# Transfer and Transport of premature or small, sick newborn infants

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21th Feb 2024

# Objectives

- Acknowledge  the important of adequate transport of preterm and sick Newborn infants.
- Indication for transfer
- Organize transferring and transporting

# I. Introduction

- Neonatal period (28 days of life) is the period of greatest mortality in childhood.
- Based on CDHS 2021, neonatal mortality rate was 8/1000 live birth*.
- Infants may be born outside a regional center and require transport to a neonatal intensive care
- In 2023, around 6000 newborns were transferred to the Kantha Bopha Hospital in Phnom Penh.

*Ref: Cambodia Demographic and Health Survey 2021. Ministy of health. 2022

# Effect of place of birth and transport on morbidity and mortality of preterm newborns

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## Abstract

**Objective:** To evaluate the effect of place of birth and transport on morbidity and mortality of preterm newborns in the southern region of Brazil.

**Methods:** This cohort study included preterm newborns transported to a reference intensive care unit (transport group = 61 and transport were obtained at admissio reference hospital paired according to g econdary outcomes were changes in bloo ence of necrotizing enterocolitis, broncho ate the association between variables and outcome. The level of significance was se β = 90%.

**Results:** Mean travel distance was 91 km. Mean gestational weeks. Of the neonates in the transport group, 23% (n = 14) did not receive pediatric care in the de . During transportation, 33% of newborns were accompanied by a pediatrician, and the equipment availa incubator (57%), infusion pump (13%), oximeter (49%) and device for blood glucose test (21%). The tr t group had a greater incidence of hyperglycemia (RR = 3.2; 2.3-4.4), hypoglycemia (RR = 2.4; 1.4-4.0), perthermia (RR = 2.5; 1.6-3.9), and hypoxemia (RR = 2.2; 1.6-3.0). The percentage of deaths was 18% in the transport group and 8.9% in the control group (RR = 2.0; 1.0-2.6).

**Conclusions:** This study revealed deficiencies in neonatal care and transport. Perinatal care and transport should be better organized in the northeastern region of Rio Grande do Sul, Brazil.

The percentage of deaths was 18% in the transport group and 8.9% in the control group

*J Pediatr (Rio J). 2011;87(3):257-262:* Neonates, patient transport, intensive care unit.

# I. Introduction

## Immediate Outcomes of Neonatal Transport in a Tertiary Hospital in South-West of Nigeria

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Poor pre and intra-transport care → significant association with morbidity and mortality in the first 48 hours of presentation

If level of neonatal unite at maternity does not adapt to the state of the newborn.

What is the best method to transfer the sick babies?

Transfer the babies before they are born
(In-utero transfer)

# II. In-utero transport

- In-utero transfer has been proven to reduce perinatal morbidity and mortality compared to postnatal transport.

In-utero transfer is the gold standard

Ref: Raquel Jordán Lucas, et al. Recommendations on the skills profile and standards of the neonatal transport system in Spain, Anales de Pediatría (English Edition), Volume 94, Issue 6, 2021,

# II. In-utero transfer

❖ **Maternal indications of transfer**

- Placenta previa
- Pre-eclampsia, Severe pre-eclampsia, HELLP syndrome
- Polyhydramnios or severe oligoamnios
- Maternal disease with vital risk or need adequate  management
- Severe maternal disease or complications of pregnancy (heart disease, insulin-dependent diabetes, infection)

Ref: Raquel Jordán Lucas, et al. Recommendations on the skills profile and standards of the neonatal transport system in Spain, Anales de Pediatría (English Edition), Volume 94, Issue 6, 2021,

# II. In-utero transfer

❖ **Fetal indications for in-utero transfer**

- Risk of preterm birth before 32 weeks
- Congenital anomalies requiring immediate treatment
- PROM
- IUGR
- Twin pregnancy (Twin to Twin Transfusion  Syndrome), Triplet pregnancy
- Risk of blood type incompatibility

Ref: Raquel Jordán Lucas, et al. Recommendations on the skills profile and standards of the neonatal transport system in Spain, Anales de Pediatría (English Edition), Volume 94, Issue 6, 2021,

