Planned neonatal transfers by a centralised nurse-led team

A retrospective study of routine and urgent inter-hospital neonatal transfers by a centralised nurse-led team based in the east of England is reported. Patient population and predefined criteria for selecting suitable patients before transfers are undertaken, are described.

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Keywords

criteria; triage; planned neonatal transfers; nurse-led transport team; patient selection

Key points

Cheema, I.U., Bomont, R.K., Hare, A.B. (2007) Planned neonatal transfers by a centralised nurse-led team *Infant* 3(3): 112-115.

1. After triage and patient selection 521 non-emergency nurse-led transfers were completed following 864 initial requests.
2. Four planned transfers did not go ahead due to the infants' condition on arrival of the team at the referring hospital.
3. Clearly defined acceptance criteria, provision of accurate information to the transport team, careful call triage and availability of senior advice are important prerequisites for transfers to be effectively undertaken by a centralised nurse-led team.

Nurses have always played a key role in inter hospital transfer of newborn infants, both in emergency and routine or planned transfer settings[1]. The safety and effectiveness of nurse-led emergency transport teams in North America has been well documented[2,3]. However the practice of nurse-led routine or planned infant transfers for repatriation from tertiary units to the local hospital, which account for a considerable proportion of the total transfer activity[4,5], is not as well described in the literature. There are no informative data as to which types of infants can be safely transferred by a nurse alone and over what distances. For instance, should infants receiving nasal continuous positive airway pressure (nCPAP) be included in this group? What is a suitable minimum weight or gestation for such infants? What about the baby with frequent apnoeas and bradycardias? Should a single nurse be responsible for such patients during a journey lasting several hours? These and other questions remain unanswered in the literature.

Until now the relative dearth of data on this subject may not have been considered problematic as the infants have invariably been transferred by nurses from the referring facility, already familiar with the infant's clinical status. This allowed the nurse undertaking the transfer to determine whether or not the transfer could be safely carried out, considering the infant's clinical status and the nurse's own clinical experience and competencies. However with increasing awareness of clinical governance, staff shortages and a drive towards improving nursing ratios for inpatient care, many hospitals may not be prepared to conduct such transfers themselves, leading to the development of centralised neonatal transport teams currently being set up regionally across the UK. So far emergency transport of infants requiring immediate intervention has been the main focus of these teams, leaving repatriation of infants to nurses from the individual hospitals.

If centralised transport teams are to prove effective, it is important that they help repatriate infants to the local hospitals in order to maintain intensive care capacity within tertiary centres. The nature of centralised transport teams is such that their staff are not familiar with the infant's clinical course and current status until the transport request is received and cannot independently assess the infant without travelling to the referring hospital. This puts the transport nurses and the senior medical staff of the transport team ultimately responsible for the infant during transfer, at a distinct disadvantage compared to the referring facility and makes it difficult to determine, at the point of referral, which patients can be transferred safely by the transport nurses.

For the transfers to be safely carried out by the centralised teams there is a need for clear, robust patient selection criteria to ensure that the right patients are transferred safely. In order to develop such criteria, it is important that teams already undertaking such transfers scrutinise their practice and share their results.

The Acute Neonatal Transport Service provides inter hospital neonatal transport to the east of England, a region covering twenty two thousand square kilometres, and serving a population of 5.4 million, with an annual birth rate of approximately 62,000. There are 18 hospitals in the region with facilities for neonatal intensive care. The service offers a team for emergency transfers, comprising a doctor or advanced nurse practitioner as team leader, as well as a transport nurse and an ambulance driver. An additional nurse-led team, comprising

