

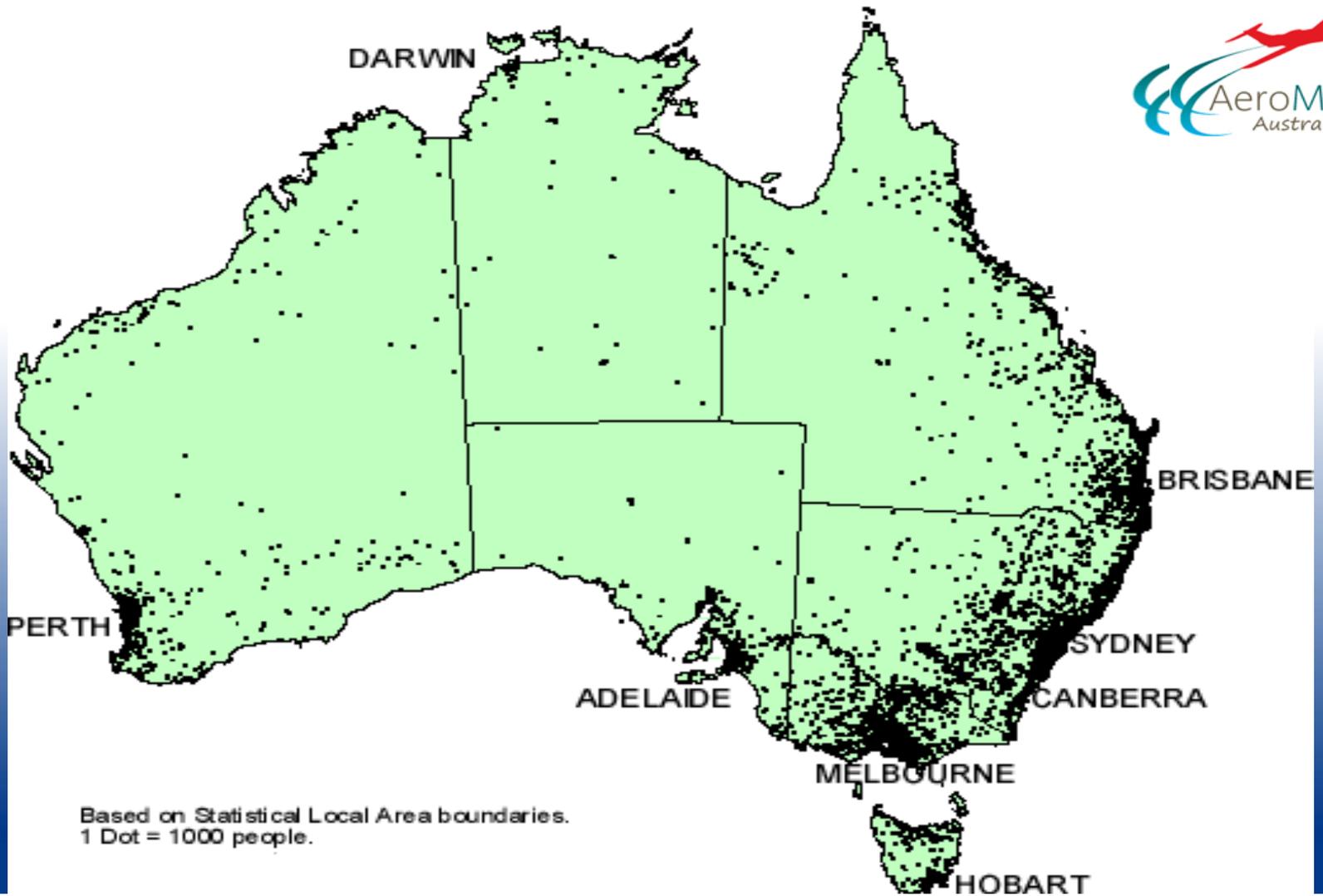
Obstetric Transfer

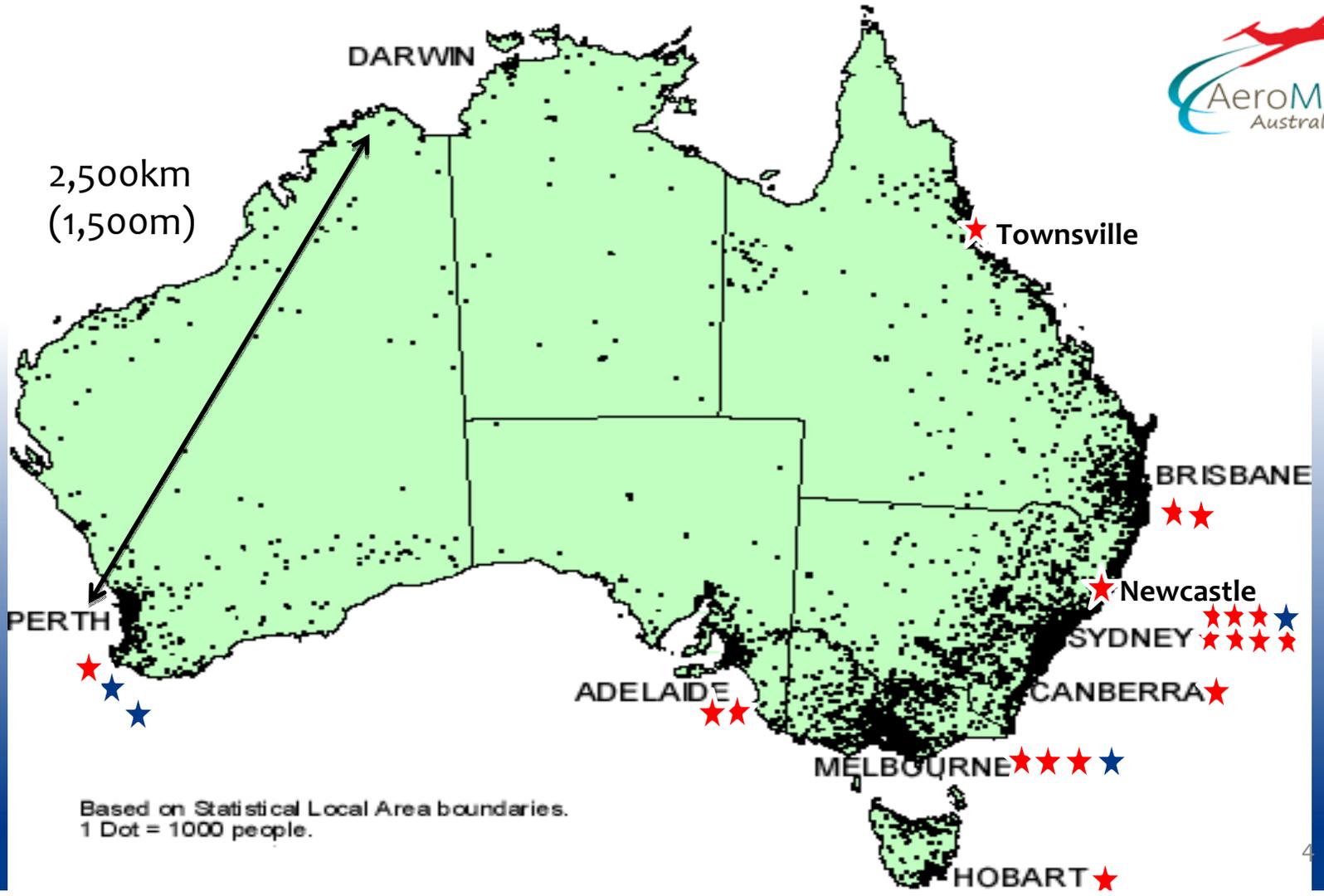
Balancing the Risks

Andrew Berry AM FRACP
State Director, NETS – NSW
Newborn & pædiatric Emergency Transport Service
President, Aeromedical Society of Australasia

