



Ground vs Air Transport for Neonates. Does it Matter?



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Introduction

MedSTAR *kids* conducted a retrospective study reviewing all neonatal cases retrieved during 2010-2012.

This study aimed to investigate whether the mode of transport had any significant clinical effect on the neonate.





WHY?

- > The choice of transport mode depends on availability, location, weather and numerous other external influences.
- > However the effect of the transport mode chosen on the neonate must be considered.





Choice of transport platforms

- > Ambulance
- > Rotary wing (helicopter)
- > Fixed wing aircraft

Each have advantages and disadvantages in particular circumstances.





What are the effects of transport?

The goal of Neonatal retrieval is to provide expedient stabilizing care, before transporting to a Tertiary NICU that can provide the required level of care.

Physiological	Physical
Hypoxia	Weather
Vibration	Motion
Temperature	Psychology
Decreased humidity	Equipment
Noise	Fatigue
Altitude	





Effects of mode of transport.

	Road	Fixed Wing	Helicopter
Vibration effects	High	Low	High
Sensory stimuli	High	Low	High
Altitude Effects	Low	Moderate	High
Temperature	Low	Moderate	High
Biophysical accelerometry	High	Moderate	Low
Weather	Low	Moderate	High



Advantages/Disadvantages

	Road	Fixed- Wing	Helicopter
Departure times	Excellent	Fair	Good
Arrival times	Fair	Good	Good
Patient accessibility	Good	Fair	Poor
Weather issues	Excellent	Good	Fair
Cost	Low	Moderate to High	High
Scene access	Excellent	Poor	Good
Parents able to escort	Good	Fair	Fair





Patient origins.





Retrospective study

All neonatal cases retrieved during 2010-2012.

AIM

- > To investigate whether the mode of transport had any significant clinical effect on the neonate

HOW

- > The frequency of interventions performed on neonates during transport across the different modes of transport platforms using it as a surrogate marker for clinical deterioration.





Literature

Transport modes

Shah S (2009) USA

Five times more impulsive shocks in ambulances than in helicopters.

Jean-Christophe Bouchut (2010) France

- Road transfers are characterised by dynamic events whereas helicopters are global whole of body vibrations and higher noise with a gradual onset .





Literature - inter-hospital transfers (Risks)

(Mohamed a Mohamed 2010)

The inter-hospital transport of VLBW correlates with the risk for IVH

- The cause is not understood but the paper highlighted multiple factors could be considered.
 - > Hypothermia-instability- movement- hypoxia.

Mortality /Morbidity

(Alstri Lang 2010) Norway

- They concluded poor outcomes for VLBW with an almost 5 fold increase in adjusted risk for death or severe ICH.

Australian data

- A review of Australian data is occurring at present in Victoria and no other recent Australian published data could be found.



Methods

We reviewed the transport records of 1274 neonates that required transfer in South Australia over a three year period.

- Demographic data
- Underlying diagnosis
- Clinical interventions in transit





Demographics

Total number of patients 1274		
Gender	Male	48%
	Female	52%
Weight	<1000	1%
	1000-2000	5%
	2000-3000	15%
	>3000	80%



