A Case Series:
Pre – Flight Births over a 3 year period in the Northern Territory

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Overview…

- A little bit of background
- Description of study/tocolysis
- Case Reviews
  - Descriptions and follow-up
- Discussion and literature review
- References
Tabloid Headline Grabber...
Looking back…

Sister Margaret Lyons (Mrs Doherty) replaced Marie Yapp in the Aerial Medical Service in July 1964 when the latter left to become Matron of Mildura Base Hospital in Victoria. During the two days handover, Sister Yapp assured her replacement that there were never any deliveries in aircraft as most babies were born in the bush and without complications. The first emergency with which Sister Lyons had to cope was a woman at Port Keats in obstructed labour. Captain Slade was out flying a party of eminent visitors from Canberra.

As the bladder was emptied labour recommenced and within minutes the baby was delivered without further complications. Ossie Osgood announced on the radio that he had another passenger. Over the next eight years Sister Lyons delivered four more babies in aircraft but most were in the medical plane which had a little more space.
244km

Darwin

Wadeye

CareFlight
<table>
<thead>
<tr>
<th>Year</th>
<th>Total O&amp;G Retrievals</th>
<th>Total All Retrievals</th>
<th>Percentage of Total</th>
<th>Pre-Term Labors</th>
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</thead>
<tbody>
<tr>
<td>2011</td>
<td>326</td>
<td>3832</td>
<td>8.5%</td>
<td>106</td>
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<tr>
<td>2012</td>
<td>306</td>
<td>3722</td>
<td>8.2%</td>
<td>107</td>
</tr>
<tr>
<td>2013</td>
<td>272</td>
<td>3526</td>
<td>7.7%</td>
<td>74</td>
</tr>
<tr>
<td>2014</td>
<td>261</td>
<td>3150</td>
<td>8.2%</td>
<td>96</td>
</tr>
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<td>2015 (to August)</td>
<td>146</td>
<td>1737</td>
<td>8.4%</td>
<td>53</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>1311</strong></td>
<td><strong>15967</strong></td>
<td><strong>8.2% (avge)</strong></td>
<td><strong>436</strong></td>
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Core facts

• Area of the Northern Territory 600,000 kms$^2$
• Population density 0.2 persons per km$^2$
• Flight distances regularly over 350kms
Choice of Tocolytic Agent

- Tocolysis aims to delay preterm birth
- Aim is for in-utero transfer to a tertiary perinatal centre
  - reduction of neonatal morbidity and mortality
- Alcohol
- β-sympathomimetic agents
- Now a number of tocolytic agents are in use, each with good and bad points
  - Calcium channel blockers: nifedipine
  - NSAIDS: indomethacin
  - Magnesium Sulphate
Nifedipine: agent of choice in the NT

• 20mg Nifedipine orally stat

If uterine contractions persist:
• 20mg at 30mins
• 20mg at 60mins

• Decisions about cessation of treatment will be on an individual basis and need to take into account location, steroid cover and gestational age
Description of Case Series

- Retrospective analysis of case notes and electronic medical retrieval record
  - **Four** patients undergoing in-flight, at altitude, obstetric birth 2012-2015

- To maintain confidentiality community names will not be used

- All retrieval missions in Beechcraft King Air 200
Case 1: Background

- DJ - 37 years old
- G5P2, 36+5/40 weeks pregnant, Group B Strep (GBS) +ve, rubella non-immune
- PMH: gestational diabetes, ASD and gastroschisis repaired in infancy, NKDA
- Tasked at 0010 and take-off at 0050
- Total mission time 4hrs 33mins
- Flight nurse (midwife trained) and pilot crew
Case 1: Events

- SROM at 2230, dilated at 1cm at 2305
  - referral for retrieval from community clinic
  - given benzylpenicillin, nifedipine for tocolysis x2
- Patient contact made 0145 – assessed at airstrip
- Contracting 3:10, producing pink liquor, walked onto aircraft, third dose of nifedipine given prior to take off, BGL 4.7
- Initial observations: BP 131/80, HR 123, Sats 95% on RA, RR 26, FHR 160
Case 1: Events

• Return take–off to Darwin 0210

• Inflight nursing notes: Progressed to spontaneous vaginal delivery at 0245

• 10 units of syntocinoin given IM (3rd stage)
  • Placenta and membranes delivered following approximate blood loss 300ml

• APGARS 6¹ and 9⁵ – tactile stimulation only

• Infant temp 36.1, placed skin to skin on mother

• No further incident on transfer; safe delivery to maternity unit at RDH
Discharge follow-up

