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CEO MESSAGE

Growth of EMS in India – Crescendo Phase

Expansion of emergency response services in India has reached a crescendo in the recent past. Our recent experience of launching of services in Uttar Pradesh, largest State in India with nearly 200 million population, with 988 ambulances in less than six months timeframe, was a phenomenal learning experience in the annals of EMS history world over. Our process, people and performance centered approach though tested and stretched, was able to prove its robustness at the end of the day in this endeavor. For the EMS professionals, public representatives, public servants, policy makers such accomplishments are real moments of pride. As an organization GVK EMRI is keen that every person in the country gets security and surety of an effective emergency response service at the earliest. GVK EMRI has once again been selected to operate 108 service in Rajasthan, making us more responsible to meet with the growing expectations of people and Government. We now cover a population of more than 700 million in 15 states and union territories. Many more States are in various stages of implementation of 108 service. These events of EMS expansion should be perceived by clinical leaders and academic institutes of repute as an opportunity to measure changes –before and after, both in terms of health outcomes and impact by using direct and indirect indicators. Research studies should be proposed to measure beneficial effects of such large scale initiatives to identify enabling factors and recommend areas of strengthening for future expansions and long term development of EMS.

In addition, to the EMS services in new regions, most states are offering specialized out-of-hospital services like Inter-facility Transfers, drop-back services etc. GVK EMRI is selected to provide IFT and Mahtari services

respectively by Governments of Assam and Chhattisgarh under NRHM. These new initiatives by Governments are strengthening the critical aspects out-of-hospital care and referral systems at a very fast pace. These developments should also draw the attention of academicians and researchers to conduct quantitative and qualitative research studies.

I am proud to inform that GVK EMRI has till date responded to over 20 million emergencies and saved nearly seven lakh lives. Our organization is at present having a fleet strength of over 5300 ambulances and employee strength of 24,000.

This issue of IEJ has interesting articles on use of life support interventions and manikin based training and a rare clinical case presentation as original research articles and review and editorial articles on national ambulance code and role of EMTs in MCI. I am sure all these will add value to the science and practice of EMS.

EMTs and Essentials in Multi-Casualty Incidents

Dr. G.V. Ramana Rao

EMS systems must be fully geared up to respond to individual emergencies. Preparedness includes responding to calls through a toll-free emergency number in a timely manner at the response center; delivering qualified providers to the scene; providing emergency care from basic to advanced pre-hospital care, transporting ill or injured to the most appropriate nearest hospital in well equipped ambulance. Reliable network enabling closed loop communication between distress callers, emergency response center staff, EMT in ambulance, doctor in case of need for on-line medical direction, pre-arrival information to the receiving hospital are also equally essential. True value of EMS system will be revealed in ability to handle more extreme circumstances as in the case of Multiple Casualty Incident (MCI) and Disasters. All MCIs may be classified as a disaster, but not all disasters are MCIs. EMS is expected to be stand-by in all disasters. In simple terms, MCI is defined as more patients than EMTs.

Multiple patients may be very stressful for the responding Emergency Medical Technician. It is often confusing and chaotic. Management of initial minutes will have implications on the total outcomes. EMS personnel should act safely and effectively. Identification of hazardous material avoids potential exposure and injury to EMTs. Before approaching the scene, EMT should keenly observe the event from a distance. The purpose is to categorize whether the

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event is complete or ongoing. EMT needs to presume the cause of the event. EMS personnel should balance their personal safety against the urgency of the situation. The *"LACES"* principle for responding EMS units should be applied:

Lookout : Safety officer views overall scene from a safe distance

Awareness : All must maintain situational awareness

Communications : Primary and secondary communications are needed

Escapes : All must have a preplanned escape route from the scene

Safety Zones : An upwind and uphill distant safe zone must be set up.

Initial scene survey is important than the greatest temptation and basic instinct of a medical person upon seeing casualties. It will be duty to direct EMS units as they arrive at the area. Upon arrival of senior personnel, fast but structured handover should be performed.

Immediately inform the Emergency Response Center (ERC). At least two redundant communication technologies must be in place, based on resources and regularly tested. During the initial communication to ERC it is suggested to use acronym of "*HELP ALERT*":

- **H**azardous conditions, if any (chemical fumes with wind direction to east),
- **E**vent nature (railroad accident/ fall of a bus in valley/ fire in a chemical factory),
- **L**ocation,
- **P**ersonnel and resources need based on number of victims
- **A**lert Hospitals

EMTs must remember that tasks that need to be accomplished for many patients are the same as tasks that remain to be completed for one patient, duty to provide emergency medical care to sick and injured patients. Where there are only minor injuries, it may only be necessary to establish triage and treatment center. In case, adequate numbers of ambulances are quickly available, it may not be necessary to establish treatment area. Basic premise for EMT in MCI is "if you do not control the situation, the situation will control you".

If it is a major incident, many other problems need to address beyond just providing patient care. Law enforcement authorities need to become involved. Fire suppression and hazard mitigation is the responsibility of the fire service. Best way to deal with the complexity of the scenes is to develop management approach that is flexible. Approach should also be expandable. Large scale events require organization and administration involving all emergency response service providers (police, fire and EMS staff). Large scale events also require calculated response to the typical challenges faced including critical tasks of command, control and communication. These actions are implemented by activation of incident management system. Coordinating with other arriving agencies, in particular Police and Fire personnel, is pivotal. EMS must function within a pre-determined command and control system. In other words, Casualty numbers, type, severity, geographic distribution as well as hospital distances, road conditions, and thus expected travel times dictate response magnitude.

EMS providers who arrive first at scene become the triage officer. During scene-size up additional help should be requested. Care is not provided during triage. Exception to interruption of triage is correction of immediate life threats (airway opening/ control of major active bleeding). For initial assessment EMT should not spend more than one minute to determine the priority of the patient. Level of consciousness, respiratory system and circulatory system are quickly evaluated. Injured rescuers will not fall into the triage system. Greatest good is expected to be done to the greatest number of patients in MCIs. Patients are prioritized into four categories.

- Priority-0 (Black tagged, dead),
- Priority-1 (Red tagged, critical unstable),
- Priority – 2 (Yellow tagged, serious, potentially unstable) and
- Priority-3 (Green tagged, stable conditions, minor injuries, walking wounded).

“Red tagged or Immediate Treatment" is the highest level of triage, and is assigned to those with major life-threatening injuries who are salvageable. Patients

with uncontrollable bleeding are tagged red. Green Tagged" is the second-lowest level of triage, and is assigned to those with minor injuries who can get out of the incident area and to a treatment area under their own power. Announcement can also be made in the public address system that "if you can walk, please stand up and go over to the secondary assessment area (on your left/ right). Patients with minor illnesses/injuries may be transported by unconventional means or mass transit such as local buses. The accuracy of field triage can be thought of as the degree of match between the severity of injury and level of care. During the triage operation, a second group of rescuers follows behind the triage officer to bring patients to different areas.

Treatment area for each priority of patient is the preferred approach in large scale events. In the treatment area secondary triage of patients is performed and that adequate patient care is given as resources allow. EMS personnel in treatment area have responsibility to assist and with moving patients to the transportation area. National Disaster Management Authorities guidelines on Medical Preparedness on Mass Casualty Events identified Basic life support including airway maintenance, ventilation support, control of hemorrhage, anti shock treatment and preparation for transportation as part of basic life support interventions. Under NDMA/ UNFPA new initiative of MISP, safe child birth is also included.

Coordination of transportation of MCI victims and distribution of patients to appropriate receiving hospitals is a key on-scene activity of MCI personnel. Ambulances should not drive into the scene of MCI without directions. Activities at transportation area are important.

Once sufficient emergency medical personnel are assigned to initial triage, patient extraction, secondary triage, and treatment areas, subsequent responding transport units and personnel re-assigned from completed tasks can assist in transport.

Patient extraction is the act of removing the remaining victims from the affected areas and delivering them to designated

treatment areas. Patient extraction can begin as soon as resources on scene allow. Extraction can commence prior to the completion of initial triage but shall begin as soon as initial triage has been completed or additional personnel in proper PPE are available. Now ambulances have GPS tracking systems, permitting effective prioritization and distribution of vehicles closest to the incident sites.

MCI and disasters may pose two distinct challenges as far as EMS staffing. For limited disasters there is a need for immediate surge capacity with mobilization of existing staff, which will permit adequate although short-term response. For large scale or prolonged events there is a need for preplanned surge in staffing.

The use of pre-hospital is protocols and online medical direction can facilitate and improve care initiated in the field.

