

# Nepal Paediatric Society Guidelines for the Safe Transport of Critically Ill Children in Nepal

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## ABSTRACT

Transport of critically ill children is associated with increased risk of morbidity and mortality in developing countries due to the lack of adequate resources and skilled personnel. Transport of the sick child remains a major challenge in Nepal as well. The main objective of this article is to describe the importance of safe transport, and be a resource and guide for health care personnel during inter-facility transport of sick children in Nepal. This guideline is based on consensus statement of Nepal Paediatric Critical Care Working Group (NPCCWG) under the aegis of the Nepal Paediatric Society (NEPAS). It includes different components of transport, namely essential equipment, patient preparation, communications, medications, and transport checklist, that are required during transport of sick children, taking into consideration the current resources available in our health care facilities.

**Key words:** Critically ill child; Nepal Paediatric Critical Care Working Group (NPCCWG); Nepal Paediatric Society (NEPAS); Paediatric Intensive Care Unit (PICU); Transport

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## INTRODUCTION

Transport of critically ill children is a priority in health care that still needs to be addressed in Nepal.<sup>1</sup> The large burden of sick children, along with relative lack of availability of paediatric intensive care units (PICUs), has led to an increase in referral of patients among health care facilities.<sup>2</sup> Transport may make a difference in survival of sick children in resource limited countries for this very reason: to reach children to facilities that actually have intensive care services that they may need.<sup>3</sup> However, sick children are at increased risk of morbidity and mortality during transport. Hence, decision to even transfer needs to be done based on the benefit versus risks associated with transport itself.<sup>4</sup> Additionally, in Nepal, transport of sick paediatric patients is mostly done in the absence of health care personnel and without any information or documentation for receiving facilities.<sup>1,2</sup> These inappropriate transports may, in fact, cause deterioration of clinical status and even death, en-route or upon arrival to the receiving hospital / health facility. Studies have shown reduction in morbidity and mortality of critically ill children if transport is carried out correctly, by trained health personnel or specialised teams, after initial stabilisation of the child if needed.<sup>5,6</sup> This results in less transport-related adverse events, more stable patients on arrival at receiving facility and less in-hospital mortality.<sup>6-10</sup>

## AIM

The main aim of this document is to create a consensus guideline and protocol for the safe inter-facility transport of critically ill children in Nepal. The protocol will include:

- Emphasis on appropriate emergency treatment and stabilisation of patients prior to transport
- Guideline to anticipate adverse events during transport and their timely management en-route
- Availability of emergency equipment and medications that may be required during transport
- Documentation and communication of required information between referral and receiving facility

## METHODOLOGY

Most of the PICUs in Nepal are run by general paediatricians, as there are only a few paediatric intensive care specialists working in the country. Hence, the paediatricians working in PICUs in different parts of Nepal were contacted and 'Nepal Paediatric Critical Care Working Group' (NPCCWG) was created in 2016. The main objective of this group was to develop evidence-based protocols for PICU, based on locally available resources to improve quality of care of critically ill children in Nepal. As critically ill paediatric patients are at increased risk of morbidity and mortality during transport in a resource limited country like Nepal, the group agreed that creation of protocol for transport of critically ill children needed to be a priority. Accordingly, the initial draft was developed at the first paediatric critical care workshop of the NPCCWG conducted on 23<sup>rd</sup> November 2016. After further revisions done at subsequent meetings of the NPCCWG in 2018 and 2019, the final consensus document was presented to the Nepal Paediatric Society (NEPAS). The guideline and protocol for 'Transport of Critically Ill Children in Nepal' was finally endorsed by NEPAS to be published in NEPAS journal for the benefit of critically ill children in Nepal.

### Importance of safe transport:

Critically ill children transported by skilled personnel, with availability of appropriate equipment and medications that may be needed, leads to fewer adverse events and decreased deaths during transport and upon arrival at the health facility.

### Types of transport:<sup>11</sup>

- Intra-hospital transport: Transport of a patient from one site to another within the same hospital for diagnostics or therapeutic interventions.
  - Inter-hospital transport: Transport of a patient from one hospital to another hospital.
- Common indications for transport:<sup>12</sup>
- Unavailability of beds or ventilator
  - Unavailability to treat critically ill patients within the facility
  - Diagnostic and therapeutic interventions
  - On request of the family

### Components of transport:

When potential transfer is identified, both providers and patients and their parents / legal guardians need to be prepared for referral to another health facility.

1. Communication with parents: This is one of the important aspects of transport of critically ill children. Parents must be counselled regarding the reason for transferring their child to another health facility, and ensure that they agree to this.

