London Neonatal Transfer Service
ANNUAL REPORT

PUBLICATION NO: 003

2014 / 2015
Mission Statement

The Neonatal Transfer Service (NTS) aims to provide the best possible care to neonates and their families who need to be transferred for intensive care. We take pride in being a safe, caring and efficient transfer operation committed to our users. We strive to deliver the highest standards of care by leading on training, innovation and research in the field of neonatal transport medicine.
The London Neonatal Transfer Service (NTS) commenced operations in October 2003. We are funded through NHSE specialised commissioning and are based at The Royal London Hospital in Whitechapel. The remit of the commissioned team is to provide stabilisation and transport for any neonate requiring emergency transfer into or out of a London neonatal unit. The team works closely with the neonatal transfer services for Kent, Sussex, Surrey and the East of England as well as with CATS (Children’s Acute Transfer Service) and the South Thames Paediatric Retrieval Service based at Evelina Children’s Hospital on pre-agreed mutual aid and cross-referral arrangements.

London NTS aspires to perform against nationally agreed standards for neonatal transport services. As well as providing a commissioned emergency service the team provides a non commissioned repatriation service for London neonatal units. These transfers are charged on a time and mileage basis to the Clinical Commissioning Group of the home postcode of the patient.

The team consists of 2 Neonatal Consultants, a neonatal lead nurse, a service manager, an administrator, 6 WTE band 7 nurses, 6 WTE Neonatal Speciality Trainees / Clinical Fellows/ ANNPS and 6 paramedics on secondment from The London Ambulance Service.

With these staff the service provides one 7 day 24 hour emergency team and a Monday to Saturday 08:00-19:00 elective repatriation service.

**Accomplishments 2014/15**

- Neonatal Emergencies Simulation Team Training (NEST) course launched in New-Delhi, India on 22\textsuperscript{nd} November 2014 in collaboration with National Neonatal Forum of India to help train Indian doctors and nurses in dealing with neonatal emergencies.
- NTS commenced operation of a 2\textsuperscript{nd} emergency *hybrid* team commissioned with non-recurrent funds in collaboration with St John Ambulance Service on 1st January 2015 running 10am-9pm seven days a week.
- Our new website [www.london-nts.nhs.uk](http://www.london-nts.nhs.uk) went live on the 2nd February 2015.
- *NeoMate* our smartphone App for iPhone and Android was launched on the 20th February 2015.
- London NTS won a £30K bid from Health Education North Central and East London (HENCEL) to run NETS courses and develop e-material for multi-professional education.
We are very excited with the launch of our new website, in the first month we received 2070 views, we have pages for both professionals and parents and we hope our users find the website useful and informative.

**NeoMate App**

NeoMate is an award-winning smartphone app that helps neonatal staff to provide the best possible care for unwell babies in the hospital setting. The app offers drug and fluid calculations, guides, and concise checklists to guide acute neonatal intensive care.

The NeoMate App for iPhone and Android launched on the 20th Feb 2015. The App is available for free, and has been designed for frontline neonatal doctors and nurses.

NeoMate is based upon established guidelines used by the London Neonatal Transfer Service (NTS). By standardising the care given to babies, it is hoped that the app will improve safety by reducing variability of prescribing practices and local guidelines between different units.

NeoMate by London NTS on App Store: [https://appsto.re/gb/MVss4.i](https://appsto.re/gb/MVss4.i)

NeoMate by London NTS on Android Play Store: [http://goo.gl/hSpoik](http://goo.gl/hSpoik)
## Team Profile

### NTS Lead Consultant
- Dr N Ratnavel
- Dr S Mohinuddin

### On-call Neonatal Consultants
- Dr A Sinha
- Dr A Opute
- Dr D Shah
- Dr M Hird
- Dr R Ebel
- Dr C May
- Dr S Kempley
- Dr V Murthy
- Dr N Rao
- Dr P Fleming

### Lead Nurse
- Louise Howarth

### Service Manager
- Claire King

### Office Manager
- Sonya Silby

### Senior Sisters
- Josie Mendus-Edwards
- Laura Kelly
- Madeline Motsi
- Siri Kowalski
- Rebecca Abbotts
- Zakiya Dhansey
- Patience Rusinga
- Elsa Simoes

### Bank Nurse
- Sharon Lott
- Julie Stockwell
- Maricar Callueng
- Elnora Duro
- Liz Mc Cahill
- Gemma Sion
- Kathy Mellor
- Maysze Chang
- Patrick Desmond
- Jerome Gruenfeld
- Richard Hutchinson
- Kumar Shivamurthappa
- Isioma Onyekpe
- Ian Morris
- Andrei Morgan

### ANNP’s
- Kate Convery
- Simmi Naidu

### Paramedics
- Peter Burbidge
- Mick Beadle
- Phillip Janes
- Karl Baxter
- Claire Maguire
- Mark Bolding
- Jane Blackburn
- Tim Flockhart

### St John Ambulance ETA
- Malkie Campbell
- John Smith

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Finance/Commissioning

Prior to inception of the emergency service in October 2003 an agreement was made by the London Specialised Commissioning Group, the five historic London perinatal networks, Bart’s & The London NHS trust and the London Ambulance Service (LAS) that the costs of the emergency service would be supported centrally via top sliced monies from the pan London Neonatal Consortium on a block contract. The relative costs per network were proportionally based on the ratio of low birth weight infants for each sector. This principle is still in place for the core emergency service with Bart’s Health NHS Trust and The London Ambulance Service providing the initial outlay and recharging NHSE.

*Current Bart’s Health annual outlay is £1,712,919*

*Current LAS annual outlay is £588,155 including the Emergency Bed Service element*

**Total 2013/14 annual emergency funding = £2,301,07**

The elective service is not commissioned and is financially managed by The London Ambulance Service (LAS) who provide 2 additional paramedics to the pool. LAS pays Bart’s Health to add 2 nurses to the pool. The extra workforce is used to run the elective service 6 days a week 8am to 7pm. Staff rotate between the emergency and elective service.