Determining the most appropriate facility for a given patient's injury is a complex process that involves the patient's clinical condition, patient and family members' preferences, state laws or regulations that might affect destination choices (e.g. mandating transport to the closest hospital) and hospital and EMS system capability and capacity.

In training of EMTs, therefore principle of mass casualty by lectures and group discussions, practice in the simulation environment or in the real situation is mandated. Table top MCI exercises are a helpful way for providers to learn their role at an MCI. There should be planning of mass casualty. Logistics including communication equipment, facilities, food and water, fuel, lighting and medical equipment for emergency responders is equally important and should be part of the planning and preparedness.

New technologies, techniques and tools to improve trauma care also direct impact in addition to the training, planning and practice.

When an incident draws to a close, there should be a termination of command. After the incident, and after critique, we can look back and “post-plan” as if the incident were something more serious.

MCIs take a physical and emotional toll of EMTs. Hence, EMTs should take full advantage of stress debriefing after an event.

Every pre-hospital care systems regardless of its budget, size and location, may be required to respond to such MCIs and disasters. Many fatal injuries may be prevented or their severity reduced by adequate pre-hospital trauma care. it is thus possible to minimize the consequences of serious injury, including long-term morbidity or mortality by promptly providing effective pre-hospital care by EMTs in MCIs. Guidelines for Essential Trauma Care, World Health Organization also emphasizes planning of emergency medical services, pre-hospital triage, transfer criteria and transfer arrangements between hospitals to improve trauma care in individual countries.

NMDA guidelines on Medical Preparedness in Mass Casualty amply recognizes the need for trained emergency medical response teams; promotion of concept of triage; basic life support and preparation for transportation; mock drills twice a year and integrated ambulance network (IAN).

Thus, the most effective function of EMT on site in MCI is to survey the site, estimate the numbers, severity, and type of causalities, find a suitable staging area for patient care and for ambulances, determine the best way for entry and exit lanes for ambulances, liaise with police and other relevant authorities already present and establish a communication line with Emergency Response Center in addition to the triage, treatment and transport.

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Original Article

Application of NSSK training Skills (Basic Resuscitation) at the Workplace by Health Personnel in Andhra Pradesh

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ABSTRACT

The retrospective study assessed the applicability of basic resuscitation skills acquired in the Navjaat Sishu Suraksha Karyakram(NSSK) training by health personnel and skill utilization in day-to-day work place situation. The findings showed that out of 338 newborns with asphyxia related complications, one-fourth started breathing immediately after change of wet cloth by a dry cloth, two-thirds (62-65%) responded to suction and stimulation in the first thirty seconds after birth and 11% required Ambu bag ventilation. Availability of dry washed sheets/towels, mucous sucker and warmer/200 watt bulb at every delivery point and early initiation of bag and mask within golden one minute with prompt recognition, quick reaction and effective ventilation by health personnel are essential for an immediate reduction of early neonatal deaths in the state.

During the last five decades, emphasis has been placed on reducing child mortality largely through immunization, oral rehydration and control of acute respiratory infections. Consequently, deaths among children over one month of age have sharply declined. During triennium ending from 2003-05 to 2009-11, infant mortality rate in Andhra Pradesh declined from 58.3 deaths per 1000 live births to 46. The rich benefits of higher antenatal care visits, institutional deliveries and deployment of medical and paramedical staff including ASHA at village level under the National Rural Health Mission (NRHM) did not reflect a proportionate decline of early neo-natal mortality rate (4 points decline from 37.3

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per 1000 births in 2003-05 to 33.5 in 2009-11 (SRS, 2011). According to NFHS-2 (1998-99), children of delivered women who received all three types of care (ante-natal care, safe delivery and high standard newborn care) had a lower risk of neonatal mortality (14.3 deaths per 1000) than those with only one or two types of care (49 deaths per 1000). Bang et.al. (2005) reported asphyxia-specific mortality rate (ASMR) to be around 10.5 per 1000 live births in rural Gadchiroli area. Further resuscitation of an asphyxiated baby, then study demonstrated bag and mask as more effective intervention as compared to tube and mask or mouth-to-mouth breathing. The major causes of neo-natal deaths in the state (Mahabubnagar district) were sepsis (34%), asphyxia (24%), pre-maturity (20%) and congenital anomalies (11%), respectively (IIHFW, 2004).

BACKGROUND

Systematic training in resuscitation of the new born is the cornerstone of modern neonatology. The American Academy of Pediatrics (AAP) and American Heart Association (AHA) developed Neonatal Resuscitation Program (NRP) in 1987 and provided resuscitation training to delivery assistants. NRP is a standardized approach/protocol resuscitation widely used in developed countries and is applied to a limited extent in developing countries, where it has greater potential. The NRP registered an impact and brought down neonatal mortality in Turkey from 41 to 29 per 1000 live births between 1998 and 2003. It was popular in over a hundred countries and the program was translated into 25 different languages (Panna Chowdary, 2009). In India, NRP training program was started as a certificate course under the aegis of the National Neonatal Forum (NNF) and subsequently added to the curricula of medical and nursing students (Deorari et. al, 2000).

The MOHFW, GOI in collaboration with Indian Academy of Pediatrics (IAP) and National Institute of Health and Family Welfare (NIHFW), New Delhi initiated the NRP training program in the country under *Navajaat Sishu Suraksha Karyakram* (NSSK) also popularly known as a 'First Golden Minute Program' during 2009. The objective of NSSK training is to

train health personnel on basic newborn care and ensure availability of newborn resuscitation at every delivery point in the country. In Andhra Pradesh, the NSSK training was initiated jointly by the IIHFW and Indian Academy of Pediatrics (IAP), AP Chapter under the auspices of Commissionerate of Health and Family Welfare, GOAP and rolled out in districts by early 2011.

The workshop methodology includes pre written and pre performance evaluation tests, class room lectures and common demonstrations followed by small group discussion in the form of modular reading, reply demonstrations on manikins and individual practice. At the end of the sessions, post-training test, inclusive of written evaluation and performance evaluation (Mega Code), was conducted as per NSSK guidelines.

After completing more than 200 batches of NSSK workshops across the districts in the state, the IIHFW conducted an evaluation study to assess the retention levels of trainees on basic newborn resuscitation steps and utilisation of acquired NSSK skills at their work place. A semi-structured questionnaire was e-mailed to 600 participants who completed NSSK training. The e-mail survey yielded a response rate of 27% i.e. about 162 medical officers and staff nurses responded during June-September 2012. Nine out of ten respondents recalled all six topics viz., warmer/200 watt bulb, stimulation steps, hand washing, resuscitation of newborn baby, thermal protection, feeding of normal and LBW babies and three steps of proper functioning of bag and mask, that were covered in the training. Steps of warm-chain management in labour room and post-natal ward require re-emphasis in future training courses. Nine out of ten (94%) trainees were reportedly confident in administrating the bag and mask independently at the delivery point (Satya Sekhar et. al, 2012).

Several reviews with delivery point staff and personal interactions revealed that neonatal resuscitation procedure of suction, stimulation and bag and mask have potentially saved many newborn lives in health facilities. Lack of documentation of information exists at

each delivery point, to guide program planners as to how many lives could have been saved due to immediate assessment, stimulation and bag and mask application as demonstrated in NSSK workshop. The present retrospective study will fill the gap by analysing interventions of basic newborn resuscitation by NSSK trained participants in delivery points across the state.

OBJECTIVE

To assess the basic resuscitation steps implementation in labour room/delivery points by NSSK trained health personnel (medical officers and staff nurses).

METHODOLOGY

A model questionnaire developed and shared by Dr. Panna Chowdary was modified in consultation with a team of experts in Hyderabad on the basis of NSSK training manual. The modified questionnaire has been field tested in West Godavari and Nellore district hospitals and later fine-tuned. The first part of the questionnaire includes health facility delivery statistics, availability and working /usable status of items available in labour room preceding three months prior to the date of survey. The second part of the questionnaire includes information on resuscitation of asphyxiated deliveries with details of mother's name, date of delivery and other delivery characteristics. The study is based on health facilities, labour room record, and reported asphyxia based deliveries attended by doctors and staff nurses who underwent the basic resuscitation NSSK training program.

A sample of 338 mother-newborn records with asphyxia was collected from the Parturition (delivery) Register from 22 health facilities as detailed in appendix-1). All data, mother-newborn records and treatment particulars were entered in to the computer and analyzed by SPSS package.