2. Communication with referral facility: Effective communication with the receiving facility is one of the most important factors to determine successful transport. It is the responsibility of the referring facility to communicate with the receiving facility to ascertain availability of bed and / or ventilator prior to transport. The receiving facility should be provided with a brief summary of patient's condition, all imaging and laboratory work done, treatment administered and the reason for referral.

3. Means of transport: The appropriate means of transport should be identified (air transport versus ambulance by road) and arranged after discussion with the family. Ensure that the ambulance brings the transfer team back to the referring hospital.

4. Patient preparation: As soon as transfer is planned, patient should be prepared according to the transfer checklist provided below (APPENDIX I).

5. Stabilisation of child before transport: This is a very crucial part for management of sick children. It is the responsibility of the referring facility to stabilise the child pre-transport. Transporting a sick child without stabilisation will lead to serious adverse events, including death.

6. Equipment preparation: As soon as transport is planned, equipment needs to be checked. It's always better to keep equipment ready in a bag or box that is used during transfer of sick children. Oxygen cylinder needs to be checked. It is advised to carry one extra cylinder in the ambulance. Table 1 provides the details of equipment lists that should be used in transport of critically ill children.

7. Personnel and training: During transfer, sick children should be accompanied by health

personnel. If the child is intubated, he / she should be accompanied by two health personnel and at least one should know how to intubate the child. Ideally, transport personnel should be trained on Basic Life Support (BLS), Paediatric Advance Life Support (PALS), Neonatal Resuscitation Program (NRP). It is always better to send health personnel who have some experience of working in PICU for transport of a critical child.

8. Documents: Patient should be transferred with a copy of transfer summary, radiographic studies, laboratory investigation results, medication list and referral slip as provided below (APPENDIX II).

9. Patient assessment before leaving the referral unit: Patient should be assessed including general physical examination, vital signs, along with systemic evaluation before transporting the child. Transport personnel should evaluate whether the child is stable enough to be transferred. If the child is not stable, he / she should be transferred only after stabilisation.

10. Duration of transport: The start time of transport from referral facility and time of arrival at receiving facility should be noted. Any adverse events during the transport should be noted along with any intervention performed.

11. Patient assessment at arrival at the receiving facility: Patient should be assessed by a health personnel including vital signs check on arrival to the receiving facility. After assessment and documentation of the findings, the patient should be handed over to receiving unit with all the documents brought along.

12. Returning back to hospital: Once transport process is completed; transport personnel should return with the equipment and transfer checklist back to the referring facility.

## CONCLUSIONS

This clinical guideline for management of sepsis and septic shock in children in Nepal is a consensus document, keeping in view the resources available, created by paediatricians working in various PICUs in the country and based / adapted from the Surviving Sepsis Campaign 2020. This is an

attempt to decrease variability in critical care delivery and standardise care by providing a guide to providers. Use and efficacy of this guideline will be monitored after dissemination and implementation.

**Table 1.** Equipment list

Equipment lists
<p><b>A. Airway, Breathing and Circulation</b></p> <ul style="list-style-type: none"> <li>• Ambu bag and mask of appropriate size</li> <li>• Laryngeal Mask Airway (LMA) of appropriate size</li> <li>• Endotracheal tubes with stylets: appropriate size for age, one size above and below</li> <li>• Portable capnograph</li> <li>• Laryngoscope with blades and extra batteries</li> <li>• Oxygen cylinder: full tank and one extra is preferred</li> <li>• Needle thoracotomy set (Butterfly needle will do)</li> <li>• Portable suction machines with suction catheters (If available)</li> <li>• Transport ventilator (If available)</li> <li>• Automated External Defibrillator (AED)</li> <li>• Intravenous cannulas and IV start sets</li> <li>• Intraosseous needle (If difficult IV access)</li> <li>• Intravenous fluids: Isotonic crystalloids and colloids</li> </ul>
<p><b>B. Medications</b></p> <ul style="list-style-type: none"> <li>• Adrenaline</li> <li>• Atropine</li> <li>• Normal saline</li> <li>• 10% Dextrose</li> <li>• 10% Calcium gluconate</li> <li>• Morphine</li> <li>• Midazolam</li> <li>• Anticonvulsants (If seizure)</li> <li>• Inotropes (If shock)</li> <li>• Mannitol or 3% saline (If raised intracranial pressure)</li> </ul>
<p><b>C. Monitoring</b></p> <ul style="list-style-type: none"> <li>• Pulse oximeter (Ensure it is charged)</li> <li>• Thermometer</li> <li>• Stethoscopes</li> <li>• Glucometer</li> <li>• Blood pressure cuff (Appropriate size)</li> <li>• Syringe pumps (If available) or intravenous set</li> <li>• Monitor with ECG leads (If available)</li> </ul>

