Transport of Paediatric Cardiology Patients - Guidelines for Best Practice

Document Type	Guideline
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Staff members affected	Paediatric Cardiology Clinicians, NZ paediatricians
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Contents

1. Purpose of guideline (always required)

The purpose of this document is to articulate appropriate levels of care for paediatric cardiac patients during transportation to and from the tertiary referral centre. Patients who are considered vulnerable and/or have increased transport risks are described and Best Practice for their safe transport is suggested.

2. Policy statements *or* guideline management principles & goals

Underpinning principles

- ☐ The consultant at the *sending* DHB remains responsible for the care of the child until handover to the destination DHB team has been completed.
- ☐ The consultant at the *sending* DHB determines the level of care and nursing surveillance required in transit based on current and anticipated need.
- ☐ The transport criteria outlined in this document reflects the recommended levels of care for PCCS patients. This applies to patients travelling to **and** from the tertiary centre.
- ☐ The length of journey, age and physiological fragility of the child may impact on the mode of transport suggested e.g. a higher level of transport care may be indicated for children undertaking longer journeys.
- ☐ PCCS at Starship promotes the use of vehicle safety restraints for all transports including airport transfers. Furthermore, these restraints should be appropriate to the child's age, clinical condition and duration of the journey.
- ☐ When transporting infants in infant capsules, journeys of greater than 1 hour uninterrupted should be minimised. If longer journeys are unavoidable, car seat trials should be considered and the use of foam inserts promoted.
- ☐ For children who are likely to be discharged home, access to a suitable car safety restraint needs to be addressed early in the discharge planning process.
- ☐ PCCS will arrange transfer of patients back to their referring hospital at that DHB's expense if the funding DHB are unable to provide transport.

Transport Personnel

- ☐ Any child being transferred for continuation of in-patient care will be escorted by a registered nurse as a minimum.
- ☐ Nurses and physicians escorting patients must have relevant paediatric/neonatal and cardiac expertise and experience
- ☐ Nurses are able to provide for safety and comfort needs of patients but have limited capacity for escalation of care in transit. Criteria for physician escort should therefore include:
    - If the transport team consider it necessary based on the child's condition.
    - If the child's clinical status means that they could conceivably deteriorate or require escalation of care during the transport.
- ☐ Nurses and physicians escorting patients must have completed appropriate transport training. For nurse escorts during flights they should have completed the following:
    - NZNO (NZFNA) flight nurse training program for medical/transport team flights and/or
    - Air New Zealand Flight safety course for commercial flights.

3. Best practice for patients transferring to another DHB for continuation of in-patient care

Criteria		Mode of transport
Critically Ill Child Criteria ☐ Requires respiratory support other than oxygen ☐ Physiologically unstable or has the potential to become so ☐ Requires vasoactive drugs ☐ Requires invasive and/or continuous vital signs monitoring	➔	Chartered Transport Flight (ambulance transfers) *[Local transport team/ Lifeflight/PICU/NICU]* Or transport by ambulance in appropriate restraint, by transport team
Vulnerable Child Criteria Child does not meet *Critically Ill Child* Criteria but meets one of the following: ☐ Require continuous vital sign monitoring ☐ Requires O2 or is likely to require it in transit (except if on home O2) ☐ Requires intravenous therapy in transit (except for home IVN) ☐ Are being transported for imminent end of life care ☐ May be physiologically compromised by flying in an aircraft ☐ Have underlying pathology that places them at risk of rapid physiological deterioration or who may become compromised by a long or prolonged journey: For PCCS this would include: o Single ventricle infants (prior to bi directional glenn) o Infants with shunt dependent anatomy o Children with ejection fraction less than 25% o Children with severe pulmonary hypertension	➔	Chartered Transport Flight (ambulance transfers) *[Local transport team/ Lifeflight/PICU/NICU]* Or transport with nurse escort by ambulance, in appropriate restraint
Vulnerable Infant Criteria Are an infant travelling in an infant car restraint for more than 1 hour without interruption who does not meet *Critically Ill Child* or *Vulnerable Child* Criteria but meets one of the following: ☐ Are less than 4 weeks of age (corrected if less than 37 weeks gestation at birth) ☐ Are less than 3.5kg or less than 37 weeks gestational age (corrected) ☐ Have known or suspected airway compromise ☐ Have other pathology that might reduce capacity for respiratory compensation (given seated positioning) ☐ Has cyanotic heart disease	➔	**Car seat trial required** <u>If trial is passed</u> Commercial flight with nurse escort and/or road journey in taxi with car seat **Minimise time in infant car seat.** <u>If trial is not passed or not undertaken</u> Chartered Transport Flight in appropriate restraint (ambulance transfer) Or transport with nurse escort by ambulance in appropriate restraint
Nurse Escort Criteria Child is being transferred to another DHB for continuation of in-patient care but does not meet *Critically Ill Child*, *Vulnerable Child* or *Vulnerable Infant* Criteria	➔	Nurse escort and transport by: Taxi or ambulance, in appropriate restraint Or commercial flight (transfers by taxi or ambulance, in appropriate restraint)

