Air Medical Journal xxx (2017) 1–5

Contents lists available at ScienceDirect

Air Medical Journal

journal homepage: http://www.airmedicaljournal.com/

Original Research

Is Nifedipine as a Tocolytic Effective in Facilitating In Utero Transfer?

Jodie Martin, BA Science (Nursing), PG Dip Emergency Nursing, PG Cert Aeromedical Retrieval, Master Midwifery [1], Jodie Mills, BA Nursing, Grad Dip Midwifery, Postgrad Dip Advanced Clinical Nsg, Master Public Health [1], David Stanley, MSc HS, BA Ng, Dip Sc (Nursing), Grad Cert HPE [2]

[1] *RN/RM, CareFlight, Northern Territory, Australia*
[2] *Professor in Nursing, RN/RM, University of New England & Charles Sturt University, Australia*

A B S T R A C T

Objective: Previous studies have reported that air medical transfer of women in preterm labor can be safely accomplished, without preterm birth occurring; in fact, many women were later discharged without preterm birth occurring. The purpose of this study was to determine if nifedipine, when used as a tocolytic, is effective at facilitating in utero transfer of women in preterm labor in the Top End of the Northern Territory of Australia.
Methods: This was a retrospective descriptive study over a 3-year period of all women transported in preterm labor between 23 + 6 to 36 + 6 weeks' gestation of pregnancy (N = 325).
Results: The average gestation period was 32 + 2 weeks. The mean retrieval time was 6 hours. The mean time of birth from referral was 33 hours. A number of women gave birth to a preterm newborn in a remote health center (17%). There were 3 in-flight preterm births, and 49% of women were discharged without a preterm birth occurring. All women transported by air medical retrieval were admitted to the tertiary hospital for at least 24 hours.
Conclusion: In this study, nifedipine was used successfully to facilitate in utero transfer in many cases. Nearly half of the women referred were discharged without preterm birth occurring. Findings compare favorably with other published studies.

Preterm newborns born in a tertiary health center have lower rates of morbidity and mortality with better outcomes than preterm newborns who are transferred after birth.[1,2] Currently, there is a high incidence of preterm births in the Northern Territory of Australia.[3-5] Given the vast geographic and remote nature of the Northern Territory, the most rapid and often only means of transport to a tertiary health center for women in preterm labor is via air medical retrieval. Because of the remote nature of referral sites in this area, retrieval times can be lengthy. Therefore, there is a risk that preterm birth may occur before or during transport. This study aims to answer the following question: Is nifedipine as a tocolytic effective at facilitating in utero transfer of women in preterm labor in the air medical retrieval setting in the Top End of the Northern Territory?

Review of the Literature and Background

Although the air medical transfer of women in preterm labor is not without risk of in-flight birth, several studies have reported women in preterm labor can be safely transferred by air medical retrieval without birth occurring during transport.[6-8] Although these studies reported the various types of tocolytics used during transfer, no study details the specific use of nifedipine as a tocolytic. A study on the safety and effectiveness of a variety of tocolytics during air medical transfer of women in preterm labor reported 11 preterm births occurred in-flight.[9] Of these 11 in-flight births, only 4 received a tocolytic, none of which were a calcium channel blocker such as nifedipine. The air medical retrieval service (CareFlight) that operates in the remote Top End of the Northern Territory has previously reported in-flight births despite the administration of nifedipine as a tocolytic.

Clinical guidelines for air medical retrieval and remote health guidelines in the Top End of the Northern Territory recommend 60 mg nifedipine to be given orally in 20-mg increments over a 60-minute period.[10] Thus, the reason for undertaking this study is

E-mail address: Jodie.Martin@careflight.org (J. Martin).

1067-991X/$36.00

http://dx.doi.org/10.1016/j.amj.2017.01.010

to determine the overall effectiveness of nifedipine as a tocolytic in suppressing preterm labor and delaying preterm birth in the air medical retrieval setting.

In the Top End of the Northern Territory, there is a high indigenous population living in remote areas. This population is reported to have worse birth outcomes and the highest rates of preterm births in Australia, with births sometimes occurring before the arrival of an air medical team.[3-5,11] Therefore, increased remoteness combined with a high-risk obstetric population can be associated with higher potential of preterm birth occurring before arrival at a tertiary hospital. The importance of this study is to determine the effectiveness of nifedipine in facilitating in utero transfer to a tertiary health center for a high-risk obstetric group who resides in remote areas. If nifedipine proves to be an effective tocolytic in this situation, it has the potential to improve birth outcomes.