RESULTS

Between June 2011 and March 2012 period, about 8775 deliveries were conducted in 22 hospitals, out of which 508 neonates reported asphyxia related problems (Table-1). The percentage of asphyxia problems to total deliveries is found to be higher in district /sub-district

hospitals (6.38%) as compared to basic level (5.19%). As a result of simple calculations done on the basis of neonatal mortality rate (NNMR) of 34 per 1000 live births (SRS 2010), the Asphyxia related mortality rate (ASMR) per 1000 live births worked out to about 6.6 per 1000 live births in Andhra Pradesh which is closer to the current study figure.

Table-1 Percent of newborn reported with asphyxia to total deliveries during June 2011 to March 2012

S. No.	Type of health facility	Number of newborn who were resuscitated	Total deliveries	Percent of newborn who reported asphyxia
1.	Area Hosp/ Sub-dist Hospital (13)	283	4437	6.38
2.	PHC (24x7) / PHC (9)	225	4338	5.19
	Total (22)	508	8775	5.79

Every birth attendant required newborn resuscitation skills like anticipation, preparation, timely recognition and quick and correct action along with necessary equipment. Appendix-2 provides information on facility-wise equipment availability and working status. The labour room equipments in the selected health facilities such as warmers, dry washed towels, shoulder rolls, Deelys mucus sucker, self inflating Ambu bag and wall mounted clock with second's hand are inadequate in number and some of them are found to be in non-functional state.

Thirteen percent of newborns are of low birth weight (below 1800 grams) and suffer with major neonatal problems. Babies weighing more than 1800 grams are generally stable at birth and can be put on Kangaroo mother care (KMC) and initiated into breast feeding. Sixty-three percent of newborns in the health facilities were breastfed within one hour of birth. Among normal babies (>=2500 grams), about four-fifths (82%) of newborns are cord-clamped within 1-3 minutes of duration. More than half (52%) newborns in 24x7 PHCs (basic level) were applied sterile gauze / ointment to cord stump against 2% in district/sub-district hospitals (Chi-square=52.33, p=.000). Half of newborns started breathing between 1-3 minutes and 9.9% breathed after 3-5 minutes of birth. The important activities adopted in the health facility immediately after child births are: a) placing the baby on mother's abdomen (98.4%); b) immediately change of wet cloth after birth (100%); c) use of separate sterile cotton wipes for cleaning eyes (94%); d) covering the baby with dry cloth over the head and wrapping (94%) and e) baby put

to Kangaroo mother care (67%). Special emphasis on skin-to-skin care, Kangaroo mother care to protect newborn from hypothermia and early initiation of breast feeding are required in all future training programs.

According to NFHS-3 (2005-6), the neo-natal mortality rate (NNMR) in the state was 40.3 per 1000 live births during 2000-05. The present survey also indicates NNMR as 38 per 1000 live births. Twenty-seven percent (93/338) newborn reported no meconium was stained after delivery and baby was dried immediately. In other words, changing wet cloth by a dry cloth immediately after delivery provided basic stimulation for 27% in mild asphyxiated newborns.

Four out of five (79%) newborns were administered suction first in mouth followed by nose. About 80-85 percent of cases during stimulation adopted scientific methods like flicking on the soles of the feet and gently rubbing the newborn's back. Age old practices like slapping the back, squeezing the rib cage and shacking were reported on a marginal scale (3-6%) which appears to be vanishing. This indicates the positive impact of NSSK training.

DISCUSSION

The survey results indicate that 27% newborns started breathing by changing wet cloth to a dry cloth immediately after birth and remaining 73% required resuscitation of suction, stimulation and bag and mask ventilation. Out of them, about 83% of resuscitated newborn, after suction and stimulation started breathing; i.e., out of 204 newborns, 194 survived and 10 babies died after first half minute of initial steps of resuscitation. The NSSK protocol suggests initiating bag and mask ventilation within 'golden one minute' after child birth. However, study findings indicate bag and mask were applied between 1-3 minutes (34%) and between 3-5 minutes (3.8%) after birth as against the *golden one minute norm* of NSSK (Table-2). The delayed/failed resuscitation of bag and mask may be attributed to lack of prompt recognition of problem (breathing and chest rise) / not reacting quickly / not ventilating effectively. Supportive supervision may help to minimize such deaths.

The Ambu bag resuscitation was administered on 39 babies, out of whom 36 survived and 3 died. Thus NSSK training / basic resuscitation approach has saved 36 out of 242 newborns. In other

words, there would have been 16% (39/242) of neonatal deaths in health facilities and due to application of bag and mask approach; it would be possible to reduce neonatal deaths to 1.2% (3/242). The survey findings indicate that basic resuscitation skills (NSSK training) averted 14.8% of neonatal deaths at the delivery points.

Thus with a neonatal mortality rate of 36 per 1000 births (SRS 2010) in rural Andhra Pradesh, similar decline of 15% in neonatal deaths will yield a substantial decline of 4-5 points making the NRHM goal of an IMR of below 30 easily achievable by 2017. To convert it into reality, there is a need to fulfill some essential and important requirements at every delivery points. They are:

1. About 60-80% of deliveries conducted in APVVP and specialized hospitals as compared to round the clock PHCs in the state. The secondary and tertiary level hospitals (APVVP and teaching institutions) are not proactive in making all service providers (medical officers /staff nurses /ANMs /maternity assistants) to undergo training under NSSK which had more impact in the survival of newborns. Ensure that all health personnel at delivery point are trained in NSSK basic resuscitation methods.
2. Special emphasis needs to be placed on orienting high-focus and tribal district authorities on the importance of NSSK training and its benefits in reducing neonatal mortality.
3. Make all delivery points full-fledged with a newborn corner with radiant warmer/200 watt bulb, supply of Deelys mucus sucker in every delivery point and Ambu bag used in the NSSK training.
4. Abundant supply of dry and sterilized washed sheets/towels to conduct infection free deliveries. Clean cloth (1meter x 1 meter) can be given to the mother at the time of discharge, so as to keep the child warm at home by wrapping in a clean dry cloth or alternatively a *newborn warm kit* can be supplied to the new mother.
5. For effective district level implementation, it is required to a) identify 10-12 facilitators in each district and depute for training on rotation basis; b) Enhance leadership and motivational skills among facilitators (Pediatricians, Gynecologists, doctors interested in training etc); c) Time-bound completion of NSSK training in all district/ sub-district hospital, area

hospital and CHCs where more number of deliveries are conducted.

6. Emphasis should be made on early initiation of breast feeding and exclusive breast feeding during training.

SUMMARY AND CONCLUSIONS

The Navajaat Sishu Suraksha Karyakram (NSSK), a two day skill based training under the National Rural Health Mission (NRHM) showed a significant impact in preventing early neo-natal deaths in Andhra Pradesh. The retrospective study assessed the application of basic resuscitation skills acquired in NSSK training by health personnel and skill utilisation in day-to-day work place situation. Out of 338 newborn with asphyxia related complications, 27% started breathing immediately after change of wet cloth by a dry cloth, 62-65% responded to suction and stimulation in the first 30 seconds and 11% required Ambu bag ventilation. The evaluation concluded that timely initiation of bag and mask within golden one minute protocol after birth and adequate availability of dry washed sheets/towels; mucous sucker and warmer/200 watt bulbs at every delivery point have contributed substantially to a sharp reduction in neonatal deaths in the state. The findings are based on a small sample and purposively selected health institutions. An in-depth study with an appropriate statistical sampling frame is required to generalize the findings.

Table-2 Neonatal resuscitation of asphyxiated newborns in selected health facilities in Andhra Pradesh

S. No	Particulars	Total Sample (N=338)
1	Newborn birth weight	
	< = 1499	3.3
	1500-2499	27.5
	2500 +	69.2
2	Presence of liquor /meconium stained liquor (%)	72.5
3	Baby cried after change of wet cloth by dry cloth (%)	27.1
4	Baby cried after suction and stimulation (%)	60.3
5	Type of resuscitation applied (in liquor meconium stained)	
	Suction	79.0
	Stimulation	84.2
	Ambu bag and mask	76.8
6	Timing of initiation of bag and mask (%)	
	< = 1 minute	61.8
	1-3 minutes	34.4
	3-5 minutes	3.8
7	Outcome of new born resuscitation	
	Survived and Referred	86.1
	Died	13.9
8	Initiation of breast feeding within one hour	63.4
9	Baby put on mother 's chest (skin to skin contact) after stabilization	51.7

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6. [The authors are very thankful to Dr Panna Chowdary for sharing the basic questionnaire on resuscitation and Mr. Lokesh Kumar, D.C, IAS, Mission Director, NRHM and Director, IIHFW, Dr. P. Rajendra Prasad, Joint Director (Trainings), Commissionerate of Health and Family Welfare, GoAP for encouragement and suggestions. We are indebted to Dr. N.V. Rajeswari and Dr. Ravi Kiran Sarma for comments on earlier draft]

