Introduction:

The global history of ICU care dates back to the polio epidemic in 1950s, when the specialty of critical care was born. The technique of controlled ventilation was then extended to patients with drug overdose, tetanus, and chest trauma, with resultant improvement in survival. The development of effective ventilator and improved circulatory support in post operative patients radically extended the surgical possibilities. Thereafter, ICUs then assumed the role in prevention of irreversible organ failure. The first coronary care unit in India was started in 1968 at the King Edward VII Memorial Hospital, Mumbai. Critical care units in the early 1970s, though centralized, were designed and equipped chiefly to offer intensive care to patients with acute myocardial infarction and other manifestations of ischaemic heart disease. ICUs in India have evolved from cardiac to multi-system disease care units. The newest ICU set up emerging in some advanced tertiary care hospitals is the emergency or acute care units, located in the casualty or emergency departments. These emergency intensive care units cater to first 24 hours of aggressive treatment, monitoring and stabilization of diverse emergencies, and seem to have significantly reduced the mortality[1].

Challenge:

Resource utilization and diversification in hospitals are the main challenges in the present scenario as the cost of providing and availing treatment has escalated by leaps and bounds over the last decades. Cost of treatment to patients admitted under Critical Care is often astronomical. No doubt advanced technologies, better trained manpower and evidence based practice has made treating patients a more discreet practice but along with these, the necessity for quality in medicine and medico legal compliances has made clinical activities rather defensive in nature too. Moreover with the patient's identity being now seen also as a demanding and well informed customer has forced the clinical administrator and the clinician to have answers and alternatives for him. All these are improving the health care delivery system but at an escalation of cost which has ultimately to be borne by the care provider and reimbursed from the patient.

Health systems in every nation need innovation and improvement. But it is also important to appreciate that remedies imported from commerce have consistently yielded inferior care at inflated prices[2]. Hence apart from our professional, moral and ethical obligations as care providers, it is imperative that we deliver quality

care cost effectively[3].

Scope:

The article is an attempt to apprise busy clinicians or entrepreneurial doctors planning to set up a Critical Care Unit on certain economic and operational concepts and to provoke thoughts regarding setting up of alternate units specially a Respiratory Intensive Care Unit.

Dynamics Of ICU Care Cost:

A study[4] published in 2008 regarding ICU costs in India stated that an estimated about 70,000 ICU beds are available including all types and across all hospitals and small time nursing homes in India that cater to five million patients requiring ICU admission every year. 80 per cent of investment will have to come from the for-profit private and charitable sector where Critical Care accounts for 20 to 30 per cent of a hospital's budget. These numbers and demands have no doubt increased in the years.

In a for profit model, perceived financial gains may not be realized in turn forcing the organization to reengineer capital budgeting with its potential impact on service delivery. On the other hand, several government run ICUs where costs of care may exceed available funding, are noted to have limited resources, lack of infrastructure, trained intensivists and support staff. Thus routine hospital care is dependent on some form of formal or informal cost-sharing process and when the cost of intensive care is added to this burden, the clinician is faced with the dilemma of overall sustainability of the unit[4].

Nevertheless, in appropriately selected patients, the prospects for survival in ICU are much greater than care in the general ward. It is, therefore, essential to analyze the accurate cost of intensive care and translate it appropriately for better resource allocation to benefit the critically ill[4].

Framework For Conducting A Cost Study For Critical Care Services:

Since the last two decades, with increasing globalization, the importance of cost of care understanding has been imposed on clinicians and strategists alike. Many studies have been done in this regard and the results do not have a common

finding. It varies from country to country and among the structures of national health systems.

