national **neonatal**
transport programme

NNTP | Clinical Report

2004-2008

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

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This report has been compiled and written by **Ann Bowden** NNTP Co-Ordinator

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Medical Folder

1 FOREWORD

national neonatal transport programme

With the inception of the HSE in 2005, the National Neonatal Transport Programme (NNTP) became my responsibility as Assistant National Director of the National Hospital's Office (National Ambulance Service). It is in this capacity that I have much pleasure in presenting this clinical review of the NNTP's activities for the years 2004-2008.

Together with the formalisation of the NNTP's budgetary provision one of my first functions following the integration of the NNTP into the HSE was to review the composition and terms of reference of the NNTP Committee in order to reflect the new governance of the programme. With the appointment of a new chairperson, Dr. Peter Wright, Director of Public Health, HSE NW, the make up of the NNTP committee continues to reflect the complex nature of the programme involving partnerships from the different disciplines, specialties and agencies that provide and use the service.

As is internationally recognised, the success of the centralisation of resources and expertise in the area of neonatology is dependent on a reliable and effective transport service. The NNTP is achieving this by the provision of:

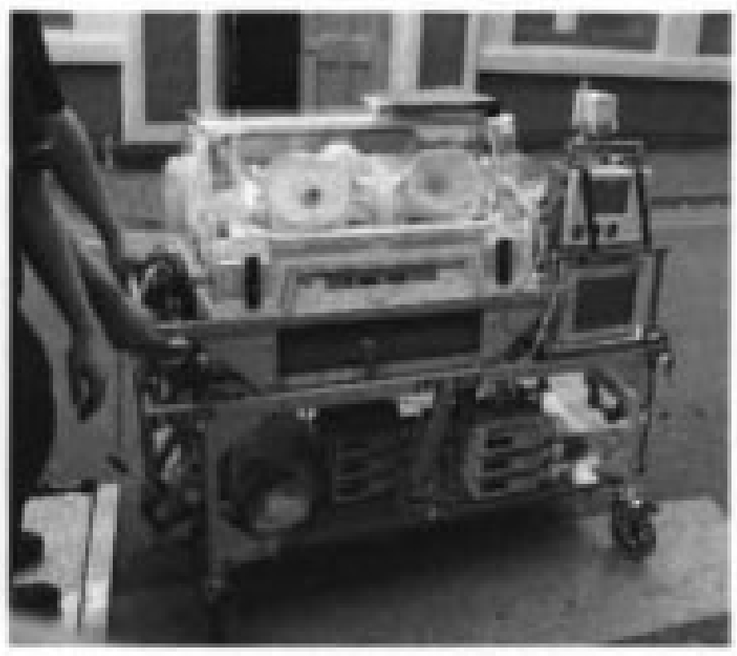
- A comprehensive transport service for acutely sick infants who require transfer for specialist care
- Timely returns which help keep tertiary beds occupied by appropriate patients
- Transport clinical staff who are skilled in the anticipation and delivery of emergency/ intensive neonatal medicine
- Dedicated neonatal transport ambulances and ambulance personnel
- Specialised equipment for Ground and Air Transport
- A centralised, integrated transport programme that facilitates the collection of transport data for systematic review and audit
- An outreach education programme that supports the NNTP's clinical objectives.

Throughout the years in which this service has been provided there have been many quality improvements and service advances as evidenced throughout this report, particularly in the areas of:

- Overall Governance
- Development of specialised equipment for ground and air transport and NO therapy delivery
- Replacement dedicated ambulance
- Development of the NNTP website and improved inter-hospital communications
- Outreach education
- Clinical Audit

The delivery of the NNTP relies on a wide stakeholder group in order to provide this seamless service. I would like to take this opportunity to thank all staff for their integrated and professional commitment to the programme on a national basis. In particular I would like to acknowledge with thanks the contribution of Ann Bowden, NNTP Co-ordinator, Dr. Anne Twomey, NNTP Medical Director and Dr. Peter Wright, Chairperson of the NNTP Committee.

Frank Mc McClitnock
Assistant National Director
National Hospitals Office



2 OVERVIEW

national neonatal transport programme

The National Neonatal Transport Programme is a rapid response service for the stabilisation and transportation of premature/ill neonates who require transfer to tertiary centres nationally. The aim of the programme is to bring to the point of retrieval, a level of care akin to that of a tertiary neonatal centre. The Department of Health and Children approved the programme in 1998 and the first patient was transported in March 2001. At its inception, the NNTP was expected to facilitate approximately 150 neonatal transports annually. This number has in fact, exceeded that projected by over 50% and to end of 2008 the programme has conducted 1903 neonatal transports.

Governance / Funding

- Initially the service was funded by the 8 Health Boards (and latterly the 7 Boards and the three Area Health Boards of the ERHA)
- In 2004 the NNTP came under the auspices of HeBE
- The overall governance of the NNTP became the responsibility of Mr. Frank McClintock, Assistant National Director (Ambulance Service) in the National Hospital Office in September 2005
- The NNTP's budget is now also incorporated into that of NHO

Programme Features

- The NNTP is serviced by clinical teams from the three Dublin maternity hospitals and the Eastern Region of the National Ambulance Service. (NAS)
- The Programme funds a WTE neonatal registrar and nurse in each of the Rotunda, National Maternity and Coombe Women's hospitals, and two drivers in the NAS
- The NNTP has two custom fitted ambulances and another back up ambulance which are maintained by the NAS.
- There is a complete NNTP transport incubator module and equipment kept in each hospital and a specific module for air transport kept in Baldonnell Airport
- There is a dedicated National Neonatal Transport Programme Co-ordinator, (Ms Ann Bowden) who is provided with an office and support in the Rotunda Hospital
- The NNTP has a part-time Medical Director (Dr. Anne Twomey, who is based at the National Maternity Hospital)
- The NNTP is overseen by the National Neonatal Transport Programme Committee, the chair of which is Dr. Peter Wright, Director of Public Health, North West Area

Partnerships

- The transport teams comprise a neonatology registrar, a neonatology nurse and an NAS driver who are available for national transport requests from 09:00 to 17:00 hrs., seven days a week. The service provided is in effect a mobile intensive care service, as opposed to a traditional ambulance pre-hospital service. Its inter-disciplinary nature is reflected in the membership of the Committee and the various partnerships involved;
- Medical — Nursing — Ambulance
- National Maternity Hospital — Rotunda Hospital — Coombe Women's Hospital
- Maternity hospitals — Tertiary paediatric hospitals
- Transport Team — Biomedical Engineering
- "Sending" hospital — "Receiving" hospital
- Purchaser-Provider
- DOHC-HSE

2 OVERVIEW

The NNTP is very pleased to present this report detailing the activities of the programme over the past five years. During this time the demands for the service have increased considerably from 223 in 2004 to 287 in 2008 with a peak of 319 in 2007. In addition, during these five years the programme has also been busy with other developments in order to enhance both the transport environment and management of our vulnerable neonatal population.

In 2005 the NNTP was integrated into the HSE and the NNTP's governance and budgetary provision was formalised. This was followed in 2006 by a review of the membership and terms of reference of the NNTP Working Group Committee.

Access to the NNTP team on call by way of a single hotline number became possible in 2005. That year also saw the launch of the NNTP website which provides information about the organisation and the services provided by the programme. In an effort to facilitate the sourcing of neonatal beds, it also includes a daily updated status of neonatal bed availability in Dublin. Further communication developments in 2008 included the development of a generic transfer referral history form for all referring hospitals and also the revision of NNTP documentation to facilitate improved auditing of individual transports.

The NNTP's second dedicated ambulance was completed in 2005 and the original NNTP ambulance assigned for use as a back up vehicle. In the development of this ambulance, the NNTP sought to address the clinical, health & safety and automotive challenges that working for long periods in the transport environment pose. This custom built 'baby friendly' vehicle has been designed in accordance with CEN European safety standards with an emphasis on ergonomics and the clinical transport environment It has improved suspension and insulation to reduce noise and vibration, transverse accommodation of the principle incubator to facilitate accessibility to the infant and also to reduce the effects of acceleration and deceleration on the baby. The vehicle also has forward style seating and can accommodate a second incubator when twin transfers are required. The result is a vehicle that allows for the optimum care environment for sick/premature babies together with greater patient and staff safety during transport

The NNTP has also addressed the additional logistical and safety concerns that the provision of iNO in the transport environment involves and since January 2006 the availability of iNO therapy has been routine for both ground and air transport. The development of this lightweight portable NO delivery system, which includes both patient and environmental monitoring facilities, has enabled the safe administration of iNO therapy during a total of 42 NNTP transports to date and mobilisation times for these transports have been halved since the system was introduced.

Although the majority of NNTP transports are by road, there are occasions when urgent, remote transports necessitate the availability of air transport. Over the last three years the Irish Air Corps have been re-equipped with a fleet of modern utility helicopters and in conjunction with the arrival of these aircraft, a service level agreement between the Irish Air Corps and the HSE to provide an emergency inter-hospital air transfer service has been established. The scope of the service includes the Air Transport of Neonates requiring immediate medical intervention in Ireland. This formal collaboration provides the NNTP with much greater flexibility and accessibility regarding air ambulance. In order then to accommodate incubator transports in these aircraft, the NNTP has developed a specific module that meets both CEN and European aviation standards. This module integrates into the Irish Air Corps' EC135 and larger AW 139 helicopters. It can be accommodated securely in both of these aircraft and also into the NNTP's dedicated ambulances and other national ambulances to enable the provision of a seamless service. Detailed NNTP Air Transport Protocols and Guidelines have also been developed and together with the establishment of air transport training for all clinical staff, safer and more efficient air transport is now a viable option for the NNTP.

2008 saw the completion of three new transport modules for NNTP ambulance transfers. In an endeavour to achieve the optimum solution for the NNTP in conformity with relevant E.U. Directives, the modules were commissioned specifically for the programme. The ergonomically designed modules can be secured in the NNTP's dedicated ambulances and other frontline ambulances with appropriate locks and all component parts of the incubator system are fixed in conformity with EU test criteria. The new modules facilitate ventilators with disposable humidity systems and ventilation mode options including CPAP, SIMV, Pressure Support and Patient trigger. The units can also facilitate iNO therapy delivery and provide exhaled tidal volume monitoring.

2 OVERVIEW

national neonatal transport programme

The NNTP's outreach education programme continues and 2006 saw the launch of the 5th edition of the 'STABLE 'Program' in Ireland by the NNTP. This new course has received much interest around the country and the NNTP has delivered a total of 31 courses since then, with representation from 30 different units. In addition to instruction in the management of the infants in the post resuscitation/pre-transport period the NNTP takes the opportunity to share information about our transport programme and to discuss issues relevant to individual units. Feedback from these courses is extremely positive. Throughout 2004-2008 numerous presentations (as listed later in this report) have also been made at other study days and conferences by the Transport Co-ordinator, Medical Director and other members of the NNTP.

The National Neonatal Transport Programme aims to provide all neonates who require critical care transport in Ireland, with access to a dedicated, highly trained and equipped professional team, available at all times of the day. Despite the official hours of service remaining at 09:00 to 17:00 hrs seven days a week, the majority of NNTP transports continue to extend beyond these hours. In fact 30% of the total hours spent on actual transports over this period occurred after the scheduled hours of service. The most significant issue for the NNTP at present is therefore, extension of the hours of operation, which, in keeping with programmes in other developed countries, need to move to 24 hours a day. To this end, a detailed business proposal to extend the NNTP's service hours to twenty-four was submitted by the NNTP committee to the HSE in 2007 and a revised version in 2008. However, although no formal disapproval of this proposal has been received, current budgetary constraints would suggest that this extension is very unlikely in 2009.

The NNTP would like to take this opportunity to thank all who contribute to the delivery of this programme, particularly the NNTP teams, the NNTP Committee, the National Ambulance Service, the Irish Air Corps and referring hospital and receiving hospital staff. The NNTP also wishes to acknowledge the dedication and commitment of all staff - medical, nursing, ambulance and bioengineering who, in the absence of a twenty four programme, continue to facilitate so many transports outside the scheduled hours of the service.

Ann Bowden
Co-ordinator
National Neonatal Transport Programme

Dr Anne Twomey
Medical Director
National Neonatal Transport Programme

3 NNTP PERSONNEL

The NNTP would like to acknowledge and thank the following staff for their contribution to the programme

NNTP Team Nurses, Midwives, ANNPs 2004-2008

Alice O'Connor
Anita Morales
Ann Healy
Ann Kelly
Ann Little
Ann MacIntyre
Anne O'Sullivan
Bernie Loughran
Breda Coronella
Brid O'Brien
Carol Kamtoh
Carolina Commandador
Christine McDermott
Ciara Murphy
Deirdre McBride
Deirdre Molloy
Deirdre O'Connell
Edna Woolhead
Elizabeth Doran
Elizabeth Tobin
Emily Baringa
Gemma Brown
Gunasheela Shetty
Hazel Cooke
Helen Lonergan
Helen Walsh
Irene Glynn
Jessy Thomas
Joan O'Neill
Josephine Morris
Julie Heslin
Julietta Miagoe
Karen Bourke
Lily Cudiamat
Margaret Coleman
Maria O'Connell
Maria Teresa Figueroa
Marian Barron
Marian O'Shaughnessy
Mark Hollywood
Mary Cassidy
Mary Jacob
Michelle Quinn
Monica Kavanagh
Niamh Buggy
Niamh Hegarty
Orla O'Byrne
Rabekah Prabakaran
Rachael Irwin
Sara Rock
Shirley Moore
Siobhain Mulvany
Sonia Aliwales
Suzanne Brown
Thankamma S. Mathew
Veronica McHugh

NNTP Team Registrars 2004-2008

Afif El Khuffash
Ahmed Abou Zaid
Alan Macken
Anne Doolan
Aoife Carroll
Asad Rahman
Asma Awadalla
Bilal Java
Blainaid McCoy
Breda Hayes
Brian Walsh
C. Moosakutty
Carol Blackburn
Catherine Quinlan
Catherine O'Carroll
Cecilia Halling
Chitra Arumugam
Chris Pitan
Ciara Mc Donnell
Claire Purcell
Claudine Vavasseur
Cormac Owens
Damien Noone
Declan O'Rourke
Deirdre Sweetman
Des Cox
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Fawzy Ali Aldelaimi
Feryal Al Daaysi
Fiona Healy
Fiona O'Hare
Frances Enright
Ghia Harrison
Heike Bruell
Ireti Farombi
Jackie Pando Kelly
Jan Janota
Jan Miletin
Jayne Hopewell
Jennifer Walsh
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Margaret Moran
Maria Stack
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Mary Sherlock
Mary White
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Michael O'Grady
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Michelle McEvoy
Mohammad Rehman
Moya Vandeleur
Mudaffa Al Muddaffer
Murwan Omar
Mustafa Nemir
N.G. Teo
Nana Yao
Niamh Dolan
Niamh Ni Shuibhne
Nicholas Allen
Nina Hapnes
Oneza Ahmareen
Orla Neylon
Paul Fleming
Paul Gallagher
Redvers Stellenberg
Rehan Ali
Rihab Agouba
Rizwan Khan
Ronan Leahy
Sabrina McHale
Sandra Walsh
Seeletso O Nchingane
Shahid Saleemi
Shashi Vaish
Stan Keo
Susie Bolton
Terry Prenderville
Tim Savage
Veronica Kelly
Vincent Saharahj
Zahir Afridi