Appendix-1: Newborn cases resuscitated by type of health facility and by district

S. No	District	Dist hospital	Sub dist/CHC	PHC	PHC (24x7)	Total	No. of resuscitated baby case studies included
1	Visakhapatnam	0	1	1	2	4	184
2	Vizianagaram	0	5	1	1	7	23
3	West Godavari	0	1	1	0	2	6
4	Nellore	1	0	0	2	3	94
5	Krishna	1	0	0	0	1	7
6	Mahabubnagar	0	2	0	1	3	9
7	Nalgonda	0	1	0	0	1	7
8	Anantapur	1	0	0	0	1	7
	Total	**3**	**10**	**3**	**6**	**22**	**338**

Appendix-B Items available (in working condition) in the labour room for New born care in health facilities

S. No	Items available in the health facility	Warmer device	Dry washed sheets	Shoulder rolls	Deelys mucus sucker	Rubber mucus sucker	Self inflating Ambu bag	Mask-size zero	Mask-size one	Wall clock with seconds hand	Wall mounted thermom eter	Oxygen supply	Sterile cotton swabs	Baby cap
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	MCH Hospital Nellore	3	3	3	2	2	2	2	2	3	3	1	1	3
2	CHC, Atmakur, Mahabubnagar	1	1	1	1	2	1	1	1	1	3	2	1	1
3	PHC(24x7), Lothugadda, Visakhapatnam	N	N	3	N	3	3	3	3	2	N	N	2	N
4	PHC, Butchiyapeta, Visakahpatnam	N	3	3	3	1	2	2	2	1	N	N	1	2
5	PHC Madhuravada, Visakhapatnam	1	1	1	1	1	1	1	1	1	3	3	1	1
6	CHC, Makthal, Mahabubnagar	1	N	1	N	1	1	1	1	1	N	N	1	N
7	PHC, Devarakadra, Mahabubnagar	3	3	3	1	1	1	1	1	1	3	2	1	2
8	Area Hospital Suryapet, Nalgonda	3	1	1	1	1	1	1	1	1	1	1	1	1
9	Area Hospital, Tadepalligudem, West Godavari	1	1	1	N	1	1	1	1	N	N	1	1	N
10	Dist Hospital, Machlipatnam, Krishna	N	1	1	1	1	N	N	N	1	N	1	1	1
11	CHC, Chipurupalli, Vizianagaram	3	1	3	3	2	1	3	3	1	3	3	1	3
12	CHC, Badangi, Vizianagaram	1	3	3	3	1	1	1	3	3	3	1	1	3
13	CHC, Salur, Vizianagaram	N	1	1	N	1	1	N	1	1	N	N	1	N
14	CHC, Nellimarla, Vizianagaram	N	1	1	1	1	1	1	1	1	N	1	1	1
15	PHC, Gurla, Vizianagaram	3	2	2	3	1	2	2	3	3	3	3	1	1
16	CHC, Bobbili, Vizianagaram	1	1	1	N	1	1	1	1	1	N	1	1	1
17	PHC(24x7), Muthukur, Nellore	1	1	1	1	1	1	1	1	1	1	1	1	1
18	Area Hospital Narsipatnam Visakhapatnam	1	1	1	N	1	1	1	1	1	N	1	1	1

Note: N: Not available; 1: Sufficient quantity available; 2: Adequate quantity / on demand; 3: Insufficient quantity

Original Article

Ability of a trainee EMT to learn how to use Video laryngoscope and accomplish the task of Intubation

Srinivasa Rao J; Raja Narsing Rao HV; Ramana Rao GV

ABSTRACT:

INTRODUCTION:

Intubation is considered to be an advanced intervention among the airway management techniques. Video assisted intubation is considered to make the task easy

MATERIALS AND METHODS:

A group of 29 EMT trainees were taken through a didactic session for 30 minutes followed by demonstration and practice. The time at first instance of placement of endotracheal tube on a manikin using a video assisted intubation device is recorded. The device used is vividtrac – a video intubating device.

A left sided one tail student t-test is used to assess the statistical significance of the findings.

RESULTS:

25 of the 29 trainees could accomplish the task on the first attempt. The sample mean time is 12.04 seconds, hypothesized mean is 15 seconds, and the sample standard deviation is 4.89. The t-statistic is -3.02906. The critical value from t-table for 24 as degrees of freedom and 99% CI (p = 0.01) is -2.492. The t-statistic value less than critical value allows us disprove null hypothesis.

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CONCLUSION:

The technique of intubation can be acquired by trainee Emergency Medical Technicians, and they would be able to accomplish the task of intubation within the time span allowed. However this requires a thorough large scale analytical study before it can be rolled out as a routine technique to be taught as a part of curriculum and practiced on the ambulance.

KEY WORDS:

Video Intubation; Intubation by EMT; Intubation by paramedic;

INTRODUCTION:

Airway management is an important skill that plays a critical role in the outcomes especially in patients who have airway compromise. It is the skill that has to be handled even in a pre-hospital environment. But a deciding factor that plays a role in the extent to which an associate can handle depends on the skill level. Most often in India, we limit to basic skills such as placement of NPA or OPA and use of BVM in the pre-hospital setting. It is just not the availability of skilled people that is a limiting factor, but the license to practice, ability to teach, ability to learn and availability of manpower, play a role in provision of advanced airway management and care on the ambulance. The indications for advanced airway management have been established, but their practice in pre-hospital setting has a mixed support. Some studies have concluded that the advanced airway management in the form intubation in severe head injuries in out of hospital scenario can actually worsen the outcomes[1]. Some studies have concluded that the evidence for or against such interventions needs to be studied further[2]. The complications out of advanced airway placement on the ambulance include misplacement of the tubes, displacement of the tubes, and delayed transport to definitive care unit. But simplifying the technique using gadgets that make the task of training and execution and implementation easy have a profound impact on the practice of such skills and the outcomes as well[3].

At GVK EMRI the Inter-Facility Transfers (IFT) handling happen between the Primary and Community Health centers in rural areas to Area Hospitals and tertiary

hospitals. The travel time averages over 2 hours and average distance over 40 kilometers for First Referral Unit (FRU) ; and over 4 hours and distance over 100 kilometers for tertiary referral centers. Even the pre-hospital Emergency Medical transport time from the scene to hospital is over half hour in some instances. The outcome does depend on the care rendered on the ambulance and sometimes it becomes necessary that we do perform some advanced interventions for the airway management.

Over the last decade many new gadgets which take the advantage of video assisted intubation have come in to the market. They are being used in the emergencies and operation theaters to alarge extent. There are studies done to know how these devices can be of help for paramedics and medical students. A study by Mr Nasim et al has concluded that paramedics performed more favorable when larynx is visualized with the aid optical devices-airtraq in this instance[4]. However they are of the opinion this needs to be studied when used on patients. One study by Maharaj etal has stated that *"The Airtraq may constitute a superior device for use by personnel infrequently required to perform tracheal intubation."*[5]. One more study has concluded that *"The Airtraq appears to be a superior device for novice personnel to acquire the skills of tracheal intubation."*[6] With all the literature available in support of the optical aided visualization of larynx this study is planned to check the abilities of EMT trainees to handle the device and intubate on an airway trainer.

This study is to check whether the same device be handled by trainee EMT's. The device selected is the Vividtrac video intubating laryngoscope. The device has a handle and a groove in which the endotrachel tube can be placed. The camera at the tip of the handle is used to visualize the path. The device can be connected to any computer.

MATERIALS AND METHODS:

A group of 29 EMT trainees who have finished their institutional phase and are going for Hospital Phase of training were explained about what intubation is, the landmark that we should look for, how the procedure is done using the device. A demonstration of the same is done for the group as a whole. Next each student is called for performing the procedure on

the Manikin. The manikin used is Laerdal airway trainer. The procedure is demonstrated again to the associate. He is made to perform the procedure and the time taken to place the tube, seal the cuff and withdraw the device is recorded. The exact time taken is recorded using a stop watch. 30 seconds is taken as the cut off to decide whether he is able to perform the procedure or not. If he takes more than 30 seconds it is considered as failed attempt and made him go for the second attempt.

