Long distance transport and retrieval of neonates

Newborn Emergency Transport Service
Mobile Intensive Care for Babies

Dr Steven Resnick
Medical Director NETS WA
Western Australia

- Largest state in Australia
- Spans 2400km
- Area 2.5 million km$^2$
- Population 2.2 million
- Annual birth rate 30,000
- Most isolated capital city in the world
  - Unique environment for retrieval/transport
RFDS Bases in Western Australia

[Map of Western Australia showing major RFDS bases: Perth, Kalgoorlie, Meekatharra, Port Hedland, and Derby.]
NETS WA

- One of the first neonatal transport services in Australia
- Developed in the early ‘70s
- Originally called WANTS
- MAIN OBJECTIVE
  - to facilitate the safe transfer of sick or preterm infants to tertiary referral centre
- 850 emergency transports/year
- 10 interstate transports
  - Neonates with CHD
Congenital heart disease

- Incidence of ~ 10/1000 live births in WA
- Of these, 2-3/1000 have critical conditions requiring intervention in infancy.
  - TGA
  - Coarctation/ interrupted aortic arch
  - Hypoplastic left heart
  - Truncus arteriosus
  - Pulmonary atresia
• Maintaining ductal patency with PGE1 infusion
Local history

- 1st Arterial switch operation performed in Melbourne in 1983
  - Preceded by Senning/ Mustard procedures
- Early 1980’s:
  - Population of WA ~ <1 million
  - 21,000 births/year
- Limited neonatal cardiac surgery in Perth
- Adult cardiac surgeons from RPH
  - Coarct repairs/ PDA ligations
  - Senning (poor results)
Interstate transports

• 1\textsuperscript{st} interstate transport to Melbourne 1986
  – “supraregional centre”

• Since then, 250 neonates transported across the country
  – Primarily Melbourne (~3000km)
  – More recently Brisbane (~3600km)
Why the need?

• Small population, caseload
• Difficult to upskill, especially for complex cases
• Single cardiac surgeon
• Paediatric cardiac surgery not just about the surgeon!
  – Cardiac anaesthetists
  – Perfusionists
  – ICU
  – ECMO…
• Public enquiry into the management of the care of children receiving complex cardiac surgery between 1984 & 1995.

• Focussed on open-heart surgery in <1yr age group
  – Mortality rates for Arterial switch double those of other centres
• Treatment was divided between 2 sites:
  – Cardiologists at children’s hospital
  – Surgeons at adult hospital
  – Surgeons operated on adults & children
  – Children cared for in mixed ICU (alongside adults).

• Conclusion:
  – “The system for delivering PCS services in Bristol was frankly not up to the task.”
  – Bristol should not have been a designated supraregional centre for open heart PCS.
The way it was...
Equipment

• Commercial aircraft (Qantas/ Ansett)
• Specially adapted transport cot
  – Vickers Model 77 MK3
  – In-built ventilator, battery
  – Strapped down on 3 seats
  – Row in front blocked off: 2-3 D-size cylinders of air &/or O₂.
  – Biomedical engineer
  – Nurse & doctor
  – Accommodation
  – Parents
Cylinders facing aisle

Aircraft seat

Fixing rings on cot

Floor shackles

Cylinder box goes on the floor in front of the next row of seats

Fixing rings on cot

Floor shackles

Aircraft seat

Cylinders facing aisle

Set up for PMH transport cot on 737 aircraft.

Belts wrapped around cot carrying handles

Female end of strap with buckle on to be attached here

Affix cylinder box handle to floor with looped belt attached to shackle.
Outcomes

• 250 patients transported
  – 165 (65%) on PGE1 infusion
  – 100 (40%) ventilated
  – 55 (22%) on inotropes

• Morbidity:
  – Mostly stable (90%)
  – No accidental extubations

• Mortality: 1 (0.4%)
Diagnoses of transported patients

• Duct-dependent lesions:
  – TGA
  – Coarct/ interrupted arch
  – Hypoplastic LH
• Truncus arteriosus
• TAPVR
Transport complications

• Logistical/equipment issues:
  – Organising flights
  – Flight delays
  – “cot had been used for 2 transports night prior; batteries failed 1 hr out of Melbourne”
  – “had to carry cot down flight of stairs”
  – “ambulance was just a Tarago van.”
  – Nosy passengers
  – Return journey
  – Ageing equipment
A BETTER WAY
Dedicated air ambulance

• “Unlimited” power and oxygen supply.
• Available at short notice.
• Flight time similar to commercial aircraft, but substantial time saved on the ground (loading and unloading directly into the ambulance.)
• Loading into and out of the jet is effortless.

• 15 transports
  – 9 Brisbane (Careflight)
  – 6 Melbourne (RFDS)
Chilean ash cloud's round-the-world tour
From: AFP
June 18, 2011 5:29PM
RFDS mercy dash to beat the ash
KATE BASTIANS, Yahoo7 June 15, 2011, 2:25 pm

RFDS fly despite the ash cloud as baby Bronwyn Bevan is prepared for a life saving flight to Melbourne. Picture: Ian
Desperately ill baby girl in low-flying mercy dash to Melbourne
Nathan Mawby, Olga Galacho
From: Herald Sun
June 16, 2011 12:00AM
Newborn Emergency Transport Service
Mobile Intensive Care for Babies
Rare events
• 28 week twins born in Bali
• Australian parents
• 1\textsuperscript{st} twin died
• 2\textsuperscript{nd} twin RDS/ sepsis
  – On CPAP
  – Deteriorating, considering ventilation
  – No blood gas facilities
• ++ logistic issues
• Careflight
DO NOT CIRCULATE

DOCUMEN
T OF IDENTITY

AUSTRALIA

DOCUMENT No.
A2000281

AUS

04 MAR 2010

F

13 MAR 2010

27 MAR 2010

BALI

DENPASAR

FATHER'S SIGNATURE / SIGNATURE DU PÈRE