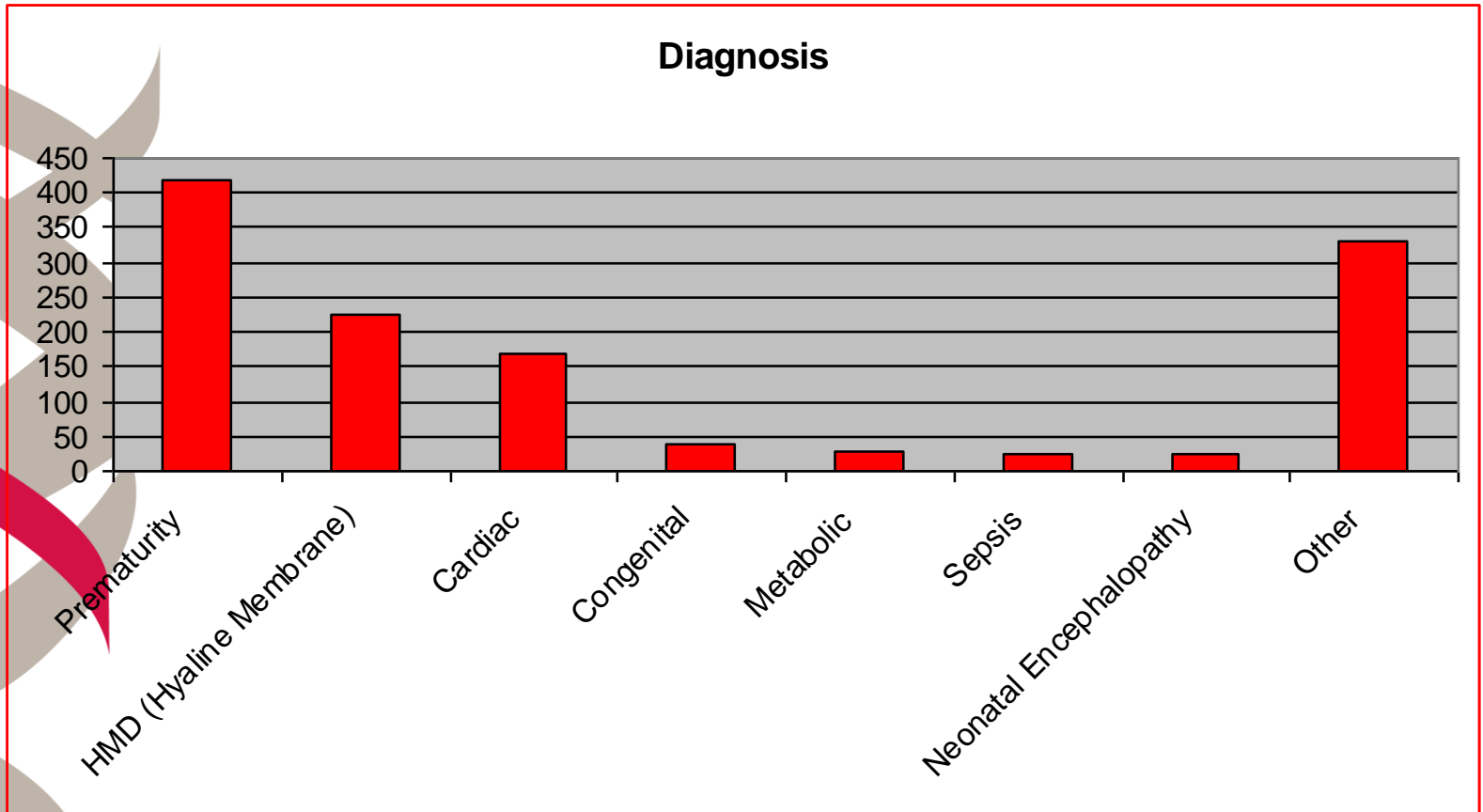
Transport mode	Road	53%
	Fixed Wing	43%
	Helicopter	4%



Intubated (23% or 291 cases)		Non-Intubated (77% or 983)	
Road	47%	Road	53%
Fixed Wing	48%	Fixed Wing	43%
Helicopter	5%	Helicopter	4%



Common Diagnosis





Clinical Interventions in transit

	Ventilated	Non ventilated
Adjustments to inotropes	√	√
Adjustments to ventilator	√	
Blood gases performed	√	
Lines inserted/failures	√	√
Oxygen adjustments	√	√
Repositioning of neonate	√	√
Sedation change	√	√
Suction	√	√
Volume expanders	√	√



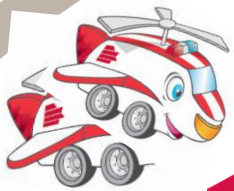
Clinical Interventions (291) Intubated Neonates

	Road (%)	Fixed Wing (%)	Helicopter (%)
Blood gases performed	3	11	0
Inotropes decreased	5	3	0
Inotropes increased	3	5	0
Lines replaced	1	0	1
Oxygen decreased	13	16	5
Oxygen increased	4	6	1
Patient position changed	2	5	0
Sedation+ muscle relaxant	4	7	1
Suction	3	8	0
Ventilation (pressure)	16	4.8	2
Volume expanders	17	19	1

Clinical interventions (983) Non-Intubated



	Road %	Fixed Wing %	Helicopter %
Blood gases	3	5	0
Inotrope decrease	11	6	9
Inotrope increase	21	8	0
Lines replaced	5	3	0
Oxygen decreased	16	21	2
Oxygen increased	19	8	7
Position changed	9	2	0
Sedation + muscle relaxants	14	8	0
Suction	3	10	0
Volume expanders	23	12	1



On Scene Time

	Road	Fixed- Wing	Helicopter
On scene time <i>(average)</i>	57minutes	102 minutes	155 minutes





CONCLUSIONS

Overall, no statistical differences were demonstrated in the number of clinical interventions, across the different modes of transport.

- > The numerical data suggests a tendency towards
 - A greater number of volume expansion interventions in non ventilated neonates, on Road transport.
 - For ventilated infants there was a greater need for ventilation adjustments in Fixed Wing transports.

- > Despite low number of Helicopter transports, we noticed an increased scene time and numerically, a reduced number of interventions.



Conclusions

The choice of transport mode is a decision which depends on which asset is available, the location of patient and their clinical condition.

In this retrospective study we did not demonstrate any statistically significant difference in clinical intervention in our patient group, dependant on mode of transport.



FUTURE

- > Gather data, post retrieval, to investigate long term effects of transport on the neonate.
- > Big Picture thinking; all Australasian retrieval services combine data to look at trends, as a bigger cohort may have given us a different result.

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QUESTIONS ?



MedSTAR Emergency Medical Retrieval



Statistic method used by outsourced statistician

- > Man Whitney u test in SPSS