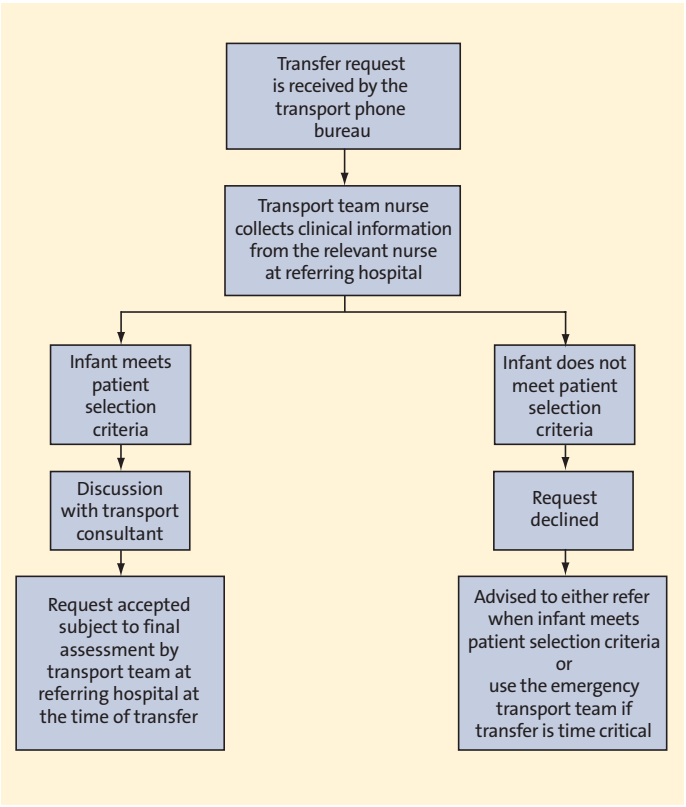

FIGURE 1 Transfer call triage algorithm. Referring NICUs advised to give 24-48 hours' notice.

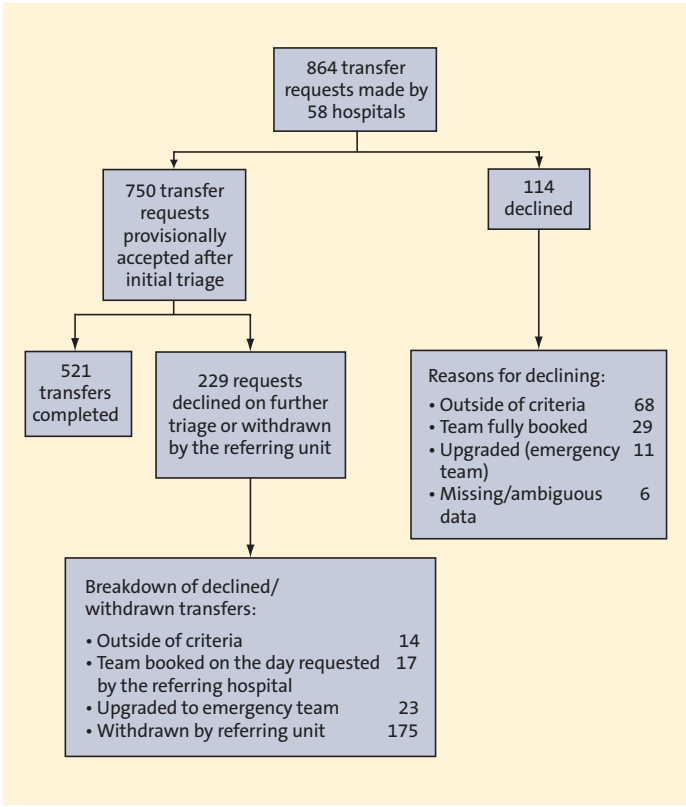

FIGURE 2 Breakdown of all transfer requests.