NNTP Ambulance Drivers

Brian Cox
John Smyth

3 NNTP PERSONNEL

national neonatal transport programme

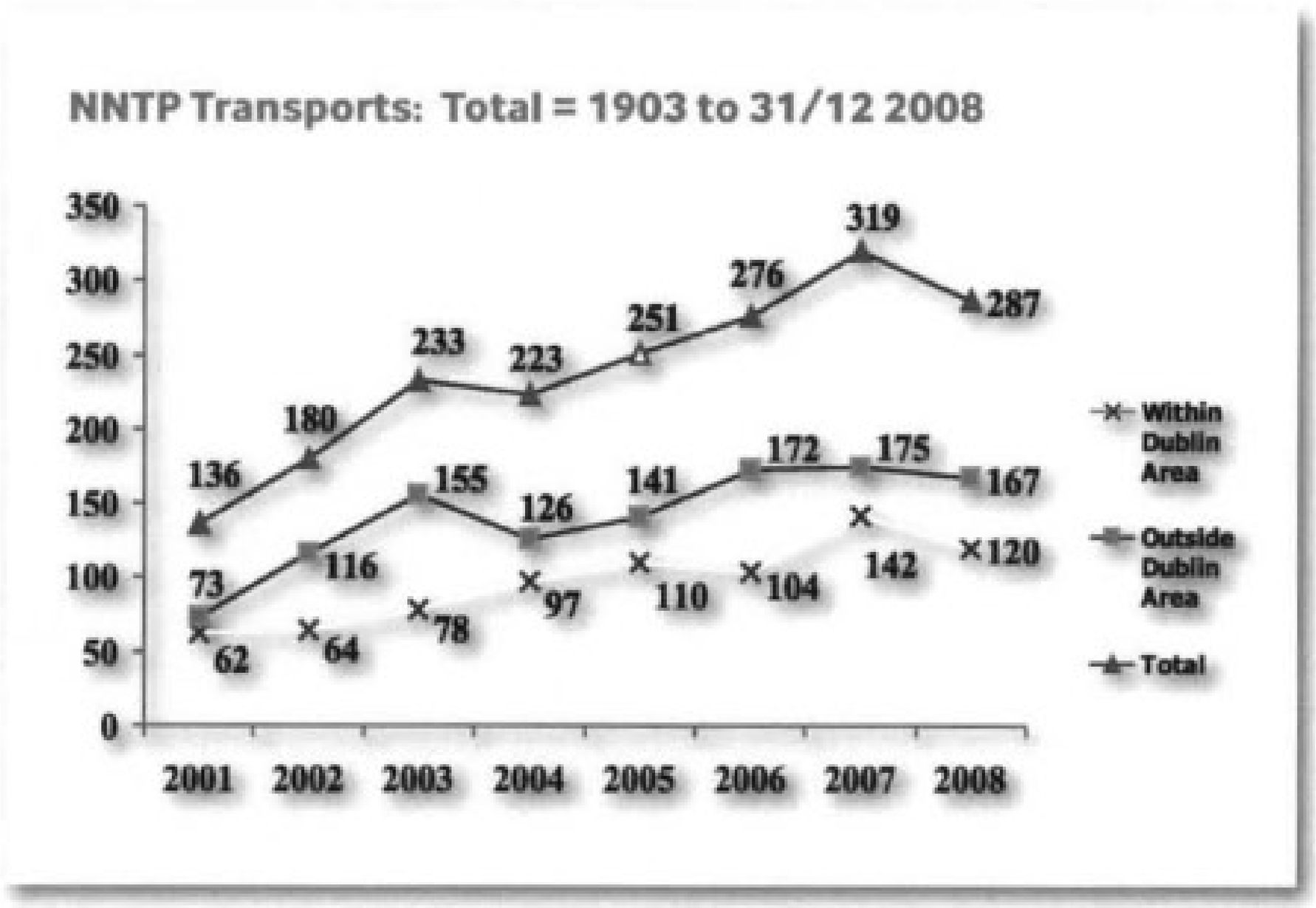
Clinical Engineering Support
Karl Bergin
Eoin Hayden

Administrative Support
Margaret Campion

Out Reach Education Instructors
Ann Bowden
Patricia Healy
Dr. Martin White
Breda Coronella
Prof Tom Clarke
Dr Afif El-Khuffash
Hazel Cooke
Sara Rock
Claire McCormick
Dr. Shahid Saleemi

Current NNTP Working Group Committee
Dr. Peter Wright, Director of Public Health, NWHA *(NNTP Chairperson)*
Ann Bowden, NHO, *(NNTP Coordinator)*
Dr. Anne Twomey, National Maternity Hospital, *(NNTP Medical Director)*
Dr. Martin White, Coombe Women's Hospital
Prof. Tom Clarke, Rotunda Hospital
Bridget Boyd, Coombe Women's Hospital
Geraldine Duffy, National Maternity Hospital
Orla O'Byrne, Rotunda Hospital
Dr. David Mannion OLHSC
Dr Geraldine Nolan, Portlaoise General Hospital
Dr Peter Filan, Cork Unified Maternity Hospital
Pat McCreanor, National Ambulance Service
Karl Bergin, National Maternity Hospital

4 ACTIVITY - TOTAL NUMBERS



- Since the programme commenced in March 2001, the NNTP has undertaken a total of 1903 transports
- 1356 of these infants were transported between 2004-2008, 781 (58%) of whom were to/from units outside of Dublin and 573 (42%) were within the Dublin area
- In line with the increase in activity in Irish maternity units over the past five years the demands for the services of the NNTP have also increased year on year with a peak in 2007 when 319 transports were conducted. This figure represents an increase of 77% over the number of transports in 2002, the first full year of NNTP operations
- The average number of transports performed annually between 2004-2008 was 271.2
- The weekly average for the same period was 5.2

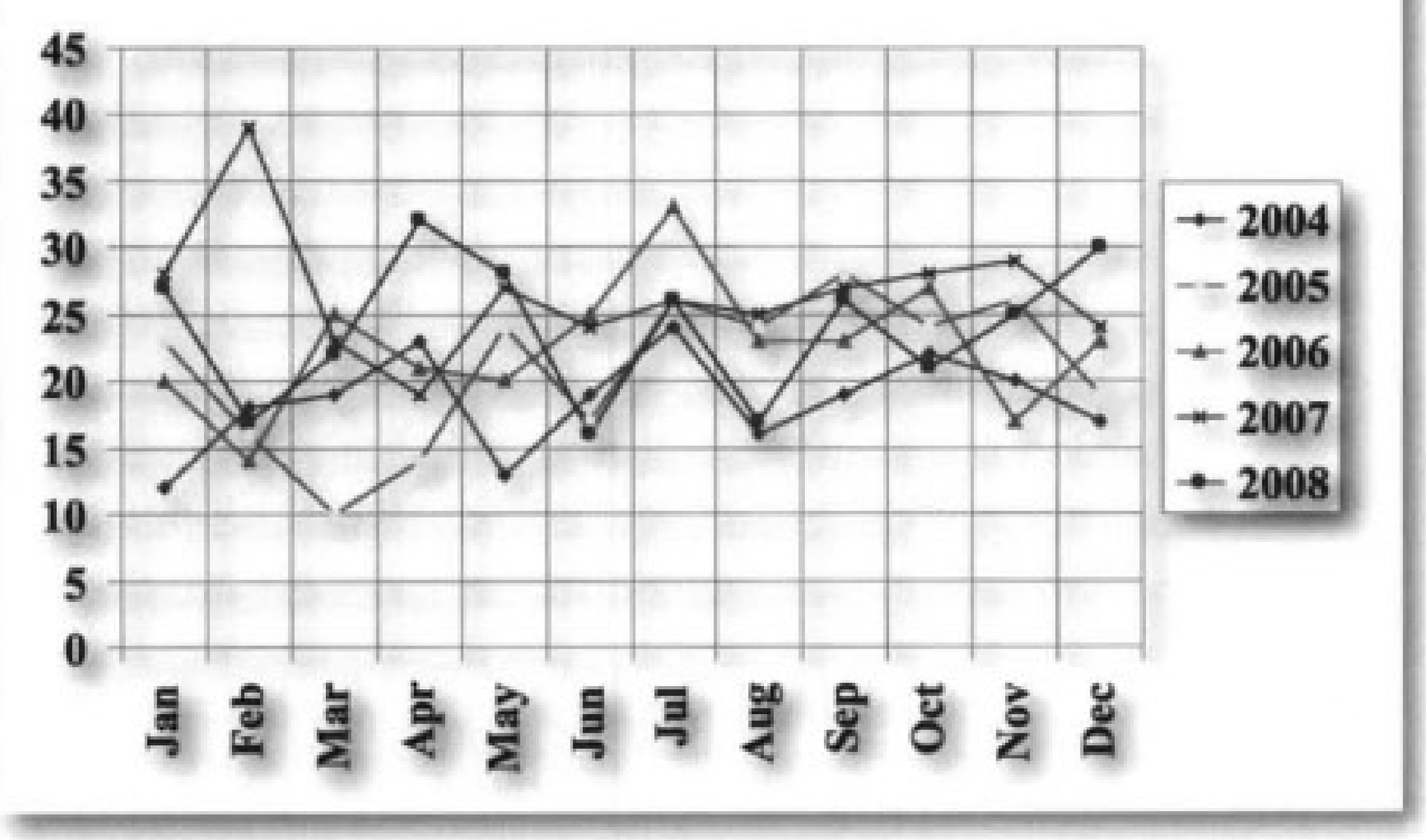
Mode of Transfer

MODE	2004	2005	2006	2007	2008
Ground Ambulance	210 (94%)	234 (93.2%)	269 (97.5%)	313 (98.2%)	280 (97.6%)
Rotary Wing Aircraft	12 (5.5%)	16 (6.4%)	6 (2.2%)	6 (1.8%)	7 (2.4%)
Fixed Wing Aircraft	1 (0.5%)	1 (0.4%)	1 (0.35%)	1 (0.3%)	0

4 ACTIVITY - TOTAL NUMBERS

national neonatal transport programme

NNTP Activity by Month 2004-2008

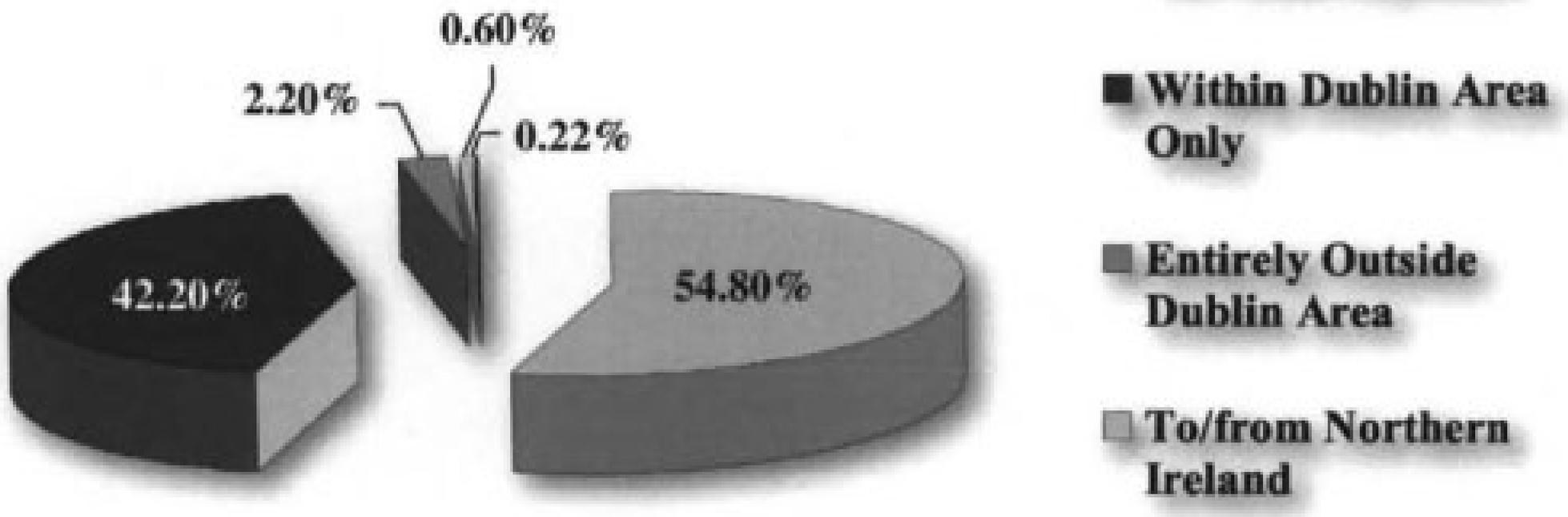


- On average over the past five years July has been the busiest month for the NNTP and March the quietest
- The maximum number of transports that occurred in any one month was 39 in February 2007 and the minimum number 10 in March 2005

MONTH	2004	2005	2006	2007	2008	Average Monthly Total 2004-08
January	12	23	20	28	27	22
February	18	16	14	39	17	20.8
March	19	10	25	23	22	19.8
April	23	14	21	19	32	21.8
May	13	24	20	27	28	22.4
June	19	17	25	24	16	20.2
July	24	26	33	26	26	27
August	16	24	26	25	17	21.6
September	19	28	23	27	26	24.6
October	22	24	27	28	21	24.4
November	20	26	17	29	25	23.4
December	17	19	23	24	30	22.6
Total	223	251	274	319	287	

4 ACTIVITY - TOTAL NUMBERS

Summary of NNTP Transports 2004-2008



Annual Summary of Transport Destinations

TRANSPORTS	2004	2005	2006	2007	2008	TOTAL 2004-08
Between Dublin & other Regions within Irish Republic	124 (56%)	135 (53.5%)	161 (58.5%)	164 (51.5%)	158 (55%)	**742 (54.8%)**
Within Dublin Area Only	97 (43%)	110 (43.5%)	104 (37.7%)	142 (44.5%)	120 (41.8%)	**573 (42.2%)**
Entirely Outside Dublin Area	1 (0.5%)	5 (2%)	6 (2%)	10 (3.1%)	8 (2.8%)	**30 (2.2%)**
To/from Northern Ireland	-	1 (1%)	5 (1.8%)	1 (0.3%)	1 (0.4%)	**8 (0.6%)**
To/from United Kingdom	1 (0.5%)	-	-	1 (0.3%)	-	**2 (0.15%)**
To/from France	-	-	-	1 (0.3%)	-	**1 (0.7%)**
TOTAL	223	251	276	319	287	1356

4 ACTIVITY - DESTINATIONS

national neonatal transport programme

Overview of the Destination of NNTP Transports 2004-2008

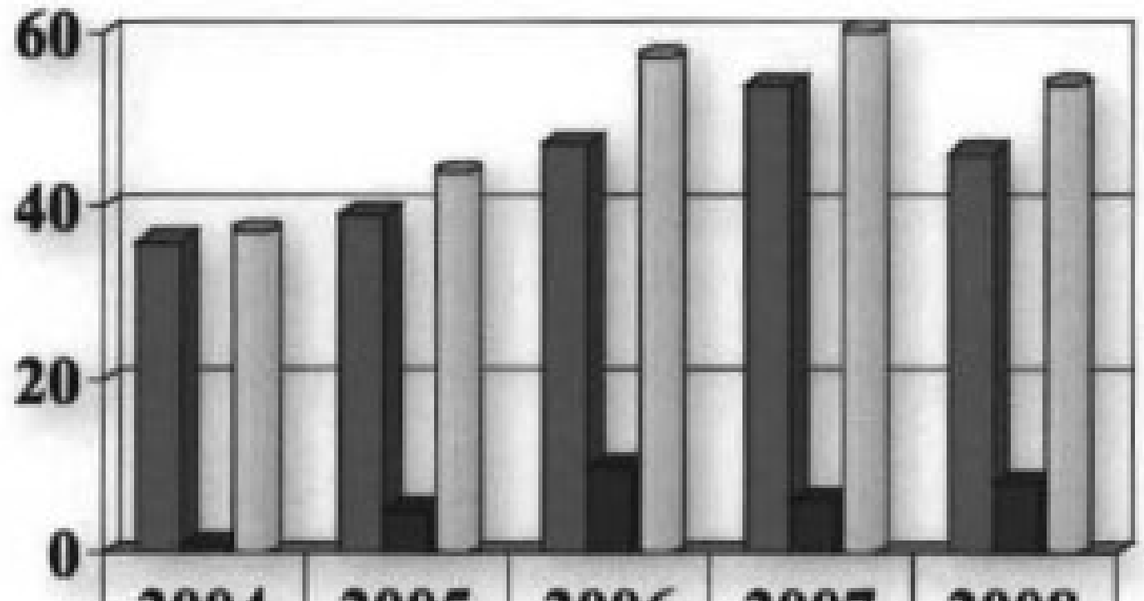
Type of Transport	No.	%	Total
FORWARD TRANSFERS			936 (69%)
To Tertiary Paediatric Centres	684	50.4%	
from Tertiary Neonatal Centres	507	14.2%	
from Non-Tertiary Neonatal Centres	146	10.8%	
from Other Tertiary Paediatric Centres	14	1.03%	
from Non tertiary Paediatric Centres	20	1.5%	
To Tertiary Neonatal Centres:	252	18.6%	
from Non-Tertiary Neonatal Centres	235	17.3%	
from Other Tertiary Neonatal Centres	29	2.1%	
from Adult Centres	8	0.65%	
RETURN TRANSFERS			368 (27%)
From Tertiary Paediatric Centres:	312	23%	
to Tertiary Neonatal Centres	290	21.4%	
to Non Tertiary Neonatal Centres	10	0.7%	
to Other Tertiary Paediatric Centres	8	0.65%	
to Non-Tertiary Paediatric Centres	4	0.3%	
From Tertiary Neonatal Centres:	56	4.1%	
to Non-Tertiary Neonatal Centres	14	1.03%	
to Other Tertiary Neonatal Centres	42	31%	
INCOMPLETE TRANSPORTS			52 (4%)
TOTAL	1354		100%

Included in these figures are:

- Two transfers to tertiary paediatric centres abroad, one to London for specialised hepatic surgery and the other to Paris for specialised neurosurgery.
- One infant was also repatriated from Glasgow following ECMO treatment.

