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## **Transport Medicine International – Hungary**

### **A Non-Governmental Organization for Neonatal Transport in Central Europe in the Central Region of Hungary**

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The Peter Cerny Neonatal Emergency Ambulance Service has been around since June 1989. It operates in Budapest as well as the 130-140km surrounding areas, and with a service population of more than 4.5 million people. With its around the clock service, 46,523 babies have been transported over the course of the past 20 years. To avoid life threatening respiratory problems, mechanical ventilation has been carried out in 9,205 cases. 1,010 per 1,124 neonates and infants (below 6kg body weight and/or 60cm body length) have been reanimated successfully.

#### **The “ 9 Ws ” as the key elements of Neonatal Transport Service:**

**WHY** do about 3,000 infants per year need to be transported?

The infants were transported because they were not born in the right place or at the right time, or because the circumstances required special needs. The so-called intrauterine transport proved to be insufficient and the facilities for special examinations (cardiac ECHO, ultrasound, CT, MRI) have not been available in those hospitals without NICUs.

**WHO** must be transported?

- a) Newly born infants who need resuscitation (in the delivery room / in pediatric wards of town hospitals / at home delivery / in emergency cases anywhere (prehospital care) or neonates during the first weeks of life who are critically ill for any other reasons, and need sub-intensive or intensive neonatal care and interfacility transport.
- b) Return / reverse / back transport to the referral hospitals with recovering infants, who have not yet needed high-level intensive care.
- c) Premature infants in the 3-4 month of life after discharge from NICU, with 2-3kgs body weight, who need emergency help, and more specialized neonatal care rather than the regular pediatric care in a critical situation at home.
- d) Infants with problems during the transition period after a “planned” home delivery.
- e) 6-7 month old infants (earlier ELBWI) who suffer from typical chronic neonatological diseases like BPD and need acute care when the condition worsens.

The target group is not only defined by age but also by body size. Babies need much more neonatal interfacility transport than pediatric supply when the body weight is below 6kg and/or the body size is less than 60cm (which ensure that babies fit into transport incubators). And if we talk about neonate transport, we imply activities for emergency reasons, which require immediate intervention in any potentially life threatening cases. Worsening condition of the infant in any time and any place requires urgent and fast professional medical interventions, which are served optimally only by “a mobile NICU on four wheels”.

## **WHEN** do newborns need to be transported?

The best answer: “in the right time”. We can talk about the right time if we consider the different aims of the transport.

Interhospital transport with ongoing resuscitation by the referral team is the most urgent case for newborn transport. We have to decrease the initial contact time and the departure time to the bare minimum. The same applies before starting an emergency caesarean section. We have to leave and drive as fast as possible. Our guideline allows only 1-3 minutes in the day and 1-6 minutes at night. The average travel time inside Budapest is about 10-12 minutes and to rural areas about 25-50 minutes. Planned transports have been coordinated by our dispatch service (24/7 duty) which attempts to satisfy every demand. Response time of interhospital transports between NICUs is 5-10 minutes. For diagnostic or operative interventions, transports can be planned up to 1-3 days.

There are many situations and places when resuscitation has been done by the mobile NICU. Examples include deliveries at home or birth or death in an unexpected place. After a fatal event, resuscitation is needed. If our emergency-transport team is called before the caesarian section of an asphyxiated fetus, we have to start resuscitation wherever we are. We are able to start the controlled hypothermia at the place of birth and continue it in the ambulance car as well. For resuscitation we use the AHA-AAP NRP-2006 version, which is available in Hungarian translation permitted by the contract of AAP and the Hungarian Child Health Institute.

## **WHO** transports neonates?

We work with fixed team composition:

- a) one car staffed by a neonatologist + registered neonatal nurse practitioner + driver, who are able to assist medical staff,
- b) one car with registered neonatal nurse practitioner + driver; both (a+b) in 24/7 duty
- c) plus an other car with registered neonatal nurse practitioner+ drivers daytime at workdays (8hours/5days a week duty)

If the doctor is a woman we also need a man who can carry the stretcher as some hospitals do not have elevators. (Usually medical students.)