Nurse led transfers are NOT available for the following patient groups:

- Intensive care babies (BAPM 2001)[6]
- Babies below 1kg in weight
- Babies below 28 weeks' gestation and less than 48 hours of age
- Babies who are on nCPAP for less than 48 hours after extubation from a period of ventilation
- Unstable high dependency babies e.g. babies with apnoeas and bradycardia requiring oxygen or stimulation
- Babies with complex cardiac problems or those requiring medication to maintain a PDA.
- Babies with complex surgical problems
- Babies with neurological problems that require constant monitoring and treatment to maintain stability

Nurse led transfers may be undertaken for the following patient groups:

- Stable special care babies
- High dependency babies who have been stable for 48 hours with no increasing oxygen requirement and no significant bradycardia or desaturation
- Babies on nCPAP who have been stable for 48 hours on nCPAP with no increase in oxygen or flow, who have not had bradycardia or desaturation requiring oxygen or stimulation in the last 24 hours
- Surgical referrals where the baby is stable for transfer and does not require interventions to maintain stability
- Babies with neurological disorders where the baby has been stable for 48 hours
- Babies who have been extubated for 24 hours after being electively intubated for surgery and are stable in pre intervention state
- Stable babies requiring outpatient appointment (not intervention) where the wait for appointment does not exceed one hour

BAPM: British Association of Perinatal Medicine nCPAP: nasal continuous positive airway pressure
PDA: patent ductus arteriosus

TABLE 1 Patient selection criteria for nurse-led transfers.

a transport nurse and an ambulance driver is available for planned transfers. The results of two years' experience of planned transfers by this nurse-led team are reported.

Methods

All requests for elective neonatal transfers made by neonatal intensive care units (NICUs) to the transport team between October 2003 and October 2005 were included in the study.

Referring units were advised to make transfer requests 24-48 hours ahead of the desired date to allow the transport team to plan ahead. Transfer requests were triaged according to a predetermined protocol (**FIGURE 1**) with the help of predefined criteria (**TABLE 1**). All operational and clinical data were prospectively recorded on transfer sheets and then entered into a customised electronic database. Any untoward incidents, based on a predefined trigger list (**TABLE 2**), were documented at the time of transfer. Data including dates and times of requests, patient demographics and clinical status, referring and receiving hospitals and reasons for transfer or refusal and any adverse events were retrieved from the database for review. Missing or ambiguous data were cross referenced against the original transfer documents.

Results

All 18 regional hospitals, as well as 40 hospitals from outside the region, made 864 requests for planned transfers over the two year period. Repatriation (80%), outpatient appointment (4%) and surgical review (1.9%) were the main reasons for transfer requests. No clearly identifiable reason was available in 12% of cases. Seven hundred and fifty requests were provisionally accepted after initial triage. One hundred and seventy five requests were subsequently withdrawn by referring hospitals either because of deterioration in the infant's clinical status or due to the loss of cot at the admitting hospital. Five hundred and twenty one infants were transferred to 65 different hospitals. Transfer of 54 infants was declined on further triage or due to the team being booked on the day transfer was requested. A breakdown of all transfer requests is given in **FIGURE 2**. Weight of less than one kilogram at the time of request, frequent apnoeas and bradycardias in the preceding 48 hours and nCPAP for less than 48 hours after extubation, were the commonest reasons for non acceptance of transfer requests.

TABLE 3 provides a comparison of salient clinical characteristics of transferred versus non transferred infants. Twelve members of nursing staff carried out these transfers with a mean (range) of 43.4 (3-214) transfers per individual. Four adverse incidents were reported, none occurring in transit or resulting in patient harm (**TABLE 4**).

- Ambulance mechanical problem/breakdown
- Blood sugar <2.0 mmol/L during transfer or on arrival at admitting hospital
- Communication issues
- Unnecessary delay at referring hospital
- Unnecessary delay at admitting hospital
- Drug related incident
- Equipment malfunction
- Iatrogenic injury to the patient
- Record keeping/documentation issues
- Temperature <36°C or >38°C on arrival at admitting hospital
- Vascular line associated incidence.

TABLE 2 Trigger list for critical incident reporting.