4 ACTIVITY - DESTINATIONS

Summary of Primary Referrals for Neonatal Management 2004-2008
Total = 252



	2004	2005	2006	2007	2008
■ To Dublin Neonatal Units	36	39	47	54	46
■ To Regional Neonatal Units	1	5	10	6	8
□ Total	37	44	57	60	54

- Although the majority 222 (88%) of infants requiring transport for primary neonatal management were brought to Dublin, 30 (22%) were transported by the NNTP to Regional Units

Annual Primary Transfers to Regional Centres for Neonatal Management

	RECEIVING HOSPITALS													
	2004	2005		2006					2007		2008			
REFERRING HOSPITAL	To EC	To EC	To WRH	To CUH	To EC	To OLLHD	To UCHG	To WRH	To UCHG	To WRH	To CUH	To LM	To WRH
Erinville Hospital, Cork						1							
Kerry General Hospital, Tralee	1	2		1	1						1		
Limerick Maternity Hospital			1										
Portiuncula Hospital, Ballinasloe							1		1				
South Tipperary General Hospital, Clonmel								1		2		2	
St. Luke's Hospital, Kilkenny		1						5		3			5
Wexford General Hospital			1										
ANNUAL TOTALS OF TRANSFERS	1	5		10					6		8		

4 ACTIVITY - DESTINATIONS

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Annual Primary Transfers to Dublin Hospitals for Neonatal Management

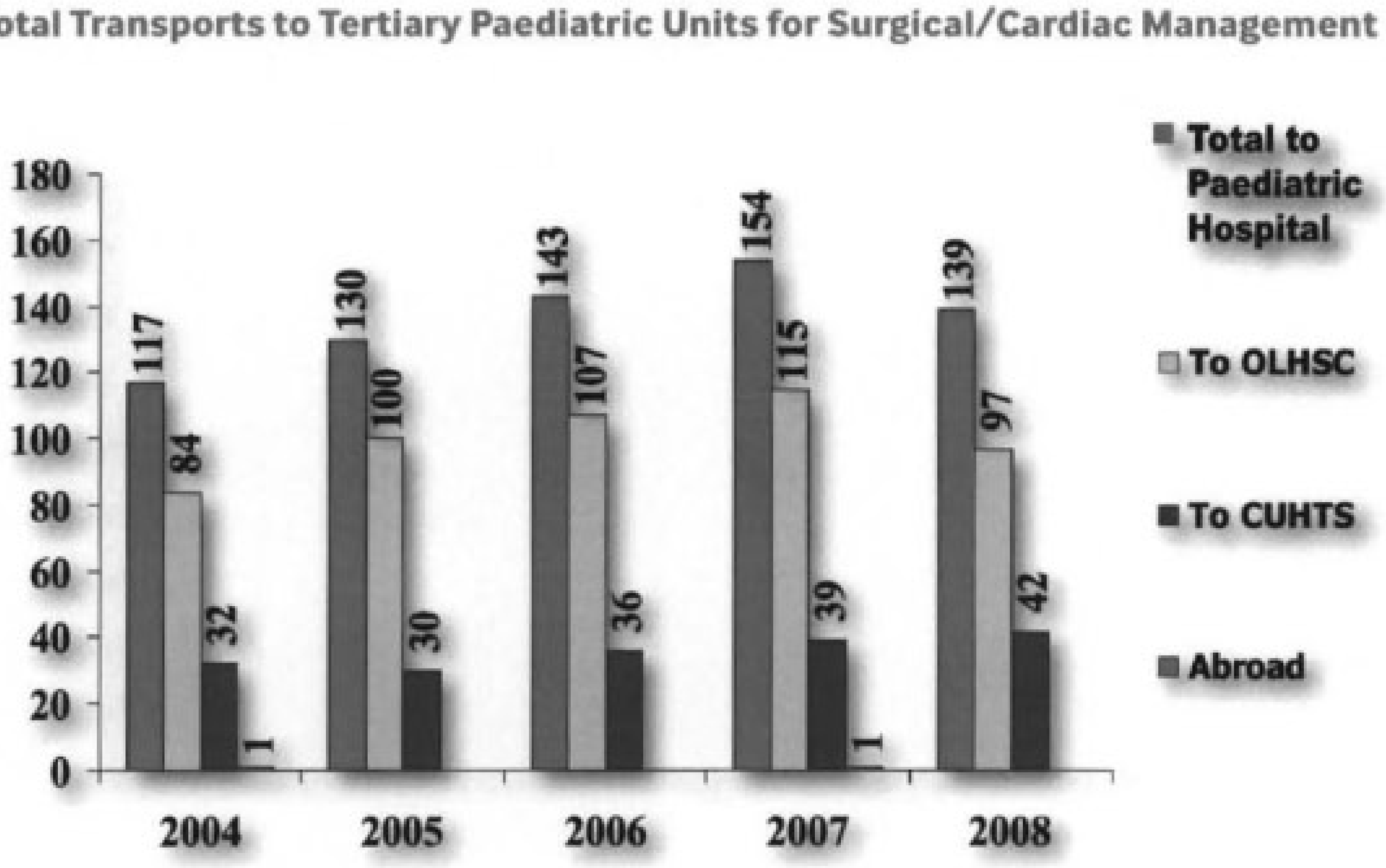
RECEIVING HOSPITAL	CWH					NMH					RH				
SENDING HOSPITAL	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Cavan General	1		1		1		1	5	3	2	4	1		1	
Daisy Hill Newry									1			1			
Enniskillen General			1										1		
Emville Cork						1	1								
Letterkenny General		1	2	1		1	1	1	2	4		2	2		1
Limerick Regional								2	1						
Limerick Maternity							1		3			1			1
Longford/Westmeath					2	1	1	7	2	6	1	1			2
Kerry General						1				1					
Mater Misericordiae												1			1
Mayo General	1	1		2		1	3	1	3	2			1	1	2
Mount Carmel						3	1		1						1
OLLH Drogheda			1				6	2	4	1	1				
Portiuncula Ballinasloe		1	2	1	1		2	3	2	2		1	1	1	
Portlaoise General	2	1	1		2	3		6	6	1	1			1	
Sligo General				1		5	1	5		3		4		1	2
South Tipperary General	1			1				1	1		2				
St. James Hospital Dub				1								1			
St. Luke's Kilkenny				1		1			6	3	3				1
St. Vincent's Hosp. Dub							1								
UCH Galway							2		1			1			
Wexford General						2			3	3			1	1	1
ANNUAL TOTALS	5	4	8	8	6	19	21	33	39	28	12	14	6	6	12

Referrals to Dublin Maternity Hospitals from Other Dublin Hospitals

RECEIVING HOSPITALS →	CWH					NMH					RH				
SENDING HOSPITAL ↓	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Coombe Women's Hospital								1		1	1			1	1
James Connolly Memorial Hospital				1											
Mount Carmel Hospital						3	1		1						1
Mater Misericordiae Hospital												1			1
National Maternity Hospital														1	
St Vincent's Hospital							1								
St James' Hospital				1								1			
TOTALS				2		3	2	1	1	1	1	2		2	3

4 ACTIVITY - DESTINATIONS

Total Transports to Tertiary Paediatric Units for Surgical/Cardiac Management



As all neonatal surgery and cardiology in Ireland is performed in tertiary paediatric hospitals, the greatest number 684 (50.4%) of NNTP transports are to and from these centres.

Between 2004-2008

- 503 (73.6%) of these were to Our Lady's Hospital Crumlin
- 179 (26%) to the Children's University Hospital, Temple Street.
- 1 (0.2%) to Kings Hospital, London
- 1 (0.2%) to Bicetre Hospital, Paris

4 ACTIVITY - DESTINATIONS

national neonatal transport programme

Referrals to Dublin Paediatric Hospitals for Surgical/Cardiac Management by Referring Hospital 2004-2008

	2004		2005		2006		2007		2008	
REFERRING HOSPITAL ↓	To CUHTS	To OLHSC	To CUHTS	To OLHSC	To CUHTS	To OLHSC	To CUHTS	To OLHSC	To CUHTS	To OLHSC
Adelaide, Meath & National Children's Hospital, Dublin	-	-	-	-	-	-	1	-	-	1
Bons Secour Hospital Cork	-	1	-	-	-	1	-	2	-	-
Cavan General Hospital	-	6	-	2	4	-	2	2	1	2
Children's University Hospital Temple St Dublin	-	1	-	-	-	2	-	3	-	1
Coombe Women's Hospital Dublin	4	15	1	18	-	12	-	24	-	8
Cork University Hospital	-	-	-	-	-	5	1	9	3	13
Daisy Hill Hospital Newry	-	-	-	2	-	-	-	-	-	-
Erinville Hospital Cork	1	4	-	8	3	12	1	1	-	-
Kerry General Hospital	1	-	-	2	-	-	-	2	-	1
Letterkenny General Hospital	2	1	1	4	1	5	2	2	-	1
Limerick Maternity Hospital	2	6	5	11	2	4	3	6	2	5
Limerick Regional Hospital	-	3	-	1	1	1	-	1	-	2
Longford-Westmeath General Hospital	-	1	-	-	-	3	1	2	1	3
Mayo General Hospital	-	1	2	2	-	-	1	2	3	2
Mercy Hospital Cork	-	-	-	-	-	-	-	-	-	1
Mount Carmel Hospital	-	-	-	1	-	-	-	3	-	-
National Maternity Hospital	8	10	4	20	6	13	7	11	5	19
Our Lady of Lourdes Hospital Drogheda	4	6	4	5	1	9	3	2	3	3
Our Lady's Hospital for Sick Children, Dublin	1	-	-	-	1	-	2	-	3	-
Portiuncula Hospital Ballinasloe	1	2	-	-	-	2	1	4	-	8
Portlaoise General Hospital	-	1	1	2	1	2	-	-	-	1
Rotunda Hospital, Dublin	5	12	8	13	10	17	9	19	16	14
Sligo General Hospital	1	3	-	2	1	1	-	6	1	-
South Tipperary General Hospital	-	1	-	2	1	3	-	2	-	-
St. Finbar's Hospital Cork	-	3	1	-	-	4	-	-	-	-
St. Luke's Hospital Kilkenny	-	1	-	-	-	1	-	1	-	-
University College Hospital Galway	-	5	1	3	1	4	-	5	3	5
Waterford Regional Hospital	2	-	2	2	2	-	2	4	1	5
Wexford General Hospital	-	1	-	-	1	6	2	2	-	2
TOTAL	32	84	30	100	36	107	38	115	42	97

4 ACTIVITY - DESTINATIONS

Returns to Original Booked Hospitals for Further Management by Receiving Hospitals

SENDING HOSPITAL →	CWH					NHM					OLHSC					RH					TSCUH					SFC	YG
RECEIVING HOSPITALS ↓	04	05	06	07	08	04	05	06	07	08	04	05	06	07	08	04	05	06	07	08	04	05	06	07	08	06	07
Bon Secour, Cork													2														
Cavan General											1																
Coombe Women's Hospital											8	9	12	19	5					2		1			2		1
CUH Cork									1	1				3	2										2		
Daisy Hill Newry			2																								
Emville Cork			1								3	6	5	2					1			1	1				
Letterkenny General		1																									
Limerick Regional												1											1				
Limerick Maternity				2					1	1	1	5		2	5							6		1	1		
Longford/Westmeath Gen								1																			
Kerry General												1															
Mayo General																	1										
National Maternity Hospital											3	12	8	13	13						3	3	3	6	5		
Our Lady of Lourdes Drogheda	1	1					1	1	3	1	3	2	2	1	1	2	1	4	1		3				2		
Portiuncula Ballinasloe			2		1						1			2	1			1						1			
Rotunda Hospital	1			1	1				1		13	8	9	17	12						2	1	4	1	9		
Royal Belfast																									1		
Sligo General																				2			1				
St Finbar's Cork												1	1														
Temple St. CUH											1		1	2	3												
Ulster Clinic Belfast																											1
University College Galway		1			3				1	1	2	1	1	1	2						1		1	1	3		
Waterford Regional Hospital			1	1	1				1		2	2	2	3	3				2		2						
Wexford General			1	2																							
TOTALS	2	3	7	6	6	0	1	2	8	4	38	48	43	65	47	2	2	5	4	4	11	12	11	10	25	1	1

4 ACTIVITY - INCOMPLETE TRANSPORTS

national neonatal transport programme

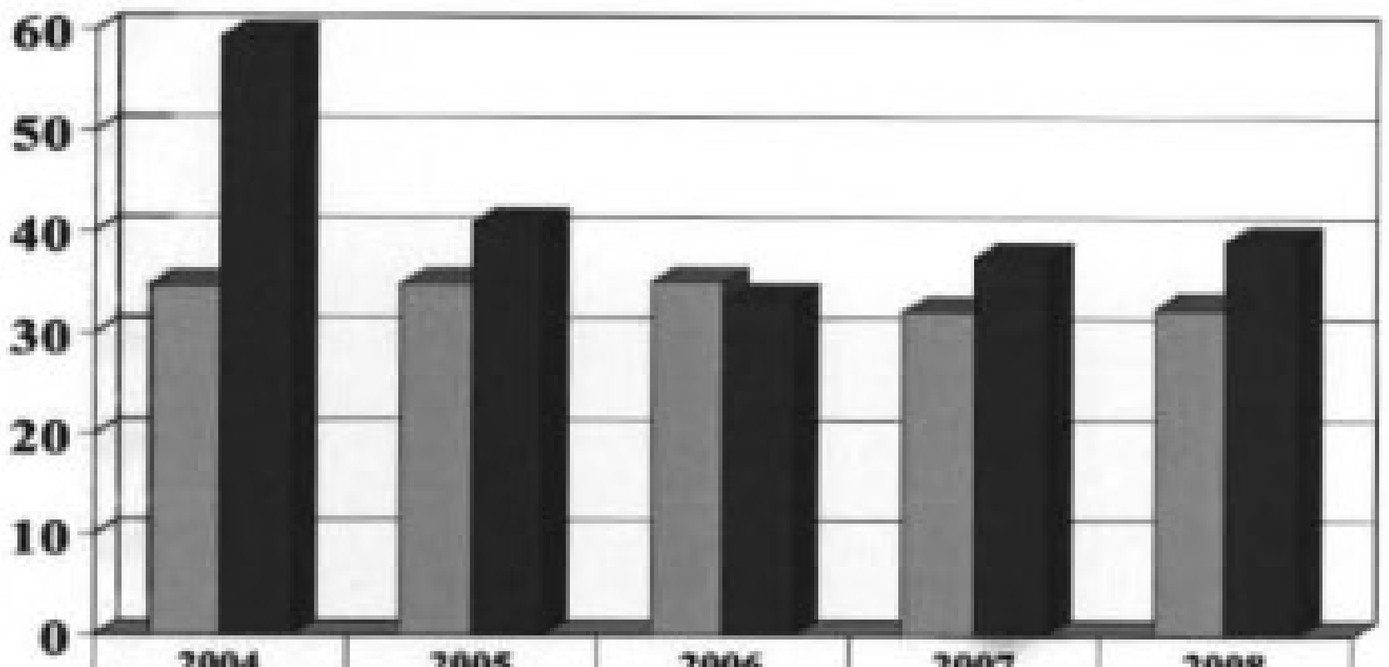
Transports Commenced by NNTP but Incomplete

