Editorial

Pediatric Intensive Care in India: Time for Introspection and Intensification

The last decade of the last millennium saw the establishment of the first pediatric intensive care units (PICUs) in India at Chennai, Chandigarh, New Delhi, Mumbai and Lucknow(1). In 1997, the intensive care group of the Indian Academy of Pediatrics was formed and in 1998, the pediatric section of the Indian Society of Critical Care Medicine was established. Many more PICUs came up subsequently, mostly in the private sector and a few in teaching institutions.

Undoubtedly, these PICUs have been able to establish fairly high standards of care providing respiratory support, hemodynamic control, neurologic protection and support of the whole child and for the family to assure optimal recovery from the life-threatening challenges to the critically ill child's very existence. Not only the PICUs fulfilled their role in saving lives of those admitted to the PICU but also provided learning opportunities to resident doctors and other staff resulting in improved standards of care outside the PICUs as well.

In spite of unparalleled benefits, the PICU has also unfolded complex medical, social, ethical and legal issues. It is difficult to understand the fairness of the fact that whereas children born in financially well-off families have access to high-cost intensive care, the vast majority of the Indian population is denied access to these facilities. Although it is a fact of life that every child does not receive the best of everything that a country has to offer, nevertheless, every society has the obligation to ensure that children are not dying from lack of a minimum level of care regardless of their socioeconomic status(2).

Then, what is appropriate intensive care in the Indian context? Should we remain satisfied with what has been done already and perhaps with a few more PICUs that might come up in a few more corporate hospitals. Should we allow the gap between the haves and have-nots to protect their right to live widen further?

There can be absolutely no two opinions that the life expectancy and quality of life of the vast majority of the Indian population are linked to hygiene, sanitation, immunization, nutrition, water management, education, birth control and other public health measures to prevent disease rather than the provision of intensive care units. However, it is also true that the benefits of these measures are quite slow to come by. It is, therefore, not surprising that malnutrition rates in south Asia have remained virtually static(3), and the infant mortality rate has, of late stagnated in India. The country currently accounts for 2.5 million child deaths annually which translates into one-fifth of the world's total.

Until the effects of public health measures percolate, it will also be necessary to strengthen health systems in the entire length and breadth of the country by providing low-technology and low-cost interventions. These can be done by establishing a 4-tier system by utilizing the already existing network of primary health centers, community health centers, district hospitals and medical colleges. The major components of such a strategy would be:

Strengthening the skills of healthcare workers including physicians in their ability to recognize a child who requires urgent referral, attain quick intravenous/intraosseus access, administration of appropriate fluids with on-going clinical assessment, oxygen administration in a non-threatening manner and not the least cardiopulmonary resuscitation.

Strengthening the health care infrastructure at the following levels:

(*i*) Level zero (Primary Health Center/ Subcentre) by ensuring availability of oxygen, intravenous access, fluid resuscitation, antibiotics and reasonably equipped and prompt transport facility.

(*ii*) Level 1 (Community Health Centre/ District Hospitals in small towns) by earmarking at least 4 beds equipped with a pulse oximeter on each bed, a nebulizer, a suction machine in addition to the other facilities mentioned for level zero. A pediatric specialist with the assistance of one or two nurses (present round-the-clock) should be taking care of children on these beds. Examples of the type of patients managed could be: children with moderate respiratory distress, severe dehydration/ non-refractory shock and altered sensorium with a Glasgow Coma Scale of >8. Needless to say, a strong transport system would be indispensable.

(*iii*) Level 2 (District Hospitals in large cities/ all medical colleges) by having a 4-6 bedded level 2 PICU (high dependency unit) in accordance with the Consensus Guidelines for PICUs in India developed by the Indian Society of Critical Care Medicine (Pediatric Section) and the Indian Academy of Pediatrics (Intensive Care Chapter)(4).

(*iv*) Level 3 (One major teaching institution/ University in each state) by having a 6-10 bedded level 3 (tertiary) PICU set-up in accordance with the Consensus Guidelines(4). Such a unit will help define standards of pediatric intensive care by serving three major functions, namely - provision of outstanding patient care, education of postgraduate doctors, nurses, other staff and research. Besides, each such unit should also be given the responsibility of conceptualizing, establishing and supervising all level 2 PICUs in the state of its location; level 2 PICUs in turn should similarly be supervising level 1 pediatric units while level 1 units should be monitoring level zero units under their jurisdiction.

Creation of such a network is not a difficult proposition provided a faculty member in each department of Pediatrics at all medical colleges becomes interested in pediatric intensive care. Experience has shown that if sustained and serious efforts are made resources are forthcoming(5,6).

In this issue of the Indian Pediatrics, Jayashree et al have tried to find predictors of outcome in children with hydrocarbon poisoning receiving intensive care(7). Of the 48 children admitted in their tertiary level PICU, 8 needed mehanical ventilation. Six of these 8 children developed complications: pneumothorax (n = 3), ARDS with pneumothorax (n = 2) and ventilator-associated pneumonia (n = 1) and two of them died. The median duration of PICU stay of the survivors was 15 days (range 8-85 days). A high incidence of pneumothorax (5 of 8 patients) probably caused by the need to maintain oxygenation by high ventilatory settings(8) due to the severe underlying lung inflammation brings up a logical question: whether some other novel therapy could have

improved the outcome in these patients?

Surfactant has been demonstrated to be helpful in hydrocarbon poisoning in experimental animals but not in humans. A recent case report of an eighteen months old child hospitalized following hydrocarbon aspiration who failed to improve on conventional mechanical ventilation, high frequency oscillatory ventilation and administration of inhaled surfactant but dramatically improved when given inhaled nitric oxide and was discharged home successfully, probably gives a preliminary answer to this question(9).

This clearly illustrates the need to intensify efforts to make our tertiary PICUs develop the capability to provide the contemporary standard critical care. The level 3 PICUs in the country should have the capability of high frequency ventilation, intracranial pressure monitoring, continuous renal replacement therapy, flexible bronchoscopy, nitric oxide administration and preferably extra-corporeal membrane oxygenation (ECMO). It is time to go forward!

The benefits of such an approach are immense. Besides saving lives directly, such PICUs could become a useful place to teach medical students - both undergraduates and postgraduates - about ethics, care of the dying, distributive justice and appropriateness(10). PICU is an ideal place where the best outcome depends upon teamwork much more than mere technology(11), thus fostering excellent relationships between different members of the healthcare providers. Finally, the joy of being able to provide the most efficient care for the critically ill by bringing some aspects of different medical specialities to the bedside and titration of resources for converting hopelessness into hope can be unparalleled. The case in point is a recent report of an eighteen month old ventilator-dependent child since birth with chronic lung disease with tracheobronchomalacia, who could walk after being discharged home on a novel lightweight CPAP device connected to his tracheostomy tube(12).

At the same time, it is essential that we should not get swayed by the glamour of technology. It is too easy to get caught up in the excitement of technology. In pediatric intensive care, we should strive to strike a balance between low-cost and high-cost technology at different levels of care, between private and public PICU set-ups, between teaching and non-teaching hospitals and between technologic empowerment and social responsibility. This will be possible only if all members of the society have one common goal in mind - to save millions of lives.

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Yogesh C. Govil,
Professor,
Department of Pediatrics
King George's Medical University
Lucknow 226 003, India
E-mail: yogeshgovil@rediffmail.com

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