• Length of stay: 3 days

• Neonatal birth weight 2380g
  • Discharge weight 2255g, breastfeeding, nil signs of sepsis, generally fit and well

• Mother
  • On metformin/insulin
  • Otherwise well

• Baby to be followed up in the community
Case 2 - Background

- FG – 25 years old
- G2P1, 31/40 weeks
- PMH: Previous emergency LSCS for placental abruption at 31/40 weeks, NKDA
- Tasked at 0052 and take–off at 0128
- Total mission time 4hr 28 mins
- Flight Nurse (midwife trained), Flight Doctor and Pilot
Case 2 - Events

- Referral 0035 (+18hrs 35mins from onset) –
  - SROM previous day 0600,
  - Irregular contractions, pink liquor noted

- Nil midwife services at community,
  - Given benzylpenicillin, x3 nifedipine for tocolysis
  - Speculum: unable to visualise os

- Patient contact made at 0250 – assessed at airstrip

- Contracting 1:10, walked onto plane, intermittent severe discomfort abdominal pain

- Initial observations: BP 133/77, HR 81, 98% on RA, RR 24, FHR 154
Case 2 - Events

• Return take-off 0300
• Progression of labour: NVD at 0400
• 10 units of syntocinin IM given
  • Placenta and membranes delivered at 0420 (after landing), blood loss approximately 350mls
• APGARS 6¹ and 8⁵
  • Poor respiratory effort, assisted ventilation
  • Saturations: Initially 76% (poor respiratory effort), 94% at 5mins, 98% at 10mins
  • Temp 35.7 – plane temperature increased, wrapped for transfer, BGL 7.2
• Needed intermittent neopuff support into hospital but nil other incident. Neonate transferred to SCBU and mother to maternity ward
Discharge follow-up

- Paediatric length of stay: 22 days
- IUGR: birth weight of 1728g
  - Discharge weight 2065g
- Presumed sepsis – low grade temp, antibiotics started, normal bloods, screening negative
- Improved and nil further issues
- 3 – 4 weeks post-discharge review requested in community
Case 3 - Background

- FG – 31 years old
- G6P2, 22/40 weeks pregnant, febrile in clinic
- PMH: Gestational diabetes, previous stillborn at 21/40 weeks, NKDA

- Tasked at 0330, already airborne 0145 from previous retrieval mission
- Total mission time (2 jobs) 7hrs 35mins
- Flight Nurse (midwife trained) and Pilot
Case 3 - Events

- Referred 0300
  - Decision 0330 to re-route as duty midwife on board (nil specialist equipment)

- Nil midwife services at community clinic,
  - Antibiotics given (ampicillin 2G, metronidazole 500mg, gentamicin 280mg)
  - Steroid given, x3 doses nifedipine and MgSO4 given on advise of MRC

- Patient contact made at 0450, assessed at airstrip

- Contracting 2–3:10
  - Documented APH – large blood clot passed in clinic
  - Initial Observations: BP 128/78, HR 95, Sats 98% RA, Temp 37.7, RR 29, FHR 145 (170 in clinic)
Case 3 - Events

- Return take-off 0500
- On take off: large contraction, membrane sac visualised
  - Vaginal delivery at 0522
- APGARS 6\(^1\), 5\(^5\) and 5\(^10\)
  - Neonatal resuscitation started with BVM
  - Placed in plastic bag for temp control + O2, monitoring applied, cord clamped
- Placental delivery 0548; preceded by bloody show
  - PPH – 1 litre – maternal BP 42/38 – no LOC
  - 10 units of syntocinon IM given
  - Blood transfusion started
  - Fundal massage started
Case 3 - Events

- Ongoing fluid management
  - On landing BP 94/58

- Emergency transfer to RDH in ambulance

- Neonate handed to on–call Doctor at Darwin Airport
  - HR 80-100, agonal breathing, poor perfusion
  - Decreased muscle tone and movement

- Ongoing resuscitation in ambulance with humidicrib
  - Ventilation with neopuff,
  - Failed intubation: well visualised but small diameter trachea

- On presentation to ED: eyes fixed, agonal breathing
  - Decision made at 0645 to cease input
Discharge follow-up

- Mother: length of stay 4 days
- Further transfusion required
- For community clinic review in community
Case 4 - Background

- GH – 26 years old
- G2P1, 28+5/40 weeks pregnant
- PMH: treated for UTI 1/7 day previously with cephalexin, NKDA
- Tasked at 1040, take–off at 1135
- Total mission time 4hr 55mins
- x2 Flight Nurses (training flight), Pilot
Case 4 - Events