REASONS	2004		2005		2006		2007		2008	
Infant too unstable to Transport - Transport postponed/cancelled	8	3.6%	3	1.2%	4	1.4%	4	1.25%	1	0.35%
Infant too ill to wait for arrival of NNTP team	2	0.9%	1	0.4%	-	-	-	-	-	-
Infant too unstable to Transport - Infant RIP while NNTP at referring hospital	1	0.45%	-	-	-	-	-	-	3	1%
Infant RIP while NNTP team en route to refering hospital	-	-	-	-	1	0.36%	2	0.62%	1	0.35%
Infant's Condition Improved – transport no longer necessary	2	0.9%	-	-	1	0.36%	-	-	-	-
Bed cancelled by Receiving Hospital	-	-	3	1.2%	1	0.36%		0.31%		
Bed cancelled in receiving hospital due to infant infection	1	0.45%	-	-	-	-	2	0.62%	-	-
More urgent transport request received by NNTP	1	0.45%	2	0.8%	-	-	1	0.31%	-	-
Transport cancelled due to lateness of call	-	-	1	0.4%	-	-	-	-	-	-
Transport cancelled by Referring Hospital	-	-	-	-	-	-	-	-	1	0.35%
Mechanical Problem with Ambulance	1	0.45%	-	-	-	-	-	-	2	0.7%
Mechanical Problem with Aircraft	1	0.45%	-	-	-	-	-	-	-	-
Annual Total of Incomplete Transports	17	7.6%	10	3.9%	7	2.5%	10	3.1%	8	2.7%

4 ACTIVITY - MOBILISATION TIMES

Mobilisation Times

- NNTP guidelines have a mobilisation time target of 45mins
- Over the period of this review the average mobilisation rate for ground transfers is 33.8 minutes, exceeding the target by 11.2 minutes (25%)
- The rate for departure for air transports has improved on average from 59.4 mins in 2004 to an average of 38 mins in the last two years

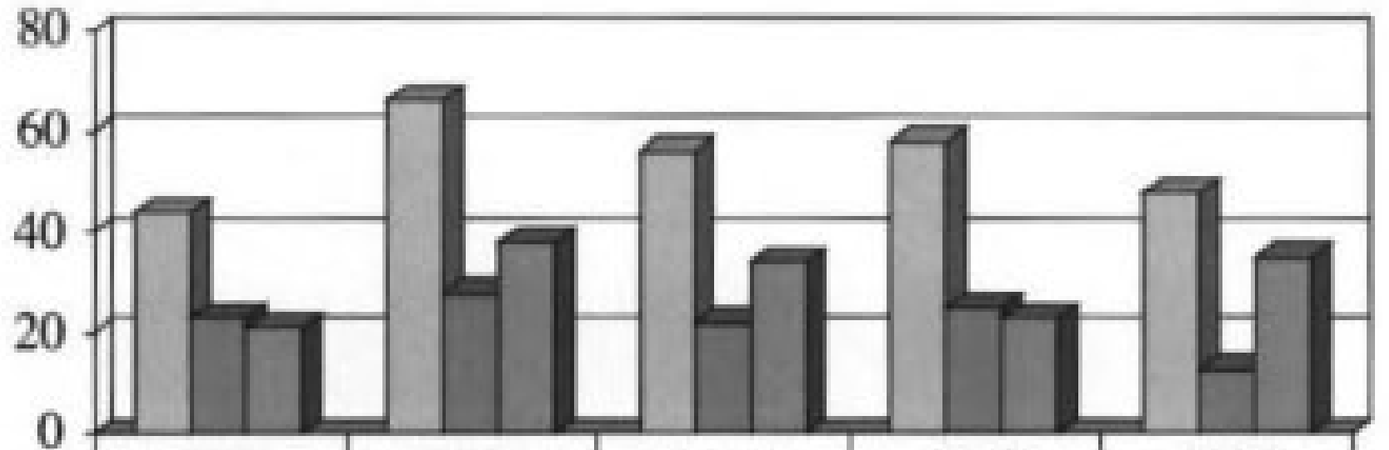


	2004	2005	2006	2007	2008
Mean Mobilisation Time from Base	34.7	34.8	35	32.2	32.5
Mean Mobilisation Time for Air Transport	59.4	40.8	33.5	37.5	39.2

**Mobilisation Times are calculated in minutes from the time the team accepts the transport until the time the team departs its base hospital.

Number of Transports Where Team Already Mobilised When Call Received

- In calculating the average annual mobilisation times, situations where the team have already mobilised have been excluded
  - ie. either the team was conducting a previous transport,
  - or is already on site at the location of the transport request

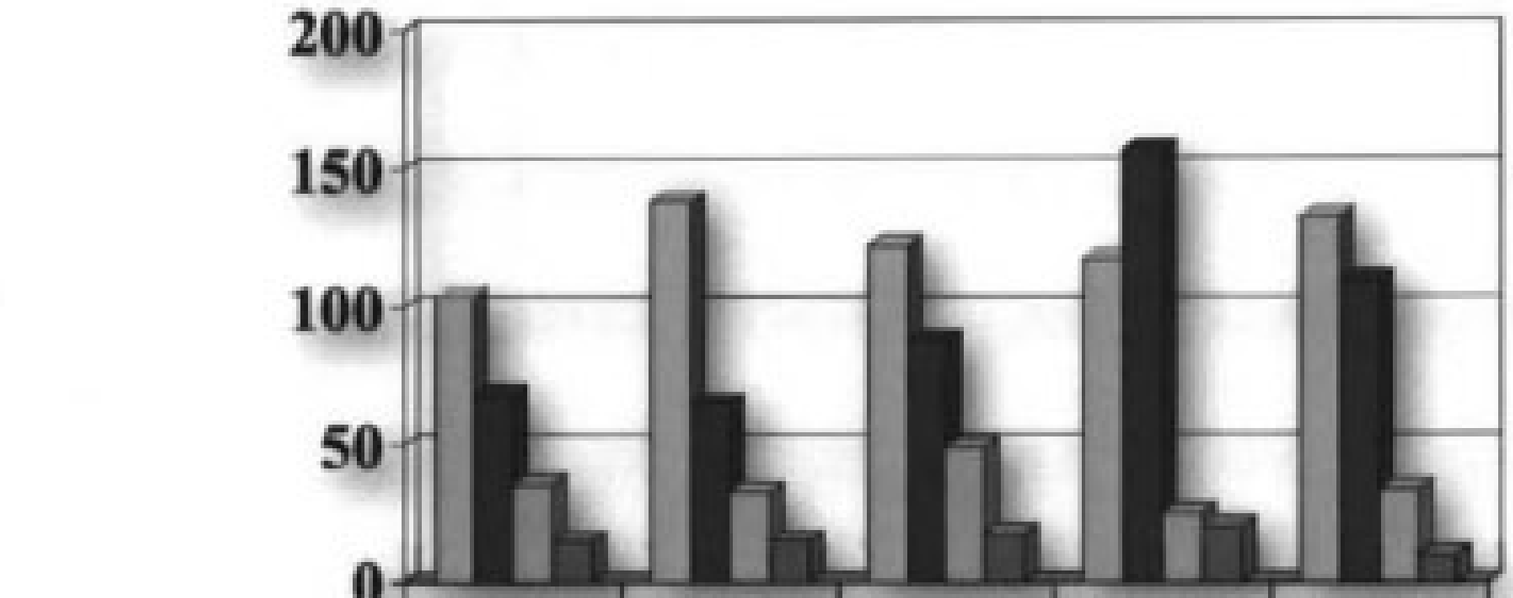


	2004	2005	2006	2007	2008
Total Transports where Team Already Mobilised	44	66	56	58	48
No. Follow on Transports	23	28	22	25	13
No. On Site Transfers	21	38	34	23	35

4 ACTIVITY - COMPLETION TIMES

national neonatal transport programme

Annual NNTP Transport Completion Times



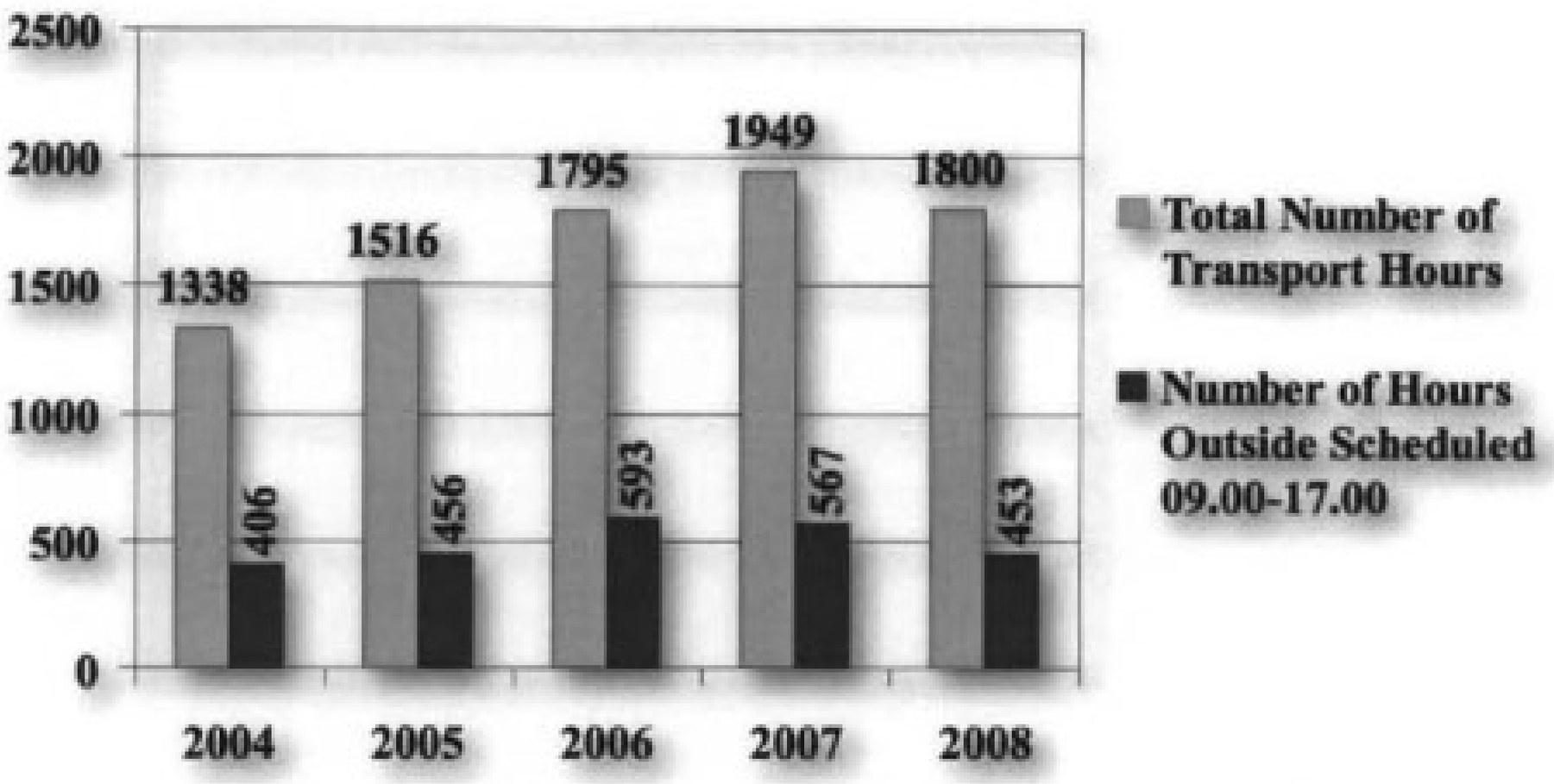
	2004	2005	2006	2007	2008
09.00-17.00	104	138	122	117	133
17.00-21.00	68	65	88	157	110
21.00-24.00	36	33	49	25	34
>24.00	15	15	17	20	10

- Although the NNTP service hours are scheduled from 09:00 hrs to 17:00 hrs, the majority (54%) of transports extend beyond these hours
- In 91 (6.7%) of these cases the entire transport occurred 'out of hours'
- Over the period of this report, 513 (38%) of calls for transport are received within the first hour of service which infers that centres are at times, waiting overnight to avail of the NNTP

Annual Number of Transports Completed Outside Scheduled Service Hours

	2004	2005	2006	2007	2008	Annual Average	Weekly Average
Number of Transports completed after **5pm but before 9pm**	68 (30%)	65 (26%)	88 (32%)	157 (49%)	110 (38%)	**97.6 (35%)**	**1.87 (35%)**
Number of Transports completed after **9pm**	51 (23%)	48 (19%)	66 (26%)	45 (14%)	44 (15%)	**50.8 (30%)**	**0.98 (30%)**

4 ACTIVITY



- During the period of this report, the NNTP spent 8398 actual hours on transport, 2475 (29.5%) of which were outside the scheduled service hours

All Transport Hours

	2004	2005	2006	2007	2008	Annual Average	Weekly Average
Number of **Hours on Transport**	1338	1516	1795	1949	1800	**1679.6**	**32.3**
Number of Transport Hours **5pm-9pm**	275 (20%)	289 (19%)	423 (24%)	386 (20%)	312 (17%)	**337 (20%)**	**6.4 (20%)**
Number of Transport Hours after **9pm**	131 (10%)	167 (11%)	170 (10%)	181 (9%)	141 (8%)	**158 (9.5%)**	**3 (10.5%)**