The additional emergency team runs 7 days a week from 10am to 9pm and has been commissioned with a non-recurrent £500,000 from NHSE. This arrangement funds 2 St John Ambulance staff, a vehicle and locum medical and bank nursing staff to work the Rota until March 31st 2015. The on-going funding of this is currently under review.

**Aspirations**

- Increase emergency team provision permanently by working with NHSE to secure recurrent additional funding for the 2nd emergency team to address delayed dispatches and call stacking
- Achieve NHSE commissioning of the elective service and seek added team resource to manage current refusals
- To develop plans for a pan London in-utero transfer service in collaboration with maternity services in London
<table>
<thead>
<tr>
<th>NTS Dashboard</th>
<th>Green</th>
<th>Amber</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Time Critical Dispatches (team dispatches with 1hr of referral)</td>
<td>≥ 95%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>2. Response time for unplanned uplift within 3.5hrs</td>
<td>≥ 95%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>3. Refusal rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency ≥ 95% of appropriate transfers undertaken</td>
<td>≥ 95%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>Elective ≥ 95% of appropriate transfers undertake</td>
<td>≥ 95%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>4. Baby temperature ≥ 36.5 °c (excluding cooling)</td>
<td>≥95%</td>
<td>≥85%</td>
<td>&lt;85%</td>
</tr>
<tr>
<td>5. Team availability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency team</td>
<td>100%</td>
<td>≥95%</td>
<td>&lt;95%</td>
</tr>
<tr>
<td>Elective team</td>
<td>≥95%</td>
<td>≥85%</td>
<td>&lt;85%</td>
</tr>
<tr>
<td>6. Cooling target temperature (33-34 °c) by end of transfer</td>
<td>≥95%</td>
<td>≥85%</td>
<td>&lt;85%</td>
</tr>
<tr>
<td>7. Over ventilation: Arrival Co2 ≥4kPa</td>
<td>95%</td>
<td>&gt;85%</td>
<td>&lt;85%</td>
</tr>
<tr>
<td>8. Under ventilation: Arrival paCo2 ≤7 and pH ≥7.2</td>
<td>≥95%</td>
<td>≥85%</td>
<td>&lt;85%</td>
</tr>
<tr>
<td>9. 95% of emergency transfers have a Patient Safety Incident form completed</td>
<td>≥95%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>10. Guidelines updated annually</td>
<td>100%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>11. Ambulance availability – 2 fully functioning vehicles</td>
<td>100%</td>
<td>≥95%</td>
<td>&lt;95%</td>
</tr>
<tr>
<td>12. Consultant accompany team (once a week)</td>
<td>≥95%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>13. Unplanned uplift transfer case review at consultant level within 7 days</td>
<td>≥95%</td>
<td>≥85%</td>
<td>&gt;75%</td>
</tr>
<tr>
<td>14. Feedback letter sent within 7 days</td>
<td>≥95%</td>
<td>≥75%</td>
<td>&lt;75%</td>
</tr>
</tbody>
</table>

London NTS is a member of the UK Neonatal Transport Group and participates in all associated work:

1. Submission of data to the annual benchmarking round
2. Development of a national incident reporting mechanism for neonatal transport
3. Development of the transport section of Badgernet
4. Presentation of audit & research at the annual conference
5. Coordinated and collated response from the group on neonatal transport matters
6. Formal links to BAPM and the neonatal CRG
Networks

3 London neonatal networks

South East & South West Network
- King's College
- Lewisham
- PR Farnborough
- St Thomas
- Queen Elizabeth
- Epsom
- Kingston
- Mayday
- St Georges
- St Helier

North Central & North East Network
- Barnet
- Royal Free
- UCH
- Whittington
- Homerton
- Newham
- North Middlesex
- Queens / Romford
- Royal London
- Whipps Cross
- Basildon & Southend

North West Network
- Chelsea & Westminster
- Ealing
- Queen Charlottes
- Hillingdon
- Northwick Park
- St Marys
- West Middlesex

Specialist
- GOS
- Royal Brompton

South East & South West Network

North Central & North East Network

North West Network
Between 1st April 2014 and 31st March 2015, there were 2085 referrals made to the London Neonatal Transfer Service. The percentage change in activity since 2013/14 is shown in brackets.

![Diagram showing 2085 referrals to London NTS, with 1345 emergency and 740 elective, and percentages of completed referrals.]
The team dispatched to 940 unplanned emergency referrals, resulting in 930 babies being transferred.

Time data is complete for 879 transfers

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>IQR (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilisation</td>
<td>30</td>
<td>15-120</td>
</tr>
<tr>
<td>Response</td>
<td>85</td>
<td>57-170</td>
</tr>
<tr>
<td>Stabilisation</td>
<td>70</td>
<td>45-110</td>
</tr>
<tr>
<td>Total Retrieval Time</td>
<td>223</td>
<td>171-275</td>
</tr>
</tbody>
</table>

Acuity of NTS transfers continues to be high. Excluding elective referrals, the majority of babies were transferred with respiratory support, and a significant number needed cardiovascular support and / inhaled nitric oxide during transport.

Invasive ventilation – 57.6%
CPAP – 9.1%
Inotropes – 19.1%
Inhaled nitric oxide – 5.7%

The toolkit recommendations are for a departure time within one hour for transfers deemed time critical. The nationally agreed definitions of time critical transfers include the following:

- Gastroschisis
- Ventilated infant with trachea-oesophageal fistula +/- atresia
- Intestinal perforation
- Suspected duct-dependent cardiac lesion not responding to prostin
- Unstable respiratory or cardiovascular failure not responding to appropriate management:

  *Despite giving appropriate ventilation via endotracheal tube, the infant’s respiratory status remains unstable or severely compromised:*

  - Persistent unstable pneumothorax despite chest drain
  - Requiring FiO₂ 100%
  - Arterial oxygen < 5kPa on 2 consecutive blood gas measurements
  - pH < 7.1 and pCO₂ > 9kPa
  - Persistent mean blood pressure below corrected gestational age, measured on arterial line; if measured with cuff only, there should also be acidosis (pH < 7.1)