All elective intubations need to be accomplished within 30 seconds after initiating the task otherwise the task need to be abandoned before the next trial is given after thorough oxygenation[7]. These 30 seconds include insertion of laryngoscope, suction time, visualization of vocal cords, picking the tube and inserting it. With a conventional laryngoscope all these actions occur one after the other; but in video assisted laryngoscopy, insertion of scope and tube, visualization of cords occur simultaneously. Suction is an independent entity. The maximum time allowed for suction in an adult is 10-15 seconds [7]. Visualization of vocal cords cannot be achieved without suction. So from the 30 seconds that is allowed for intubation procedure a 15 seconds time is set aside for suction and clearing of secretions and fluids from the oral cavity. As we are using a manikin and there are no secretions, a 15 second time that is presumed for suction is deducted from the 30 seconds and the mean time accepted for intubation is set to 15 seconds.

Only those that can succeed in the first attempt (after only one instance of practice) will be included for the study and those that cannot succeed in the first attempt will be excluded (those who took >30 seconds in first attempt). As we have a small sample [25] it is decided to go for one tail (left) student t-test for assessment of statistical significance. Null hypothesis is that EMT takes longer than 15 seconds and alternate hypothesis is that EMT takes less than or equal to 15 seconds.

Table 1

Null Hypothesis	H_0	Sample mean	>	15
Alternate Hypothesis	H_1	Sample Mean	<=	15

RESULTS:

Out of the 29 EMT trainees,though all of them could intubate, 4 could not accomplish the task within 30 seconds on

Figure 1: Vividtrac video Laryngoscope
Picture courtesy Vivid Medical Inc

the first attempt. The 4 are excluded from the study. The sample mean time is 12.04 seconds, hypothesized mean is 15 seconds, and the sample standard deviation is 4.89. The t-statistic is -3.02906. The critical value from t-table for 24 as degrees of freedom and 99% CI (p = 0.01) is -2.492.

Table 2

	Attempt	Time
1	First	12.54
2	First	11
3	First	12.4
4	First	14.5
5	First	15.9
6	First	7.4
7	First	16.8
8	First	12.5
9	First	7.3
10	First	16.4
11	First	9.6
12	First	6.3
13	First	19.8
14	First	4.4
15	First	7.5
16	First	22
17	First	13.6
18	Second	12.9
19	Second	19.6
20	First	7.11
21	Second	4.23
22	First	7.11
23	First	8.3
24	First	18.18
25	First	4.33
26	First	13.7
27	First	18.7
28	Second	23.3
29	First	13.6

Table 3	
Hypothesized Mean	15
Sample Mean	12.04
Sample SD	4.88798
T-statistic	-3.0291
Sample count (n)	25
Degree of Freedom	24
Critical value from T-table for 24 degrees of freedom and 0.05 as p	-1.711

Table 1				
Null Hypothesis	H_0	Sample mean	>	15
Alternate Hypothesis	H_1	Sample Mean	<=	15

Critical values,from t-table, for 24 as degree of freedom:

Table 4					
one-tailed	0.05	0.025	0.01	0.005	0.001
	95%	97.5%	99%	99.5%	99.9%
Df=24	-1.711	-2.064	-2.492	-2.797	-3.467

A t-statistic of -3.0292 when compared with values in table 4, there is a 99.5% chance that the sample mean will be less than 15 seconds. This helps us reject Null hypothesis and accept alternate hypothesis.

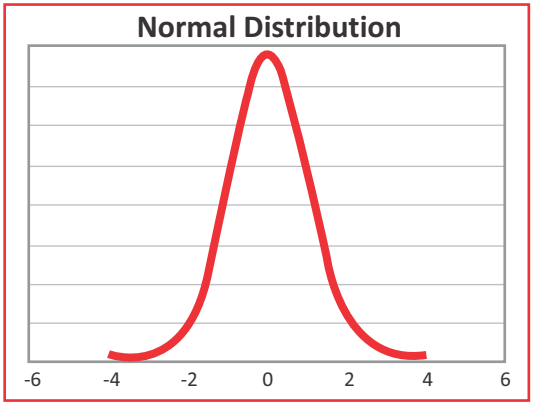

Figure 2a: Normal distribution

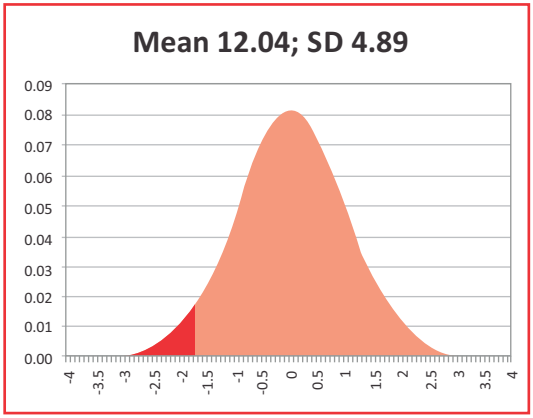

Figure 2b: Normal distribution

DISCUSSION:

Only 4 out of the 29 trainees could not accomplish the task with in stipulated time. This being a controlled environment, this may not be representative of the actual time taken, however out of practice this may be perfected. The procedure being done on a manikin, it may not all the components

involved in managing real life situation. However this is a demonstration that the intervention may be practiced and introduced as a part of curriculum. This may act as an alternative to the traditional laryngoscope aided intubation. A small sample and study on manikin may not be a representative of actual real life scenario.

CONCLUSION:

Statistical analysis has rejected the null hypothesis. The null hypothesis for the study is that the EMT cannot achieve the task within 15 seconds using a video laryngoscope and this hypothesis stands rejected by results. This probably is enough support for the statement that EMT can acquire the skill of video assisted intubation and accomplish the task of intubation within allowed time limits.Video assisted intubation is definitely a technique to depend on for use by Emergency Medical technicians and can be considered to be included in the curriculum for Emergency medical Technicians.

DISCLAIMER:

We do not have any contributions or what so ever from any of the companies or whoever it is for the conduct of this study.

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Original Article

Comparing the Usage of Double Endopharyngeal Tubes Versus the Usage of Traditional Nasopharyngeal Tubes in Manikins with Upper Airway Obstruction in Simulated Seizures in paediatric patients.

Kumara Nibhanipudi, Roger Chirugi, Brett J Sweeney, Akash Pandey

BACKGROUND:

Airway control can be a difficult task during paediatric seizures especially status epilepticus. The aim of this study was to determine the advantage of the usage of double endopharyngeal tubes via nasal passages versus traditional nasopharyngeal tubes in manikins with upper airway obstruction during simulated seizure in paediatric patients.

HYPOTHESIS:

The usage of double endopharyngeal tubes will be as effective as traditional nasopharyngeal tubes (NPT) in manikins with airway obstruction during simulated seizure in paediatric patients.

METHODS AND MATERIALS:

Two endotracheal tubes were cut to a length equal to the distance between the tragus of the ear and the angle of the nose plus one inch. The distal ends rest in the pharynx and proximal ends remain outside the nostril away from the external nares. The proximal ends were connected to a Bag Valve Mask (BVM) via a T-connector. This configuration of materials was referred to as the Double Endopharyngeal tube (DEP)

This is an in-vitro study using 3 manikins. The mouth of each manikin was closed so that no air can pass through the mouth simulating airway obstruction due to displacement of the tongue as can occur in patients seizing. The manikins were labeled to simulate different possible

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positions of the traditional methods of intubation versus the DEP (manikins A-C). A scoring method was designed to assess the effectiveness of the various methods with a maximum score of 4 correlating with maximum effectiveness.

RESULTS:

18 volunteers participated in the study. In all the manikins (A, B and C), a score of 4/4 was achieved. The group C results were compared to Groups A and B. The differences were compared using Krausal-Willis tests followed by Willcox two-sample tests.

CONCLUSIONS:

The DEP was as efficacious as NPT for managements of upper air way obstructions as it occurs in seizing patients.

KEY-WORDS:

Double Endopharyngeal Tube; Paediatric Seizure; Airway; Nasopharyngeal Intubation;

INTRODUCTION:

Upper airway obstruction can occur in patients having a seizure due to posterior displacement of the tongue. Similar obstruction of the airway is also known to occur in angeoneurotic edema and infectious conditions like croup, epiglottitis and secondary to foreign body obstruction. In our study, we want to study the usage of double endopharyngeal tube (DEP) versus traditional nasopharyngeal tubes in manikins as it occurs during simulated seizures.