- Presented to clinic 0300
  - APH – post coital, 200ml volume
  - Stable observations, ongoing contractions O/N
- Midwife at clinic but due to prematurity decision made to transfer
  - Given Benzyl Penicillin and betamethasone IM, tocolysis deemed to be contraindicated due to APH
- Speculum exam 1115 – closed cervix, small volume bright red blood in vault
- Retrieval team patient contact made 1245 in Clinic
  - Contracting 1:10
- Initial observations: BP 105/75, HR 100, RR 32, Sats 100% on 6L via HM, FHR 160
Case 4 - Events

- Return take–off to Darwin 1345
- Passed large blood clot at 1410
  - Normal vaginal delivery at 1418, 10 unit of syntocinin IM given
- APGARS 6₁ and 9⁵,
  - Cot for temperature control
  - Respiratory support with nasal CPAP
- Placenta delivered at 1425: total EBL assessed to be 250ml
- Post–placental delivery obs: BP 114/68, HR 94, RR 20, Sats 100%
- Safe transfer of mother to maternity ward at RDH and neonate to SCBU
Discharge follow-up

- Paediatric length of stay: 66 days
- Birth weight: \textbf{1408g},
  - Discharge weight: \textbf{2310g}
- Needing long standing respiratory and feeding support
- Mother: nil concerns clinically
- Baby diagnosed +6 months with dilated cardiomyopathy (LVEF – 10%) – awaiting heart transplant at follow up
  - Needing regular cardiology review
Discussion

- Aim is to prevent in-flight birth: clinical assessment, tocolytics and timely retrieval
- All patients received antibiotics and appropriate steroid therapy
- 3/4 cases tocolysis given
  - 3x doses of nifedipine administered
  - Case 4: documented as contraindicated
- On average 3,550 patients transported per year
  - 8.2% involve obstetric retrievals
  - 2.7% involve pre-term labour patients
  - In-flight births <1%
SURGICAL AND MEDICAL EMERGENCIES ON BOARD EUROPEAN AIRCRAFT: A RETROSPECTIVE STUDY OF 10189 CASES

- 2/32 airlines reported back sufficient data – 10,189 patients reviewed

- Passenger lists reviewed from:
  - 2002-2007
  - 2006-2007

- Review from 2009 looking at rates of critical incidents on commercial flights showed incidence of in-flight birth of <0.1%

- A separate study from 2004 showed no consensus on commercial airlines regarding agree standards for flying in pregnancy – in flight obstetric emergencies reported by 11/17 airlines (65%)
AEROMEDICAL TRANSFER OF WOMEN AT RISK OF PRETERM DELIVERY IN REMOTE AND RURAL WESTERN AUSTRALIA: WHY ARE THERE NO BIRTHS IN FLIGHT?

AUSTRALIAN AND NEW ZEALAND JOURNAL OF OBSTETRICS AND GYNAECOLOGY. 2012 Aug;52(4):327-33

- RFDS Article from 2012 reported: No births in-flight from a retrospective observational study
  - 500 cases from September 2007 – December 2009

- It concluded that ambient and cabin altitude >14,000ft were more likely to delay time to delivery

- No mid-flight deliveries
- Article from 2013 from CareFlight NT, February 2012 – December 2012
  - Retrospective analysis of 200 women (mean age 25): 20 weeks gestation to 24hrs post-partum
- Of 147 in active labour, 108 pre-term labour
- No in-flight births in period
- (although one from this case review from January 2012 – after IT system change in Feb 2012)
Review of pre–term labour patients in Ontario, Canada, from Jan 2006 to Jan 2011

Patients included if gestation <37+6 and >20 weeks gestation
- 488 patients met inclusion criteria
- Mean gestational age 31.2 weeks (<25% less than 28 weeks)
- Mean transport time 80mins

11 in-flight births
- 4 received tocolytics (3:nitroglycerine, 1:beta–agonists, 1:NSAIDS)
Conclusions

- In-flight birth remains a rare occurrence
- Assessment of maternal risk factors for pre-term labour is essential
- Full clinical assessment of pre-term labour required
  - Weigh up risks vs benefits of transfer
- Tocolysis to be administered if clinically indicated
- Neonatal outcomes are improved if managed in a centres with high numbers of preterm newborns
References

1. Aeromedical transfer of women at risk of preterm delivery in remote and rural Western Australia: Why are there no births in flight? AKL Natalie et al. Australian and New Zealand Journal of Obstetrics and Gynaecology 2012
3. Medical Transfer or Patients in Preterm Labor: Treatments and Tocolytics. K McCubbin et al. Prehospital Emergency Care, January/March 2015, Volume 19/Number 1
Thank you for listening