There were 145 referrals categorised as time critical, of which NTS London dispatched to 78.6% of these transfers within one hour of the referral being made. This is an improvement when compared to 2013/14, when NTS dispatched to 72.4%.
**Reasons for emergency referrals not being completed**

- Emergency Team busy, unable to do transfer: 28%
- PICU team remit: 11%
- No bed available (for planned emergency transfer): 12%
- Baby improved so transfer not needed: 16%
- Not in NTS remit: 3%
- Baby too big for incubator: 3%
- Baby too sick for planned surgery/investigations: 1%
- NTS team unavailable (staff sickness): 2%
- Parents refused consent for transfer: 3%
- No cot found for capacity transfer: 1%
- Duplicate referral: 1%

**Reasons for elective transfers not being completed**

- Diary full, declined to pre-book transfer: 33%
- No bed available on booked date: 18%
- Transfer already done by booked date: 10%
- Baby unwell on booked date: 12%
- Not in NTS remit: 3%
- Baby not suitable for nurse led transfer: 1%
- Baby gone home by planned day of transfer: 1%
- Rebooked as capacity transfer: 1%
- Air transfer as long distance: 1%
- Parents moved so transfer not needed: 1%
- Parents refused consent for baby’s transfer: 0.3%
Between December 2014 and March 2015, London NTS were able to run an additional team as a pilot to establish whether the additional resource would have a positive impact on the ability of the service to meet national standards for dispatching to time critical calls.

The additional team worked between 10am and 9pm, although due to the non-recurrent nature of the funding, it was not possible to recruit permanent staff to the additional team. This meant that the team did not operate every day as it was not always possible to staff the team. During this period, a full team (1 Paramedic, 1 Dr, 1 Nurse) was available 84 days out of 118 (excluding bank holidays).

During this time period, an emergency team was dispatched to 54 time critical referrals, with 88.9% being dispatched to within one hour of referral; clearly the additional resource had a positive effect.

29 of these referrals were made during the hours that the extra team was working (or within an hour of the start of their shift). 93% of these calls (27/29) were dispatched to within one hour, which brings the service much closer to the national target to dispatch to 95% of time critical referrals within one hour. It is anticipated that if the additional team were permanently funded, then the substantive staffing would ensure the national standard was met during the hours that the two teams are operational.

The team resource at night remained constant throughout the year. During this 4 month period, 25 time critical referrals were made outside of the working hours of the additional team, with 20 (80%) being dispatched to within one hour of referral. During the 7 months of 2014/15 prior to the introduction of the additional team, the team dispatched to 81% of time critical calls within an hour during the night.
London Neonatal Transfer Service Emergency Remit

SUMMARY

London NTS will carry out unplanned emergency transfers of babies in or out of a London neonatal unit, including:

- Any baby needing respiratory support who is moving up a level of care, or being moved for specialist care which is not available locally (could include referring unit full).
- Any transfer of a sick newborn baby (baby has respiratory, gastrointestinal, renal or neurological problems, congenital abnormality, cardiac problem, even if not ventilated).
- Any baby presenting with a new condition after the immediate neonatal period (e.g. a baby presenting with necrotising enterocolitis, respiratory collapse or sepsis).

In the event of the team not being immediately available due to call stacking, referrals will be triaged by the NTS duty consultant, taking into account the condition of the baby, and the level of expertise available in the referring unit.

The emergency service cannot guarantee to undertake pre-booked journeys, but will endeavour to transfer infants for the following reasons:

- Babies being transferred for specialist investigations or a planned procedure such as PDA ligation or stoma reversal.
- Back transfers of ventilated babies being transferred out of a London NICU to another London neonatal unit, following their specialist investigation or planned procedure.
- Babies being transferred for palliative care, either to a hospice or to a neonatal unit closer to home.

Returning ventilated babies

- Pre-booking cannot be guaranteed, as higher priority calls will always take precedence.
- Should not involve a shift over-run.

What we cannot do:

- Take babies to a hospital and stay with them whilst they are investigated – the baby must have a bed arranged, and be admitted to the accepting hospital.
- Undertake back transfers of ventilated babies where the accepting unit is outside of the geographical area covered by London NTS (see below). These babies should be repatriated by the transfer service which covers the region that the baby is returning to.

Clear Emergencies include:

- Any transfer of a newborn baby requiring respiratory support who is moving up a level of care for medical intensive care
- Any baby requiring urgent surgery, whether or not they are ventilated.
- Any baby being moved for specialist care which is not available locally, whether or not they need respiratory support. However, the baby must have a bed arranged, and be admitted to the accepting hospital.
- Any baby presenting with a new condition after the immediate neonatal period (e.g. a baby presenting with necrotising enterocolitis, respiratory collapse or sepsis). This would include babies who are readmitted from home to A&E or a paediatric ward, who are being transferred to a London neonatal unit.
- This list is not exhaustive, and the final decision will be made by the NTS Duty Consultant.
Clinical Governance

Case discussions/debrief

We continue discuss all emergency transfers on a daily basis with the consultant on call. Feedback is given to a liaison consultant on all transfers which are emailed to a secure NHS.net email address. However additional sessions are organised at the referring / receiving unit for difficult cases or those that required additional attention.

A request for organising a debrief session can be instigated by anyone from the referral or receiving unit by contacting our service manager Claire King Claire.king2@bartshealth.nhs.uk.

Any recurrent issues are raised at the network governance meetings.

Patient Safety Incident (PSI)

Patient safety Incident forms have been designed in line with the national guidelines and are completed for every transfer. These are reviewed on a daily basis so that any issues can be dealt with promptly and entered into a service database. Incidents are also reported via the Trust Datix system. Feedback on incidents is given individually to any units involved via the unit risk lead. Network or trust specific reports are provided to each perinatal network clinical governance meeting.

Winter Pressures

2013/14 saw the allocation to NTS of £66,000 non recurrent funding to support repatriations of babies from PICU’s to NNU’s to free up PICU spaces. NTS was able to utilise £31,467 of this to run additional team resource for this purpose. The unused money was kept within NHS England.