1. Most published studies have however followed the cost block analysis system which comprised of the following[4]:
    - ***Cost block 1:*** Capital equipment
    - ***Cost block 2:*** Estates: *This is defined as depreciation, maintenance and utilities necessary to maintain ICU structure.*
    - ***Cost block 3:***Non-clinical support services
    - ***Cost block 4:*** Clinical support services
    - ***Cost block 5:*** Consumables
    - ***Cost block 6:*** Manpower costs
2. **Cost control measures:** Any cost minimizing strategy has to be internally fashioned than being externally imposed to optimize results. At the same time quality of care will suffer if cost cutting is the sole determinant of care. Hence a balance is required. Moreover optimization of various other factors such as organization/staffing, reduction of errors/critical incidents, ongoing audits/staff training, practicing preventive intensive care/application of telemedicine etc can impact these blocks in turn bringing down the total ICU costs[4].
3. **Implementation of preventive intensive care**: It is prudent to analyze ways to minimize ICU admissions or practice measures to decrease length of stay by either early optimization or preventing secondary complications[4].
4. **Minimizing errors and critical incidents:** It is well proven fact that medication errors and other near misses add to the cost of care and is more common in ICU context. Solution to circumvent this include staff training, close supervision and developing a web-based anonymous reporting gateway[4].
5. **Financial and management training for ICU leaders:** Most doctors have very little interest in matters pertaining to finance and accounts. This is not surprising as management and financial training is not part of medical curriculum. But it is imperative that ICU director is trained in financial decision-making. This in turn allows the intensivist to execute appropriate accounting methods, capital budgeting and resource management. Also acquiring negotiation skills will be useful in dealing with financial directors, hospital managers and other personnel funding the ICU. All these invariably translate into cost containment[4].
6. **Information technology** promises to consolidate and present existing information so that clinical efficiency improves and medical errors decrease, especially for common complex conditions for which evidence-based clinical

practice guidelines may be developed. Clinical informatics applications include physician order entry systems, electronic medical records with laboratory and radiology data, and computerized clinical decision support systems (CDSSs). More recently, studies of a CDSS for mechanical ventilation for patients with acute respiratory distress syndrome have shown improved patient morbidity. Whether this approach will reduce ICU costs per case (for example, by allowing the implementation of diagnostic pathways and standardizing medication use) remains to be tested[5].

7. **Tips to remember while planning a Critical Care unit [6]** :
    - Budget available
    - Level of ICU needed
    - Location
    - Number of Beds needed
    - Designs
    - Human Resource Development
    - Engineering and designing constraints
    - What type of Case mix the ICU team is likely to deal with and therefore help in prioritise equipment type
    - In Case of existing facility being upgraded or relocated, then the review of past mistakes
    - Patient safety and prevention of infection programme
    - Transition in case of relocation during reconstruction of the existing ICU
8. Critically assessing the need for invasive intubation and non-invasive airway support for patients before admitting in Critical Care units: Exploring the use of dedicated Respiratory Medicine Unit instead of Critical Care units specially for patients recommended for non invasive ventilation.

Rationale For Stand-Alone Respiratory Medicine Units In Hospitals:

In case of patients admitted with respiratory diseases, it is seen that in the long run either the morbidity of these patients admitted in the General Wards is increased or the patients admitted in the ICUs only for assisted ventilation support occupy beds which were required by more critical patients with other organ failure diseases. This type of arrangements led to sub-optimal use of resources as well as sub-optimal care of patients.

1. Services to improve the care of patients with acute severe medical conditions

in general and respiratory disease in particular, need to be improved. **This includes access to a non-invasive ventilation service, available 24 hours per day, in all hospitals admitting patients with acute medical conditions.** Patients with respiratory failure constitute a significant proportion of medical admissions and the development of appropriate services for these patients is important from both the clinical governance and the economic perspectives[7].

2. The published report of April 2002 of the **Royal College of Physicians Working Group** and developed further by the **NHS Modernisation Agency** subgroup emanating from the expert group producing **"Comprehensive Critical Care"** suggested that an **NIV(Non Invasive Ventilation)** service should be established in each acute trust (hospital under NHS) on the grounds that selected groups of patients with acute respiratory insufficiency have been shown to benefit from this intervention. Equally importantly, it may be more suited to patients' needs and can reduce the complication rate attributable to endotracheal intubation. The development of such a service would not only facilitate the movement of patients from level 3 to level 2 dependency, but would also afford a more palatable and dignified means of providing respiratory support to those who have little hope of being successfully weaned from mechanical ventilation owing to the chronicity and/or terminal nature of their pulmonary disease. **It was also recognised that NIV should be provided in specialist centres for patients with delayed weaning and for those likely to require long term and domiciliary ventilatory support[8].**
3. **Rationale For Non-Invasive Ventilation –** There is now a robust evidence base for the use of non-invasive ventilation (NIV) in patients with mild (pH 7.31–7.35), moderate (pH 7.25–7.30), and severe (pH <7.25) acidotic exacerbations of chronic obstructive pulmonary disease(COPD). It is best instituted "early" before ventilatory support is definitely needed but, even when the patient appears to warrant intubation and mechanical ventilation, there is much to be gained and little to be lost by a trial of NIV. NIV has also been used in patients with hypoxaemic respiratory failure resulting from a variety of different conditions. It has been shown to be both more effective and cheaper than intubation and ventilation on the ICU and conventional treatment on general wards. It is certainly feasible outside the ICU[9].