4. Best practice for children discharging home from Starship

Destination	Best Practice
Child resides in greater Auckland area	→ Carer to transport child home Undertake car seat trial if child meets Vulnerable Infant Criteria. For all children travelling by car: o Promote appropriate car safety restraint use o Recommend regular rest breaks for long journeys by road
Child resides in *non- ADHB domicile*, is approaching discharge but meets Vulnerable Child Criteria.	→ In-patient transfer to local DHB. Local team assess patient and manage discharge home
Child resides in *non- ADHB domicile*, is approaching discharge but meets Vulnerable Infant Criteria.	→ *Consider* in-patient transfer to local DHB. Local team assess patient and manage discharge home **or** Undertake car seat trial prior to discharge **and** suggest use of car seat insert
Child resides in *non- ADHB domicile* requiring a flight transfer but does **not** meet Vulnerable Child Criteria or Vulnerable Infant Criteria	→ Commercial flight with carer provided they are competent to meet the needs of the child, e.g: o Tracheostomy o Suctioning o Seizures o Enteral feeds o Medication administration
Child resides in *non- ADHB* domicile requiring a flight transfer who does **not** meet Vulnerable Child Criteria or Vulnerable Infant Criteria but meets one of the following: • Carers need support or supervision in transit • Child has care needs that carers cannot manage alone. For instance: o Child has potential to have seizures in transit o Child has increased safety needs o Child has mobility issues that carers cannot manage without assistance	→ Nurse escort and transport by: Taxi or ambulance, in appropriate restraint Or commercial flight (transfers by taxi or ambulance, in appropriate restraint)
Child resides in *non- ADHB domicile* requiring a flight transfer and is on home oxygen	→ Commercial flight with carer (provided they are competent and confident about meeting the needs of their child.) Follow guidelines for booking flights with oxygen.
Patient has a special transport needs (e.g. Casts or splints that preclude use of car safety restraints or patient has special needs and does not have access to specialist vehicle)	→ Specialist equipment for safe travel provided to carers **or** Bespoke transport arrangements made (e.g. ambulance transfer)

For non Auckland DHB families, the local DHB usually funds transport for 1 caregiver (2 for major surgery and when agreed on an individual basis).
Other children or family members are not funded so costs must be met by family (or occasionally other agency).
If families wish to travel together they must wait until the child and caregivers travel arrangements are booked and then book on the same flight (the ward social worker may be able to provide assistance if needed) or contact NTA directly to book groups and pay them directly.

5. Appendix One: PCCS Car Seat Trial Protocol

A car seat trial will be undertaken for all infants travelling for more than 1 hour without interruption in an infant capsule if they meet the vulnerable infant criteria as outlined below:

- ☐ Are less than 4 weeks of age (corrected if less than 37 weeks gestation at birth)
- ☐ Are less than 3.5kg or less than 37 weeks gestational age (corrected)
- ☐ Have known or suspected airway compromise
- ☐ Have underlying pathology that might reduce capacity for sustained cardiorespiratory compensation
- ☐ Has cyanotic heart disease

Car seat trials may be undertaken on ***any*** infant, regardless of the above criteria if parents request it.

Car Seat Trial Procedure

PCCS recommends the use of h-type inserts (such as the *happi baby* insert) for **all** infants especially those travelling in infant capsules. If parents are considering purchasing these inserts the car seat trial should be conducted with the insert in place. Ideally the trial should be undertaken in their own car seat (or the one they will be transported in).

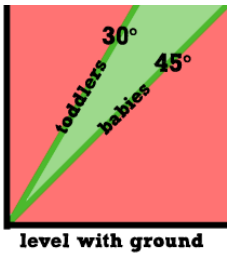
Positioning for the trial

- ☐ Secure the child in the car seat with just clothes (no blankets) and then add blankets afterwards.
- ☐ In the rear facing position, the shoulder straps should be *at or below* the level of the child's shoulders.
- ☐ The straps should be either a

5-point harness	3-point harness with a chest strap	
	Chest strap should be positioned at the level of the armpits. If the seat has no chest strap this should be purchased from a baby equipment outlet.	