PICU services received approximately £3m. In London £1.07m was allocated to PICU and paediatric transport services. This funding was allocated to enable the opening of additional capacity to meet demand, however, the uncertainty about non recurrent funding, the timing of its release and operational rather than strategic nature of the investment had limited effect as trained and experienced staff were not readily available to be deployed.

A review of the potential to centralise PIC/NIC transport resources to support step down transfers will be undertaken in 2014/15.

Operational Meetings

(Meetings are scheduled bi-monthly or every 3 months)

- Network Clinical Governance & Oversight
- TRPG
- London Neonatal Group
NTS recognises the need for providing on-going educational and training support to staff in house and across the London neonatal units that we serve. Towards this we have set up an on-going education programme which focuses on stabilisation and preparation of sick neonates for transfer. We also have many other training opportunities that we provide as a part of our everyday business and encourage members of the multi-disciplinary teams across London to benefit from.

We continue to provide on-going teaching / training sessions at various hospitals when we receive requests to integrate into their local paediatric / neonatal teaching programme. Requests for these should be made to the team consultants or team coordinator.

Email: Syed.mohinuddin@bartshealth.nhs.uk
Email: Nandiran.ratnavel@bartshealth.nhs.uk
Email: Sonya.silby@bartshealth.nhs.uk

NTS holds bi-annual network study days in each of the neonatal networks across London. These study days often have a theme e.g. ‘care of the surgical sick baby or baby with PPHN’. These study days cater to the need of all members of the MDT including nursing and consultant colleagues.

“We strive to provide high quality training that empowers the participants to deliver the best possible care to patients”
NETS: Neonatal Emergencies Team-Training Simulation Program

**Background:** With the advent of neonatal networks and regional neonatal transfer services, neonatal intensive care is being increasingly delivered in regional neonatal intensive care units. Although this has led to improvement of care for the neonates, it has been generally perceived that there has been a relative loss of skill and experience amongst staff in peripheral units in the management of neonatal emergencies. Furthermore there is a perceived need for training beyond the initial resuscitation of the newborn, which focuses on the stabilisation management of babies with further problems both in new-borns and on the neonatal unit.

Towards this there are individual efforts and work in progress at a national level by the neonatal simulation group.

We at London NTS have taken a pragmatic approach and in collaboration with London networks have designed and are rolling out the Neonatal Emergencies Team Training Simulation (NETS) Program.

This multi professional training programme focuses on the recognition, escalation and stabilisation of neonatal emergencies. This programme has been well received and has been supported by an education grant from HENCEL (Health Education North Central & East London) procuring simulation.

**NTS Training Objectives**

1. To use a practical learning approach to common neonatal emergencies based on principles of pedagogic learning.
2. To bridge the gaps in clinical practice and training needs (based on London NTS experience of patient safety incidents - thereby linking patient safety with training and closing the loop).
3. To use an MDT approach aiming to mimic real life neonatal problems and solutions.
4. To integrate simulation and case based discussion approach.
5. To cater to the training needs in terms of communication, end of life and ethical issues.
6. Using a network based approach aiming for sharing of knowledge and practices and better team working within networks.
RESEARCH, AUDITS & PRESENTATIONS

IS IT ALWAYS REASONABLE TO TRANSFER BABIES WITH NECROTIZING ENTEROCOLITIS TO NEONATAL SURGICAL UNITS?

E. MOLNAR, E. FUKARI-Irvine, C. KING, N. RATNAVEL, A. SINHA

NEONATAL TRANSFER SERVICE, BARTS HEALTH NHS TRUST, THE ROYAL LONDON HOSPITAL, LONDON, UNITED KINGDOM

BACKGROUND

Necrotising Enterocolitis (NEC) is the most common gastrointestinal emergency and a major cause of morbidity and mortality in preterm infants. Based on severity of the disease, treatment can involve a medical approach or surgical intervention. Whilst babies requiring medical treatment can be managed in a non-surgical neonatal intensive care unit (NICU), patients that require surgery need to be transferred to a tertiary surgical NICU. In recent years, the sense that an increasing number of patients transferred to surgical centres had no clear surgical indication has arisen. In addition, neonatal surgical bed capacity is under constant strain.

AIM

Our aim was to quantify the number of babies referred for NEC who were transferred directly to neonatal surgical units in London and to see what proportion of these had a clear need for surgery and proceeded to have surgical intervention.

PATIENTS AND METHODS

The Neonatal Transfer Service (NTS) provides neonatal transfers across London. In this observational retrospective study, we collected data from 83 babies who were transferred with the diagnosis or suspicion of necrotising enterocolitis between July 2012 and June 2013. We recorded if the receiving hospital was a tertiary level medical NICU or a tertiary surgical unit, the clinical and abdominal X-ray findings in the referring hospital, the transport events, whether the baby needed surgical treatment and the mortality. We also compared the referral patterns between 2 epochs, July 2012-June 2013 versus January 2011-December 2011.

RESULTS

82/83 babies (98.8%) with suspected NEC were transferred to tertiary surgical NICUs. 1 was transferred to a level 3 NICU whilst awaiting a surgical bed. 44/83 (53%) did not require surgical intervention and were successfully managed with medical treatment only. 39/83 (47%) underwent surgery in the receiving hospital. The mean birth weight was 1106 g, the mean gestational age at birth was 28.2 weeks and the mean gestational age at the time of referral was 32 weeks. 8 babies (9.6%) were referred from level 1 neonatal units, 38 (45.8%) from level 2 units and 37 (44.6%) from level 3 medical units. 1 of the babies who underwent surgery had healthy bowel, 38 (47.4%) of those who had surgery had a stoma created. 6/83 (7.2%) had signs of perforation on XRR, 100% of them needed ventilation during transport and all of them underwent surgery. 32/83 (38.5%) showed pneumatosis intestinalis on AXR, 19 (59.4%) of them required surgery. 13/83 (15.7%) showed thickened bowel loops. 46/83 (55.4%) showed distended bowel loops on AXR. On physical examination, 76/83 (92%) had distended abdomen, 38 (50%) of these needed surgery. 16/83 (19.3%) had rectal bleeding, 3 (18.8%) of these required surgery. 29/83 (35%) had bilious vomiting and 16 (55.2%) of these underwent surgery. 71/83 (86%) were ventilated and 16/83 (19.3%) required inotropic support during transfer. 11/83 (13.3%) babies died. In 2011 the same number of babies (83) were transferred by NTS due to suspected NEC.