Traditionally in patients with upper airway obstruction, who are unconscious, the oropharyngeal airway is used. In patients who are semiconscious or almost conscious, the nasopharyngeal tube can be used. The nasopharyngeal tube is lubricated and the passed through one nostril. The distal end rests in the pharynx and the proximal end is located at the external orifice. The purpose of the nasopharyngeal tube is to bypass the tongue that is causing obstruction and preventing adequate ventilation. Ventilation is performed by using a tight fitting face mask covering both nostrils

and the mouth which is attached to a BVM. Adequate ventilation is dependent on the seal between the face and mask created by the provider. Theoretically in patients who are seizing, it is difficult maintain this seal due to rapid violent head movements, even with the usage of a nasopharyngeal tube. The Double Endopharyngeal tube is away from the face, requiring no seal to be maintained. The BVM is directly connected to the T tube connector and hence ventilate is easily performed even in patients who are having violent head movements.

The next question that may arise is, "What is a double endopharyngeal tube?"

The Double Endopharyngeal tube was designed by the first author (KUMARA NIBHANIPUDI). Two endotracheal tubes were cut to a length equal to the distance between the ear lobe and the nose plus one inch. The distal ends rest in the pharynx and the proximal ends outside of the nostril. The proximal ends are connected to an BVM via T-connector. This configuration is referred to as the Double Endopharyngeal tube.

The purpose of the tube is to enable providers to create an airway in patients with airway obstruction secondary to a swollen tongue, or posterior displacement of the tongue during seizures. The goal is also to facilitate the usage of the BVM for ventilation in difficult situations like seizing patients with violent head movements.

MATERIALS AND METHODS:

It is an in-vitro study using 3 manikins. The usage of each manikin was closed so that no air can pass through the mouth thus simulating airway obstruction due to displacements of tongue as it may occur in paediatric patients seizing.

The manikins were labelled:

A. Traditional nasopharyngeal tube passed through one nostril. See picture 1.

Picture 1. X ray of neck: DEP Tube with no BVM and no face mask

B. Two Traditional nasopharyngeal tubes pass through both nostrils. See picture 2

Picture 2 :DEP Tube with no BVM and no face mask

C. Double endopharyngeal tubes passed through both nostrils. See picture 3.

Picture 3 : X ray of neck: DEP Tube with BVM and no face mask

An X ray was taken in these manikins to ensure the position of the tubes in regards to the airway.
See the x-rays 1, 2 and 3.

A scoring system of 1 to 4 was used to evaluate the movements of the chest wall.
Score 1indicates no rise of the chest wall bilaterally. (0cm_
Score 2 indicates faint movements of the chest wall.(<2cm)
Score 3 indicates unequal movements of the chest wall. (2 to5cm)
Score 4 indicates equal movements of the chest bilaterally (>5cm)

For manikins A and B, the volunteers were asked to ventilate using the BVM with a tight fitting face mask covering both nostrils and the mouth. (See pictures 1&2)

For Manikin C, the volunteers were asked to connect the BVM directly to the T-connector of the double endopharyngeal tube then asked to ventilate. A couple of volunteers were shaking the body and head of the manikin simulating seizure activity in paediatric patients.

An independent observer (an attending physician) was assigned to each manikin. They were asked to score the success of ventilation or chest wall movement using

the previously described scoring system.

RESULTS:

Results: 18 volunteers participated in the study. In all the manikins (A, B and C), a score of 4/4 was achieved.

The group C results were compared to Group A and B. The differences were compared using Krauskal-Willis tests followed by Willcox two-sample tests.

DISCUSSION:

Nasopharyngeal airways are uncuffed tubes made of soft rubber or plastic. They are used most frequently for intoxicated or semiconscious patients who cannot tolerate an oropharyngeal airway. A nasopharyngeal airway is indicated when insertion of an oropharyngeal airway is technically difficult or impossible because of a strong gag reflex, trismus, massive trauma around the mouth, or wiring of the upper and lower jaw. The proper technique of inserting a nasopharyngeal tube is to lubricate the tube with water soluble jelly or anaesthetic jelly and gently insert close to the midline along the floor of the nostril. This results in insertion of the airway into the posterior pharynx behind the tongue. (ACLS Provider manual page 23). A modified nasopharyngeal tube has been used to reduce high upper airway obstruction in patients with Pierre-Robins Syndrome and other causes (Chang, Harris & O'Neil, 1989 and 2000)[1]. A simple nasal splint can be used to assist the stability of nasopharyngeal tubes in the Pierre Robin syndrome (Smith, 1998)[2]. According to the BMJ, (Matthew et. al., 1984)[3], a study of nasopharyngeal tubes in Pierre- Robin Syndrome, they have described the usage of a shortened endotracheal tube shortened to end just above the epiglottis to provide a stable airway, with the splinters tongue forward. Stillings and Lines (1976)[4], describe the usage of nasopharyngeal tubes as aid to lateral port construction in maintenance of the airway in pharyngeal flap surgery. According to Ralson & Charters (1994)[5], a cuffed nasopharyngeal tube can be used in a difficult intubation situation. In this case, a cuffed nasopharyngeal was used to maintain anaesthesia and subsequently to act as a landmarks for the passage of a fiber optic laryngoscope loaded with a tracheal tube. No such studies have been done on Double Endopharyngeal tubes.

CONCLUSION:

The usage of double endopharyngeal tubes via both nostrils were as effective as traditional nasopharyngeal tubes in manikins to manage airway obstruction due to displacement of tongue as it occurs in seizing paediatric patients.

The DEP is designed with the ability to connect it directly to the BVM. Hence it has the distinct physical advantage of stability and convenience to ventilate by using BVM without the difficult task of maintaining a tight seal as required in other methods. This is especially true in situations where the violent head movements produced by seizure activity make creating a tight face/mask seal nearly impossible.

LIMITATIONS OF OUR STUDY:

1. The use of volunteers to shake the head and the body of the manikin is to simulate seizures, may not be a true substitution. A future study, using actual seizing patients may be more transferable.

2. The use of an "independent observer" to score appropriate ventilation is somewhat subjective. A more objective would be to measure distal pressures in the lungs of the manikins. However, at this time our manikins cannot perform this measure.

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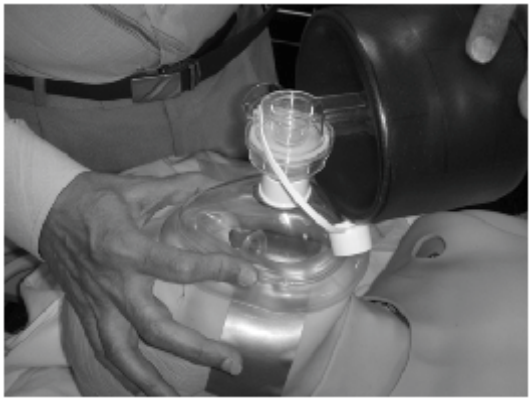
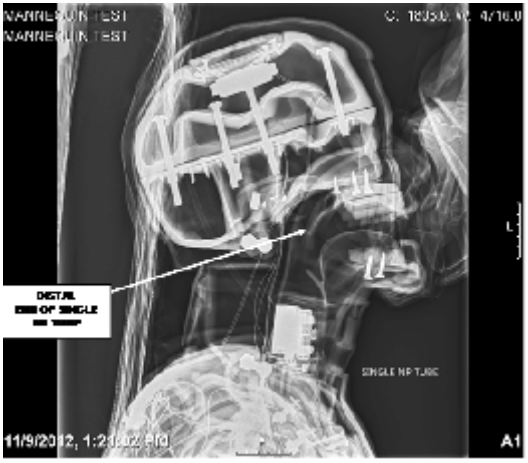
Picture 4 :DEP Tube with BV and no face mask

Picture 5: X
ray of neck: Two NP Tubes (X-Ray of the neck) with BVM



Picture 6: Two NP Tubes with BVM



Picture 7: X ray of neck: Single NP Tube with BVM

Picture 8: Single NP Tube with BVM

Case Study

Condition in a neonate with Rare Congenital Anomaly, Tamil Nadu.

Sailaja. P, Vimal. M, Jebin.T
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ABSTRACT

The situation is rarely anticipated and can be a source of great distress for parents, delivery room and nursery staff. Often there can be pressure on medical staff to "make it better" and assign a gender to the child arbitrarily in the first few hours after birth.

Ambiguous genitalia currently known as disorders of sex development (DSD) in a newborn, due to increased prevalence of consanguineous mating and multiple siblings in the one family. The birth of a child with ambiguous genitalia is a challenging and distressing event for the family and physician and one with life-long consequences. Most disorders of sexual differentiation (DSD) associated with ambiguous genitalia are the result either of inappropriate virilization of girls or incomplete virilization.

Approximately 1 in 4,500 births are complicated by ambiguous genitalia. GVK EMRI introduced neonatal ambulance, from inception to till date 3 neonates in 3985 neonates.

KEY WORDS:

Ambiguous genitalia, Hermaphrodite, Sepsis, Neonatal Emergency Technician.

