Indian Journal of Emergency Pediatrics
Volume 2 Number 1, January - March 2010

# Transport of sick children – the Indian perspective

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## INTRODUCTION:

Very often, a single action or intervention may not be enough to save life. Rather it requires a chain of medical action to save the life of a victim. A dedicated efficient transport system is a vital link of this chain. The number of centers providing advanced pediatric critical care has increased in India over the years. However, sick children reaching these centers on time or after appropriate initial stabilization are less. In resource restricted areas where a critically ill child cannot be managed, activation of the pediatric transport team should be initiated to efficiently transport the child on time to an appropriate higher center. It is not an uncommon scenario to find a sick child from a remote village being brought dead to a Pediatric Emergency Room. Lack of transport facilities is one of the common factors contributing to the poor outcome of these unfortunate children. Lack of trained paramedical, medical and nursing manpower, extreme variability in standards of care, lack of organized infrastructure for emergency medical services, poor structure and organization in dealing with disasters are other issues of concern. In contrast, '108' – an excellent free ambulance network provided by GVK EMRI (Emergency Management and Research Institute) is promising and the Indian scenario may undergo a paradigm shift in the years to come.

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## THE TRANSPORT SYSTEM

Transport needs are affected by terrain, population density, weather patterns, location and number of receiving and referral hospitals. A transport system must be tailored to the specific needs of the community they serve (1). Many adult systems were established with emergency medical technicians and paramedic teams and the predominant philosophy of their protocols was to "swoop-and-scoop" within the 'golden hour' to minimize the time for definite therapy. On the other hand, most neonatal systems use nurses and nurse practitioners to bring intensive care to the bedside and perform specialized stabilizing procedures prior to transport. Most of the transfers in India are done by the source hospital by utilizing private ambulances and semi-trained or ill-trained personnel. With less experienced staff, the risk of adverse events on such transports can be greater than with well-equipped and trained staff (2, 3). It will be prudent to have a dedicated pediatric team rather than an adult oriented team for transporting critically ill children. However the logistics involved need to be worked out. It is always good to have the transport team as a natural physical extension of the PICU (4). In other words, it is preferable to have a PICU doctor and nurse in the transport team. . This will minimize the communication gap and ensure better coordination and early initiation of the required higher level of care. Moreover, the parents of the victims need not 'knock

multiple doors' before reaching the higher centre.

## PERSONNEL

Personnel are the single most valuable asset of any transport system (5). Highly skilled individuals, well trained and acutely aware of the perils of transport, can anticipate problems and adapt to adverse circumstances. Team members of a transport team can be pediatrician, nurses, paramedics or emergency medical technicians. This composition may be adjusted depending on the mode of transport, the severity of illness and diagnosis. The transport team leader (ideally a pediatrician) should coordinate all aspects of care and determines the optimal time to leave the referring hospital when the child is considered stable. The vehicle operator should also be competent. The ambulance should reach the destination on time. However, rash driving leading to dislodgement of endotracheal tubes, injuries to the personnel inside or accidents on the way should be avoided. The role of personnel behind the screen – those dealing with communication, administration, maintenance of vehicles, ordering supplies and equipment is also quite significant for the effective functioning of the transport system.

## VEHICLE AND EQUIPMENTS

In a resource restricted country like India, most of the sick children are transported to hospitals by auto, two-wheeler or taxi (6). In remote villages, a bullock cart or even a physical lift maybe in picture. Hence it is not surprising to see hypothermic, hypoglycemic, hypoxic or apnoeic babies and children arriving at the ER. Ideally, a well equipped ambulance in good condition along with trained personnel would fit the bill in ensuring the stable transport of critically ill children. A sample list of medications and equipments for transport is given in table 1. Medications, intravenous fluids and oxygen should be sufficient to last twice the expected duration of transport. Well organized and standardized equipments and

**Table.1 Medications and equipments for transport**

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|---|---|
| **For Resuscitation :**<br>Adrenaline, Atropine, Calcium gluconate, Dextrose, Bicarbonate<br>**For rapid sequence intubation:**<br>Midazolam, Ketamine, Propofol, Lidocaine, Thiopental, Vecuronium, Succinyl choline<br>**Others:**<br>Analgesics, Activated Charcoal, Diazepam, Frusemide, Mannitol, hydrocortisone, Dexamethasone, Morphine, Prostaglandin E, Dopamine, Dobutamine | **Airway:**<br>Self inflating bag and mask<br>Endotracheal tubes (all sizes)<br>Laryngoscopes (with batteries)<br>Suction / Nasogastric tubes<br>Oxygen cylinder/ tubes/ masks/ cannulae<br>Ventilator / Nebuliser<br>Tracheostomy tubes<br>**Vascular access:**<br>IV cannulae, tubings, pumps,<br>Intraosseous needles, IV fluids<br>**Monitors:**<br>ECG monitor with lead wires<br>Defibrillator<br>Pulse oximeter with probes<br>NIBP monitor/ BP cuffs<br>**Others:**<br>Stethoscope/ thermometers<br>Gloves, cotton, plaster, dressings<br>Splints and bandages |

**Stabilisation and transport..' and 'transport of sick children - the Indian perspective'**

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medications are essential for efficient delivery of care.