| NEC transfers | N (%) | Surgery | 39 (47%) | Conservative | 44 (53%) |
| Transfers | N (%) | Level 1 unit | 8 (9.6%) | Level 2 unit | 38 (45.8%) | Level 3 unit | 37 (44.6%) |
| Discharged | N (%) | Died | 72 (86.7%) | 11 (13.3%) |

CONCLUSION

We have noted a high number of transfers 44/83 (53%) into surgical units of infants with confirmed or suspected NEC that had no indication for surgery at the time of referral or transfer and did not go on to have surgery. We also noted that pneumatosis intestinalis, signs of perforation or thickened bowel loops on AXR and presence of bilious vomits were strongly associated with a subsequent need for surgery.

DISCUSSION

Our results suggest that referral patterns could be modified to optimise surgical cot usage. In recent years clinicians have started referring patients with NEC who may not necessarily have indications for surgery into surgical units for joint medical and surgical oversight. However, surgical bed pressure has increased as a consequence. Depending on careful clinical assessment and review of the abdominal X-ray, a more informed decision could be made as to whether an infant with suspected NEC needs to be transferred to a tertiary medical or surgical unit. Guidelines on indication for transfer in surgical patients could be effective in avoiding unnecessary transports to surgical centres.

Clinical presentation | N (%) | Surgery N (%) |
| Abdominal distension | 76 (92%) | 38 (50%) |
| PR bleeding | 16 (19.3%) | 3 (18.8%) |
| Bilious aspirates | 29 (35%) | 16 (55.2%) |
| X-ray findings | N (%) | Surgery (%) |
| Perforation | 6 (7.2%) | 6 (100%) |
| Pneumatosis intestinalis | 32 (38.5%) | 19 (59.4%) |
| Thickened bowel loops | 13 (15.7%) | 10 (77%) |
| Dilated bowel loops | 46 (55.4%) | 19 (41.3%) |
Thermoregulation of Premature babies during Neonatal Transfer

Miss R Shah (medical student), Dr S Galu, Dr A Sinha, Dr S Mohinuddin, Dr N Ratnavel

Background

- Prematurity is the leading cause of neonatal death worldwide
- National neonatal audit programme (NNAP), established in 2006 assesses the consistency and quality of the care provided for those needing specialist input and identifies areas of improvement, including thermal care.
- Inter-hospital transfer subjects neonates to becoming hypothermic; an imperative risk factor for morbidity and mortality.
- Transepidermal water loss (TEWL), the biggest contributor to hypothermia in standard flow of Hypothermia cold 32 babies
- Centile 23 will Receiving 57% (n) 31% (10)
- A (18) centile efficacy
- Plastic 1 or 34 (6)
- Referral Tecotherm controlled 7 the 20 (11)
- (31) (9) 65% of initially hypothermic babies established normothermia.
- centiles)
- TIME PERIOD (2) heat to study (33) mattress (7) Inter
- standard Only 34% of those moderately hypothermic had both a plastic cover and a transwarmer .
- 10 Receiving compare alone
- September 2012 be
- Cover (14) Neo (15) Tecotherm (32)
- No intervention (n) in Stabilisation for fluid 28 thermoregulation Stabilisation*
- Neo thermoregulation (101) 6 (n)
- Neonates who are <26 weeks gestation, a temperature of <35 °C
- therapy 73 the
- Rates of normothermia increased from 48% to 73% from the referral to the receiving unit.
- 25% (57) (66) 4% (5)
- Referral The 25
- and 75
- base conducted
- 7% (10) 28
- Potential interventions, difficult transition and movement of baby from one environment to another can all subject the baby to heat loss.

Aims

1. To assess the team’s ability to establish and maintain normothermia (36.5-37.5°C) of babies during inter-hospital transfer.
2. To evaluate the use of additional warming intervention(s) for babies who were hypothermic during inter-hospital transfer.

Methods

Retrospective study of preterm babies transferred by the London Neonatal Transfer Service (NTS)

INCLUSION CRITERIA
1. Gestational age (weeks): 24-28
2. Transferred in the first 14 days of life

TIME PERIOD
September 2012-2013

DATA COLLECTION
- Badger net database
- Transfer notes

Temperature for each recorded at 4 stages of transfer and categorised according to WHO criteria
1. Referral
2. Stabilisation*
3. Transfer*
4. Receiving

*A lowest temperature of series was used

The use of any recorded intervention was assessed.

Results (Aim 1)

PATIENT DEMOGRAPHICS
159 babies transferred, data missing for 21, final number analysed was 138

Gestational age (weeks): 26 (25-27)*
Birth weight (grams): 830 (715-997)*
Transport age (days): 0.3 (0.2-4.2)*

*Median (25th-75th centiles)

Results (Aim 1 continued)

Temperatures shift toward normothermic during transfer:
- Rates of normothermia increased from 48% to 73% from the referral to the receiving unit.
- 65% of initially hypothermic babies established normothermia.
- The 25th and 75th centile encompassed all normothermic babies at the receiving unit.

Normothermia isn’t always achievable during transfer:
- 17% of babies were hypothermic at the receiving unit.
- Potential interventions, difficult transition and movement of baby from one environment to another can all subject the baby to heat loss.

Results (Aim 2)

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>No. of babies</th>
<th>Plastic Cover (n)</th>
<th>Transwarmer (n)</th>
<th>Both (n)</th>
<th>No intervention (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Hypothermia</td>
<td>28</td>
<td>4% (1)</td>
<td>32% (9)</td>
<td>7% (2)</td>
<td>57% (16)</td>
</tr>
<tr>
<td>Moderate Hypothermia</td>
<td>32</td>
<td>6% (2)</td>
<td>28% (9)</td>
<td>34% (11)</td>
<td>31% (10)</td>
</tr>
</tbody>
</table>

Appropriate warming methods are not being used consistently:
- Only 34% of those moderately hypothermic had both a plastic cover and a transwarmer.