## Appendix I

### Transfer Checklist (Referring Hospital to complete)

Doctor / Medical staff accompanying the patient needs to complete this

Name: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Hospital no: \_\_\_\_\_  
 Date of Transfer: \_\_\_\_\_ Time of transfer: \_\_\_\_\_  
 Transfer from: \_\_\_\_\_ Transfer to: \_\_\_\_\_

1. WHEN POTENTIAL TRANSFER IS IDENTIFIED	Check [√] [N/A if not available or not applicable]
Identify the problem and the reason for transfer	
Inform the senior doctor on call	
Inform parents	
Ensure that the problem of the patient is communicated to the receiving unit	
Ensure that the receiving unit is ready to receive and bed is available	
Identify the transfer team	
Evaluate urgency of transfer	
Prepare equipment for transfer	
Book ambulance with oxygen and ensure that the ambulance will take the transfer team back to hospital	
2. PATIENT PREPARATION	
Patient must have a definitive airway. If in doubt, intubate electively.	
Secure endotracheal tube	
Ensure normal blood glucose	
Tape the eyes of the patient if sedated	
If history of trauma, immobilize the cervical spine	
Chest drains must never be clamped. Use one way valve drainage bag instead of underwater seal bottles if possible	
At least two reliable intravenous accesses should be obtained	
For short transfers and or for older children, maintenance fluid may sometimes be omitted but must be carried	
Neonates: intravenous fluid should be continued (via a syringe pump, if available)	
Sedation and paralyzing agents can be given by bolus injections	
Ensure patient is wrapped properly to prevent hypothermia	
3. EQUIPMENT PREPARATION	
Resuscitation Box : Endotracheal tube <input type="checkbox"/> , stylet <input type="checkbox"/> , Ambubag <input type="checkbox"/> , laryngoscope <input type="checkbox"/> , with blades and extra batteries <input type="checkbox"/> , syringes <input type="checkbox"/> , Adrenaline <input type="checkbox"/> , Atropine <input type="checkbox"/> , Normal saline <input type="checkbox"/> , 10% Dextrose <input type="checkbox"/> , Morphine <input type="checkbox"/> , Midazolam <input type="checkbox"/> , Calcium gluconate <input type="checkbox"/> , thermometer <input type="checkbox"/> , glucometer <input type="checkbox"/> , BP instrument[app. cuff] <input type="checkbox"/>	Check [√] available items
Transfer cot for small babies	
Portable SPO2 machine (ensure that it is charged fully)	
Portable O2: keep extra cylinder	
Patient's transfer notes <input type="checkbox"/> X-rays <input type="checkbox"/> investigation reports <input type="checkbox"/>	Check [√] available items
• Ensure the transfer team has a mobile phone, the receiving unit's contact no and the contact no of a senior doctor on call from the referring unit	
• Money for emergency	
• Confirm route to receiving unit	

Reason for transfer:

Time of leaving the referral unit:

Vital signs on leaving the referral unit:

- Temperature:
- Heart Rate:
- Respiratory Rate: [On ventilator Yes  No - CRT / BP:
- SPO<sub>2</sub>:
- Blood Glucose:

Time of arrival at the receiving unit:

Assessment of child on arrival at the receiving unit:

- Temperature:
- Heart Rate:
- Respiratory Rate:
- CRT / BP:
- SPO<sub>2</sub>:
- Blood Glucose:
- Airway status:
- Breathing:
- Circulation status: Sepsis: Y / N
- Disability: Neurological status: AVPU Pupils (size and reaction):
- Nutrition: Enteral or parenteral:
- Sedation status (if yes): medicines and dose:

Adverse events during transfer if any: \_\_\_\_\_  
 \_\_\_\_\_

Receiving unit / Doctor's Name and Signature: \_\_\_\_\_

Name and signature of the transferring Doctor: \_\_\_\_\_

**APPENDIX II (Referring Hospital to complete)****Critically ill Child Referral Slip****Code****Name:****Age:****Sex:****Provisional Diagnosis:****Name of referring hospital:****Phone no:****Name of receiving hospital:****Phone no:****Date and time of referral:****Estimated duration of travel:****Reason for referral:****During transport accompanied by:** Doctor / Nurse / Paramedics / Other Health worker / Parents / guardians**Brief History and Hospital course (Relevant only): Or a discharge summary****Vitals at the time of referral:** Temp.: PR: BP: CRT: RR: SpO<sub>2</sub>: Blood Sugar:**Level of Consciousness: AVPU or GCS****If on ventilator, ventilator settings:**PIP: Rate: FiO<sub>2</sub>: TV: Minute ventilation: PEEP:**Blood Gas: ABG:**  **CBG:**  **VBG:**   
pH: pO<sub>2</sub>: HCO<sub>3</sub>: pCO<sub>2</sub>: Base excess:**Laboratory reports (Relevant only):****Treatment received:**.....  
Consultant / Resident / House officer

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