- ☐ The infant should be secured in the device with the straps done up firmly (you should be able to fit a finger comfortably between the straps and the child).

☐ The device should be placed in the same position it would be in a vehicle (i.e. angle of the spine needs to be 45 degrees). You may need to place blankets beneath one end to re-produce this outside a car.



Preparing for the Trial Procedure

☐ Choose a time in the day when the child might normally sleep e.g. after a feed.
☐ Infant should be constantly observed by carer during trial for changes in colour or breathing patterns.
☐ Saturations should be monitored throughout the trial.
☐ The trial needs to be 120 minutes in duration, as clinical trials suggest that hypoxic events occur more frequently after 60-90 minutes in a device. If the child is removed before this time the trial should be repeated.

Trial failure would be considered in the event of the following:

☐ Witnessed apnoea or sudden colour change (with associated desaturation)
☐ Saturations dip to less than the agreed minimum for more than 20 seconds
  ☐ For infants with normal cardiorespiratory anatomy this would be less than 92%
  ☐ For infants who usually have lower than normal saturations (e.g. cyanotic heart disease), less than the limit dictated by their physician

In the event of trial failure:

☐ Discuss need for further investigation with medical team.
☐ Consider using a h-type insert – repeat the trial with the insert in situ.
☐ Consider transporting infant flat (travel cot/bassinet/incubator) for transfers *or*
☐ Consider using lie-flat infant car seat in family car.
☐ Consider whether oxygen would be indicated.

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6. Appendix Two: Equipment carried on Ambulance Vehicles

Appropriate Vehicles and Equipment

In the Auckland area, Patient Transport Vehicles (PTS) are available for patient transports as well as "baby bus" vehicles that are equipped below. Outside the Auckland area front line vehicles are usually used for patient transports. Ambulances do not carry paediatric monitoring equipment or paediatric airway equipment and this must be provided by the escorting nurse or team. ALL ambulance services in NZ should be able to access

Type of Vehicle	Equipment carried	Do NOT carry	Other notes:
Auckland Patient transfer ambulances PTS (old)	▪ Pedimates, ▪ Skip harnesses, ▪ Oxygen (wall and portable) ▪ Suction (not necessarily with paediatric catheters)	▪ Low flow oxygen, ▪ 240v power supply, ▪ Paediatric Airway Equipment ▪ Vital Signs Monitoring Equipment	▪ Drivers and attendants are non clinical
Auckland "Baby bus" and New PTS vehicles	▪ Oxygen with high and low flow regulators, ▪ Medical air, ▪ Skip harnesses ▪ Pedimates, ▪ Inverters for the supply of 240 volt power ▪ Suction (not necessarily with paediatric catheters)	▪ Paediatric Airway Equipment ▪ Vital Signs Monitoring Equipment	▪ Staffed with a non-clinical driver
Non- Auckland front line vehicles used for tranports	▪ Oxygen (wall and portable) ▪ Suction (not necessarily with paediatric catheters)	▪ Skip harnesses & pedimates (all should have *access* to pedimates) ▪ Paediatric Airway Equipment ▪ Vital Signs Monitoring Equipment	

7. Best Practice for Ambulance Transport Restraints for Children (non ICU transport)

Age or weight	Patient need	Recommended Device
Infant (<5kg) N.B Some models can transport up to 6kg)	▪ Unable to maintain own temperature without warming **and/or** ▪ Requires direct observation of respiration in transit or IV lines (no clothes)	▪ Transport incubator
Infant	▪ Journey time less than 1 hour (longer if saturations are monitored) **and** ▪ Able to maintain own temperature without warming ▪ Does **not** require direct observation of respiration in transit (wearing clothes) ▪ Does **not** meet vulnerable infant criteria	▪ Infant capsule secured to stretcher **or** ▪ Infant capsule/stretcher system **or** ▪ Convertible car seat (rear facing position)
Infant	▪ Journey time more than 1 hour ▪ Able to maintain own temperature without warming ▪ Does **not** require direct observation of respiration in transit (wearing clothes) ▪ Meets vulnerable infant criteria	▪ Transport crib[1] **plus** ▪ Skip harness[2] **plus** ▪ Ambulance stretcher
Child (5-18.55kg)	All	▪ Pedi-mate harness[3] **plus** Ambulance stretcher
8 years or older **or** >18.5kg	All	▪ Ambulance stretcher with straps

Adapted from U.S. Department of Transportation and National Highway Traffic Safety Administration (NHTSA) (2012) Guidelines.

