Early Human Development 88 (2012) 147–150

Contents lists available at ScienceDirect

Early Human Development

journal homepage: www.elsevier.com/locate/earlhumdev

In-utero transfer is too difficult: Results from a prospective study

C. Gale [a,b,*], A. Hay [c], C. Philipp [a], R. Khan [d], S. Santhakumaran [b], N. Ratnavel [a]

[a] Neonatal Transport Team, Royal London Hospital, London, United Kingdom
[b] Department of Academic Neonatal Medicine, Imperial College London, Chelsea and Westminster Hospital, London, United Kingdom
[c] Emergency Bed Service, London Ambulance Service NHS Trust, London, United Kingdom
[d] Department of Obstetrics and Gynaecology, Barts and The London Hospital, London, United Kingdom

ARTICLE INFO

Article history:
Received 16 May 2011
Received in revised form 19 July 2011
Accepted 21 July 2011

Keywords:
Preterm birth
Patient transfer
In-utero transfer
Post-natal transfer

ABSTRACT

Backgound: Perinatal transfer is an unavoidable part of neonatal care. In-utero as opposed to postnatal transfer is recommended whenever possible.
Aims: To quantify prevalence of in-utero transfers, determine the duration of time spent arranging in-utero transfers and whether failures in the organisation of potential in-utero transfers were occurring.
Study design: Prospective study of in-utero transfers referred and completed, and questionnaire study of failed potential in-utero transfers.
Subjects: Women referred to the Emergency Bed Service (EBS), women undergoing in-utero transfer by London Ambulance Service (LAS), and preterm infants undergoing postnatal transfer where in-utero transfer had been potentially achievable, in the London area, over a six month period in 2009.
Outcome measures: Number of in-utero transfers being undertaken, duration of time spent arranging in-utero transfer, and number of failed in-utero transfers.
Results: Over the study period LAS undertook 438 in-utero transfers and there were 338 referrals for in-utero transfer to EBS, of which 180 (53%) were successful. Of 69 emergency postnatal transfers of preterm infants (<29 weeks gestational age), 11 were classified as failed in-utero transfers. Median (IQR) duration of EBS involvement in in-utero referrals was 340 (200–696) min. A median (IQR) of 240 (150–308) min was spent contacting a median (IQR) of 7 (6–8) units when attempting to arrange in-utero transfer in the failed in-utero transfer group.
Conclusions: Arranging in-utero transfer consumes considerable clinical time; an important number of in-utero transfer attempts fail for non-clinical reasons; establishment of a centralised in-utero transfer planning service will save clinical time and may improve outcomes.

1. Introduction

Perinatal transport is an unavoidable aspect of high quality perinatal care. Neonatal intensive care is a high cost, low volume service that is not available in all maternity units. Antenatal recognition of a postnatal requirement for neonatal intensive care is not always possible, and therefore many cases of postnatal transfer are unavoidable. However, when the need for specialist care can be determined prior to delivery in-utero transfer of the mother and foetus may be achievable. This is associated with a reduced neonatal morbidity [1] and mortality [2], is less commonly associated with adverse events [3] and is cheaper [4] when compared to postnatal transfer. In-utero transfer of infants is therefore recommended whenever feasible.

Since 2003, changes in the provision and planning of neonatal care [5] have led to the establishment of dedicated postnatal transfer teams and the reorganisation of neonatal units into managed clinical networks, with policies determining provision of care by individual neonatal units and centralised neonatal cot organisation. These changes to neonatal services have not been accompanied by parallel reorganisation of perinatal services, thus whilst postnatal transfer is centrally organised and well supported in London, corresponding changes to the in-utero transfer process remain to be realised. Referrals for postnatal transfer within London have increased since 2003 whilst referrals for in-utero transfer to the London emergency bed service (EBS) have declined [6]. One potential explanation for this is a reduction in in-utero transfers due to the difficulties inherent in arranging them. The priority of labour ward clinical staff centres on caring for the labouring mother, aiming to make this as safe and risk free as possible. When arranging an in-utero transfer is appropriate, clinical staff undertake the time-consuming, administrative duties required to secure a maternal bed and neonatal cot, whilst continuing to provide ongoing care of for labour ward patients. This does not appear to be a suitable use of clinical time. Furthermore the delay

* Corresponding author at: Department of Academic Neonatal Medicine, Imperial College London, Chelsea and Westminster Hospital, London, United Kingdom. Tel.: +44 20331558241.
E-mail address: christopher.gale@imperial.ac.uk (C. Gale).

0378-3782/$ – see front matter © 2011 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.earlhumdev.2011.07.016

inherent in this process may result in a change in the maternal condition, rendering the in-utero transfer inappropriate. Evidence from other countries suggests that opportunities for in-utero transfer are commonly missed in preterm populations [2,7], and whilst it appears widely accepted amongst perinatal practitioners in the UK that the process of arranging in-utero transfer is difficult, the extent of the problem and the resulting effects on clinical time and patient care have not, to our knowledge, been adequately explored. Failure of in-utero transfer has important implications: the Confidential Enquiry into Stillbirths and Deaths in Infancy found that circumstances where an in-utero transfer was indicated but did not occur were highly likely to be associated with the death of the baby [8].

2. Methods

The aim of our study was to determine, within the London area:

1. Requests for in-utero transfer.
2. Duration of time spent arranging in-utero transfers.
3. Whether potential in-utero transfers were being missed.

