Embracing the future – Yorkshire & Humber Infant and Children Transport Service

This article describes the need for a new paediatric and neonatal transport model in the Yorkshire and the Humber region – Embrace. The development of the service was based on the Department of Health toolkit recommendations for neonatal care and services. The article provides details of the service organisation, operational specifications and activity data for the first year of operation.

Cath Harrison
BMedSci, BM, BS, DTM&H, FRCPCH
Lead Neonatologist for Embrace Yorkshire and Humber Infant and Children Transport Service, Unit 7, Capitol Business Park, Barnsley
catherine.harrison@sch.nhs.uk

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Key points

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1. Embrace is the first dedicated combined neonatal and paediatric transport service in the UK covering Yorkshire and the Humber.
2. A non-hospital base with dedicated staff and vehicles leads to rapid activation times.
3. Simulation training ensures ongoing competence.

In 2006 a working party comprising clinicians, managers and commissioners was tasked with reviewing paediatric transport service provision in Yorkshire and the Humber. The region compromises two neonatal networks (Yorkshire and North Trent) and two paediatric intensive care units based in Leeds and Sheffield. The region has approximately 78,000 births/year. Transfer capability was historically provided by four independent teams – two neonatal and two paediatric. Despite being extremely busy and efficient there were deficiencies in some of the services relating to medical cover for out-of-hours transfers.

The neonatal teams were funded by their relative networks and provided dedicated nursing staff. Medical cover, for both neonatal and paediatric transfers if needed, was taken from the host intensive care units. With 'Modernising Medical Careers' and the 'European Working Time Directive' changes, provision of medical staffing became more problematic and these services became unsustainable.

After many option appraisals, the decision to fund and develop a combined Strategic Health Authority (SHA)-wide infant and children transport service was made. A three-year process then began with working groups looking at clinical, operational, and logistical issues which culminated in 'Embrace' carrying out its first transfer in December 2009.

In October 2009 the Department of Health published the 'Toolkit for High Quality Neonatal Services'[1]. In the dedicated section on neonatal transfers, the paper recommends:

> "a service is available at all times and to all units within a network, providing safe and effective transfers for newborn babies. This service is in addition to the delivery of in-patient care, recognises the importance of family circumstance and provides arrangements to undertake or facilitate transfers in all categories as part of its baseline provision".

Several members of the core working group for Embrace were involved in this document and thus the set up of Embrace was planned according to the principles of the toolkit, focusing on the 'Operational specification for a neonatal transfer service' and 'Markers of good practice'.

Development of Embrace

It was agreed early on in the process that the new service should be built upon the quality and experience of existing services and that participation of all current providers was essential for success. Clinicians were therefore invited from existing transport services, local district general hospitals and intensive care units to be part of the planning and development process, alongside managers, commissioners, and the Yorkshire Ambulance Service. A project manager was also appointed to coordinate the process. Work stream groups were established to create operational guidelines, clinical guidelines, equipment needs, ambulance specification, financial plans, and staffing requirements. Sheffield Children's NHS Foundation Trust was invited to host the transport service following a tendering process.

Embrace has been commissioned to organise and implement transfers of babies and children within the Yorkshire and Humber SHA. During the planning period, data were obtained from the four existing transport teams to predict the activity of the new service. Neighbouring transport teams were also contacted to collate numbers of transfers that they had carried out for the existing teams. The estimated number of transfers was 2000/year.

Due to the large predicted number of transfers, the new service had a phased implementation. It was recognised that the neonatal work load would exceed the paediatric demand and with that in mind, paediatric transfers started first in December 2009. This allowed the logistical and operational set up of the new service to be used and trialled before the large number of neonatal referrals started. Between December 2009 and April 2010, there were only three paediatric trainees and two consultants for the service.

Transfers were facilitated through Embrace using Embrace call handlers, nursing staff, vehicles and drivers but frequently the service relied on medical input from the regional paediatric intensive care units. The first neonatal transfer was made on 6 April 2010 marking the beginning of the Embrace combined paediatric and neonatal service. By August 2010, there were five paediatric trainees and five consultants working at Embrace which allowed the initial limited operating hours from 8am-10pm to be extended and in September 2010 the service starting operating 24 hours a day.

Operational specification

All transfers (excluding *in utero*) are classified as per the toolkit as unplanned (time-critical, emergency/urgent) or planned (for investigation and treatment, continuing intensive care and repatriation). As a team it was agreed for Embrace to provide a repatriation service for moving babies back into their mother's resident network, as per the national toolkit. A document listing the hierarchical order for transfers has been drawn up and Embrace will carry out these transfers unless committed to other transfers or it is clinically/logistically appropriate for another service to do so.