Summary and Future Work

Future study will be conducted to compare the efficacy of the Tecotherm Neo in addition to standard thermoregulation care vs. standard care alone.

- The Tecotherm Neo is a servo controlled thermoregulation mattress that allows for continuous monitoring and controlled heat or cold therapy via continuous flow an alcohol base fluid.

65% of babies established normothermia
76% of babies maintained normothermia
17% of babies became hypothermic
INTRODUCTION
- Therapeutic hypothermia commenced after birth results in improved neuro-developmental outcomes in infants with moderate to severe hypoxic ischaemic encephalopathy.
- Important to achieve core target temperature of 33-34°C within six hours of birth.
- In centres where active cooling is not possible, the infants are passively cooled and transferred to the nearest cooling unit.
- Recently, with the availability of servo-controlled cooling equipment on transport, it is now possible to commence active cooling at referral unit by transfer teams.

METHODS
- Retrospective data collection - infants referred for therapeutic hypothermia between July 2011 to June 2013 to the London Neonatal Transfer Service (NTS).
- Active hypothermia during transfer using servo-controlled cooling mattress (Tecotherm) commenced from Sept 12.

RESULTS
- 156 infants were transferred to a cooling centre.
- Data available on 145 infants – 76 were passively cooled, 69 were actively cooled (Table 1). The two groups were similar for patient demographics and transfer related variables apart from stabilization time and age at reaching target temperature.
- Stabilization time was significantly longer for active cooling group compared to passive cooling (median time 110 vs. 90 min, Mann Whitney U test, p=0.034) (Table 1).
- The proportion of infants within target temperature range were significantly higher at all stages of transfer in active cooling group (Figure 1).
- Median time to achieve target temperature was 30 (95%CI 23-37) min in actively cooled babies, which was significantly shorter in comparison to 130 (95% CI 83-177) minutes in passively cooled babies (Log rank chi sq =29.8, p<0.001) (Figure 2).

CONCLUSIONS
- Infants actively cooled during the transfer achieve target temperature for therapeutic hypothermia in a significantly shorter time period and achieve better temperature stability during the transfer.
- Although the stabilization times were longer, babies reached target temperature sooner and therefore active cooling should become the standard of care for achieving therapeutic hypothermia during neonatal transfer.

Table 1: Patient demographics and neonatal transfer related variables in two groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Passive cooled (n=76)</th>
<th>Active cooled (n=69)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (gm)</td>
<td>3371 (±600)</td>
<td>3332 (±566)</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>40 (±1.6)</td>
<td>39.7 (±1.6)</td>
</tr>
<tr>
<td>Age at referral for cooling (min)</td>
<td>170.1 (±116.6)</td>
<td>159.4 (±106.5)</td>
</tr>
<tr>
<td>Temperature on arrival of NTS</td>
<td>34.9 (±1.37°C)</td>
<td>34.2 (±1.32°C)</td>
</tr>
<tr>
<td>Dispatch time (min)</td>
<td>20 (15-37)</td>
<td>30 (15-72)</td>
</tr>
<tr>
<td>Age at arrival of transfer team (min)</td>
<td>230 (175-320)</td>
<td>220 (180-290)</td>
</tr>
<tr>
<td>Stabilization time (min)</td>
<td>90 (70-120)</td>
<td>110 (80-140)*</td>
</tr>
<tr>
<td>Age at target temperature (min)</td>
<td>325 (255-401)</td>
<td>270 (197-342)*</td>
</tr>
<tr>
<td>Age on reaching cooling centre (min)</td>
<td>390 (300-450)</td>
<td>375 (330-470)</td>
</tr>
</tbody>
</table>

Data expressed as median (interquartile range), * denotes p<0.05.

Figure 1: Box & whisker plot of temperatures achieved at each stages of transfer with table showing number of babies in 3 temperature ranges.

Figure 2: Kaplan-Meier estimator showing time to achieve target temperature from arrival of transfer team.
Neurological assessment in infants referred for therapeutic hypothermia: a need for more structured assessment and /or pragmatic criteria?

Nitin Goel1, Syed Mohinuddin1,2, Nandiran Ratnavel1,2, Ajay Sinha2,3


INTRODUCTION
- Therapeutic hypothermia improves neuro-developmental outcomes in moderate to severe hypoxic ischaemic encephalopathy.
- Identification of suitable infants requiring hypothermia needs careful clinical assessment. The major cooling trials that informed clinical practice had specific entry criteria to select infants, before recruitment into the study occurred.
- With proven efficacy of hypothermia, there is a concern that in everyday clinical practice there may be a ‘therapeutic drift’ and clinicians may choose to start treatment in borderline cases where the ‘trial criteria with proven benefit’ are not fulfilled.
- The long term effects and risks or benefits of cooling outside the published trial criteria are not yet known.

RESULTS
- 156 infants were transferred to a cooling centre (data available on 145 infants). The documentation of neurological assessment for encephalopathy prior to cooling treatment is shown in Figure 1.
- Hypertonia was more commonly used as referral criteria rather than the trial criteria of hypotonia.
- Suck reflex as not mentioned in 50% of ventilated babies as compared to 25% of non-ventilated babies.
- When reviewed for encephalopathy assessment criteria as published by the TOBY group (1), only 86/145 infants fulfilled the criteria. The remained 59/145 (40%) infants did not have documented evidence of moderate to severe encephalopathy (Table 2).
- Normal neurological examination was documented in 36/145 (24.8%) and in 23/145 cases, there was only evidence of mild encephalopathy.
- Similarly reviewing cases to check if encephalopathy assessment criteria as published by the Shankaran et al group – 24/145 infants did not meet the criteria and 36 others had normal neurology.
- Cerebral function monitoring (CFM) was available at the referral centre in 47/145 (32%) cases. The CFM trace was documented as normal in 14/47, of which 8 had normal neurology as well, while 6 had abnormal tone with no seizure activity.

