bedside X ray (Portable)	One	
18	Autoclave unit		
19	Stand	2 per bed	Must be strong attached for syringe pump ,Infusion and others.
20	Instrument tray, kidney tray	As much as	Traceostomy tray-(1 for 5 bed) Central Venous line tray(alternative bed)
21	Self Resuscitator bag		Go to resuscitation trolley.

2.c. List of Equipments:

PRIMARY LEVEL ICU/Level-1

Sr. No.	Name of equipment	Number	Specification
1	Bedside Monitors	One per Bed In cases of 5 bedded ICU need 1 extra machine	Must have multi parameter monitor which have - , SPO2,NIBP, ECG, RR, Temp Probes
	Ventilators Large LED monitor for visualization with alarm system 1portable ventilator	1 in number for 5 bed (Transport Ventilator)	With paediatric and adult provisions, invasive and Non-Invasive Modes
2	Syringe Pumps	1 per bed in ICU	With recent up gradation
3	Defibrillator	1with TCP facility (one standby)	Adult and paediatric pads (with Transcutaneous pacing facility) Optional
4	ICU Beds (Shock Proof) (Fibre)	One for each bed	Electronically Manoeuvred with all positions possible with mattress. Now beds are available which give lateral positions also Bed facility(May be compromise) All position X-ray facilities CPR facilities
5	Over Bed Tables	One for each Bed	ALL SS with 6 to 8 cupboards in each to store Drugs Medicines, side tray for x-rays, BHT, on wheels
6	Bed side locker		
7	Crash/ Resuscitation trolley(Details on last page)	One	To hold all resuscitation equipment and Medicines

8	Pulse Oxymeter (Transport system (Small Units))	Two	As stand by units during transportation of patient
9	Glucometer	one	
10	Stand	2 per bed	Must be strong attached for syringe pump ,Infusion and others.
11	Instrument tray, kidney tray	As much as	Traceostomy tray-(1 for 5 bed) Central Venous line tray(alternative bed)

2.d. Crash or Resuscitation trolley:

It is a set of trays/drawers/shelves on wheels which is used in hospitals for transportation of equipments & medicine during medical or surgical emergency for cardio pulmonary resuscitation

1) Monitored functioning defibrillator

- 2) **In first drawer:** Intubation equipments
Laryngoscope with 3 different size blade
Different size Endotracheal tube
Different size rescue mask
Self Resuscitator bag(Umbo bag)

3) **In second Drawer:** Cardio Pulmonary resuscitation drugs

Adrenaline
Atropine
Ephedrine
Amidarone
Lignocaine
Dopamine
Vasopresine
Sodium Bicarbonate
Dextrose
Diazepam
Naloxane
Nitroglycerine
Thiopental Sodium
I/V Canula
Saline set

Part-3

Manpower

3.a. Introduction:

Medical staffing Director of the intensive care unit. The responsibility for the administrative and medical management of the unit is held by a physician, whose professional activities are devoted full-time or at least 75% of the time to intensive care, who holds the position of director of the ICU. The head of the ICU has the sole administrative and medical responsibility for this unit and cannot hold top-level responsibilities in other departments or facilities of the hospital. The head of the ICU should be a senior accredited specialist in intensive care medicine as defined at country level, usually with a prior degree in anesthesiology, internal medicine, or surgery and have had a formal education, training, and experience in intensive care medicine as described by the ESICM guidelines

Intensive care nurses are registered nursing personnel, formally trained in intensive care medicine and emergency medicine. A specific program should be available to assure a minimum of competencies amongst the nursing staff . An experienced nurse (head nurse or a dedicated nurse) is in charge of education and evaluation of the competencies of the nurses.

3.b. Manpower distribution:

Level -3 (Medical College / Specialized hospitals) (Minimum 20 bed ICU) 10 bed HDU

- 1 Professor/ Chief Consultant-1
- 2 Associate Professor/ -1/ Senior Consultant-1
- 4 Assistant Professor/ Junior Consultant-1

Medical officer: 2 MO per shift and 1 MO for 5 patient (MO must be trained for minimum 1 year including CPR and Anaesthesia/CCM)

ICU nurse (Third level): 1:1 or minimum Morning- 1 nurse per 1patient, Evening & Night-1 nurse per 2 patient

HDU Nurse: Morning: 1 nurse per 2 patient, Evening & Night
1 nurse per 3 patient

Nurse Should have training for minimum 3 months, and English proficiency will be required with computer skill

3.c. Supportive staff

- Physiotherapist -2 number per 10 patient
- Nutritionist -at least 1
- Pharmacist - 1
- Radiographer -1
- Laundry support-1
- Patient Attendant -1 Attendant for 3 patient
- Cleaner-2 per shift

3.d. Level-2 (District level hospital/ 2ndary level) For 5-10 beds

- Senior consultant-1
- Junior consultant-2
- Medical officer- 1 per shift
- Nurse:- Morning 4 in number & Evening + Night 2 in number for 10 bedded ICU
- Physiotherapist-1
- Patient Attendant,- 1 per shift

3.e. Level-1(Primary level/ UHC) For

- Junior consultant-1
- Medical officer -1 per shift
- Nurse:- Morning 2 in number & Evening + Night 1 in number for 10 bedded ICU
- Patient attendant- 1 per shift

3.f. Dress Code :

There should be different color code for dresses of Doctors , Nurse and other allied staff.

Doctors, medical assistants and nurses working in ICU should wear standard ICU attire at all time.

Visiting doctors/ staff and all visitors should wear clean gown preferably disposable gowns.

Visitors should wear disposable gowns and slippers when entering ICU and to wear cap and masks if the patient is in the isolation cubicle.

(Daily 1 time- 2 member of each pt at a time 2 beds patient)

Part-4

Quality Indicators for M & E

SI	Domain	Indicator Type			Remarks
		Structure	Process	Outcome	
1	Effectiveness	Physician Staffing	Daily Interventionist round	Risk adjusted mortality	
2	Effectiveness	Nurse Patient Ratio	LOS	VAP rate	
3	Safety	CPOE (Computerized Physician order entry)	VAP (Ventilated Associated Pnumonia)prevention Follow protocol	CRBSI rate	
4	Safety		CRBSI (catheter related blood stream infection)prevention SBT(Spontaneous breathing Trial) protocol	Rate of resistant infection	
5	Efficiency		Glycemic control	Pressure ulcer	
6	Efficiency		Transfusion	Family satisfaction	
7	Efficiency		Hand washing	Readmission rate	
8	Efficiency		Family Communication (Information to patient /Families)		

Annex-1

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