Criteria For Selection Of Patients For Admission To RICU:

Admission of patients to General Wards or **Intermediary care units** or to **Intensive Care Units** is done based on the following classification:

Level 0: Patients whose needs can be met through normal ward care.

Level 1: Patients at risk of deterioration in their condition and those recently relocated from higher levels of care whose needs can be met on an acute ward with additional advice and support from the critical care team.

Level 2: Patients requiring more detailed observation, including support for a single failing organ system or postoperative care, and those "stepping down" from higher levels of care.

Level 3: Patients requiring advanced respiratory support alone or basic respiratory support together with support of at least two organ systems. This level includes all complex patients requiring support for multi-organ failure.

The Respiratory Physician is usually involved with patients in Level 1–3 dependency.

In the light of these findings based on many studies carried out across the globe, it is now an accepted norm that a stand-alone and comprehensive Respiratory Medicine Unit with all facilities required for diagnostic, therapeutic and rehabilitative procedures of patients is the order of the day.

References :

1. *ICU Care in India – Status and Challenges ,ME Yeolekar, S Mehta © JAPI • VOL. 56 • APRIL 2008.*
2. *Davis K, Schoen C, Schoenbaum SC, Doty MM, Holmgren AL, Kriss JL, et al. New York: Commonwealth Fund; 2007. Mirror, mirror on the wall: An international update on the comparative performance of American health care.*
3. *Indian J Crit Care Med. 2008 Apr-Jun; 12(2): 55–61. doi: 4103/0972-5229.42558PMCID: PMC2738307.*
4. *Cost of Intensive care: Indian perspective : Jayaram R, Ramakrishnan N. Cost of intensive care in India. Indian J Crit Care Med [serial online] 2008 [cited 2017*

May 3];12:55-61. Available from: http://www.ijccm.org/text.asp?2008/12/2/55/42558.

5. *The Large Cost of Critical Care: Realities and Challenges Adhikari, Neill MD, CM, FRCPC; Sibbald, William MD, FRCPC, FCCHSE Anesthesia & Analgesia: February 2003 – Volume 96 – Issue 2 – pp 311-314; doi: 10.1213/00000539-200302000-00001).*
6. *ICU Planning and Designing in India – Guidelines 2010* **:** *Guidelines Committee ISCCM : Dr Narendra Rungta (Convenor); Members – Dr Deepak Govil, Dr Sheila Nainan, Dr Manish Munjal , Dr J,Divatia (President) , Dr C K Jani (Secretary).*
7. *Improving the care for patients with acute severe respiratory disease, M.W.Elliott, St James's University Hospital, Beckett Street, Leeds LS9 7TF, UK:Author Affiliations, Thorax2003;58:285-288 doi:10.1136/thorax.58.4.285.*
8. *Pulmonary physicians, intensive care medicine and Thorax: an evolving relationship S Baudouin, Senior Lecturer in Intensive Care Medicine, Royal Victoria Infirmary, Newcastle upon Tyne, UK , T Evans,Professor of Intensive Care Medicine, Royal Brompton Hospital, London, UK :Thorax2003;58:829-832 doi:10.1136/thorax.58.10.829-a.*
9. *Report of Royal College of Physicians Working Group and NHS Modernisation Agency report and Executive Summary published in April 2002 –criticalcare.nhs.uk*

Author:

Dr. Surajit Kumar Barua (Medical Superintendent, Narayana Superspeciality Hospital, Guwahati)

Author

- CCEM Journal

View all posts