The study was carried out over a six-month period (May 24th–November 23th, 2009). We extracted the number of requests for in-utero transfer and duration of time spent arranging and completing in-utero transfers from EBS in London. EBS provides a centralised cot locating service to assist with in-utero transfer, and remains in contact with referring units until either transfer is completed or the request is cancelled. Duration of EBS in-utero transfers was defined as the time from initial EBS involvement to completion or cancellation of transfer. As EBS does not provide assistance locating a maternal bed or arranging transportation, it may not be involved in all in-utero transfers. Therefore we determined the total number of in-utero transfers over the study period by extracting the number of inter-hospital transfers carried out by the London Ambulance Service (LAS) with an obstetric coding.

To detect cases where in-utero transfer failed, all postnatal transfers referred to the Neonatal Transfer Service (NTS) over the study period were prospectively reviewed. During the study period all requests for postnatal transfer within the Greater London area were referred to the NTS. Previously published census figures from the London network using similar data collection techniques resulted in >96% capture of all postnatal transfers [6]. To identify the subgroup where in-utero transfer had not occurred despite antenatal indications and sufficient time, *failed transfers,* the following criteria were used:

- Gestational age at birth <29 weeks, requiring postnatal transfer within 24 h of birth.
- Transfer from a lower designation unit to a higher designation unit.
- Transfer for reasons of prematurity.
- Maternal admission to and continuous inpatient stay at referring hospital >12 h pre-delivery.

Preterm births <29 weeks gestation were chosen because the need for transfer to a higher level unit is evident prior to delivery and defined according to network policies. A 12-hour window was chosen to allow sufficient time to arrange an in-utero transfer and because it corresponds with commonly given antenatal steroids.

Where cases met the above criteria a structured telephone questionnaire was carried out immediately following the postnatal transfer to survey in-utero transfer processes. This included questions about the staff involved in the attempted transfer organisation, the number and approximate duration of telephone calls made, the number of hospitals contacted, whether maternal beds and neonatal cots were available and the reason why the transfer did not occur. Time taken arranging the attempted transfer was defined as the total time spent contacting and in discussion with other units. Using a pre-specified algorithm, repeated attempts were made to contact staff involved in the management of cases. Initial enquiries were made to the obstetric team working at the time of the delivery, with further enquiries made to midwifery staff or clerical staff where appropriate. Cases were defined as *failed in-utero transfers* where there was no clinical contra-indication for in-utero transfer, or *contra-indicated in-utero transfers* where clinical reasons prevented in-utero transfer. For the purposes of this study, any decision that in-utero transfer was contra-indicated on clinical grounds, made by medical or midwifery staff was acceptable.

2.1. Statistical analysis

Statistical analysis was carried out using Stata version 11 (Stata Corp, Texas, USA). Statistical significance was defined as $p<0.05$. Infant and transfer characteristics were described for the missed in-utero transfer group and the contra-indicated in-utero transfer group. For each variable, differences between groups were tested for significance using the Student's *t*-test for normally distributed variables; the Mann Whitney *U*-test for non-normal variables and the Fisher's exact test for proportions with low frequency counts.

3. Results

There were 338 referrals to EBS for in-utero transfer over the study period, including 162 requests at <29 gestational weeks. Fifty-three percent (180) resulted in successful in-utero transfer of mother and foetus. The median (IQR) duration of in-utero transfers, where a referral was made to EBS was 340 min (200–696 min). Over the same period LAS undertook 438 inter-hospital transfers with obstetric codes.

663 requests for postnatal transfer were made to NTS during the study period. Sixty-nine postnatal transfers occurred within 24 h of birth, of infants <29 weeks gestational age. Of these 26 were to a higher-level unit, following maternal admission of >12 h. A telephone questionnaire was attempted in all cases and responses obtained in 24 cases; one further case was excluded as no in-utero transfer was attempted (the unit at the referring hospital had initially expected to provide ongoing care for the infant). A flow chart, Fig. 1, details postnatal transfer requests over the study period. Table 1 shows the demographic details of postnatal transfers that occurred within 24 h of birth, of infants <29 weeks gestational age, and where the mother had been an in-patient for >12 h: *failed* and *contra-indicated in-utero transfers*.

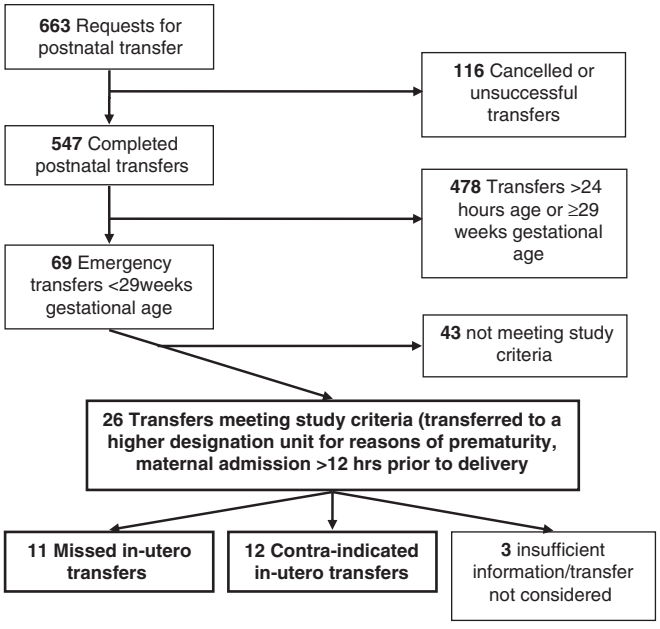

Fig. 1. Flowchart of postnatal transfers.