Previous studies conducted in Australia on the transfer of women in preterm labor from rural and remote areas to a tertiary hospital have reported many of the women do not have a preterm birth and are in fact later discharged home to continue their pregnancy once preterm labor has been suppressed.[6,12,13] This study may also reveal that there are some unnecessary air medical transfers of women in preterm labor, with some women not proceeding to preterm birth at all. The practical importance of understanding the outcomes of these women will not only assist in guiding the scope of future study but also would optimally help to decrease unnecessary air medical transfers, to operate a more cost-effective air medical retrieval service, to decrease the cost and length of hospital admissions, and to decrease the time women from remote areas are separated from their families.

Methods

Setting

This study was undertaken in the Top End of the Northern Territory, Australia. It is a vast and isolated area twice the size of the United Kingdom. CareFlight is the only air medical retrieval organization to service this region. The service transports 3,000 patients per year, encompassing the entire life span, using both fixed and rotor wing aircraft.

Within the region are 2 small rural hospitals that undertake planned low-risk, term births. However, there are limited resources to care for a preterm newborn for any extensive period of time. Additionally, there are also over 35 small remote health centers that do not have inpatient facilities and do not perform planned births. They can manage an unexpected normal birth but have no surgical or neonatal nursery care resources. There is often a midwife employed at each remote health center. Royal Darwin Hospital is the only tertiary hospital in the catchment area and the only facility with a neonatal intensive care unit.

Design

This was a retrospective descriptive study over a 3-year period from February 2012 to February 2015 (inclusive).

Sample

Women were retrospectively identified from a computer-based search of an electronic medical retrieval database located at the air medical retrieval service using key word searches of “preterm labor,” “other labor and delivery,” “PV (vaginal) bleeding in pregnancy,” and “ruptured membranes.” The sample included all women with a viable pregnancy from 23 + 6 weeks to 36 + 6 weeks, those identified in preterm labor, those considered to possibly be in preterm labor, and those with ruptured membranes. Preterm labor was defined as abdominal or uterine tightening or contractions indicative of labor, ruptured membranes, and/or vaginal blood loss. Women were excluded if they showed no signs of preterm labor or were outside of the previously stated gestational period. Women were further excluded if they were referred to the service after a preterm birth had already occurred.

Data Collection

There were 2 sites for data collection. The first was the air medical retrieval service. Data were retrospectively collected from an electronic medical retrieval database and patient clinical records including demographics (age), median time of retrieval task, crew mix, referring site (rural hospital or remote health center), pregnancy data (gestation, gravida, and parity), diagnosis (preterm labor with or without vaginal fluid/blood loss), vaginal examination, tocolysis given, and birth outcomes (delivered before arrival to a hospital or not).

The second site was the tertiary hospital where outcome data were collected retrospectively. Electronic discharge summaries from an electronic patient database (JADECare) were reviewed to collect indigenous status, time of birth, place of birth, and length of stay if discharged from the tertiary hospital before birth.

Two flight nurse/midwives collected the data and recorded it onto an Excel spreadsheet (Microsoft, Redmond, WA), which was later uploaded onto SPSS Version 23 software (SPSS Inc, Chicago, IL). Women were tracked from the primary site to the secondary site by their unique and individual hospital record number. Written approval to undertake this study and source data from both sites were obtained. Ethics approvals were granted from the Menzies School of Health Research, Casuarina, North Territory, Australia (EC00153) and Charles Sturt University, Sydney, Australia (EC00116).

Analysis

Data were analyzed using descriptive statistics with SPSS Version 23 software. Descriptive analysis included mean, range, and percentages. Cervical dilation was stratified into 2 subgroups: cervical dilation 4 cm or less and cervical dilation 5 cm or more. Cervical dilation was included in this analysis to further determine the success of nifedipine in both early and later stages of preterm labor.

Results

There were 325 women who met the inclusion criteria. Of these, 21 were excluded because of incomplete or missing data, resulting in a total of 304 women in the study group. All women transferred were admitted to the tertiary hospital for a minimum of 24 hours.

Demographics and Retrieval Characteristics

Demographics and retrieval characteristics are detailed in Table 1. The length of retrieval was defined as the time of referral to the time of handover at the tertiary or rural hospital, regardless of whether birth had occurred before arrival or not.

Of the women who gave preterm birth after referral to the air medical retrieval service (n = 155), just over half proceeded to a preterm birth within 24 hours (n = 90, 58% of all births). In this group of women who proceeded to a preterm birth within 24 hours, the average time of referral to the time of birth was 5 hours. A number of women (n = 12, 4%) were identified as being retrieved more than once during the same pregnancy.

Place of Preterm Birth

Figure 1 details the place of preterm birth. Of the 155 preterm births that were reported, 41 occurred outside of a tertiary hospital. Of the 11 preterm births that occurred in a rural hospital, 5 were transferred from a remote health center to a closer rural hospital by air medical retrieval rather than the tertiary hospital, which was