The toolkit also specifies that for a transport service to run efficiently there are user responsibilities. These are:

- All referral requests should be made in a timely manner
- All referrals should be made with clinical and logistical information available
- Users should acknowledge priorities stipulated by the transfer service.

Availability of the operational and stabilisation guidelines on the Embrace website (www.embrace.sch.nhs.uk) has enhanced the referral process and standardised referring unit practices during the stabilisation process (eg fluids in correct size syringes, ventilation modes compatible for transport ventilator) making the process more efficient.

As well as carrying out all neonatal and paediatric retrievals across the Yorkshire and Humber region, Embrace also acts as a perinatal cot locator for mothers and infants, and a bed locator for children. Embrace call handlers contact every delivery suite, neonatal unit and paediatric intensive care unit in the region three times a day to provide an up-to-date bed status. Frequently *in utero* transfers can take many phone calls to find an available maternal bed with an appropriate neonatal cot. Embrace currently facilitates between 40 and 50 *in utero* transfers per month and these form a significant part of the workload. Administrative staff work alongside staff based in neighbouring transport services as both *in utero* and postnatal transfers may need to go 'out of region' and thus cot availability across networks needs to be accessed.

Service provision

Embrace is located on a non-hospital site on an industrial estate, close to the M1 motorway and near the M62 enabling quick and easy access to the region (**FIGURE 1**). The service is housed in a two-storey building. On the ground floor is a garage for four dedicated vehicles and the equipment store. The upper floor has a seminar room, open plan area for call handlers and staff, and offices for medical and nursing staff.

Embrace has a single point of contact: 0845 1472472. Just one phone call for the clinician provides cot or maternal bed availability, clinical advice and activation of a transport team. Embrace call handlers take basic demographic details and then the call is transferred to a transport consultant who takes a detailed history. At any point in the call, specialist advice from for example a paediatric intensivist, neonatologist, cardiologist, neurosurgeon

FIGURE 1 Embrace site.

etc, can be conferenced in using the Adtec call conferencing system, designed in Australia, that can conference in up to 30 participants if needed. All calls have real-time recording for clinical governance reasons.

Staff and training

Embrace operates 24 hours a day and has a pool of staff to complete the transfers. Dedicated staff are as follows:

- 12 drivers
- one administrative manager
- 6.4 wte call handlers
- two advanced neonatal nurse practitioners
- two advanced nurse practitioners
- 23 wte nurses
- six transport registrars
- five transport consultants.

Embrace also has off site support from pharmacists and medical physics technicians based at Sheffield Children's Hospital through service level agreements. There is a maximum of a five-day turn around time for equipment requiring repair and an annual service is carried out on all equipment.

Three or four teams operate during the day, two acute (doctor or nurse practitioner-led) and one or two 'non-acute' teams for repatriation. At night, there are two teams on duty, both medically led. The transport registrar posts are included as part of the Yorkshire School of Paediatrics rotation for training and the posts have also been recognised as part of national neonatal grid training.

The consultants have varied backgrounds: paediatric intensive care, neonatology or paediatrics with an interest in neonatology. All are APLS (Advanced Paediatric Life Support) and NLS (Newborn Life Support) trained. There is a lead neonatal consultant and a lead paediatric consultant along with a lead nurse. The consultants have had training in their opposite specialty, including airway

FIGURE 2 Simulation equipment used in training.

FIGURE 3 Embrace has dedicated custom-equipped ambulances.

lists with anaesthetists. Staff work with tertiary specialists to facilitate transfers, not to replace them – for each referral, tertiary specialists are 'call conferenced' alongside the transport consultant to provide clinical advice about the child or baby for the referring clinican. There are also two transport consultants available on weekdays to provide advice. In the early days of service provision, consultants of opposite specialties teamed up to retrieve patients to share knowledge and experience. Currently Embrace is at full establishment for administrative staff, drivers, nurses, practitioners and registrars and two more consultants are being recruited to the team.

Embrace nursing staff also have a neonatal or paediatric background and the two nurse educators (one neonatal and one paediatric) have worked extremely hard to provide training and cross-over of skills for the two specialties. During the phased implementation of the service, nursing numbers allowed 'buddying' of nursing staff on transfers to allow exchange of knowledge and skills. Regional tertiary centres also provided honorary contracts for nursing staff to allow extra experience in the opposite specialty. All Embrace staff have completed NLS and APLS courses and the majority have attended a transport course, eg PaNSTaR (Paediatric and Neonatal Safe Transfer and Retrieval course).