[1] May be borrowed from ADHB NICU or transit service and must be returned to them
[2] Carried on all Auckland patient transport ambulances – not always available outside Auckland Area – can be borrowed from transit service
[3] Carried on all Auckland patient transport ambulances – not always available outside Auckland Area – can be borrowed from transit service

8. Appendix Three: Appropriate car safety devices

Age, weight or height	Suitable Devices	NZ Legal requirements
Infants less than 2.3kg	Infant restraint (capsule) **or** car bed/lie flat infant car restraint [*for babies less than 3.5kg – check positioning and fit of capsule as can vary widely across models*]	**ALL children up to 6 years of age** must be restrained in an approved Car Safety Restraint. They may not travel in a car without an approved car safety device. **Children aged 7 years** must use a Car Safety Restraint if one is available **Children aged 8-11 years** should use an appropriate Car Safety Restraint or booster seat if one is available ***or*** a seat belt **and** must travel in the back seat of the vehicle. **Children aged 11-14 years** - must wear a seat belt if available. Recommended to travel in the back seat of vehicles as this affords the most protection in a crash If there is no seat belt, children aged 11 to 14 years **must** travel in the back seat. **Children aged 15 years and over** must wear a seat belt if available Public transport vehicles are exempt from car safety restraints legislation. However, ADHB promotes the use of appropriate vehicle restraints for **all** patients travelling to, from and between services.
Birth to 9 kg	Infant restraint (capsule) *most models suitable for infants bigger than 2.3kg however, for babies less than 3.5kg check positioning and fit of capsule as can vary widely across models* **or** car bed or lie flat infant car restraint	
Birth to 10 kg (or until infant can sit up independently)	Car bed or lie flat infant car restraint	
Birth to 12-13.5 kg (approx. 2 years) ***maximum weight varies with make and model of device***	Convertible (baby to child) restraint (car seats) *Rearward facing until two years of age or until they have reached the maximum weight and height limits recommended by the manufacturer.*	
12 to18 kg (approx. 2-4 years) ***maximum weight varies with make and model of device***	Convertible (baby to child) or front facing restraint (car seats) *From two years can travel front facing*	
9–18 kg (about 1 year to approx. 4 years).	Front-facing child restraint (car seat) *(current recommendations are that child is transported rear facing until 2 years of age or until they have outgrown rear facing device)*	
14–32 kg (approx. 4 to 11 years) or until child is 148cm tall	Belt positioning booster seat: *By the age of 11yrs most children are tall enough to fit an adult seatbelt*. **or** Child safety harness *only if a car/booster seat is not available*: 14–32 kg (approx. 4 to 11 years)	
Taller than 148cm tall	Adult car seat belt	

Other Considerations

- Choose a car safety restraint that is appropriate for the make and model of car (seek advice from car seat supplier or Plunkett)
- Never put a child, in a rear-facing child restraint, in the front seat of a car with an activated passenger airbag.
- Children in forward facing child restraints are safer in the rear seats – if they *have* to travel in the front seat – consider deactivating the passenger airbag (re-activate when an adult passenger is in the seat).

9. Appendix Four: Guidelines for arranging oxygen on a commercial flight

Flight must be booked through local hospital travel coordinator, allow 2-5 days to organise O_2.

- ☐ Obtain account details and oxygen purchase order numbers from patient's local hospital
- ☐ Faxed MEDA (medical fitness for air travel) form to Airline (fax number on form). If child has been on commercial flight with oxygen before, please note this on the MEDA form along with approximate previous discharge date as this is helpful for Air NZ.
- ☐ Obtained Air NZ clearance for child to fly with O_2 and permission for BOC to supply O_2. Allow ½ day for clearance to occur.
- ☐ Contact BOC ph 0800 111 333 to order paediatric transport pack – low / high flow meter (paediatric packs are limited therefore may take a few days). BOC flight cleared travel oxygen packs must be ordered on an individual patient basis from BOC gases.
- ☐ Collected transport pack from BOC at the designated branch. BOC may be able to courier the pack to the Penrose branch and the family can pick it up on the way to the airport – allow 1 day for courier.
- ☐ Checklist completed by BOC personnel and the pickup up person. The completed form will be required by Air NZ.

Note: ADHB does not have a supply of BOC flight cleared travel oxygen packs. They must be ordered on an individual patient basis directly from BOC gases.

10. Supporting evidence

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11. Associated ADHB documents

Transfer and Escort of Patients
PICU Transport Service

12. Disclaimer (always required for a guideline - we will add the text for you)

13. Corrections and amendments (we will add the text for you)