# II. In-utero transport

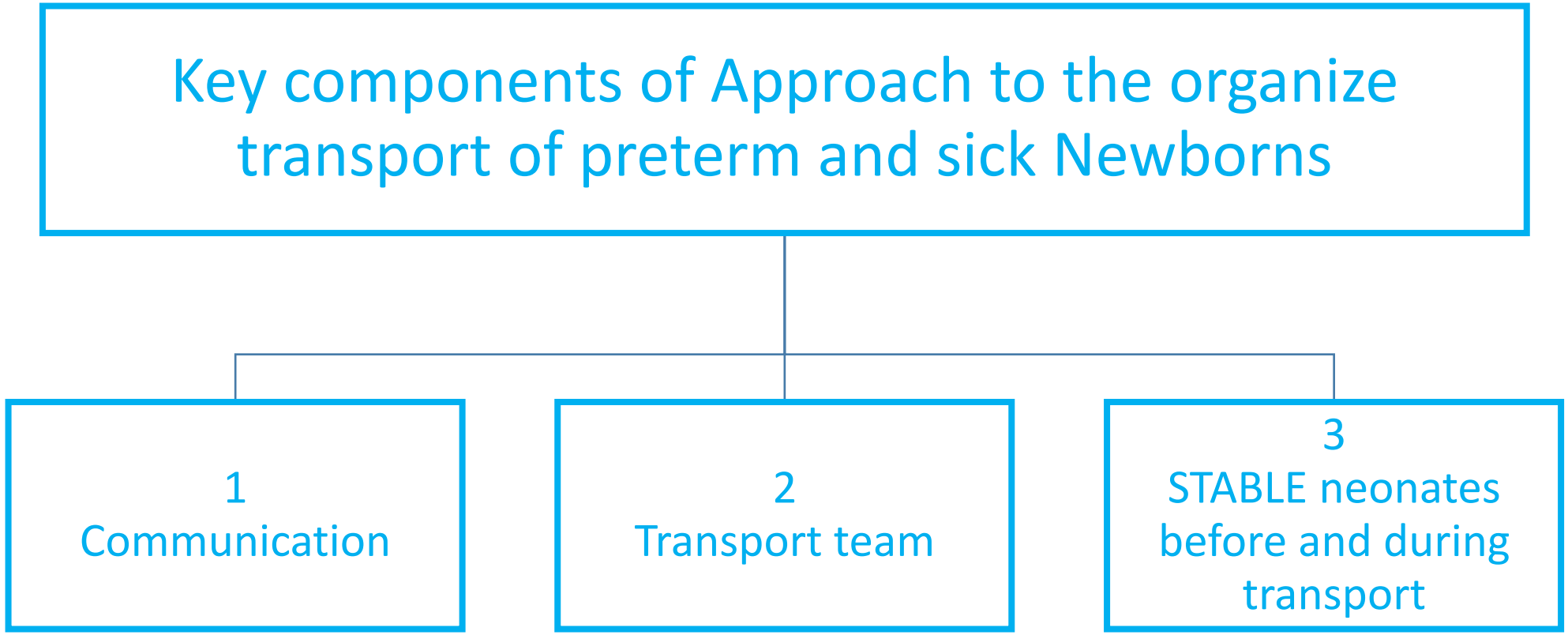
❖ **Contra-indication of transfer**

- Active peri-partum hemorrage ( bleeding praevia  placenta)
- Advanced dilated cervix in preterm labour
- All pathologies  need immediate fetal extraction
- Placenta abruption
- Perinatal asphyxia
- When the delivery is imminent and is likely to occur in the  ambulance,

→ Neonatal transport is required.

Ref: Raquel Jordán Lucas, et al. Recommendations on the skills profile and standards of the neonatal transport system in Spain, Anales de Pediatría (English Edition), Volume 94, Issue 6, 2021,

# III. Neonatal transport



# Key components of Approach to the organize transport of preterm and sick Newborns

**1- Communication**

- Inform consent from parents
- Contact receiving hospital by phone call:
    - Bed is available
    - Sick baby is
        - Term or pre-term
        - Cause of transferring?
        - Baby condition
    - estimated time of arrival to receiving hospital
- Complete newborn referral slip

Fig: Newborn Referral Slip

KINGDOM OF CAMBODIA
Nation - Religion - King

MINISTRY OF HEALTH
Provincial Health Department
RH/HC .....

**Newborn Referral Slip**

**Newborn's Information**:

Name of the newborn: ..... Sex: ..... Age: .....