Tiered levels of care

- Level 0 (no service)
- Level 1 (post-natal only)
- Level 2 (small rural GP service)
- Level 3 (larger rural GP service with OT etc.)
- Level 4 (regional or urban specialist service)
- Level 5 (tertiary care)
- Level 6 (quarternary care incl. surgery, cardiac)





Terminology

- Preterm = 22 to 37 completed weeks (40)
- VLBW = Very Low Birth Weight (< 1,500g)
- In-utero = Maternal transport (carrying fetus)
- Ex-utero = Baby transport (post delivery)
- PL = Preterm labour
- TPL = Threatened PL
- SPL = Spontaneous PL
- ROM = Rupture of membranes
- PROM = Prolonged ROM
- PPRM = Preterm PROM
- PPH = Post partum hæmorrhage

Indications for maternal transport[§]

May relate to the woman or to the unborn baby

- when either requires the advanced skills and resources of a higher Level centre
- when it is expected that the infant will need care in a higher Level

The method and timing of transfer will depend on:

- the clinical circumstances
- distances and, at times, the geographic and climatic conditions.

The most frequent reasons to consider maternal transport are:

- threatened preterm birth due to preterm labour or preterm rupture of membranes
- severe pre-eclampsia or other hypertensive complications of pregnancy
- Antepartum / Postpartum hæmorrhage

Other issues may have a significant bearing on the problem:

- multiple pregnancy
- intrauterine growth restriction
- suspected fetal abnormalities

The dilemma

- Unable to plan for optimal place of birth?
 - Previous history
 - Multiples (twins etc.)
- Emergency transfer of the obstetric patient?
- What is the balance of risk?
 - Lower level of care in transit
 - Maternal complications
 - Neonatal complications - In flight delivery
 - Neonatal resuscitation
 - Two patients



Risk profile

- How long is the window of opportunity?
 - Primipara
 - No labour
 - Good response to tocolysis
 - No pressure to deliver quickly (for mother/baby)
- Lower gestation = Lower risk of immediate birth
- Lower gestation = More difficult resuscitation
- Lower gestation = Closing gap between risks of birth in aircraft and referring hospital

Differences in approach

- In labour = Might deliver
- No fly rule
 - > 3cm cervical dilation
 - No response to tocolysis
- Low gestation (< 28 weeks)
 - Aggressive tocolysis
 - Take a chance
- Case-by-case triage
 - Maternal-fetal-medicine specialist

Balance of Risks?

- Lower level of care in transit
- Maternal complications
- Neonatal complications - In flight delivery
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- Two patients

Denver, USA 1977 §

- More in utero than ex utero transfers
- Ex utero transfers had higher mortality
- In utero transfers had lower mortality and shorter length of hospital stay

§ Am J Obstet Gynecol. 1977 Jul 1;128(5):520-5. **An analysis of air transport results in the sick newborn II. Antenatal and neonatal referrals.** [Merenstein GB](#), [Pettett C](#), [Woodall J](#), [Hill JM](#).

VLBW Survival

- Preterm births increasing; from 6% to > 8%
- Very low birth weight rates rising§
- Mortality depends on place of birth*
 - From 132.1/1000 to 283/1000 live births
 - Highest death rate for infants born at hospitals offering the lowest level of care

VLBW = Very Low Birth Weight (< 1,500g)

§ Goldenberg R, Culhane JF, Iams J, Romero R. Epidemiology and causes of preterm birth. *Lancet* 2007; **371**: 73-82

* Maternal characteristics associated with place of delivery and neonatal mortality rates among very-low-birthweight infants, Georgia.