4 ACTIVITY - TRANSPORT DURATION

national neonatal transport programme

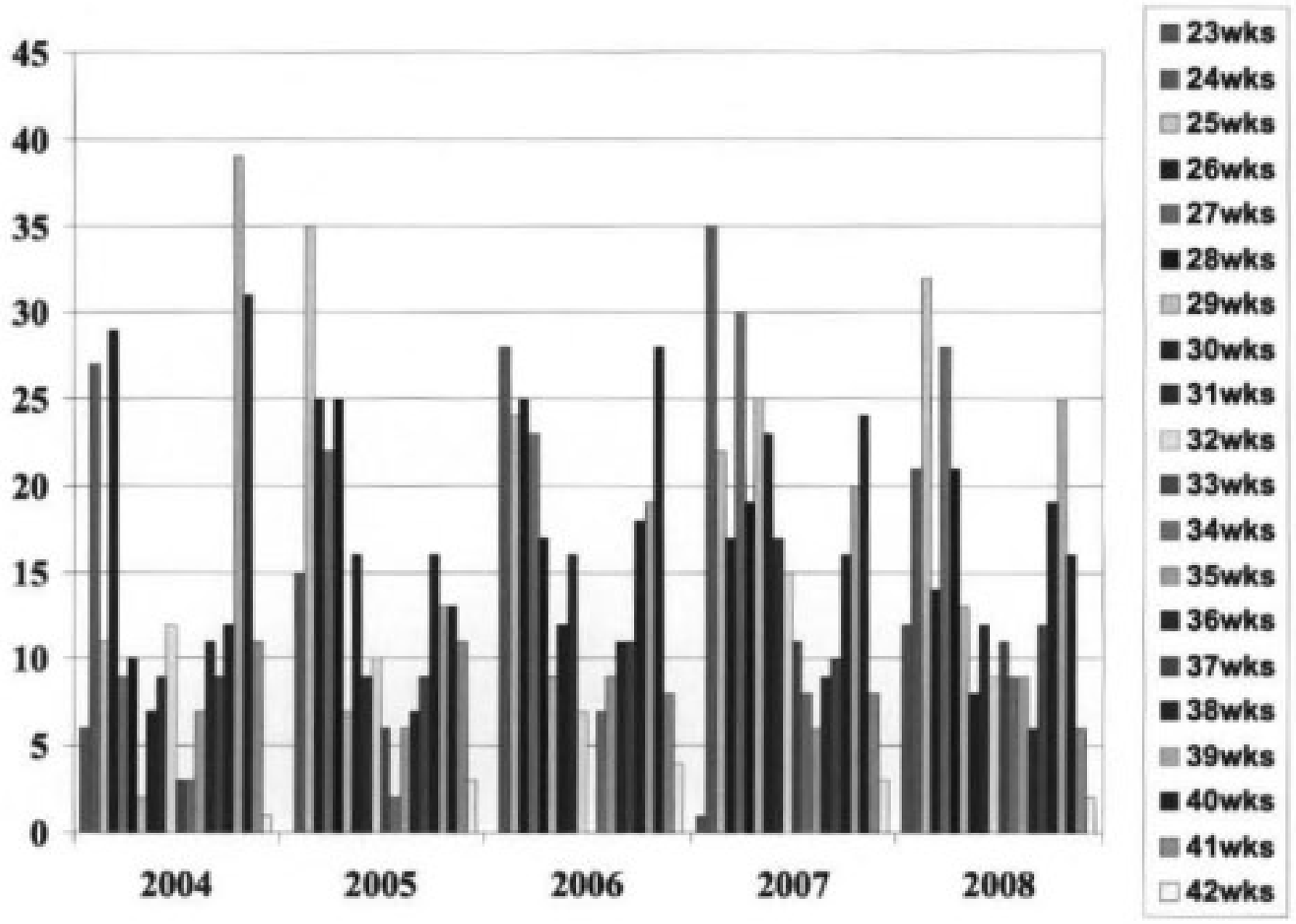
Transport Durations

	2004	2005	2006	2007	2008
Single Transport Duration Time Ranges	25 mins — 16 hrs 30 mins	30 mins — 16 hrs 50 mins	25 mins — 28 hrs	30 mins — 26 hrs	25 mins — 22.5 hrs
Mean Transport Duration	5 hrs 30 mins	5 hrs 3 mins	5 hrs 9mins	5 hrs 42 mins	5 hrs 1 min
Maximum Transport Hours in One Day	18 hrs *(2 transports)*	18 hrs *(3 transports)*	28 hrs *(1 transport)*	26 hrs *(1 transport)*	22.5 hrs *(1 transport)*
Maximum No. Transports Completed in One Day	3	4	4	4	4

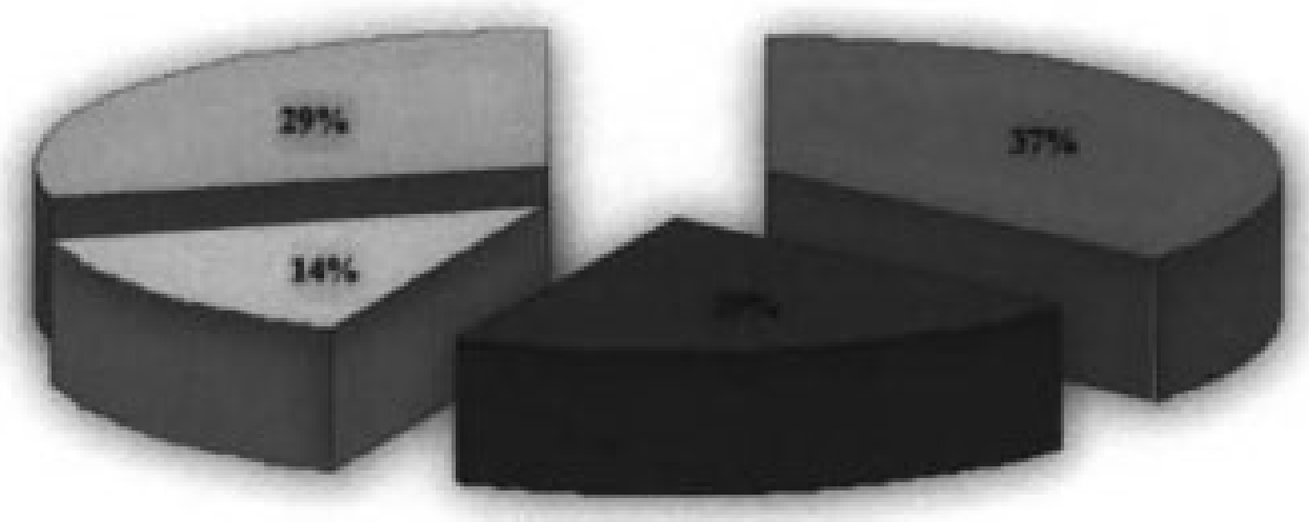
- Transport duration time is calculated from the time the team accept the call to transfer the infant until the team return to base
- The average transport duration over the past five years was 5 hours 17 minutes

5 CLINICAL STATISTICS - BIRTH GESTATION

Annual Number of Transfers by Gestational Age at Birth



Percentage of Transports 2004-2008 by Gestational Age at Birth

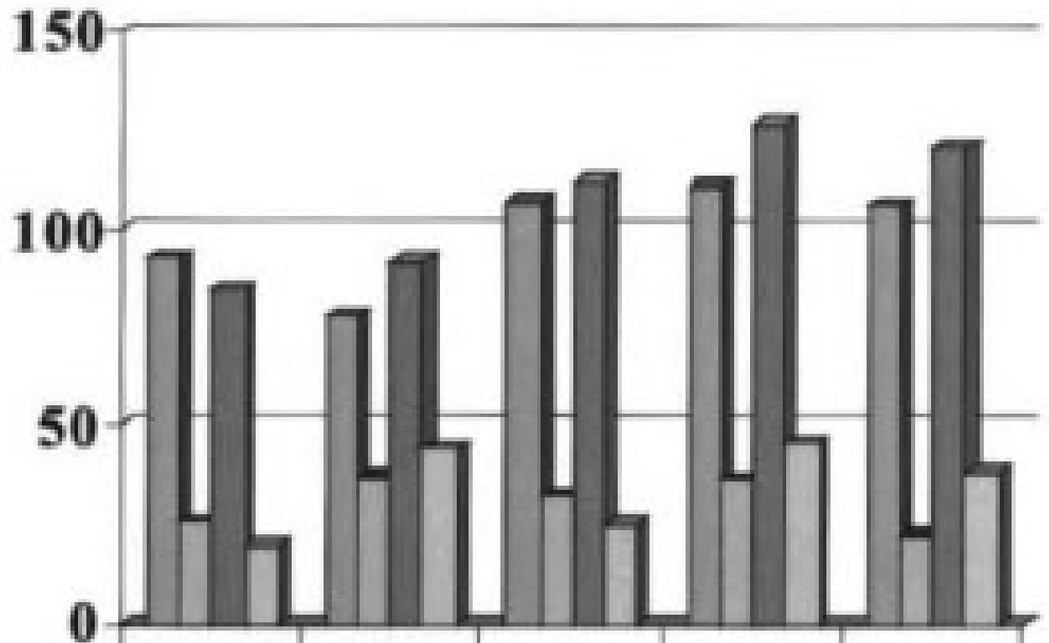


- Over the last five years the largest cohort of infants transported (37%) were less than 28wks gestation at birth.

5 CLINICAL STATISTICS - AGE ON TRANSPORT

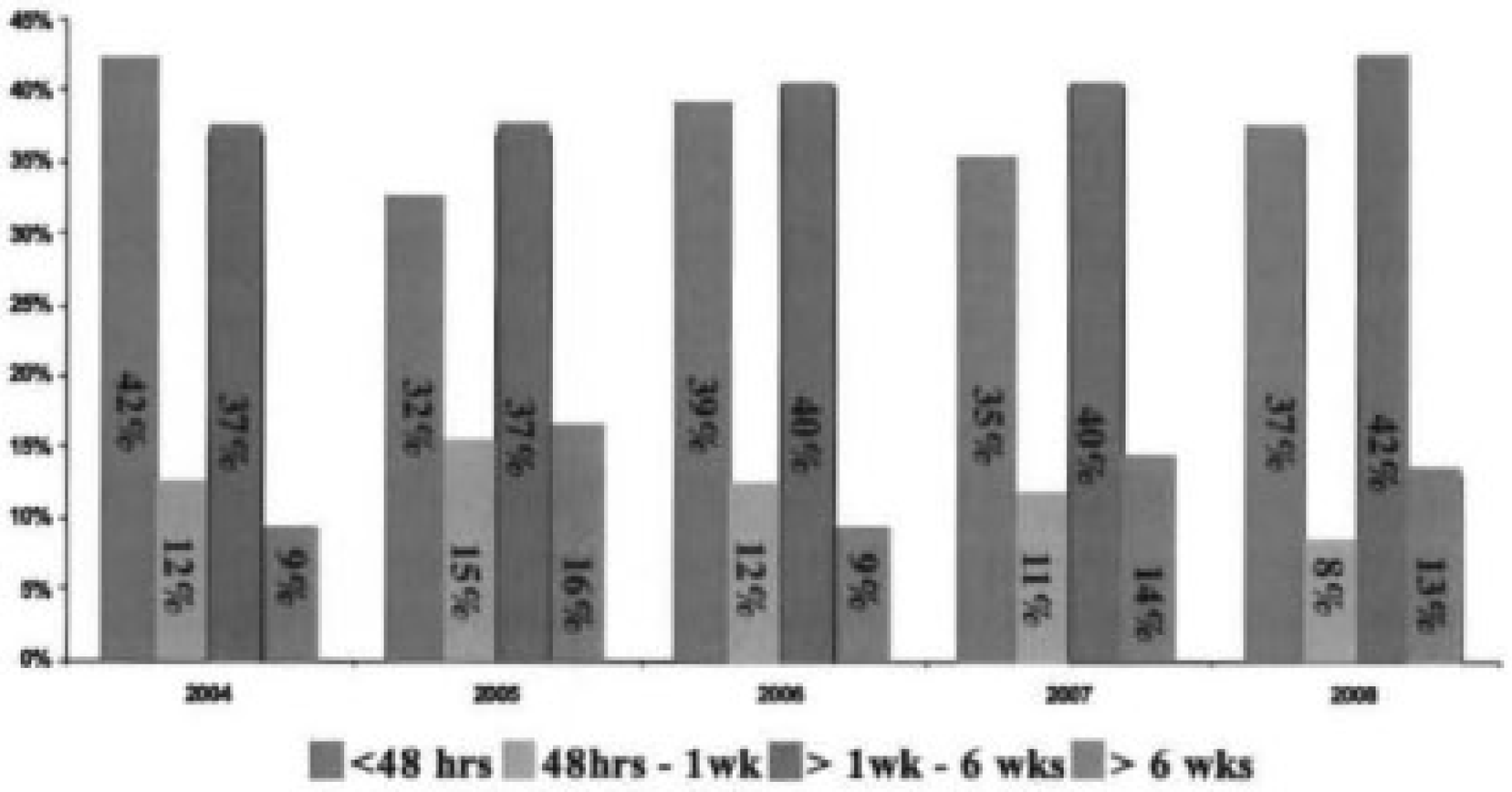
national neonatal transport programme

Number of Infants Transported by Actual Age when Transfered



	2004	2005	2006	2007	2008
<48 hrs	93	78	107	110	106
48hrs - 1wk	26	37	32	36	22
> 1wk - 6 wks	84	92	112	127	121
> 6 wks	20	44	25	46	38

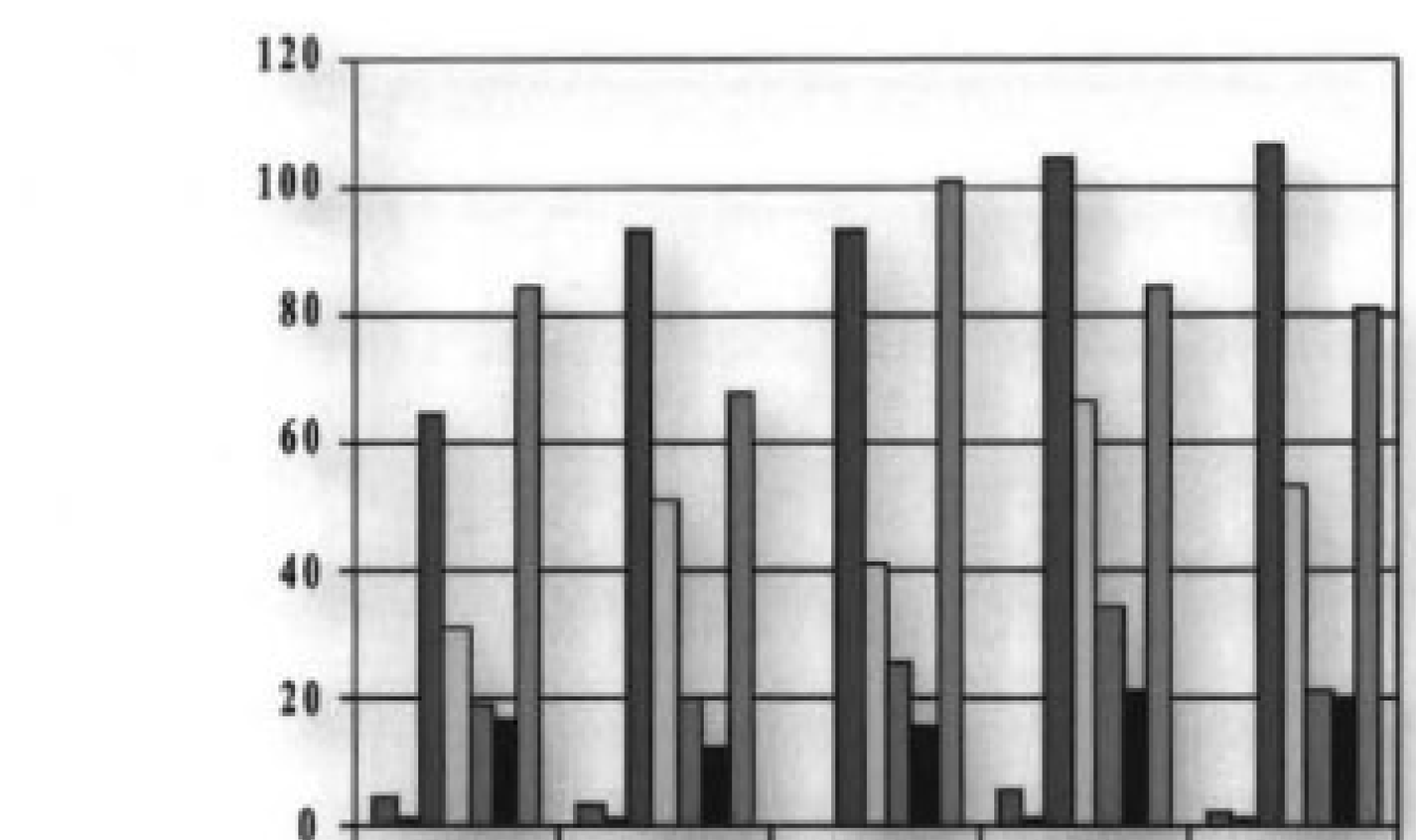
The Percentage of Infants Transferred Annually by Actual Age



- 37% of infants from 2004-2008 were less than 48hrs old when transfered.
- 39% were between 1wk and 6wks which reflects the large number of infants transported for PDA ligation.