Date of birth: ..... /..... /..... Time: ..... : ..... Place of birth: .....

Admission date: ..... /..... /..... Time: ..... : .....

Refer out on (date): ..... /..... /..... Time: ..... : ..... Reason for refers out .....

| | | |
|---|---|---|
| Gestational age at birth: ..... Fetal Heart Rate: ..... | | Apgar score: 1min ....5min ... 10 min ... |
| Birth weight: ..... | Newborn resuscitation: suction ☐, apply face mask & Ambu bag ☐, ventilation ☐<br>intubation ☐, use medicine ☐ | |
| Normal delivery:<br>Occiput presentation ☐, Breech presentation ☐ | Home delivery ☐, Referral hospital/Health center ☐, Private facility ☐ | |
| Assisted delivery: Vacuum extraction ☐, Caesarean section (C/S) ☐, Reason for C/S ..... | | |
| Head circumstance: ..... | Vitamin K1: Yes ☐, No ☐ | Eye drop: Yes ☐, No ☐ |
| Length: ..... | Hep B 0: Yes ☐, No ☐ | BCG: Yes ☐, No ☐ |
| Use of antibiotics before referral: ..... Dose: ..... Date/Time: ..... | | |

**Mother's information**:

Mother's name: ..... Age: ..... Blood group: ..... Rh: .....

Father's name: ..... Age: ..... Address: .....

..... Contact phone number: .....

| |
|---|
| Premature Rupture of Membrane: less than 18 hrs ☐, more than 18 hrs ☐, fever (>38.5°C) ☐<br>Color of amniotic fluid: clear ☐, with meconium ☐, with blood ☐, other .....<br>Odor of amniotic fluid: ..... Volume: normal ☐, polyhydramnios ☐, oligohydramnios ☐, none ☐ |
| Complication/infection during this pregnancy: rubella ☐, chicken pox ☐, syphilis ☐, HIV/AIDS ☐<br>placenta previa ☐, hemorrhage ☐, pre-eclampsia ☐, eclampsia ☐, diabetes ☐, other ..... |
| Use of medicine during this pregnancy:<br>Dexamethasone ☐ Betamethasone ☐ Dose: ..... Date/Time: .....<br>Antibiotics ..... Dose: ..... Date/Time: .....<br>Magnesium Sulphate (for pregnancy <31 weeks) ☐ Dose: ..... Date/Time: .....<br>Other medicines ..... Dose: ..... Date/Time: ..... |
| Number of antenatal care visits: ..... Number of Tetanus toxoid vaccination: ..... |

**Name and signature**

Contact phone number: ..... .....

# Key components of Approach to the organize transport of preterm and sick Newborns

**2- Transport team:**

- 2 member skilled in neonatal critical care (RNN, NN) in critical sick.

Neonatal Resuscitation Training

- Ambulance driver
- Mother accompany, family members unless mother get sick

Ref: Kristine AK, et al. Pre-transport / Post-resuscitation Stabilization Care of Sick Infants Guidelines for Neonatal Healthcare Providers 5th Edition. Learner Manual; Park City USA. 2006.

**3-Ensure that neonate is**

**STABLE before and during transfer**

**S** UGAR and SAFE Care

**T** EMPERATURE

**A** IRWAY

**B** LOOD PRESSURE

**L** AB WORK

**E** MOTIONAL SUPPORT

# S.T.A.B.L.E

- **S**ugar
  - Keep Blood glucose level >40mg/dl
  - Increase GIR if required

# S.T.A.B.L.E

❖ **T**emperature

- For non asphyxia baby and preterm infants,
  - Monitor and warm baby to keep skin T: 36.5-37.5°C
  - Transport incubator is ideal
  - Cover the baby with cap, wrap with towel warm blanquettes
  - Kangaroo mother care for stable preterm baby

- For moderate and server asphyxia baby
  - Passive cooling therapeutic.

