



Outcome of outborn infants <28 weeks: A Western Australian Experience

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Scenario

- > 23+0 week male infant
- > Born unexpectedly at peripheral hospital
- > No antenatal steroids

- > On radiant warmer
- > Wrapped in cotton wool and alfoil
- > Unable to be intubated
- > No lines attempted
- > CPAP applied via neopuff

Progress

- > Intubated
- > Given surfactant
- > Umbilical lines inserted
- > Gas and bloods
- > Transferred to transport cot
- > Deteriorating on transport
- > Unstable, high oxygen requirement

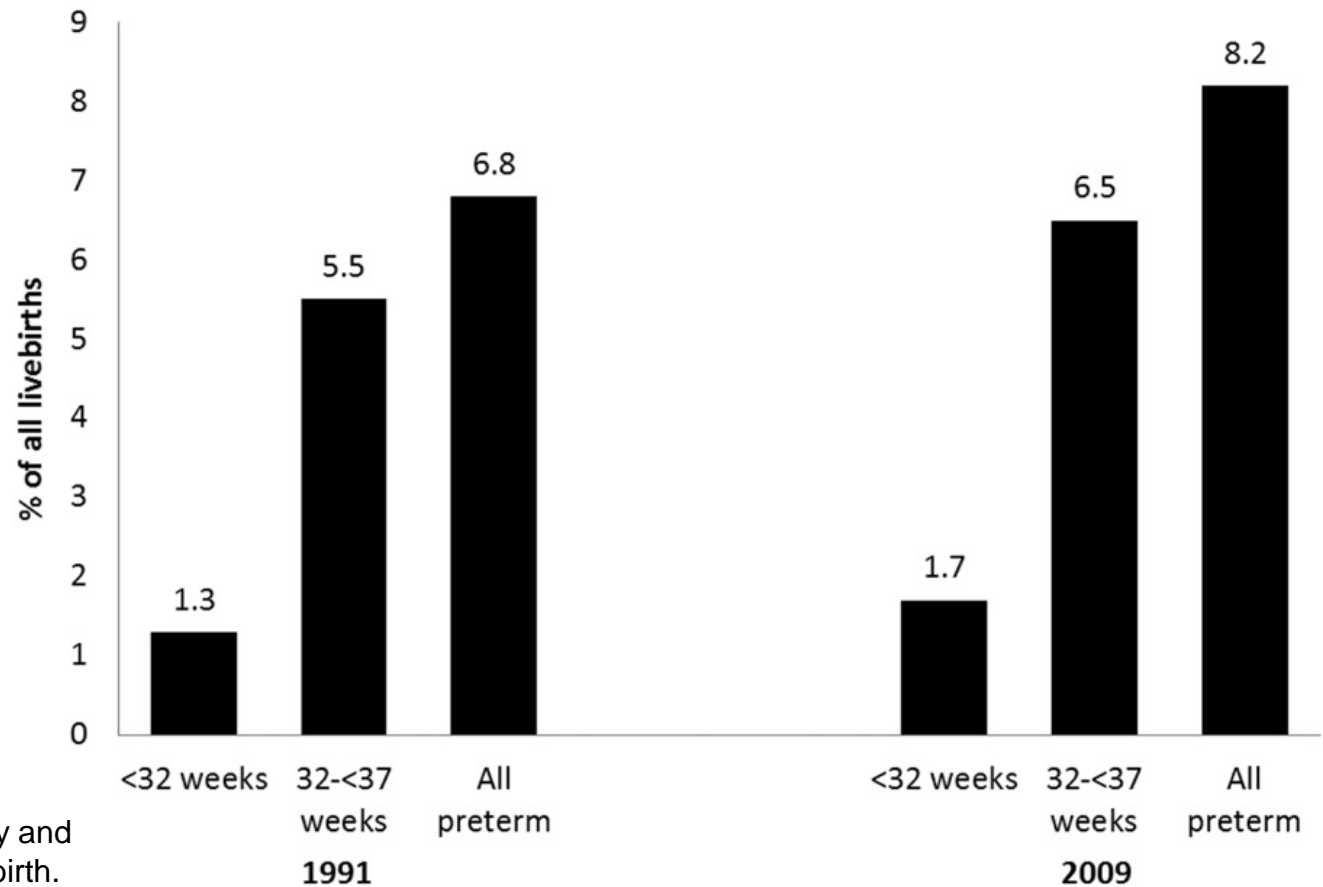


Progress

- > Rapid deterioration in respiratory status
- > Died 2 hours after admission at approx 6 hours of age