## **WHAT TYPE OF EQUIPMENT** do we use and how can we reduce the side effects of transport?

We use 5 Mercedes Sprinter vans, 1 Ford Transit and 1 Toyota Hiace van that are fully equipped to imitate both an ambulance and NICU Level-III environments. We are able to transport two babies at the same time, because our cars are equipped with two incubators with antivibration and hydraulic systems. We use Dräger 5400 ITI type intensive incubators and Babylog respirators, AVL and iSTAT mobile blood-gase analyzer, and generally Propaque monitors. All babies are placed in vacuum mattresses during the transports.

## **WHAT TYPE OF TASKS** do we have?

The basic goal of the mobile NICU is to safely transfer a neonate to a tertiary care center in an environment as close as possible to that of the hospital NICU.

- a) Start or continue the resuscitation, stabilize patient condition avoiding all factors of stress in the environment of the referral hospital, prepare the baby for the optimal transport avoiding any possibility of worsening, and start the Level-III NICU care, mostly in the first golden hours after delivery, or in a figurative sense, in the first golden hours of the developing diseases.
- b) Perform the emergency interfacility transport from referral hospitals to NICU-Level IIIs.
- c) Perform the back /reverse / return transports to the referral hospitals from the NICU-IIIs.

- d) Perform transports of critically ill neonates to diagnostic examination (such as cardiac ECHO, ultrasound, CT, MRI) and surgical, ophthalmological (ROP), cardiac and neurosurgical interventions (hydrocephalus).

Additionally:

- e) Outreach education for medical and non-medical participants. (NRP, Assistance for Early Discharge and HomeCare of premature population)  
f) Otoacustical-emission screening of prematures and newborns in NICUs by PCA nurse.  
g) Transport ophthalmologists and laser equipment to the NICU-s without this type of service.

**WHAT TYPE OF PROTOCOLS** do we have?

Neonates are a unique transported population because of their physiological vulnerability (especially considering the transitory circulation). Even the most well-equipped vehicle can mean an unfriendly environment for a neonate – especially for extremely low birth weight infants. For these reasons we use special medical and safety protocols in the transport environment for optimal care. Generally we have guidelines that are similar to the AAP's neonatal-pediatric guidelines. Operation level of the Ambulance has been working systematically on the basis of the by ISO 9001 accreditation.

**WHAT TYPE OF EDUCATION** do we have?

The optimal transport system is expected to hire a highly educated, skilled staff. We have 33 active, full-time employees. There are 5 neonatologist + 1 neonatal fellow, who have formerly been pediatricians + emergency medicine specialist. (2 of the 6 doctors have an M.Sc. degree of health care management, 1 of them informatic expertise). There are 11 skilled registered neonatal nurses (4 of them have university degrees). There are 11 drivers (with EMT-I-II-III), 4 dispatchers (3 of them with EMT III or hospital experience, 1 of them informatic expertise), 1 transport-coordinator (M.Sc. degree from health care management + human resources). We have 4 part-time neonatologist, 2 part-time ophthalmologists and 7 part-time technicians carrying stretchers (generally medical students). Every employees participate in the continuous medical education based on protocols and peer-reviewed cases.

Our organization makes effort to provide outreach education for hospital and non-hospital staff in the field of neonatal emergency care. We have educated more than 1,300 people over 9,000 teaching hours for 15 years, using the AAP-NRP protocols. We have just restarted our formerly successful project (1996-2001 sponsored by the Johnson and Johnson's European Fund) to use the neonatal interfacility transport program in the post-intensive care period, as a part of the home care of ELBWI. The mission of this project is *to ensure* adequate emergency care background for life threatening situations after discharge, and *to help* parents and lay people recognize critical situations and illnesses in infants, and *to offer* assistance for pediatricians, general practitioners and community nurses in the towns and rural areas as well.

**WHAT TYPE OF BUDGET** do we have?

We have been working in a foundation form. Our non-governmental organization has got a flexible budget. It is based on sponsorship, donations and governmental support. Investments, amortizations, and about one-third part of the operational costs are covered by the contributions and about two-third parts of the operational costs are paid by the State.

Additional details from 2008: The number of patients: 3,022; The running distance of the ambulances: 165,700kms. The running cost of the ambulance was about 830,000 USD per year. Average cost per km: 5 USD/km; Average cost per transport: 380 USD per case.

**Reference:**

G.A. Woodward, Zs. Somogyvári: The Hungarian (Budapest) neonatal interfacility transport system: Insight into program development and results. Pediatric Emergency Care 1997 13:290-293