CONCLUSIONS
- In 40% of infants referred for cooling the documentation of neurological assessment did not show any evidence of moderate to severe encephalopathy as defined in therapeutic hypothermia trial criteria.
- His has important clinical and medico-legal implications and may represent a significant additional workload.
- There is a need for structured neurological examination training with appropriate documentation for referring clinicians, along with pragmatic guidance for referring infants for cooling treatment.

REFERENCES
Paediatric Registrar, (Neonatal Special Interest)

From childhood I had had a dream of being able to drive around London in an ambulance, with the lights and sirens on, racing to save the lives of those in need. My life and career choices took a different turn and I happily found myself working as a junior doctor in a neonatal unit on the outskirts of London. Then one day, after the birth of an extremely premature baby, I was introduced to the London Neonatal Transfer Service who had raced across London in an ambulance in order to stabilise the baby and transfer her to a specialist neonatal intensive care unit. The baby made good progress following her transfer and went on to be discharged home with her family. From that moment, I knew that working with the London NTS was something for me to aspire towards.

The London NTS dispatches teams consisting of a doctor, senior neonatal nurse and experienced paramedic, across London in order to assess, stabilise and where appropriate transfer babies to an appropriate neonatal setting in order to continue their care.

Between September 1st 2014 through to March 1st 2015, I was attached to the London Neonatal Transfer Service working as a neonatal transfer fellow. During my six month posting I was privileged and honoured to be able to work with some of the most dedicated and talented neonatal consultants, registrars, nurses and paramedics that I have met throughout my years working in paediatrics and neonatology.

Boyhood dreams aside, I was both excited and nervous on my first shift out with the team, and in a positive way some of those feelings persisted throughout my attachment. Although the team were given the basic information about the patient we were dispatched to, we rarely knew quite what surprises we might encounter when we reached the referring unit. However, the experience, skill, knowledge, professionalism and expertise of the nurses and paramedics helped to ensure that no matter what we encountered, we were able to deliver the highest quality care to the babies and families that we were called to.

As a doctor on a neonatal unit you learn about the unit you are on, what equipment is available and where to find it, the experience and skills of those around you, and so when a patient is admitted you look at and assess each problem as it arises, and begin to integrate these problems into the other priorities of the unit. Working as a neonatal transfer fellow required a paradigm shift in how I perceived the situations in which I was placed. The closest analogy would be to describe it as moving from a 2-D to a 3-D experience. With each transfer, I was aware of the team around me (their experience and knowledge), but rapidly had to assimilate information; about the environment we entered; the teams that had been caring for the patient 'til the time of our arrival and who would help us to prepare medications, infusions and equipment as required; the baby, with their acute problems that would require stabilisation, issues that may arise during the stabilisation period and those that might occur during the transfer; all the while maintaining an overview of the time taken to stabilise the baby and how much time would be required to complete the transfer in order to ensure the teams availability for the next referral. Working with the transfer team, quickly teaches you this 3-D perception with dynamic assessment in a dynamic environment.

While with the transfer team, I became involved in and led a project to upgrade our mobile communication from simple mobile phones to ‘smart phones’, with the ability to take photographs of X-rays and reports and to transmit these across encrypted email to the consultants, and to access all of the transfer teams guidelines, drug formulary and medication monographs quickly and simply. Alongside my experience with the teams out across London, gaining experience managing babies with severe life threatening conditions and the most extremely premature infants, my time with the Transfer Service taught me how to operate a wide range of specialist equipment, allowed me to learn about how specialist services are commissioned and funded within the NHS and to undertake research projects. I learnt a huge amount about myself as a doctor, as a team member and as a team leader, working with a small dynamic team of specialists.

My time with London NTS has helped to shape me as a neonatal doctor, taught me many essential lessons for my future career, and of course, it also allowed me to fulfil my childhood dream of driving across London in an ambulance, racing to those in need. (Sometimes they even let me switch on the lights and sirens).
Dearest Josie and Peter

I am so very happy we have managed to find you: William and Claire, thank you for all your help with this!

Matt and I are so lucky that you came into our lives on the morning of Wednesday 4th Feb to deliver our little boy Raphael safely into the world at 6:50am (I checked the clock on the taxi dashboard..!) We will NEVER forget you and what you did for our family! We are so grateful for your calm and quick actions that meant that all ran safely and smoothly.

The final moments of Raphael’s arrival caught us all by surprise! His older brother Theodore took three days to make his appearance. AND while I was aware that second babies can come faster, I honestly left home thinking “I’ve done a good job with these contractions, I must be about half way, perhaps I’ll get a nice epidural on the labour ward after all…”.

Well, that was not to be! A kind man called Stuart was driving the Addison Lee taxi that got me to the hospital (he counted down the lights for me… and I returned the favour by screeching from the foot-well and making a right royal mess of his car! While Stuart ran in to get some help, Peter I spotted you through the window and felt instantly “this man can help me!” and started rapping madly on the window, unfortunately you didn’t hear me but moments later you were there to help deliver the baby having been alerted of the situation by my taxi driver! Thank goodness and from the moment you opened that door I thought “GOOD, HE’LL SORT ME OUT!”

Josie I’m sorry I yelled really uncouthly “I need some pain relief!” at you as a greeting! Your calm response of “we can’t get any in here” did make perfect sense to me, even at that point. Your swift and capable work (I have no real sense of the time here…) made me feel so secure and I think in minutes he was out. Thank GOODNESS for you both, Josie and Peter! You did something so extraordinary for us, all while there was anther baby in your vehicle needing care and attention too.

We will cherish the pictures I (rather randomly..!) took in the moments after it had all happened. Such a great memory, with your wonderful smile Josie and Peter cradling the baby (Stuart is behind you both looking a little shell-shocked!).

Raphael will know about the two magical individuals that ushered him safely into that chilly winter morning: his full name is Raphael Winter Winslows.

Josie and Peter: Matt and I have a small token of thanks for each of you that we would like to be able to give to you, either in person if that will be workable or perhaps we can send something to your homes or places of work. We would love for you to meet the boys but of course understand that you are busy, so posting will also be a good solution.