Preterm births



Ref: Cheong JL, Doyle LW

Increasing rates of prematurity and epidemiology of late preterm birth.

J Paediatr Child Health 2012

Sep;48(9):784-8



What do we know about outborn infants?

- > Risk of death or major morbidity for outborn VLBW infants twice that for VLBW infants born in tertiary centres
- > Higher risk of severe intraventricular haemorrhage (grade 3 or 4) in VLBW infants outborn (23% versus 9%)
- > Warner B et al The effect of hospital type on the outcome of very low birth weight infants. *Pediatrics* 2004; 113: 35-41
- > Towers CV et al The effect of transport on the rate of severe intraventricular haemorrhage in very low birth weight infants. *Obstet Gynecol* 2000; 95: 291-295

What do we know?

- > Centralisation of the neonatal expertise and training may lead to suboptimal resuscitation and may exacerbate the morbidity and mortality of these infants
- > Resuscitation of outborn preterm infants may be challenging due to:
 - Lack of appropriately trained and experienced staff
 - Insufficient familiarity with preterm neonatal resuscitation
 - Inadequate advanced neonatal procedural skills





Aim of study

- > Examine the **perinatal interventions** provided and **the short term outcomes to discharge** in those <28 weeks gestation and compare them to inborn infants of the same gestational age and weight range



Western Australia

- > KEMH/PMH – single tertiary neonatal unit
- > 105 cot unit (KEMH 80 and PMH 25)
- > Around 250 infants <32 weeks/ annum with over 90% of those inborn

- > Level 2 units
- > Usually >34 weeks gestation (one 32 weeks +)
- > Only 1 other unit offers CPAP

Western Australia



> Paediatrician at

- Derby (6-8h)
- Port Hedland (3.5h)
- Geraldton (1.5hrs)
- Kalgoorlie (2hrs)
- Bunbury (40mins)

Newborn Emergency Transport Service - NETS WA

- > Approx 900 primary retrievals per year
- > Run from NICU at PMH
- > Team of neonatal doctor and neonatal trained nurse
- > Retrieve neonates from all parts of state, interstate and internationally



NETS WA



MedSTAR Emergency Medical Retrieval



METHODS

- > Retrospective study
- > 1st Jan 2001 – 31st Dec 2008
- > Data collected from NETS case records, case notes and neonatal database
- > Paired with inborn control – next equally matched GA and centile parameter



Data Collected

- > Gestation
- > Delivery
- > Birth weight
- > Apgar Scores
- > Antenatal steroids
- > 1st pH and time of gas
- > Temperature on assumption of care by NICU team
- > Age 1st ventilated
- > Clinical Risk Index for Babies (CRIB) Score
- > Duration of ventilation
- > Duration of CPAP
- > Pneumothorax requiring ICC
- > Postnatal steroids
- > Long term inpatient with CLD
- > Chronic Lung disease
- > NEC
- > Days to full feeds
- > PDA
- > ROP
- > Death



Results

- > 57 infants outborn (6 died)→ 51 infants
- > 22 born metro hospitals
- > 20 born rural hospitals
- > 9 born outside a hospital setting
 - 6 presented to KEMH
 - 1 presented to metro hospital
 - 1 presented to rural hospital
 - 1 transported with remote area nurse 90km to nearest rural hospital)