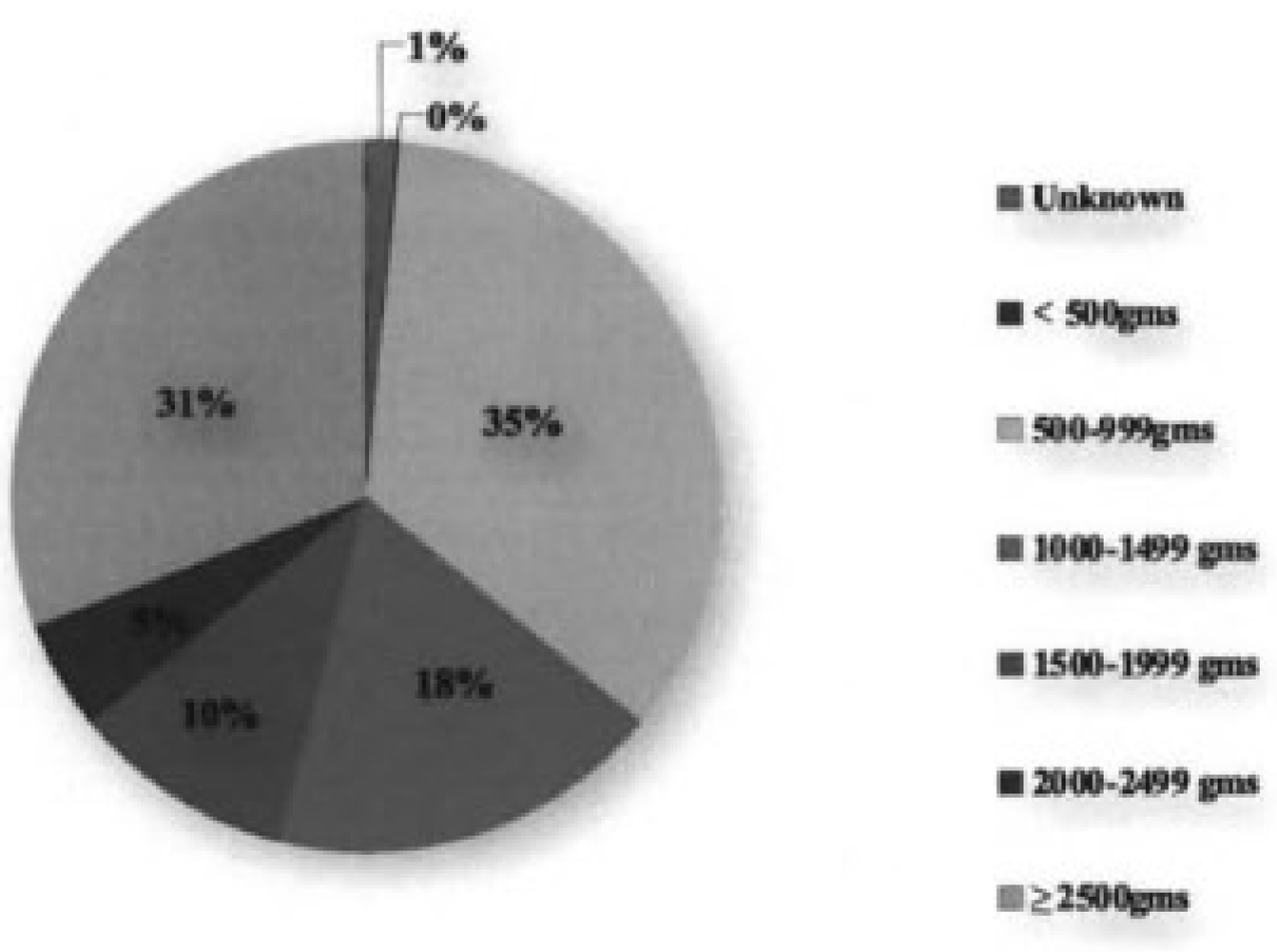
5 CLINICAL STATISTICS - BIRTH WEIGHT

The Annual Number of Transports by Birth Weight



	2004	2005	2006	2007	2008
Unknown	5	4	0	6	3
<500 gms	2	1	0	1	1
500-999gms	64	93	93	105	107
1000-1499 gms	32	52	42	67	54
1500-1999 gms	19	20	26	35	21
2000-2499 gms	17	13	16	22	20
≥ 2500gms	84	68	101	84	81

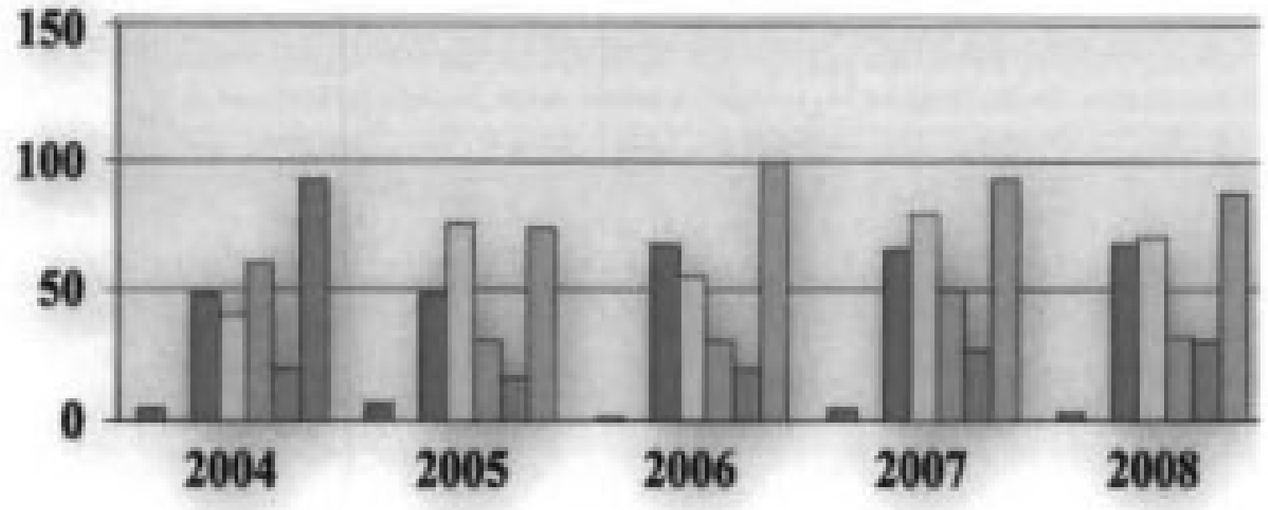
Percentage of Total Transports 2004-2008 by Birth Weight



5 CLINICAL STATISTICS - WEIGHT ON TRANSPORT

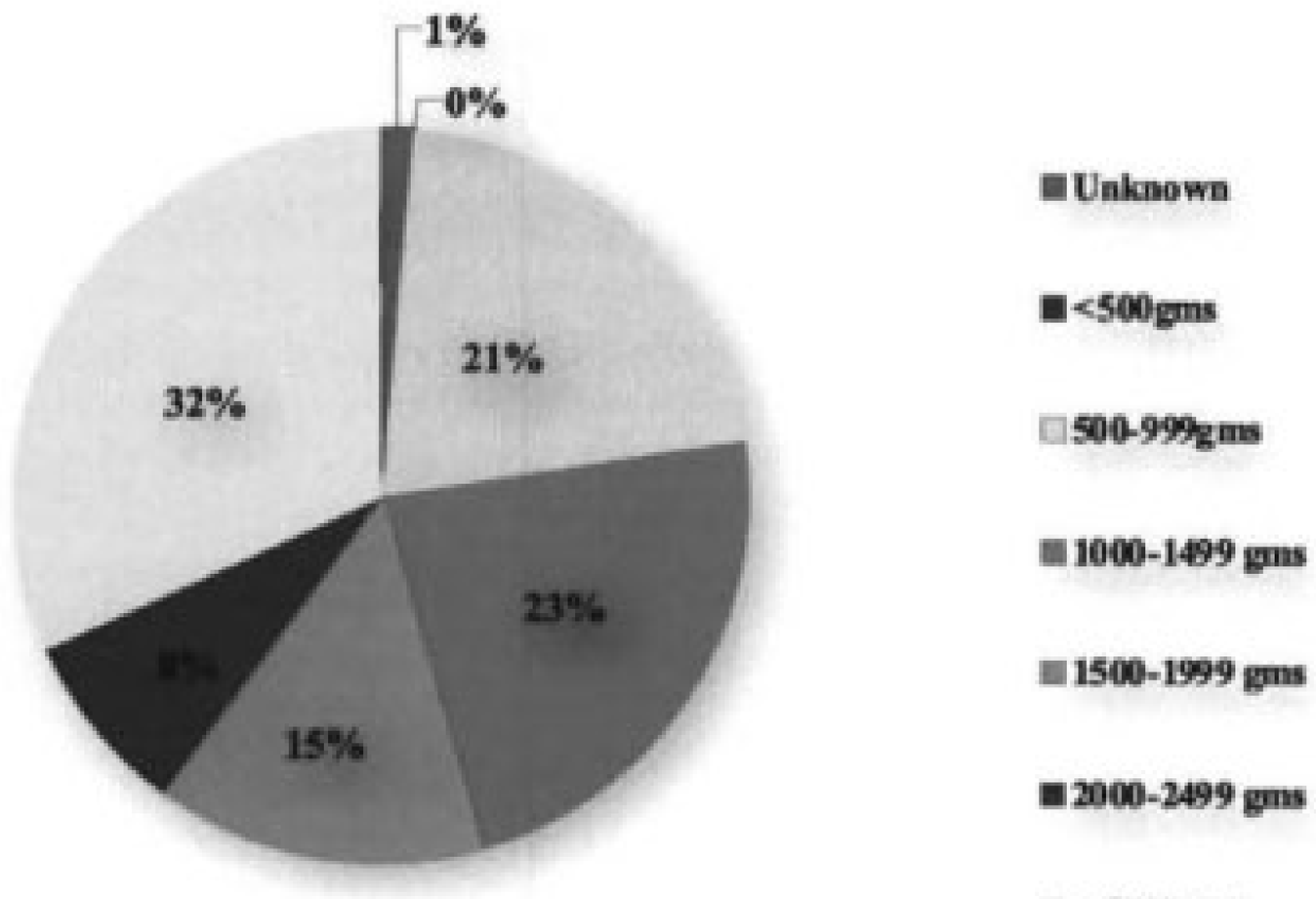
national neonatal transport programme

Annual Tranports by Weight When Transferred 2004-2008



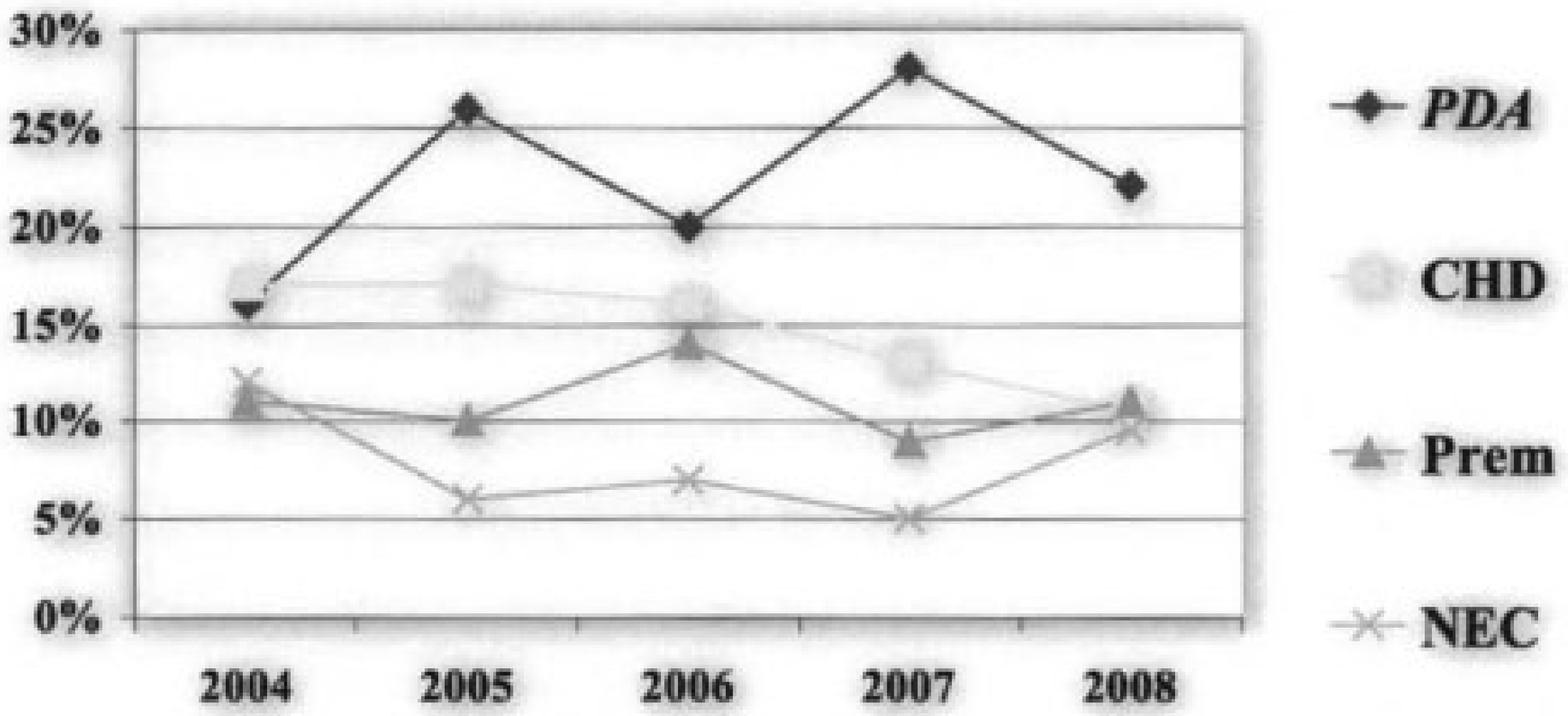
	2004	2005	2006	2007	2008
Unknown	5	6	2	4	3
< 500gms	0	0	0	0	1
500-999gms	48	48	67	65	66
1000-1499 gms	39	75	56	80	70
1500-1999 gms	60	31	30	50	32
2000-2499 gms	20	17	21	27	30
≥2500gms	92	74	100	93	86

Percentage of Total Transports 2004-2008 by Current Weight on Transfer



5 CLINICAL STATISTICS - REASONS FOR TRANSFER

Principle Reasons for Transfer in 2004-2008



- Transports to /from Cardiology assessment/surgery constitutes the greatest number 503(37%) of NNTP transports over the past five years
  - Of these infants, 308 (23%) were transported pre/ post PDA Ligation surgery
  - The remainder 195 (14%) were transferred pre/post assessment of Congenital Heart Disease
- Prematurity is the next most frequent diagnosis requiring NNTP transport. A total of 146 (11%) transports were conducted for this reason 2004-2008
- Pre/post surgical assessment of Necrotising Entercolitis also accounts for 105 (8%) of NNTP transports over this period

