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## Case Study

## A Case Review: In-Flight Births Over a 4-Year Period in the Northern Territory, Australia



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## A B S T R A C T

**Objective:** There has been much newspaper and online news coverage of in-flight obstetric births on commercial aircraft over several decades. This case series reviews several cases of in-flight birth and immediate maternal and neonatal outcomes from air medical retrievals in the Northern Territory of Australia over a 3-year period.

**Methods:** This is a retrospective written case note and electronic medical retrieval record analysis of 4 patients undergoing in-flight, at altitude, obstetric birth.

**Results:** Four premature births are recorded by CareFlight Operations over a 4-year period from January 2011 to January 2015. All patients involved were preterm; term ranged from 22 weeks to 36 weeks. Tocolysis was implemented on all 4 patients according to local obstetric guidelines. Maternal complications included 1 patient suffering antepartum hemorrhage and 2 patients suffering postpartum hemorrhage. Three neonates born at altitude needed neonatal resuscitation including positive-pressure ventilation. One neonate, 22 weeks' gestation, died approximately 2 hours after delivery. Maternal follow-up showed no morbidity or mortality at 1 to 6 days after birth.

**Conclusion:** In-flight deliveries are rare events in air medical medicine. This case series includes patients of variable preterm gestation and correlates poor outcomes to prematurity of neonates. Close communication between remote clinics, obstetric centers, and air medical teams plus up-to-date early labor guidelines are essential for safe practice and to limit the risk of in-flight births.

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Examples of in-flight births on commercial aircraft have been cited in mainstream media over the years, capturing the interest of the general public. Examples occurring within an air medical retrieval setting are less common, with multiple studies confirming the rarity of the event and only sporadic case studies described in the literature. In-flight births are a feared outcome for retrieval specialists, leading to potential high morbidity and mortality for both mothers and neonates. Therefore, the aim is to delay delivery so it can occur in a specialist tertiary care center.<sup>1</sup>

The Northern Territory in Australia covers an area of 600,000 km<sup>2</sup>, with a population density of 0.2 persons per km<sup>2</sup>. Communities, away from the hubs of Darwin, Palmerston, Katherine, and Gove, are spread out, and often the only timely link to secondary health institutions is through air medical retrieval. Flight distances are often over 350 km. The Northern Territory has also been shown to have

higher rates of preterm delivery (< 37 weeks) compared with other parts of Australia. Preterm labor rates for indigenous women have been shown to be 11.6% versus 5.4% for nonindigenous women.<sup>2</sup>

Over 35 remote health centers provide medical input for the rural population in the Northern Territory. These clinics usually have no inpatient facilities and do not perform planned births. They sometimes have midwifery staffing so they can manage an unexpected normal birth but have no theater or neonatal care services. High-risk births have to be planned in advance with the Royal Darwin Hospital (RDH) for timely transfer to enable the use of the specialist obstetric care and neonatal intensive care unit in Darwin.

Other studies looking at in-flight delivery rates have been variable, with a study in 2012 showing 0 in-flight births over a 2-year period in Western Australia,<sup>3</sup> which corresponds to several data sets published over the last 20 years from a number of retrieval organizations. However, a study from Ontario, Canada, in 2015 showed 11 in-flight births over a 5-year period from 2006 to 2011.<sup>4</sup> This study also looked into tocolytic therapy used in the retrieval of preterm laboring patients; this aspect is standardized in the

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**Table 1**  
Breakdown of patient retrievals by CareFlight in the Northern Territory since 2011

Year	Total Obstetrics and Gynecologic Retrievals	Total All Retrievals	Percentage of Total	Preterm Labors
2011	326	3,832	8.5	106
2012	306	3,722	8.2	107
2013	272	3,526	7.7	74
2014	261	3,150	8.2	96
2015 (to August)	146	1,737	8.4	53
Totals	1,311	15,967	8.2% (average)	436

Northern Territory by consultation with the obstetric department of the RDH.

CareFlight NT has provided air medical retrieval cover for the Northern Territory since 2010. The number of obstetric retrievals since 2011 (when computer recording was initiated) until August 2015 total 1,311, which equates to 8.2% of total retrievals over the 4-year period. Of these, 33.26% (436) were preterm laboring mothers (Table 1), and 4 progressed to in-flight births and will be discussed in detail. All retrievals were performed in a B200 King Air aircraft.

## Results

### Case 1

Patient 1 was a 37-year-old patient, gravida 5, para 2, presenting with early onset labor at 36 weeks 5 days' gestation. Her background history included testing positive for group B streptococcus, gestational diabetes, and an atrial septal defect repaired in infancy.

Her symptoms started at 2230 hours with spontaneous rupture of membranes. After this, she presented to the local clinic at approximately 2300 hours. Referral to CareFlight NT was made at approximately 2345 hours for retrieval. The clinic staff was advised by the retrieval consultant to administer benzylpenicillin and nifedipine 20 mg orally for tocolysis.