[Samuelson JL](#), [Buehler JW](#), [Norris D](#), [Sadek R](#). *Paediatric and Perinatal Epidemiology* **Volume 16, Issue 4**, pp 305–313, 2002

In flight delivery?

- No airborne births in 357 helicopter transfers §
 - 315 were in active labour
 - 72 in the accelerated phase of labour
 - Flights were screened
- One airborne birth in 88 fixed wing transfers

USA

- 203 programs surveyed[§]
- 133 responders
 - 45.6 missions per year
 - 52% required neonatal resuscitation certificate
 - 56% of aircraft permitted pelvic access
 - 50% involved obstetricians in tasking
 - 22% had specific tasking protocols
 - 60% anxious about in flight delivery

[§] [Air Medical Journal Vol 20, Issue 2](#), Pp 17-20 (2001) [Alan E. Jones](#) National survey of air medical transport of high-risk obstetric patients

Southern USA

- 80 fixed wing transfers over 2 years
- Complications
 - Nausea and vomiting 80%
 - Increased contractions 8%
 - Hypertension 1.3%
 - Hypotension 1.3%
 - Decreased respiratory drive 1.3%
 - Infiltrated IV line 1.3%
 - In flight deliveries 0

Which patients don't need transfer?

- Fetal fibronectin[§]
- Glycoprotein promoting adhesion between fetal chorion and maternal decidua
- Absent between 24 and 36 weeks
- Positive test suggests delivery < 1 week
- Negative test suggests later delivery (99%)
- 90% reduction in maternal transfer
- Not helpful if cervical dilatation present

[§] American Journal of Obstetrics & Gynecology [Volume 182, Issue 2](#), Pages 439-442, 2000 The effect of fetal fibronectin testing on admissions to a tertiary maternal-fetal medicine unit and cost savings. [Warwick Giles](#), et al

Management

- IV x 2[§]
- Anti-emetic
- Labour suppression (tocolysis)
- Ultrasound evaluation*
 - Fetal heart rate
 - Position, movement & general placental condition

[§] PERS – Perinatal Emergency Referral Service. Victoria, Australia

* Fetal evaluation for transport by ultrasound performed by air medical teams: A case series. Air Medical Journal Vol 23: 4 pp32-34 2004

Transferring the patient

- Need to move?
- Appropriate destination?
- Safe to move?
- Manage the risks
 - Triple therapy = Antibiotics, Steroids, Tocolysis
 - Response to suppression
 - Recurring reassessment
- Patient care
 - Consider IDC
 - Anti-emetic +/- nasogastric tube
 - Lateral tilt
 - Supplemental oxygen
 - Transfuse if Hb < 7 g/dL

Western Australia

- 500 consecutive transfers of women in preterm labour to the tertiary centre
- Ruptured & intact membranes
- Established preterm labour (regular contractions \geq 1:10 mins with cervical changes)
- Threatened preterm labour (irregular or regular contractions without accompanying cervical changes)
- Gestation 20⁺⁰ and 36⁺⁶ weeks

Factor		Median (IQR) time to delivery (days)	Multivariable analysis		
			HR	95% CI	p-value
Membranes					
	Intact	22 (11-38)	1.00		
	Ruptured	3 (1-17)	3.05	2.13 – 4.36	<0.001
Cervical dilatation					
	< 4 cm	10 (2-32)	1.00		
	≥ 4 cm	1 (0-2)	2.93	1.85 – 4.65	<0.001
Gestational age					
	≤ 32 weeks	14 (3-39)	1.00		
	> 32 weeks	3 (1-16)	2.32	1.77 – 3.05	<0.001
Parity					
	Parous	11 (2-32)	1.00		
	Nulliparous	3 (1-18)	1.41	1.09 – 1.82	0.008
Maximum ambient altitude					
	≤ 14,000 ft	4 (1-22)	1.00		
	> 14,000 ft	9 (2-35)	0.63	0.48– 0.84	0.002