5 CLINICAL STATISTICS - DIAGNOSIS

national neonatal transport programme

Reasons for Transport

Primary Diagnosis	2004	2005	2006	2007	2008
Abdominal Distension	5	13	4	5	6
Apnoea		1	2		
Bowel Obstruction /Resection	2	5	3	3	6
Bronchiolitis	3	3	9	8	3
Central Line Access	9	11	6	3	13
Cerebral Depression	7			7	3
Choanal Atresia	2	1	2	3	3
Congenital Abnormalities	5	2	3	3	7
Congenital Diaphragmatic Hernia	3	5	5	15	8
Congenital Heart Disease	38	42	45	40	30
Convulsions	2	3	2	3	6
CT Scan/MRI etc	3	3	2	4	2
Ductus Arteriosis Ligation/Assessment	36	65	54	89	64
Duodenal Atresia	3		1		
ENT Review	5	4	4	7	9
Exomphalos/Gastroschisis	7	4	2	7	3
Eye review/Laser trx.	5	7	1	5	4
General Hospital Delivery (Maternal reasons)		2		1	1
Haemorrhage/Anaemia	1	2	2	3	
Hydrocephalus		2	3	3	
Hydrops	2		1		1
Hypoglycaemia		1			
Hypoplastic Lungs	1		1		
Inguinal Hernia	2		2	1	1
IUGR	1		2		
Jaundice	1				1
Meconium Aspiration	2	3	5	3	1
Meningitis	1		1	1	
Meningomyelocoele	1	1		1	1
Metabolic			3		
Muscle Biopsy	1	1			
NEC	26	16	19	17	27
Neurological Assessment	1		3	1	8
Orthopaedic	2		1		
Overflow			1		2
Palliative Care	3	3	2	2	1
Pierre Robin Syndrome	1		1	1	
Pneumothorax/	2	2		5	
PPHN	2	2	8	4	4
Prematurity	25	22	38	29	32
Renal Failure	2	3	4	4	
Respiratory Distress	6	5	10	15	15
Return to Original Hospital		7	19	19	11
RTA				1	
TOF /Oesophageal Atresia	3	7	1	1	8
Tracheostomy		1			
Unwell/Sepsis	2	2	4	5	6
TOTAL	223	251	276	319	287

5 CLINICAL STATISTICS

Clinical Status of Infants When Transported 2004-2008

CLINICAL STATUS	2004		2005		2006		2007		2008	
	No.	%	No.	%	No.	%	No.	%	No.	%
Intubated	188	84%	202	81%	214	76%	261	82%	220	77%
CPAP	9	4%	9	3.5%	14	5%	15	5%	34	12%
Prostaglandin & ventilated	19	12%	15	7.1%	11	7.6%	16	6%	15	5%
Prostaglandin not ventilated	7	3%	3	1%	10	4%	4	1%	9	3%
Inhaled NO	2	0.9%	5	2%	11	4%	12	4%	11	4%
Inotropic Support	42	19%	38	15%	56	20%	46	14%	32	11%
Sedation	122	55%	135	54%	149	54%	182	57%	147	51%
Deaths During Transport	0	0%	0	0%	0	0%	0	0%	0	0%

- As the NNTP is a critical care transport service it is not surprising that the percentage of infants who require ventilatory support (ET Ventilation or nasal CPAP) during transport remains high at 81-89%
- 2008 however saw a sharp increase up to 12% in the number of infants receiving CPAP during transport. This reflects recent changes in ventilatory practices in neonatal units where infants are being weaned off ETT ventilation much earlier than before
- There have been no deaths during NNTP transports since the programme began in 2001
  - On a total of four occasions the infant was deemed too unstable to transport and the infant died while the team were still present

Gender of Infants Transported

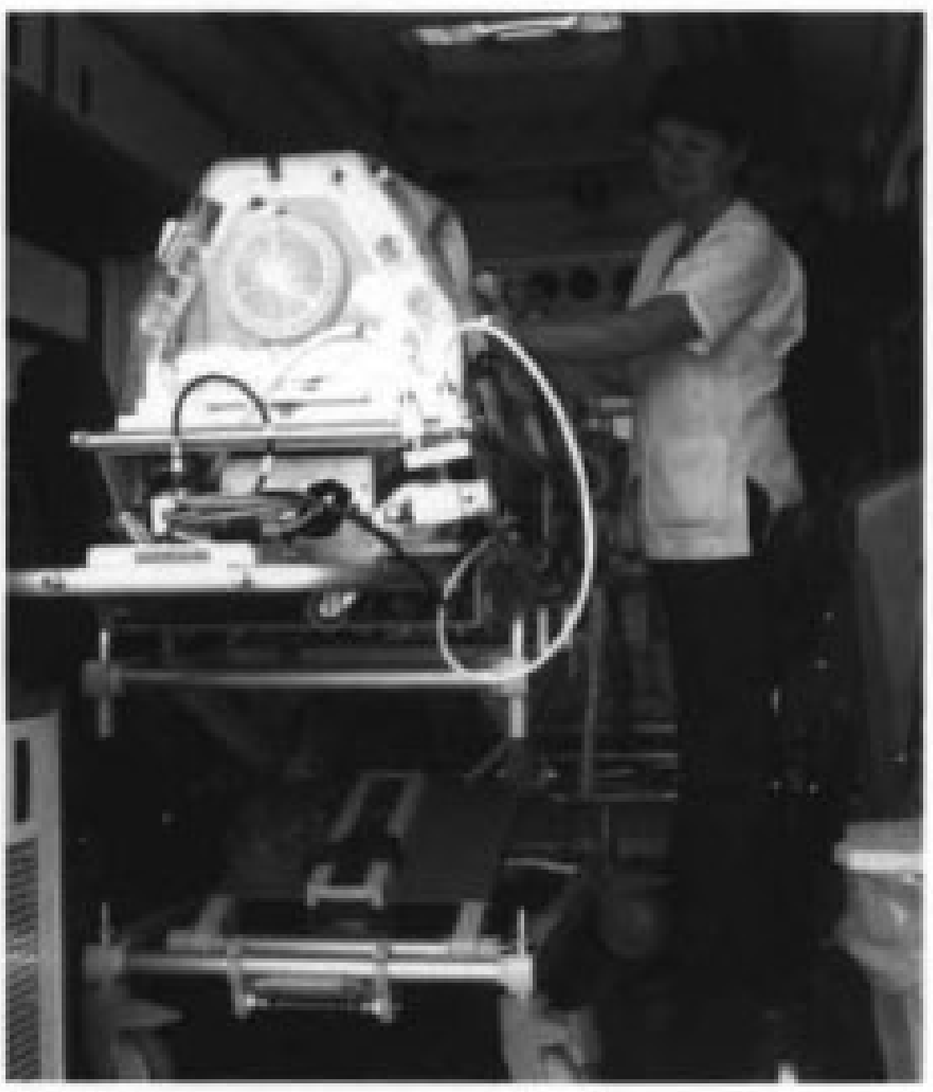
GENDER	2004		2005		2006		2007		2008	
Male	123	55%	142	57%	153	55.5%	155	48.5%	146	5%
Female	95	43%	102	40%	116	42%	157	49.5%	133	46%
Unknown	5	2%	7	3%	7	2.5%	7	2%	8	3%

5 CLINICAL STATISTICS

national neonatal transport programme

Twin Transports

- A total of 24 sets of twins have been transported together by the NNTP since 2001
- This number peaked in 2006 when there were 9 sets of twins and 1 set of triplets transported simultaneously
- 7 of these sets of twins were primary transfers < 26 wks gestation



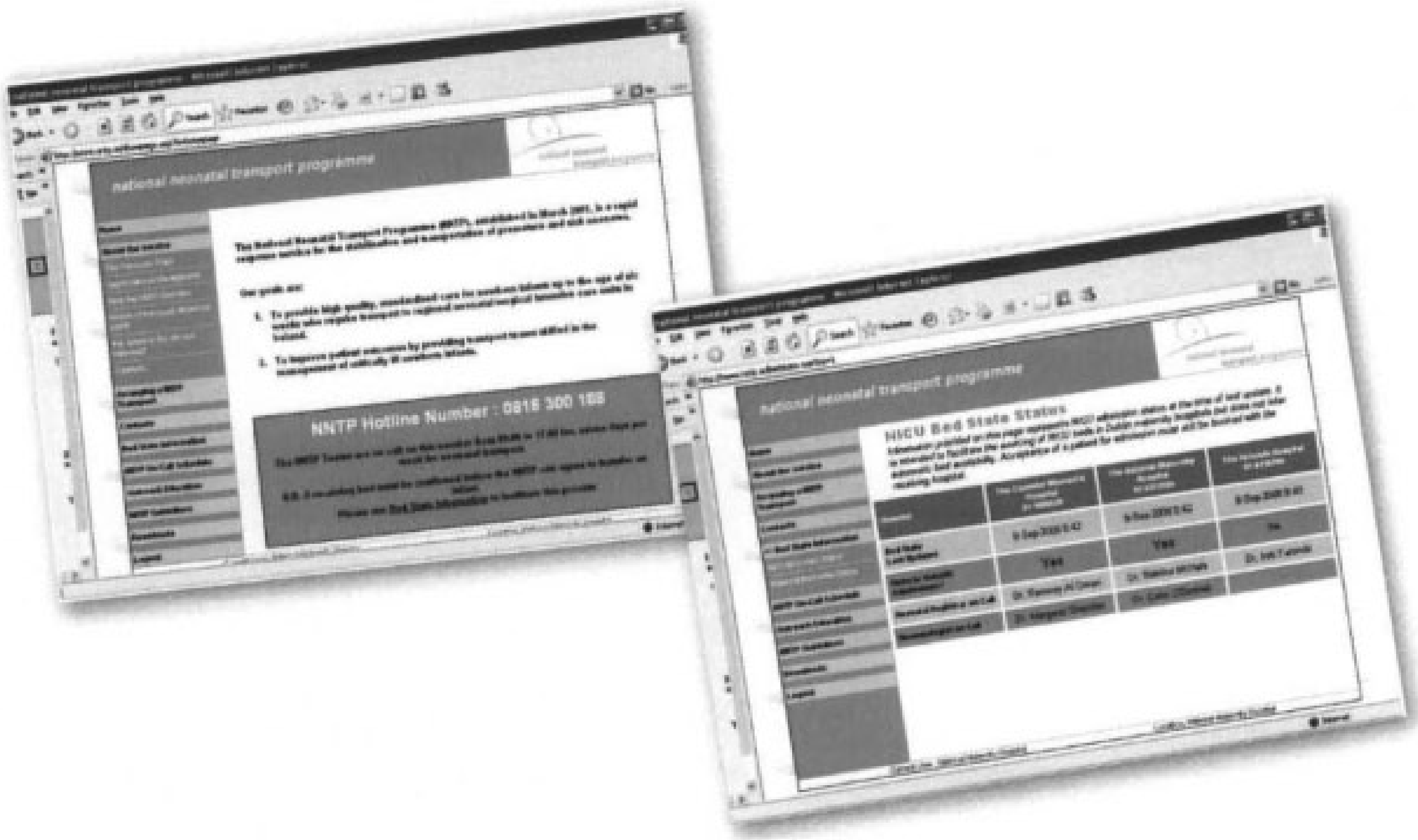
- 2 incubators on site in ambulance

New Single Transport Hot-Line Number

Up until November 2005, in order to contact the NNTP team, it was necessary to know which hospital was on call for transport each week and then phone that hospital's transport number. However, since then, this process is now easier as it has been made possible to contact the team on call for transport by way of a single phone number. Callers to this NNTP transport hot-line number, simply dial **0818 300 188**, are now routed to the neonatal transport telephone in the relevant hospital on call for transport each week.

NNTP Website

In November 2005, the NNTP Website www.nntp.ie was launched. The website which includes all contact details and the team 'on call' schedule also contains information about how the programme operates, the services it provides, criteria for acceptance to transfer and how to utilise the service. Forthcoming outreach educational courses are also listed.



In response to comments that the NNTP had received from clinicians in peripheral hospitals regarding their difficulties in sourcing NICU beds and/or antenatal maternal beds in Dublin, a section outlining the 'Bed Status' in the Dublin maternity Hospitals has also been included. This section contains two pages. The first page outlines the "NICU Bed Status" and the second page outlines the "In-Utero Bed Status". These pages simply state whether or not the hospitals listed are open to outside admissions and the names of the clinicians to contact in order to arrange a transfer. The pages clearly state that the information is intended to facilitate those trying to source a neonatal/maternal bed in Dublin maternity hospitals but acceptance to transfer must still be confirmed with the receiving hospital. This information is updated every morning. For security reasons, access to this section is restricted to authorised users only by way of a user name and password which have been issued to all service users.

6 PROGRAMME DEVELOPMENTS

national neonatal transport programme

New NNTP Documentation

As another part our initiative to improve inter-hospital communications regarding patient transfer information, the NNTP has created a generic 'Infant Referral History' form. This form is intended to replace individual hospitals' own medical and nursing transfer letters and is intended for use by all referring hospitals when requesting the NNTP to transport an infant. Pertinent information as requested on this form should be available from the referring clinician at the time of calling the team. On arrival at the referring hospital, the NNTP team receive a handover of the infant's history and sign this document accordingly. A number of copies of the form have been distributed to all units and a PDF version is also available for download on the NNTP's website (www.nntp.ie).

Together with the referral form, the NNTP transport flowcharts have also been totally revised. The improved charts are designed to capture the times and status of the infant at each stage of the transport and also include a transport review section to facilitate on-going audit.

Infant Referral History

(To be completed by referring hospital when the NNTP is requested to conduct transport)

Infant Details
Surname: First Name: Sex: Date of Birth: Hospital No.:
Address: Time of Birth: Birth Weight: Gestational Age:
Current Age: Current Weight: Corrected Age:

Referral Details
Reason for Referral: Unit in Referring Hospital:
Referring Hospital: Phone / Ext / Bleep:
Referring Consultant: Unit in Receiving Hospital:
Receiving Hospital: Phone / Ext / Bleep:
Receiving Consultant: Time of Decision to Transport:
Date & Time of Referral:

Maternal Details
Surname: GP:
First Name: Address:
Date of Birth: LMP:
Contact Details: EDD:
Marital Status: Blood Group:
Ethnicity/Language: Antibodies:
Religion: Hep B Status: Rubella Group B Status:
Consanguinity: Hep C Status: Rubella:
Smoking: HIV Status: Varicella:
Alcohol/Substance Abuse: Serology:
TPHA:

Past Medical History

Family History

Father's Details
Name: Contact Details:

6 PROGRAMME DEVELOPMENTS

New Ambulance

In 2005 the main NNTP designated Ambulance was replaced and the original NNTP ambulance assigned for use as a back up vehicle. As the average length of NNTP transports is 5 hours 17 minutes, the on-road duration of our transports is often very long. When developing this new vehicle the NNTP took cognisance of the different clinical, occupational health and safety and technical automotive challenges that working for such protracted periods in the transport environment pose. This ambulance addresses these challenges and allows for the optimum care environment for sick and premature babies and greater patient and staff safety during transport.

The new custom built ambulance was developed in accordance with the European Committee for Standardization (CEN) regulations CEN 13976-2 that dictate maximum weights of equipment, standards for locking incubator trolleys in road vehicles and many other aspects of transfer equipment systems.