INTRODUCTION:

"A Sweet new blossom of humanity"

The birth of a baby with ambiguous genitalia can cause great apprehension for the family as well as for health care providers. The data on the incidence and prevalence of conditions causing ambiguous genitalia and over all disorders of sex development (DSDs) are limited. Ambiguous genitalia are having characteristic of neither a male or female. Hence the designation is intersex or

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hermaphrodite.

Hermaphrodite is again subdivided into true hermaphrodites, male pseudohermaphroditism and female pseudohermaphroditism. Imaging plays an important role in demonstrating internal organs, genitography is used to assess the urethra, vagina and any fistulas or complex tracts, and MRI is used as an adjunct modality to assess for internal gonads and genitalia. Early and appropriate gender assignment is necessary for healthy physical and psychologic development of children with ambiguous genital.

CASE DESCRIPTION:

On 1st October 2012 around 9:57 am, our Kodambakkam neonatal 108 ambulance was called seeking help for a neonate aged 11days with birth weight 2.55kg was referred from district head quarters hospital to the tertiary care hospital which contains well established neonatal unit for the complaints of Apnea, shock, sepsis and ambiguous genitalia.

PRE- HOSPITAL ASSESSMENT:

Immediately our Neonatal Emergency Medical Technician (NEMT) reached the scene at 10:25 and assessed the neonate. The neonate was stabilized in the referral centers. Inj.Adrenaline 2 dose was administered in the referral centers. The neonate was very critical. The neonate was having ambiguous genitalia. The sex of the neonate was undetermined. The parents were very eager to know about the sex of the neonate. Our NEMT consoled the parents and explain about the treatment measures of the undetermined sex.

BASE LINE PARAMETERS:

Skin color- mottled
Capillary Refill Time (CRT)- >3sec
Heart Rate (HR)- 68b/m,
Pulse volume- weak
Cry and movements- absent
Saturated percentage of Oxygen (SpO2) – 33 %(with oxygen)
DOWNES score- 6/10

PRE- HOSPITAL INTERVENTIONS:

Immediately our NEMT received the neonate at 10:40 am and shifted the neonate to the incubator. Online medical directions were given by the Neonatal Emergency response care Physician, NEMT secured IV line and 25ml normal saline bolus dose was administered.

Oxygen 6 liters were administered through BVM. Naso gastric tube insertion was done. Frequent suctioning was done. Sniffing position was maintained.

ONGOING ASSESSMENT:

Reviewing after 10minutes, the neonate condition and vital parameters were assessed. During transport the vitals were
Skin color: pink
CRT :< 3sec
Cry and movements- mild
SpO2- 43% (with oxygen)
Temperature - 98.6F
Pulse volume- weak.

HANDOVER DETAILS:

Ambulance reached the hospital at 11:20am. While handing over the neonate at the newborn emergency ward, the vital parameters were showing marginal improvement. The vitals were as follows at the time of hand over:
Skin color: pink
HR- 145b/m,
SpO2- 97% (with oxygen)
Cry and movements- mild
DOWNES score- 4/10

HOSPITAL OUTCOME:

The neonate was received in the newborn emergency ward. After stabilizing the neonate was shifted to the NICU. After 48hrs follow up, the condition of the neonate was improved. Then the neonate was fixed for further investigations to determine the sex.

DISCUSSION:

The neonate was suffering from sepsis and ambiguous genitalia. The neonate was admitted in the district head quarters hospital. In this hospital there is no appropriate facility to give care to the newborn with specialized equipments. So the neonate was transferred to the tertiary care hospital where it is well equipped neonatal care facility.

The NEMT followed the standard guidelines of Neonatal care and was in contact with the NERCP till handover. The challenge of NEMT was to give psychological and emotional support to the parents apart from the Prehospital care. The neonate was in very critical condition. NEMT closely monitored the condition and supported the newborn. During handover NEMT narrated the entire history as well as pre hospital care provided to the attending neonatologist, including a neonatal Patient Care Record.

CONCLUSION:

Critical care of the neonates was well managed in GVK EMRI 108 neonatal ambulances. The neonatal ambulance is well equipped with the neonatal equipments to provide satisfactory prehospital management to all categories of critical neonates. The neonatal emergency medical technician is trained to provide care to the neonates.

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National Ambulance Code
Constructional & Functional Requirements for Road Ambulances April 2013 (Extract)

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An Expert Committee was constituted with approval of the Honorable Union Minster for Road Transport and Highways (MoRTH), Government of India, to formulate the "National Ambulance Code". The terms of reference of the Committee were as under: "*The Committee will formulate 'National Ambulance Code' along with detailed specifications for various types of ambulances for the country and prepare a draft amendment notification to Central Motor Vehicle Rules (CMVR) 1989*."

The Committee took stock of the existing trends vis-a-vis ambulance construction, design and integration to understand the current scenario, limitations of the existing framework, available technology, manufacturer maturity, local conditions, past trends, etc.

The Committee is chaired by Superintendant AIIMS, New Delhi. Members in the Committee are representatives from AIIMS, Army Medical Corps, Automatic Research Association of India (ARAI) Pune, Union Ministry of Road Transport and Highways, National High Authority of India, Union Ministry of Health and Family Welfare, GVK Emergency Management Research institute, Apollo Hospitals and Society for Indian Automobile Manufacturers (SIAM).

The committee initially drafted the document in line with the global best practices and localized the same to suit Indian requirements. The document was then circulated to SIAM. During the deliberations of the committee the vehicle manufacturers (OEM's) agreed to

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issue necessary instructions to the buyer of the incompletely built vehicle about the constructional and functional aspects of the ambulance. Any body builder who is engaged in the activity of building ambulances need to follow the prescriptions of this code for necessary compliance, verification or certification.

A. Scope: This standard specifies the constructional and functional requirements of Category M & L vehicles used for transport and / or emergent care of patients (Road Ambulance).

This code does not detail the requirements of training of the staff in the ambulance which will be the responsibility of the user in whose name the ambulance will be registered or the operator as the case maybe. This code doesn't cover Mobile Health Units & other such specialized mobile medical facilities which will not be used to transport patients in supine state but will only provide preventive, emergent or elective medical care / diagnostic facilities inside the vehicle to the patients when stationary.

B. Terms and Definitions:

i. **Road Ambulance:** Road Ambulance or Ambulance is a specially equipped and ergonomically designed vehicle for transportation / emergent treatment of sick or injured people and capable of providing out of hospital medical care during transit / when stationary, commensurate with its designated level of care when appropriately staffed.

ii. **Emergency Patient:** Patient who through sickness, injury or other circumstances is in immediate or imminent danger to life unless emergency treatment and / or monitoring and suitable transport to appropriate medical facilities or medical treatment are provided.

iii. **Types of Road Ambulances:** Road Ambulances are designated as follows based on the level of care they can provide:

a. **Type A Road Ambulance: Medical First Responder:** Road Ambulance

designed to provide emergent out of hospital medical care to patients when stationary. This vehicle maybe any CMVR approved Category M or L vehicle suitable for the terrain to be used in but will not have the capability to transport patients in supine state or provide them medical care inside the vehicle.

b. Type B Road Ambulance: Patient Transport Vehicle: Road ambulance designed and equipped for the transport patients who are not expected to become emergency patients.

c. Type C Road Ambulance: Basic Life Support Ambulance: A vehicle ergonomically designed, suitably equipped & appropriately staffed for the transport and treatment of patients requiring non-invasive airway management / basic monitoring.

d. Type D Road Ambulance: Advanced Life Support Ambulance: A vehicle ergonomically designed, suitably equipped & appropriately staffed for the transport & treatment of emergency patients requiring invasive airway management / intensive monitoring.

C. Vehicle Characteristics :

1. General Construction: The road ambulance shall comply with homologation requirements given in standards notified under CMVR 1989 and this Code. Wherever, there is difference in the homologation requirements given in other standards notified under CMVR 1989 and this code, the requirements of this code will be applicable.