Nursing and medical staff have an intensive induction programme on starting with the service and a generic competency package has been developed which is mandatory for all staff to complete. Due to the education and training programme, the concept of a generic transport practitioner continues to develop with successful interdisciplinary team working.

Embrace has simulation equipment that is used in the induction programme and also on a regular basis following case reviews and clinical governance meetings (**FIGURE 2**). There is also free access to the SHA-funded Montagu Clinical Simulation Centre in Mexborough. A core group of staff are trained in simulation and debriefing which is so valuable for this learning experience.

Standardised documentation is used for all transfers. This is beneficial from a training point of view and also allows input of mandatory data for PICANet (Paediatric Intensive Care Audit Network) and the BAPM minimal data set for national audit purposes. The documentation and paperwork are constantly reviewed and updated.

A recent introduction to the referral system is a planned transfer referral form containing clinical details which referring units fax through to the service. This allows efficient triage of the transfers that need doing across the region and effective utilisation of the available teams.

Guidelines

Comprehensive guidelines are available on the web site www.embrace.sch.nhs.uk.

FIGURE 4 Inside an ambulance.

These cover transfers of neonatal and paediatric patients, management prior to and during *in utero* transfer and parental travel. Parents are recommended to accompany their child, no matter what age, on transfers. The recent parental survey highlighted this approach with positive feedback from parents accompanying their child. Occasionally due to space restrictions this may not be possible and in this case staff ensure that parents see their child/ baby prior to transfer and that alternative arrangements have been put in place to transport the parents.

User leaflets are available in several different languages and can be downloaded from the Embrace website. As well as the parental feedback questionnaire, questionnaires are also given to referring and receiving units for feedback.

Ambulances

Embrace has four dedicated vehicles that are of appropriate specification and standards and designed specifically for Embrace (**FIGURES 3 AND 4**). Drivers are provided by Yorkshire Ambulance Service and have 'blue light' training and basic life support skills. They are not emergency technicians or paramedics. They are managed by Yorkshire Ambulance Service but work full time for Embrace. The availability of dedicated drivers and vehicles not only ensures a rapid response time for unplanned transfers but means that front line '999' crews are also not taken off the road for Embrace transfers.

Equipment

The equipment used is generic and designed to effectively support both paediatric and neonatal patients. Embrace has had trolleys made by Paraid to a

FIGURE 5 Specially commissioned neonatal incubator trolley.

FIGURE 6 BabyPod trolley.

particular specification. There are seven trolleys in total – four with Dräger incubators for infants weighing less than 5kg (**FIGURE 5**) and three trolleys which can be used either with a BabyPod, made by Ferno (**FIGURE 6**), or as a paediatric trolley with both neonatal and paediatric ventilators available. There are two nitric oxide systems. Each system has six infusion pumps available. A portable cooling mattress will be available on one trolley.

Governance

Embrace has a robust clinical governance strategy with a clear mechanism for quality assurance and incident review. There is a daily review by a transport consultant of all transfers done the day before, which allows any critical incident to be acted upon. A twice-weekly case review meeting (one paediatric, one neonatal) allows cases to be reviewed in detailed with all staff. This is essential from a governance point of view but also highlights training issues. Simulation scenario ideas frequently stem from these meetings.

A monthly clinical governance meeting takes place where guidelines, policies, audits and IR1s (Incident Record 1) are reviewed. These feed into the risk management structure of Sheffield Children's (NHS) Foundation Trust. Embrace also participates in referring/receiving hospitals' mortality reviews.

Safety is another priority for Embrace. A documented policy for safety of staff, patients and parents during transfers is in place with policies on speed and use of lights and sirens, manual handling, how to stow equipment and patient restraints. There is also good provision of insurance for personnel against loss of life or injury.