Perinatal characteristics

	Outborn	Inborn	p
Gestational age, median +/- weeks	26 +/- 1.39	26 +/-1.4	0.083
Birth weight (g), median,range	865	775	0.045
Male:Female (n)	34:17	30:21	0.413
Delivery			
>SVD/Breech	41	22	<0.001
>Forceps	1	2	
>NELUSCS	9	27	
Antenatal Steroids			
>Nil	29	2	<0.001
>Incomplete	15	22	
>Complete	5	24	
>Unknown	2	3	

Perinatal Interventions

	Outborn	Inborn	p
Apgar Score <7 at 5 mins	26	34	0.11
Age of intubation			
>Delivery	25	46	<0.001
><60 minutes	10	2	
>61-120 mins	8	1	
>>120 mins	7	0	
>Never	1	2	
Age at 1 st gas, mins, range	115 (44 - 530)	58 (32-134)	<0.001
1 st gas, pH, range	7.245 6.78 – 7.48	7.29 6.9 – 7.57	0.034



Perinatal Interventions 2

	Outborn	Inborn	p
Temperature			
>>37.5°C(hyperthermia)	4	0	<0.005
>36.5-37.5°C (normothermia)	6	15	
>36-36.4°C (mild hypothermia)	3	9	
>32-35.9°C (moderate hypothermia)	33	27	
><32°C (severe hypothermia)	2	0	
>Unknown	3	0	
CRIB score Median, IQR	5 (3-8)	4 (2-8)	0.894



Summary of perinatal interventions

- > Inborn infants more likely to be born by NELUSCS but have antenatal steroids
- > Securing of airway and venous access takes longer in outborn infants
- > Outborn infants colder when a tertiary level member of staff assessed the infant

Neonatal Morbidity and Mortality

	Outborn	Inborn	p
Chronic Lung Disease	15	24	0.173
Duration of intubation, hours, range	96 0-1232	202 0-1713	0.016
Duration of CPAP, hours, range	765 1 - 2108	737 14 - 2039	0.573
Pneumothorax requiring ICC	3	7	0.183
Postnatal steroids	2	5	0.24
Home oxygen	6	8	0.565
Long term inpatient with CLD	0	2	

Neonatal Morbidity and Mortality

	Outborn	Inborn	p
NEC			
>Stage 2	1	1	0.942
>Stage 3	4	5	
PDA	36	33	0.58
Grade 3/ 4 IVH	11	8	0.445
ROP			
Stage 2	6	5	0.51
Stage 3	3	9	
Laser	5	10	
Death	13	8	0.31

Death

	Outborn Died	Inborn Died	Total in group
<24 weeks gestation	5	1	6
24-24+6 weeks gestation	3	2	8
25-25+6 weeks gestation	1	1	9
26-26+6 weeks gestation	1	1	10
27-27+6 weeks gestation	3	3	18
Total	13	8	51



Summary of neonatal morbidity and mortality

- > No statistical significant difference in any of the major morbidities
 - Chronic Lung Disease
 - Necrotising Enterocolitis
 - Patent Ductus Arteriosus
 - Severe Intraventricular Haemorrhage (gr 3-4)
 - Retinopathy of Prematurity
 - Death



Summary

- > Outborn infants took longer to be stabilised with definitive airway and securing of intravenous access
- > Mode of delivery more likely to be by NELUCSC in perinatal centre
- > Antenatal steroid administration significantly higher in inborn infants
- > No statistical significance in the major neonatal morbidities between inborn and outborn infants (CLD, PDA, ROP, IVH, NEC)



Limitations of study

- > Underestimate the mortality of outborn
- > Is it an accurate comparison?