# S.T.A.B.L.E

❖ **Passive Cooling therapeutic during transport**

- For term baby
- Moderate and severe Hypoxic-Ischemic Encephalopathy
- Target axillary temperature between 33°C- 34°C
- Uncover the baby
- Using car air conditioner
- Secure air way and breathing
- Monitoring , vital signs and temperature every 15mn

# S.T.A.B.L.E

- **A**irway and breathing
  - Keep airway patency, secure, nasal cannula, CPAP, ETT with oxygen supports as indication.
  - Attach to VS monitor, if not available pulse oximeter
- **B**lood pressure cardio-vascular
  - Keep IV in place with continuous infusion
  - Dopamine or Dopamine if required
- **L**aboratory investigations: CBC, Electrolytes, Blood gas, include Imaging, …
- **E**motional supports to the family, especially mother

Ref: Kristine AK, et al. Pre-transport / Post-resuscitation Stabilization Care of Sick Infants Guidelines for Neonatal Healthcare Providers 5th Edition. Learner Manual; Park City USA. 2006.

# S.T.A.B.L.E

**Care during transport**

- Record Baby condition progress during transports (problem during transportation)
- Monitor and note to care sheet every 15min
- Inform to the receiving hospital at least 15-30 min before arrival time

Ref: Kristine AK, et al. Pre-transport / Post-resuscitation Stabilization Care of Sick Infants Guidelines for Neonatal Healthcare Providers 5th Edition. Learner Manual; Park City USA. 2006.

# III. Neonatal transport

❖ **Problem may occur during transportation**

- Baby be come unstable
- Hypothermia
- Apnea or respiratory distress
- Airways supports issues
- Hypoglycemia (seizure)
- Cardiovascular ,Hypotension
- IV displaces

# IV. Discussion

# IV. Discussion

We lack equipment and skill. We can’t do anything!!

What can we do in our limitation setting?

VS

Scand J Caring Sci. 2022 Dec;36(4):997-1005. doi: 10.1111/scs.13000. Epub 2021 May 18.

**Exploring physiol**
**Kangaroo Mother**
**transport inc**
**ambulance transp**

Conclusion: Transporting in Kangaroo mother care position was more cost-effective.

Ref: Van den Berg J, et al. Exploring physiological stability of infants in Kangaroo Mother Care position versus placed in transport incubator during neonatal ground ambulance transport in Sweden. Scand J Caring Sci. 2022 Dec;36(4):997-1005. doi: 10.1111/scs.13000. Epub 2021 May 18. PMID: 34008205.

# Passive cooling during transport of asphyxiated term newborns

Deirdre O'Reilly, MD, MPH,[1] Michelle Labrecque, MSN, RN,[2] Michael O'Melia, RN,[3] Janine Bacic, MS,[4] Anne Hansen, MD, MPH,[1] and Janet S Soul, MD, CM[5]



## Conclusions

Exclusive passive cooling for hypoxic-ischemic encephalopathy results in significantly earlier achievement of effective therapeutic hypothermia without significant adverse events.

Ref: O'Reilly D, et al. Passive cooling during transport of asphyxiated term newborns. J Perinatol. 2013 Jun;33(6):435-40. doi: 10.1038/jp.2012.138. Epub 2012 Nov 15. PMID: 23154670; PMCID: PMC4090084.

# Conclusion

- Neonatal transport is significant associated with morbidity and mortality of newborns.
- Appropriate intervention pre and during transport is necessary.

# Recommendations

- Dr/nurse must be capable of Neonatal Resuscitation → Get Training
- Be able to get IV access for newborns
- Transfer the baby with neonatal referral slip.

# V. References


1. Cambodia Demographic and Health Survey 2021. Ministy of health. 2022
2. Breno F. et al. Effect of place of birth and transport on morbidity and mortality of preterm newborns. J Pediatr (Rio J). 2011;87(3):257-262: Neonates, patient transport, intensive care unit.
3. Raquel Jordán Lucas, et al. Recommendations on the skills profile and standards of the neonatal transport system in Spain, Anales de Pediatría (English Edition), Volume 94, Issue 6, 2021,
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5. Van den Berg J, et al. Exploring physiological stability of infants in Kangaroo Mother Care position versus placed in transport incubator during neonatal ground ambulance transport in Sweden. Scand J Caring Sci. 2022 Dec;36(4):997-1005. doi: 10.1111/scs.13000. Epub 2021 May 18. PMID: 34008205.
6. O'Reilly D, et al. Passive cooling during transport of asphyxiated term newborns. J Perinatol. 2013 Jun;33(6):435-40. doi: 10.1038/jp.2012.138. Epub 2012 Nov 15. PMID: 23154670; PMCID: PMC4090084.

# Thank you