## ON-SITE MEDICAL CARE

Rapid response, establishing basic and advanced life support on the field and efficient ground or air transport are cornerstones for most of the transport teams. Any health care portal including a medical transport team should be well versed with triage principles especially while handling mass casualties. Simple Triage and Rapid Treatment (START) technique involves quick assessment of respiration, perfusion and mental status to determine the victim's level of severity. The common resuscitation procedures for trauma victims at the site and during transportation are: establish and maintain a clear airway, provide and maintain adequate oxygenation, control external bleeding and splint/ collar for fractures. The most common clinical problem encountered in children need of transport involve the respiratory system. Injury to CNS including traumatic brain injury is second (4). Transport personnel must be well versed in establishing and maintaining the airway of a child and other emergency procedures.

## INTRA TRANSPORT STABILISATION

A critically ill or injured child is extremely vulnerable during transport. During the hours following resuscitation, the initial problem may recur, the underlying illness may progress or complications of therapy may surface. Hence the transport team should anticipate these problems and be prepared to manage them (7). Securing and maintaining the airway is a priority. A child with increased work of breathing or gasping is not suitable for transport and hence he or she must be intubated. A ventilator should be used when needed and hand ventilation should be avoided during transport. All sick children for transport should be administered oxygen and have atleast one IV access. Monitoring sensorium, $SPO_2$, and peripheral perfusion during transport is crucial. Temperature and blood sugar monitoring is vital especially in newborn. For children in shock, appropriate IV fluids and inotropes should be on flow. A watchful human monitor is worth thousand electronic paraphernalia during transport.

## NEONATAL TRANSPORT

In utero transfer is the safest transfer but unfortunately, preterm delivery, perinatal illness and congenital malformations cannot always be anticipated, resulting in a continuing need for transfer of babies after delivery (8). These babies are often critically ill, and the outcome is partly dependant on the effectiveness of the transport system (9) Many of the babies transported in this way are cold, blue and hypoglycemic and 75 % of babies transferred this way have serious clinical complications(10-12). A specialized neonatal transport service could improve the survival rates and decrease the temperature and biochemical abnormalities in referred newborn infants. Babies who were transported had a good survival rate as compared to the babies who had come on their own. They had lesser incidence of hypoglycemia, hyperglycemia, hypothermia or hyperthermia on admission (13). In a comparative similar study by Sharples, et al. (14), critical events occurred in a third of all transfers undertaken by a non-specialist team. 8% of these babies were found to have arterial saturation below 90 %. Both warm chain and clean chain should be ensured during neonatal transport.

## 108 - GVK EMRI

GVK Emergency Management and Research Institute (GVK EMRI) is the only organized, professional emergency service provider in the country today with a single objective : providing an organized, integrated, accessible '108 Emergency Response Service' to an individual in need of emergency, be it medical, police, fire in a timely manner. This not-for-

profit organization launched the 108 Emergency Response Service on August 15, 2005, in Hyderabad. It presently provides services in Andhra Pradesh, Gujarat, Uttarakhand, Goa, Tamil Nadu, Rajasthan, Karnataka, Assam and Meghalaya and Madhya Pradesh with over 1936 ambulances and over 13,000 people. On an average the ambulance reaches in 14 minutes in urban areas and 22 min in rural areas. GVK EMRI has so far saved over 80,000 lives - In a Public Private Partnership framework GVK EMRI plans to extend the 108 Emergency Response Service throughout India by 2011 and save a million lives per annum (15)

## CONCLUSION

Safe transport of critically ill children remains a globally important issue, particularly in the developing countries such as India where the high risk mortality and morbidity exists during the transport process that may be less than optimal due to personnel and resource limitation. Good communication between the referring and receiving caretakers, onsite careful evaluation, pre hospital stabilization, anticipation of complications and a well equipped and well trained transport team bringing the basic services of the PICU to the patient's bedside are essential elements of a good transport system. Optimal training, optimal team composition, prospective scoring systems and certain medico legal and financial aspects need further exploration.

**A few pearls**

**Always check your oxygen, equipments and assistants before starting**

**Correct communication and documentation are essential**

**Secure airway , obtain IV access and stabilize child before transport**

**Inform parents about the condition and plan of management**

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