Neonatal Resuscitation Program

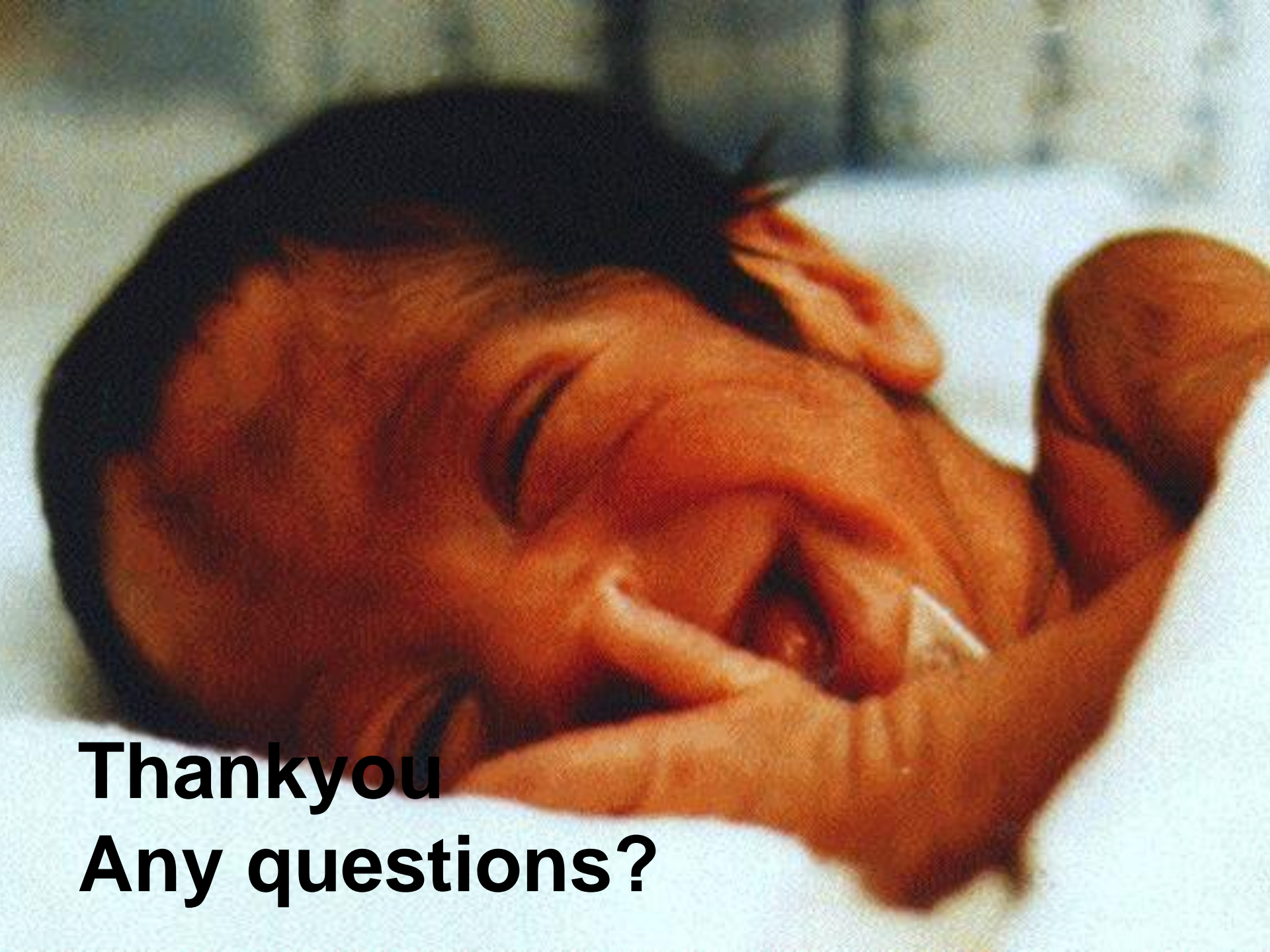
- > Modified NRP introduced to WA in March 2004
- > Over 150 courses run per year both metro and rural locations
- > Encouraging uptake in all areas of medicine and nursing





Questions for the future?

- > How many of inutero transfers were discharged without delivery?
- > Has the NRP had any impact on the outcome of these infants?
- > How can we increase the administration of antenatal steroids?
- > Need to study larger number of infants



Thankyou
Any questions?