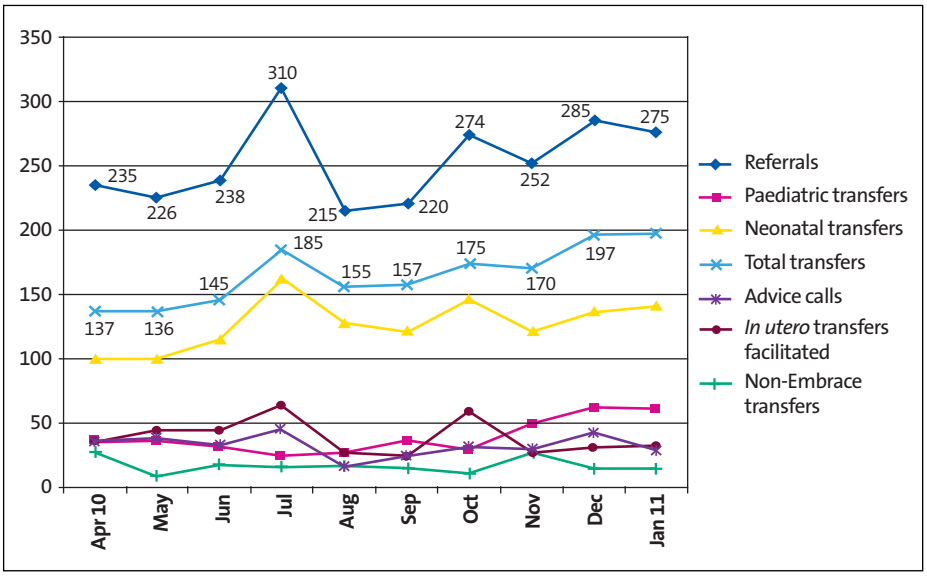

FIGURE 7 Activity data from April 2010-Dec 2010.

Activity

FIGURE 7 shows the activity from April 2010 when Embrace began carrying out both neonatal and paediatric transfers. It also shows the number of *in utero* transfers facilitated by the service. In total 1457 transfers have been carried out in this nine month period; 1127 neonatal transfers, 330 paediatric transfers and 355 *in utero* transfers.

The graph shows a number of non Embrace transfers – detailed analysis shows that the majority of these are time critical transfers which referring hospitals have organised or repatriation of babies whose mother's PCT is not covered by Embrace. Occasionally Embrace has been unable to carry out transfers due to high demand on the service.

As for many transport services around the UK, the need for transfers is increasing due to an increasing birth rate and centralisation of care. A 24-hour service can potentially lead to a decrease *in utero* transfers but the Embrace data does not seem to support this. The numbers of referrals per month is increasing along with the number of transfers carried out. The estimated number of transfers in the first year at 2000 is likely to be achieved. The number of referral phone calls received by Embrace however has exceeded all expectations.

TABLE 1 (following page) shows the data split into referral type as a percentage of the total transfers carried out. As the service provides clinical advice, with input from regional and supra-regional services, there are a number of referrals that ultimately do not require transfers due to improvement in the patient's condition.

Nationally there is interest in mobilisation times; the toolkit recommends that for an unplanned transfer request a transfer team should depart from base within one hour of the referral call. Due to the use of

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 11	Year to date
Referrals	**235**	**226**	**238**	**310**	**215**	**220**	**274**	**252**	**285**	**275**	**2530**
Paediatric transfers	16%	16%	13%	7%	13%	16%	11%	19%	21%	22%	15%
Neonatal transfers	43%	44%	48%	52%	59%	55%	53%	48%	48%	51%	50%
Advice calls	15%	17%	13%	15%	7%	11%	11%	12%	15%	11%	13%
In utero transfers facilitated	15%	19%	19%	21%	13%	12%	21%	11%	11%	12%	15%
Non-Embrace transfers	11%	4%	7%	5%	8%	6%	4%	10%	5%	5%	7%

TABLE 1 Analysis of referrals.

dedicated teams with dedicated vehicles and crews, an Embrace team can mobilise in under 20 minutes. All Embrace ambulances and teams have mobile phones and a team can be mobilised immediately on receipt of a call, while a team member at base takes details and provides stabilisation advice while the team are en route.

Service development

A monthly strategic management meeting with lead clinicians, representatives from local hospitals, managers and commissioners, allows service development to continue. Monthly activity data is reviewed along with a risk register. Lead clinicians from the service are also members of Network Boards and Critical Care Directorates to optimise liaison with users and service review.

Future developments

As with any new service, further development is anticipated. Feedback questionnaires provide vital information and the aim is to make these available on the website.

Ongoing audits on for example, cooling, nitric oxide, and temperature management, allow continuous assessment of the care and service provided. A new portable Tecotherm cooling mattress (Inspiration Healthcare) will optimise care of infants requiring therapeutic hypothermia and currently different types of ventilator are being evaluated which could provide non-invasive ventilation if required. A new electronic transport record is being implemented to enhance documentation and improve data collection.

Conclusion

The first year at Embrace has been a challenging experience with a steep learning curve. It has however been extremely rewarding. It is only due to the hard work and enthusiasm of all the staff that it has been possible to set up a high quality combined paediatric and neonatal retrieval service and receive such positive feedback from parents and clinicians for the service provided.

Reference

1. **Department of Health.** *Toolkit for High Quality Neonatal Services*; October 2009.