The flight crew was tasked at 0010 hours, and takeoff occurred at 0050 hours. The flight crew consisted of a flight nurse (midwife trained) and pilot, with the total mission time, recorded from the time of initial tasking to the time the retrieval team returned to base after hospital transfer, lasting 4 hours 33 minutes. Patient contact was made at 0145 hours on the airstrip accompanied by clinic staff. On initial assessment, the patient was contracting 3:10 and managed to walk onto the aircraft. Observations first recorded in the aircraft were blood pressure of 131/80 mmHg, heart rate of 123 beats per minute, oxygen saturation of 95% in room air, respiratory rate of 26 breaths per minute, fetal heart rate of 160 beats per minute and blood glucose level of 4.7 mmol/L. A third dose of nifedipine was administered as per guidelines.

The aircraft departed the referring site at 0210 hours. It was noted that the patient had more regular contractions and increasing severity of symptoms with progression to spontaneous vaginal delivery at 0245 hours. Immediately after delivery, 10 units of intramuscular syntocinon was given followed by delivery of the placenta and membranes. Blood loss was estimated at 300 mL. Neonatal Apgar scoring was 6 at 1 minute and 9 at 5 minutes with no 10-minute observation documented. No further resuscitation was required after the clinical assessment and Apgar scoring, and the neonate was wrapped and placed skin to skin with the mother. The neonate's temperature was recorded at 36.1°C. There was no documented record of blood glucose measurement. There were no further incidents recorded on transfer to the maternity ward at RDH.

Follow-up showed the total length of stay for patient 1 and the neonate was 3 days. The birth weight was recorded at 2,380 g, with a discharge weight of 2,255 g. Patient 1 was discharged on metformin and insulin with no other issues.

### Case 2

Patient 2 was a 25-year-old patient, gravida 2, para 1, presenting with early onset labor at 31 weeks' gestation. Her background history included a previous emergency lower segment cesarean section for placental abruption at 31 weeks in the previous pregnancy.

The patient presented to the clinic at approximately 0010 hours with an onset of contractions. It was noted that she had spontaneously ruptured membranes at 0600 hours the previous day. There was no midwife at the clinic, so the initial examination documented only irregular contractions and pink liquor; the speculum examination was unable to visualize the cervical os. Referral to CareFlight was made at 0040 hours. The clinic staff was advised to administer benzylpenicillin and a total of 3 doses nifedipine as per guidelines. The flight crew was tasked at 0052 hours; took off at 0128 hours; and consisted of a flight nurse (midwife trained), a flight doctor, and a pilot. The total mission time was 4 hours 28 minutes. Patient contact was made at 0250 hours and the patient was assessed at the airstrip. The initial assessment showed the patient contracting 1:10 with intermittent severe abdominal pain. Initial observations were blood pressure of 133/77 mm Hg, heart rate of 81 beats per minute, oxygen saturation of 98% on room air, respiratory rate of 24 breaths per minute, and fetal heart rate of 154 beats per minute.

The aircraft departed the referring site at 0300 hours with progression to spontaneous vaginal delivery at 0400 hours during aircraft descent. The patient was given 10 units of intramuscular Syntocinon (Novartis Pharmaceuticals UK Ltd., Frimley, UK), and delivery of placenta and membranes occurred at 0420 hours, after landing. The blood loss was calculated at 350 mL. The neonatal Apgar scores were 6 at 1 minute, 8 at 5 minutes, and 8 at 10 minutes. On initial review, there was poor respiratory effort with significant subcostal recession so assisted ventilation was initiated using the Neopuff (Fisher and Paykel Healthcare Pty Limited, Melbourne, Australia). Saturations were recorded as 76% at 1 minute and rising to 94% at 5 minutes and 98% at 10 minutes. The temperature of the neonate was recorded at 35.7°C so the neonate was wrapped in a blanket and aircraft heating was increased. The neonate's blood sugar was tested and the level recorded at 7.2 mmol/L. Ongoing ventilatory support was required on transfer to the hospital so admission to the special care baby unit was organized. Patient 2 was transferred to the maternity ward.

The follow-up showed no maternal concerns. The neonatal length of stay was 22 days, and a diagnosis of intrauterine growth restriction was made with a birth weight of 1,728 g. The discharge weight was 2,065 g. Sequential improvement in breathing and weight was noted until discharge. A follow-up appointment with the community midwife was organized.

### Case 3

Patient 3 was a 31-year-old patient, gravida 6, para 2, presenting to the local clinic with a febrile illness of unknown cause and intermittent abdominal pains. She was estimated to be 22 weeks' gestation. The patient passed a large blood clot in the clinic. She had a background history of gestational diabetes and a previous still-born pregnancy at 21 weeks' gestation.

There was no documented history of when the patient presented, but the clinic was noted to have no midwife services. Referral to CareFlight was made at 0300 hours, and the decision made by the medical retrieval consultant (MRC) was to reroute a mission that was already in progress because the only flight nurse/midwife available was already on a flight tasking with another obstetric patient. The rerouting was confirmed at 0330 hours, after the aircraft had originally taken off at 0145 hours. The patient was given 2 g ampicillin, 500 mg metronidazole, and 280 mg gentamicin for sepsis of unknown origin. The MRC advised steroids (11.4 mg betamethasone), 3 doses of 20 mg nifedipine, and magnesium

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