Matt will love to meet you: he was racing madly to drop a bleary-eyed Teddy (Theodore) off with friends around the corner. He felt very cross that I was “pulling his leg” with my “Raphael has been born!” phone call… until he received the picture on his phone and promptly broke into a sprint for the forecourt of the C & W! He missed you both though, I believe you had left by then already!

With all our deepest and most heartfelt thanks. You will hold a special place in our hearts, minds and family forever.

Aleid Farnum-Ford and Matt Farnum-Schneider (Theodore and Raphael)

(Picture is of NTS Nurse Josie Mendus-Edwards, NTS Paramedic Peter Burbidge, baby Raphael and Taxi driver Stuart Bluman)
Observers

April 2014– March 2015

We offer ‘ride out days’ where you can join our emergency team for a shift, experience a day in our shoes, observe the team on a transfer and see how we put our downtime to good use.

We had 176 shifts when observers joined our service, we offer observer days to any student, nurses, doctors or paramedics in the NHS.

Please contact Sonya Silby NTS coordinator with your details if you would like to arrange an observation day: sonya.silby@bartshealth.nhs.uk

NTS OBSERVERS REFLECTIONS

Student name: Natalie Yeo (130029698)

NTS observation reflections

Observing the London Neonatal Transport service for a day was a really eye-opening experience for me. Prior to this opportunity, I had never even been in an ambulance, and I was able to learn a lot from it.

The chance to observe the NTS had coincided with our year 2 human development module, giving me a good chance to get a real-life glimpse of what I had learnt only in theory. Never had I seen a premature baby so small, helpless and fragile, and the importance of good healthcare being available to support these babies from the moment they are born became apparent to me. I was privileged to get to see a 23-week gestation baby who required a lot of intervention, allowing me to see first-hand how the neonatologists and the nurses manage these babies in emergency situations. For example, the team increased the incubator’s temperature to 38 degrees Celsius and also covered the baby in a layer of plastic so as to prevent heat loss as the baby was hypothermic. Many things had to be done at once in order to provide efficient care and not waste any precious time, and though cliché, this really showed how important teamwork was.

I was also able to get a feel of some of the more social aspects of neonatal care, such as communicating well with parents and making sure they knew what was going on, while also ensuring that they themselves were okay. I saw how heart wrenching it can be for parents to have to see their new-born babies needing intensive care, and understood the importance of making sure they knew what was going on plus what was going to happen from then, even if the situation is bad.

Having the chance to observe an emergency situation made me feel that it sometimes is difficult having to constantly update parents and make sure they understand what is going on. Before this, I had, for most of the time, felt that such a thing would be instinctive and that anyone with a heart would be able to empathize with patients and their families’ need for information on the situation after having been in such a position myself. However, this day of observation got me to realize how busy everyone is attending to the patients and that it can be really hard to set aside time for such things when you have a life to save. The team I was with handled their cases really well and I was able to witness good care in the midst of all the chaos. I also saw how parents’ can be very grateful no matter the outcome if they feel that good care has been provided, and it made me think how essential such care is, especially since having a newborn baby needing intensive care treatment can be a very trying period of time and parents need all the support they can get.

All in all, it was a really good experience that I would definitely like to have again, and my interest in pediatrics and emergency care has definitely been fuelled by this opportunity.
Parent Feedback

We are very happy to have received the following feedback from our
Parent Feedback Questionnaires

Thanks to Edit, Madeline and Peter who transferred our baby boy Daniel from Whipps Cross Hospital to the Royal London Hospital, Daniel has had his surgery and is doing well with his stoma, we are very grateful to everyone involved in Daniels care and transfer. 19/01/2015

Very good at keeping me calm and explained everything, very impressed with the team and process. 05/01/2015

The team were great, despite them both having worked long shifts. 10/12/2014

The team were just fab. couldn’t have been nicer. 05/11/2014

I was incredibly impressed by the team, they arrived when our baby was close to death, since she was not responding to the resuscitation attempts, they took control of the situation and saved her life. We are extremely grateful to them. 26/10/2014

Both teams for my twins were helpful, kind and professional and reassuring, we were just so happy they were getting the care they needed. 21/10/2014

The transfer team were very friendly, approachable and informative, they kept me very comfortable and less overwhelmed. 12/10/2014

Excellent team, really friendly, efficient and caring. 07/10/2014

The transfer team were great, very helpful and allowed me to be involved in the decision making. 07/10/2014

Very happy (Sarah transport doctor) has taken my daughter on multiple transfers, she is consistently calm, friendly and makes what is a stressful and difficult event a pleasant and almost enjoyable one! Fantastic team of people each time, who provided faultless care. 10/07/2014

Skill, support and communication was excellent, we felt our baby was safe and in the best place for his needs. 21/06/2014

I was pleased I could travel with my baby. The team were very helpful. 30/05/2014

We were very happy with the transfer, we would like to thank you all, also very happy with the fact they took both of us parents. 15/05/2014

I am very happy with the team that transferred my little boy, I was very happy they let me travel in the ambulance with him. The team were very supportive and kept me aware of all things during the transfer. 07/04/2014

They were amazing, very happy. 03/04/2014
Equipment donated to NTS by Ickle Pickles:

- 2 Sophie ventilators (and part funded the 3rd)
- Tecotherm cooling unit
- GlideScope

Current NTS wish list (current appeals)

- Intellivue Patient Monitoring equipment
- babyPAC

As always we would like to thank all our neonatal colleagues across London for their invaluable support over the past year, as always it is much appreciated. There have been many improvements in the last year, and we look forward to seeing further exciting developments for the London Neonatal Transfer Service in the year to come.

The Ickle Pickles charity have been working extremely hard to raise awareness and funds for the Neonatal Transfer Service, they have been amazing and continue to raise funds for our service.

The Ickle Pickle Partnership turns gifts and donations from generous people into specialised equipment such as incubators and ventilators to help Neonatal units provide incredible levels of care for babies.

Take a look at their webpage to see what a wonderful job they do.

Ickle Pickle Charity
Registered Charity No: 1129763
www.icklepickles.org

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