Infant characteristics at referral	Total transfer requests: 864	
	Accepted: 750	Declined: 114
Mean (SD) weight (kg)	1.87 (0.78)	1.99 (1.1)
Mean (SD) postnatal age (days)	24.3 (29.6)	23.4 (30.6)
Mean (SD) corrected gestational age (weeks)	35 (4.3)	35 (5.1)
Infants in room air (%)	560 (74.6)	74 (64.9)
Infants requiring supplemental oxygen (%)	93 (12.4)	21 (18.4)
Infants on nasal CPAP (%)	86 (11.4)	17 (14.9)
Ventilated infants (%)	None	1 (0.8)
Respiratory support not documented (%)	11(1.4)	1 (0.8)

TABLE 3 Clinical characteristics of infants referred for transfer.

Discussion

Two years' experience of neonatal transfers by a centralised nurse-led transport team has been analysed. A large number of infants from a broad clinical spectrum were referred to this team. All transfer requests were triaged against predefined criteria before acceptance. Five hundred and twenty one transfers were completed. Repatriation to the local hospital was the commonest reason for these transfers, followed by attendance at outpatient clinic appointments. A number of requests were withdrawn by the referring units themselves due to a change in the individual infant's clinical status between provisional and final acceptance of the transfer. The service was utilised by not only the 18 regional hospitals who fund the service but also by 40 non regional hospitals to help repatriate infants resident in the region.

The use of the team's patient selection

criteria contributed to a proportion of requests being declined at the point of referral. However, this practice may have contributed to a low number of adverse incidents. All these incidents involved the transport team finding the infants in a clinical state significantly different from that understood at the time of referral. The transfer was abandoned at the time in three out of four cases, for the NICU to make a fresh referral at a later stage after the infant had been stabilised. In one case immediate transfer was felt to be crucial and a doctor from the referring hospital therefore accompanied the team. The remaining three infants were transferred by the team the following week after they had been stabilised and referred again.

An obvious limitation of this study is that it is not a direct comparison between a physician-led and nurse-led team transferring similar patient populations and therefore it is not possible to conclude that the patients were transferred as safely or effectively as they potentially could have been by a traditional physician-led team. The experience reported is also relatively unique to the Eastern region in terms of the team setup and consultant support. The study does not provide data on the outcome of transfers refused by the team or the longer term adverse effects of such delays. It is possible that the infants were either referred again after meeting the criteria or the referring hospitals undertook the transfer themselves, using various combinations of medical and nursing staff.

Establishment of centralised transport services is changing neonatal transport facilities in the UK. Although the operational setup and the services offered by individual teams will no doubt vary, repatriation of infants to their local hospitals is an important consideration and specialist teams will be expected to carry out these transfers. Working from a central location the transport nurses, however experienced, are disadvantaged in not being able to physically assess the infant before arriving on the referring unit on the day of the transfer. The decision to accept or decline the transfer therefore has to be made on the basis of information provided by the referring hospital at the time of referral and subsequently updated on the proposed day of transfer. There remains a need for prospective research in this area in order to develop a scoring system to help in patient selection. In the authors' experience, clearly defined acceptance criteria, provision of accurate information to the transport team, careful call triage and senior advice are prerequisites for transfers to be undertaken safely by a nurse-led team.

Nature of adverse event	Gestation at referral	Number of incidences	Action taken by transport team
Recurrent desaturations upon transport nurse's arrival at referring unit	35 weeks	1	Transfer deferred. Completed the following week after a fresh referral by the unit.
Increasing oxygen requirements on CPAP upon transport nurse's arrival at referring unit	Term	1	On this occasion transfer was time critical and emergency team was unavailable. Infant was transferred by the nurse accompanied by a doctor from referring hospital.
Increasing oxygen requirements on CPAP upon transport nurse's arrival at referring unit	32 & 34 weeks	2	Referring unit advised to make a fresh referral when infant more stable.

TABLE 4 Changes to planned transfers due to adverse events.

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