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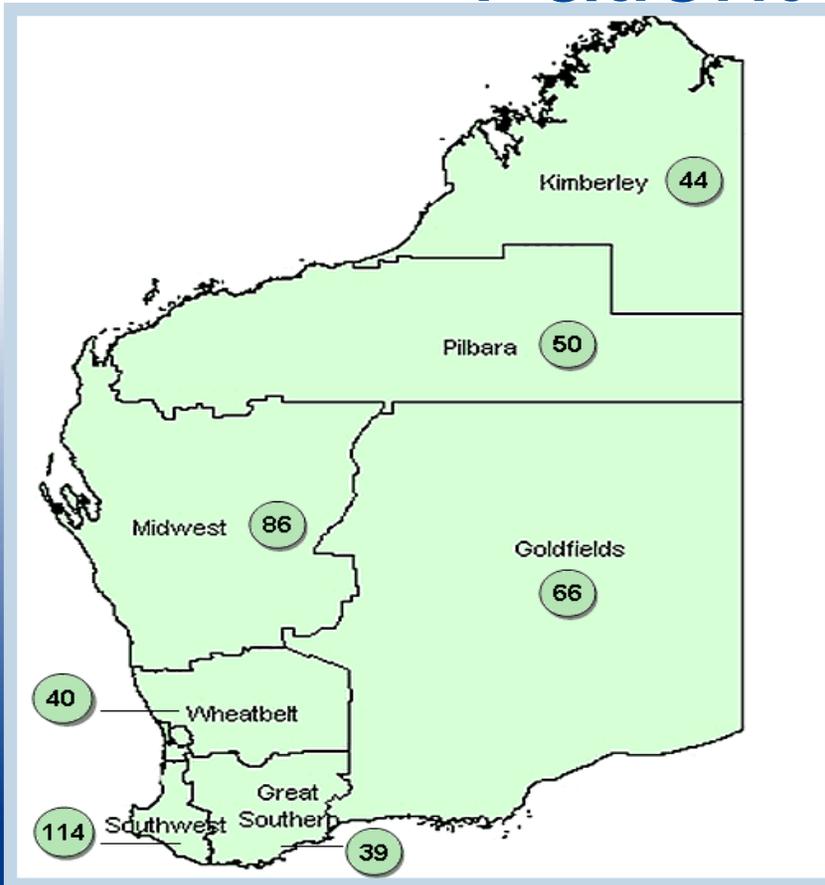
432 cases

- Gestational age at transfer = 32 weeks (20.6-36.9)
(IQR 29-34)
- No mid-flight deliveries or serious complications
- Median total mission time = 5.5 hours (1.8 – 40.6)
(IQR 3.8 – 8.2)
- Median total flight time = 76 mins (30 – 448)
- Median distance = 393 km (131 – 2811 k)
- 102 transfers (23%) > 1000 km

Reason for referral

• Premature PROM only	103 (23.5)
• <u>T</u> hreatened <u>P</u> re <u>T</u> erm <u>L</u> abour only	243 (55.4)
• Spontaneous PTL only	38 (8.7)
• TPTL & Rupture of Membranes	47 (10.7)
• SPTL & ROM	8 (1.8)

Patient locations



Infant deaths - Wyoming, USA

- Population 470,000
- Birth rate 10,500
- Hospitals 27

- Sparse population
- Few metro areas
- No tertiary care

- Early recognition of high-risk mothers
- Aggressive maternal transport
- Vigorous resuscitation and stabilisation
- Rapid air transport to a tertiary hospital
- Funding patient transport
- Increased trained practitioners/tertiary experience

1971 24.5/1,000 (48th)

1982 6.3/1,000 (2nd)

Summary

- Preterm outcomes better with in utero transfer
- Know your population and the transfer outcomes
- In flight delivery risk over-stated
- Selecting the appropriate patient
- Process of minimising the risk
- Fear of the unknown
- In-flight delivery no worse than small hospital delivery