2. Performance Requirements:

a. Acceleration : A road ambulance loaded to the permissible gross vehicle weight shall be able to accelerate from 0 km/h to 70 km/h within 40s, when tested in accordance with IS:11851-1986.

b. Electrical requirements :

i. General: Electrical installations shall comply with those clauses of IEC 60364-7-708 which are applicable to ambulances. Note 1: The reference to

IEC 60364-7-708 does not apply to the original electrical equipment, which is already covered by the type approval of the base vehicle.

ii. **Battery & Alternator:** Batteries shall be positioned to allow maintenance without removing the battery from its securing device. The construction of the battery and all connections to it shall be such as to prevent any possibility of an inadvertent short circuit. Additional batteries may be required to power the medical devices carried on board and the intended use of the ambulance. In such cases, the manufacturer shall ensure optimal charging of the additional batteries without any impact on the primary vehicle battery. When the engine is idling, electrical stability should be maintained between electrical load and alternator output. In order to achieve this it may be necessary to fit an electrical load prioritisation device to the vehicle. Further each electrical socket provided in the patient compartment should be permanently labelled as regards its voltage & amperage.

iii. **Electrical installation :** 1 In Type C and D road ambulances there shall be a recessed externally mounted power connector to enable external power to be provided for operations such as the following:

a) Charging battery(ies).

b) Operating medical devices, when installed.

c) Operating a stand-alone patient compartment heater, when installed.

d) Operating an engine pre-heater, when installed. The connector for 220/240 V, shall be a male connector and not interfere with the electrical and mechanical safety. The wiring and, where applicable conduits, shall withstand vibrations. No wiring shall be located in or pass through conduit intended for medical gas installation. The wiring shall not be loaded higher than that stated by the wire manufacture.

c. Vehicle body :

1. **Fire Safety:** All interior materials shall comply with the flammability requirements specified in IS:15061 , as notified under CMV(A)R, 1989 though the standard does not cover ambulance in the scope.

2. **Driver's Seat Configuration :** The driver's seat Shall comply with the requirements of AIS:023 or IS 15546 as applicable and notified under CMVR

3. **Minimum Loading Capacity :** The minimum loading capacity shall be in accordance with Type of Road Ambulance Type A;-; Type B: 3; Type C; 3; Type D: 4

4. **Partition Wall : I**n type C & D road ambulances, a full partition wall or a partition wall with a door or a window shall separate the driver's compartment from the patient's compartment. Where a door is fitted, it shall be secured against opening if the road ambulance is in motion. One or two windows with a minimum separation of 100 mm shall be provided in the partition wall made of material complying with the requirements of CMVR. The windows shall allow direct visual contact with the driver. The opening area of the window shall have a maximum area of 0,12 m^2. It shall be secured against self-opening and shall have an adjustable blind or other means of preventing the driver being disturbed by the light of the patient's compartment.

5. **Openings (Doors, Windows, Emergency Exits) :** The driver seat shall comply with the requirements of IS 15546 as applicable and notified under CMVR. There shall be a minimum of two openings – one at the rear (door/tailgate) and one at the side (door/window) of the patient's compartment. All openings shall have seals to protect against the ingress of water. For Type C and Type D road ambulance, each external door of the patient's compartment shall be fitted with a security system which enables the following: a) Lock and unlock from inside without use of a key

b) Lock and unlock from outside with use of a key c) Unlock from the outside using a key when the door is locked from the inside. In the patient's compartment, there shall be a minimum of two external windows. There shall be one on each side or one on the side and other at the rear. The windows shall be positioned or screened to ensure patient's privacy when required.

6. Stretcher Loading: In type C & D ambulances, the loading angle of stretcher should be a maximum of 16 degrees.

d. Patient Compartment: In C & D type of ambulances patient compartment shall be designed and constructed to accommodate medical devices. The width of the patient compartment for Type C and Type D Road Ambulance, after installation of cabinets, etc shall provide 40 ± 15 cm clear aisle walkway between the main stretcher / undercarriage and the base of squad bench /attendant seats, with the main stretcher located in the street side (non-centered) position. In Type D Ambulances, the length of the Patient Compartment shall provide at least 64 cm and not more than 76 cm of unobstructed space at the head of the primary patient, when measured from the face of the backrest of the Doctor's/ Paramedic's Seat to the forward edge of the stretcher. In Type C & D Ambulances, a minimum of 25 cm shall be provided from the end of the stretcher to rear loading door, to permit clearance for any traction or long-board splints. The ceiling, the interior side walls and the doors of the patient's compartment in Type B, C & D Ambulances shall be lined with a material that is non-permeable and resistant to disinfectant. The edges of surfaces shall be designed and/or sealed in such a way that no fluid can infiltrate. If the floor arrangement does not allow fluids to flow away, one or more drain with plugs shall be provided. Drawers should be secured against self-opening and where lockers are fitted with doors that open upwards they should be fitted with a positive hold open mechanism. Type C and D road ambulances shall be equipped with a

lockable drugs compartment with security lock. Patient and Attendant seat dimensions shall be minimum of 381 mm X 381 mm per seat. Air Conditioning shall be optional in all categories of Road Ambulances except Type D Ambulances. Natural colour balance lighting shall be provided. The colour temperature of the interior lights should be minimum 4000 Degrees Kelvin. In type D Ambulance, there shall be an additional light within the treatment area with a minimum of 1650 Lux. The interior noise level in the patient compartment in Type B, C & D Ambulances shall comply with requirements of AIS: 020. In case of type B, C and D ambulances, all doors, windows and hatches shall not allow ingress of dust and rain water when in the fully closed position, All items e.g. medical devices, equipment and objects normally carried on the road ambulance shall be restrained, installed or stowed to prevent them becoming a projectile when subjected to accelerations/ decelerations of 10 g in the forward, rearward, left, right and vertical directions

e. Medical Devices :

I **Provision of medical devices: a)** the patient transport vehicle (type B) shall have basic professional equipment for first aid and nursing care **b)** the basic life support ambulance (type C) shall have equipment for basic treatment and monitoring of patients with the current methods of pre hospital care **c)** the advance life support ambulance (type D) shall have equipment for advanced treatment and monitoring of patients with the current methods of pre hospital intensive care.

ii. **Medical devices storage: All** equipment required for a set procedure shall be stowed in specified location. Essential equipment required for use outside the vehicle shall be easily accessible via normally used doors. All equipment shall be securely and safely stowed to prevent damage or injury whilst the vehicle is in motion.

iii. **Requirements for medical devices: General:** The device shall be designed for use in mobile situations and in field applications. If a medical device is designated as "portable", which is mandatory for use inside an ambulance (except patient handling equipment according to Table 9. it shall be in accordance with IEC 60601-1 and shall a) be possible to be carried by one person b) have its own built in power supply (where relevant) c) be capable of use outside the vehicle d) be placed preferably along the street side wall of the patient compartment or along the ceiling ensuring the minimum possible distance to be connected to the patient without hindering the movement of personnel around the main stretcher.

iv. **Fixation of devices:** The device shall be restrained by means of a fixation system. The fixation system(s), maintain system(s) or storage system(s) shall hold the device to withstand accelerations or decelerations of 10 g longitudinal (forward, backward), 10 g transverse (left, right) and 10 g vertical.

v. **Gas Installation:** All the components should be certified as per ISO/TC 121/SC6 and ISO-15001:2003 as "Compatibility of Medical Equipment with Oxygen".

Source of Supply: The source of supply shall consist of one or more of the following, as per the requirement of the source supplies in the different types of road ambulances.

a) Gas in Cylinders, e.g. Oxygen
b) Any other compressed medical gas as required for treatment and therapy of patients
c) Vacuum System: The ambulance whenever fitted with a stationary oxygen system shall have all the essential components and accessories required for the piped oxygen system which shall include as a minimum:

(i) One no. Pressure Regulator for each of the supply sources (stationary as well as portable)
(ii) Low pressure, electrically conductive, hose approved for medical oxygen

(iii) Oxygen piping concealed and not exposed to the elements, securely supported to prevent damage, and be readily accessible for inspection and replacement

(iv) Oxygen piped to a self-sealing duplex oxygen outlet station for the primary patient with a minimum flow rate of 100 LPM at the outlet. The changing from one cylinder to the other should not affect the distribution pressure in any way and this change over should occur as an fully automatic operation.

vi. List of Equipment:

Minimum equipment carried by the ambulances according to type of A, B,C and D. Supplementary devices may be introduced locally. Equipment should meet the standards based on the type of device. Type of equipment in the ambulances suggested by NAC are grouped under

a. Patient handling equipment
b. Immobilization equipment
c. Life support oxygen treatment equipment
d. Diagnostic equipments
e. Drugs
f. Infusion material and equipment
g. Equipment for management of life threatening problems
h. Bandaging and nursing
i. Personal protection equipment
j. Rescue and protection material
k. Communication

vii. Recognition and visibility of ambulance:

The Ambulance Conspicuity Code is split into six sections.

a. Color
b. Conspicuity Improving Items (C2I)
c. Emblems
d. Warning Lights
e. Sirens
f. Recognition of personnel

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For complete details of different parameters in national ambulance code (NAC) please refer the reference 1 cited

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