Features of this ergonomically designed 'baby friendly' vehicle include:

- Improved air suspension and insulation to minimise noise and vibration
- CEN approved incubator locking devices which have been further updated in 2008 to allow for inter-compatibility with other frontline national ambulances
- Transverse accommodation of the principle incubator to minimise the effects of acceleration and deceleration on the infant's cardiac and cerebral blood flow
- Central accommodation for a second incubator to facilitate simultaneous twin transfers
- Tail lift for incubator loading
- Adjustable forward style seating for four people to maximize observation and access to the infant(s) and also minimize the effects of motion sickness for staff
- 'Silent' generator for continuous AC power together with DC back up facilities
- Medical gas supply for a minimum of ten hours of continuous travel
- Further seating for two persons in the front of the vehicle
- Climatic controlled air conditioning/heating
- Work top space and compartmented storage facilities
- Powered cool box
- Intercom/ blue tooth phone /camera / driver alert system/CD player
- Nitric Oxide delivery system
- Portable Blood Gas Analysis system
- Emergency adult resuscitation equipment

6 PROGRAMME DEVELOPMENTS

national neonatal transport programme

New Ground Modules

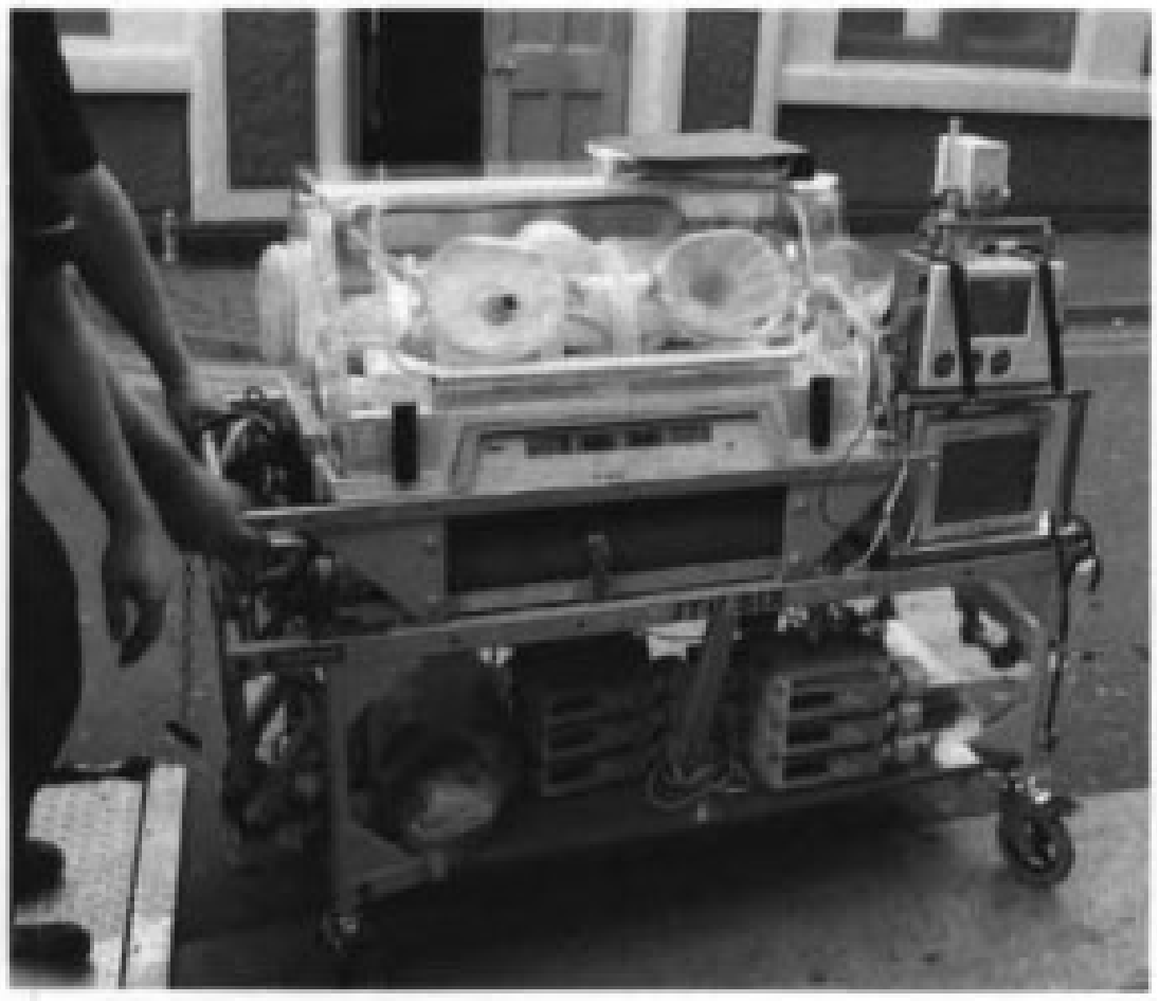
2008 saw the completion of three new transport modules for ambulance transfers. As the requirements for the NNTP were exacting, there was no suitable 'ready made' module commercially available to us. So then in an endeavour to achieve the optimum solution for the NNTP in conformity with relevant E.U. Directives and CE markings the modules were commissioned specifically for the programme. The existing floor fixation points in the NNTP's dedicated ambulances were changed to accommodate the CE regulated locks of these new modules that can fit equally in the Irish National Ambulance Service's Frontline Ambulances if required in an emergency.

The unique feature of this module is that it is made to fit across the bulkhead of the NNTP's dedicated ambulance. This is considered the most clinically appropriate position for the transport of neonates in that it minimises the effects of acceleration and deceleration on the cerebral and cardiac blood flow of this vulnerable population. The shorter length trolley also has the advantage of facilitating the carriage of a second module simultaneously in the centre of that ambulance, when required for twin transports.

The robust lightweight modules provide the mechanisms to securely fix all component parts of the transport incubator system in conformity with EU test criteria and in positions that are clinically and ergonomically suitable for staff in transit. The systems includes the following equipment:

- Compact Neonatal Ventilator that provides a choice of ventilatory modes including CPAP, SIMV, Pressure Support. Assist Control and variable /con Gas Flow and also accommodates a disposable humidity system. In addition to alarms/monitors for pressure and O2 concentration the unit provides a means to monitor rate, exhaled tidal volumes and mean airway pressure
- Incubator with three hours battery life
- Medical Gas Cylinders
- O2 Blender, Analyser and Flow-meter
- Cardiac/Resp/IBP/NIBP/Sao2/Temp Monitor
- 6 Syringe Drivers
- Suction Unit and Disposable Canister
- Nitric oxide delivery system

All of the above items have A/C power capabilities that attach to the source via a single plug which eliminates the need for multiple cables. Back up D/C and battery power is also available for maximum flexibility.



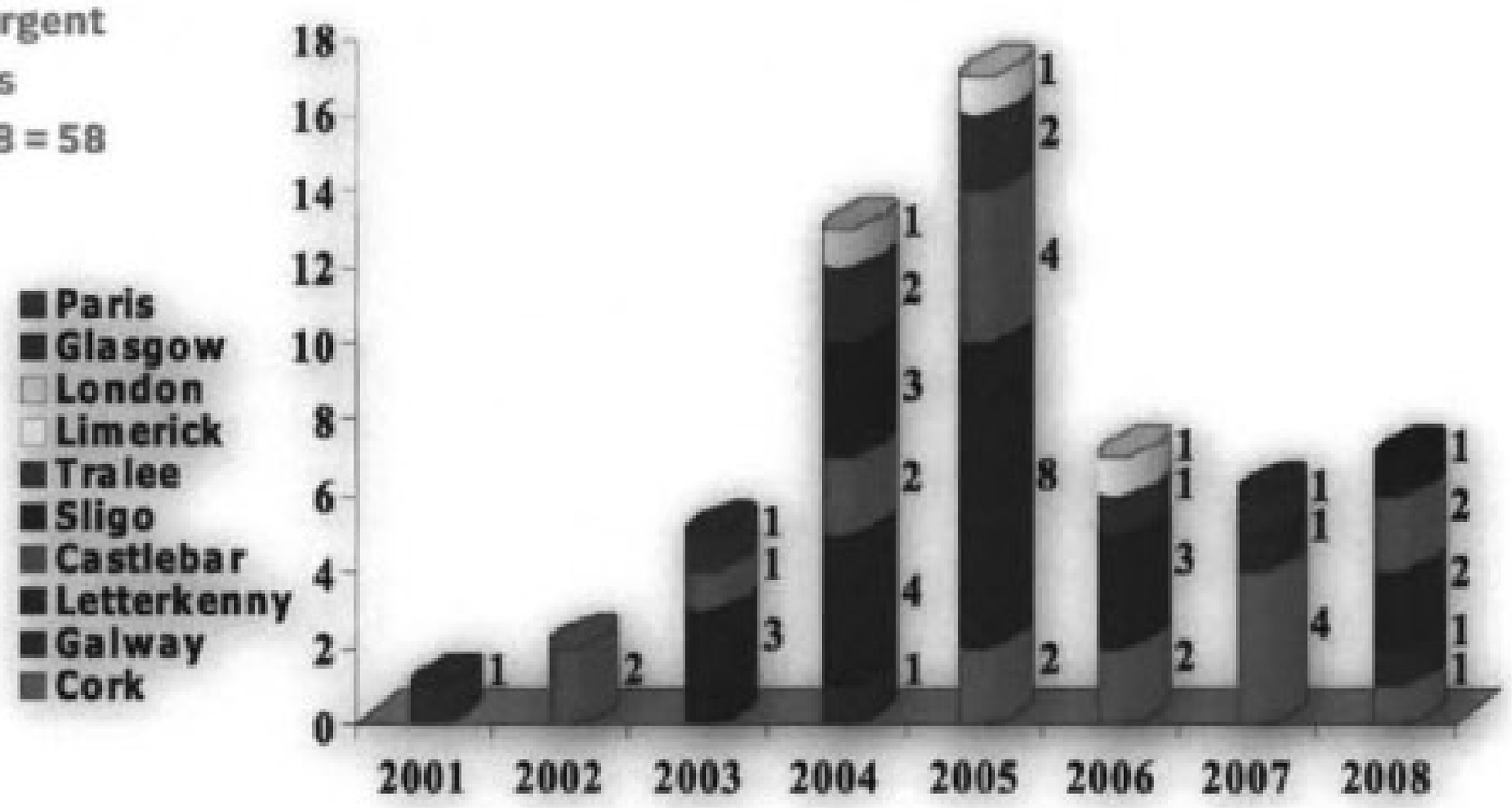
6 PROGRAMME DEVELOPMENTS

Air Transports

The majority of NNTP transfers are by road as generally this is the most practical mode of transport. There are however, certain circumstances where the availability of air transport is the preferred / only option:

- where there is an urgency of transport in relation to distance
- where there is an urgency to provide a higher level of medical care than is available at the referring centre
- where adverse road/weather conditions prevent ground transport
- where overseas transfers are required

Air Transports for urgent transports >170kms
Total to 31/12/2008 = 58



Up until 2005, air transport became the preferred option for longer distances as is reflected in the figures below. This resulted from greater procedural and staff efficiencies when utilising the Irish Air Corps' Dauphin helicopters. The decrease in air transfers since then can be explained by two factors: improvements in Irish infrastructure over the last number of years has considerably lessened the journey times to and from distant hospitals and secondly in 2006 the Dauphin fleet was phased out and the Air Corps began to re-equip with a fleet of AC135 and AW 139 modern utility helicopters. This process began with the introduction of the AC 135 in 2006 Although these aircraft can facilitate NNTP incubator transfers, the arrival in mid 2008 of the larger AW 139 aircrafts which allow for much grater access to the infant in flight, provide the NNTP with much greater flexibility and accessibility regarding air ambulance.

Together with the introduction of these new aircraft 'Service Level Agreement' (SLA) was prepared by the Department of Defence and the Department of Health and Children in consultation with the Health Services Executive, the Defence Forces and the Air Corps in respect of provision of Air Ambulance Services. The Air Corps Air Ambulance Service is an emergency inter-hospital transfer service for the essential rapid transfer of patients between hospitals and the scope of service currently provided includes: Air Transport of Neonates requiring immediate medical intervention in Ireland. The Air Corps will provide helicopters or fixed wing aircraft and flying crews for NNTP Transports dependent upon the following:

- Availability of suitable aircraft
- Availability of flying crews
- Suitability of weather conditions

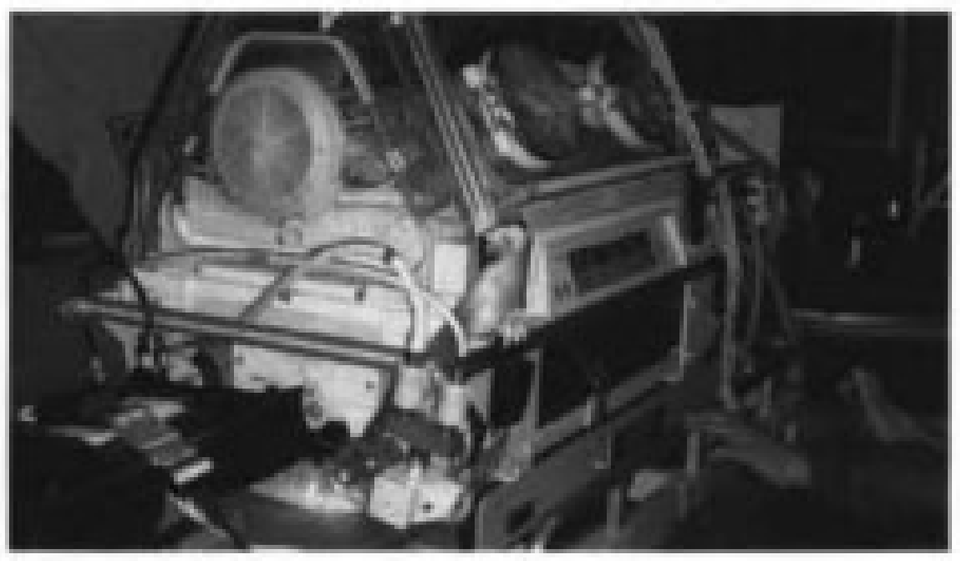
6 PROGRAMME DEVELOPMENTS

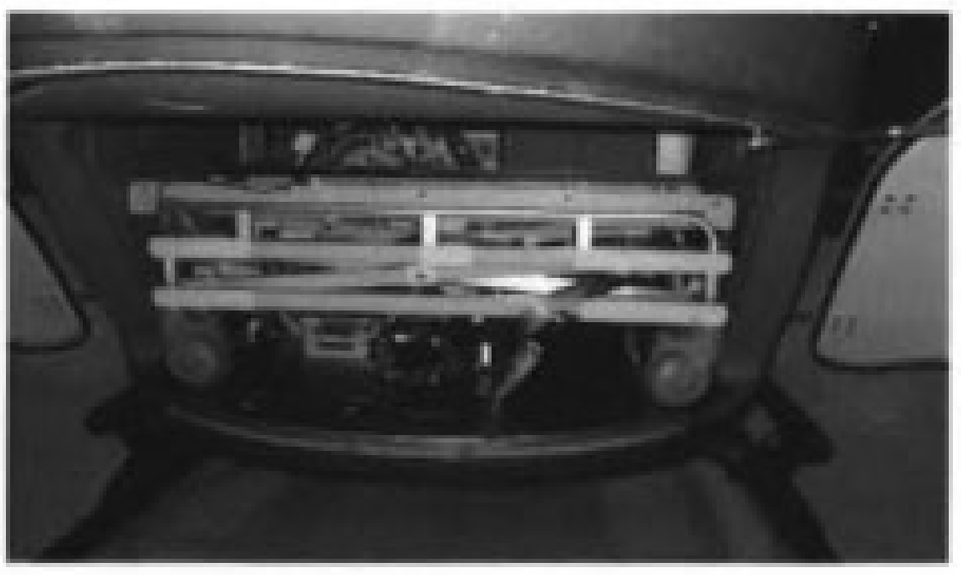
national neonatal transport programme

Air Transport Module

The NNTP has developed a specific module for this air ambulance service that meets both CEN and European aviation standards. This module integrates into the Irish Air Corps' EC135 and larger AW 139 helicopters. It can be accommodated securely in both of these aircraft and also into the NNTP's dedicated ambulances and all other national ambulances. The lightweight incubator/ventilator system and trolley can be loaded safely with no lifting by way of a battery activated raising and lowering mechanism. The top frame assembly separates from the trolley and glides into the helicopter on a wheel based system, which securely locks into the aircraft. The trolley base is then loaded in the aft of the helicopter.

Detailed air transport guidelines have been developed by the NNTP in conjunction with the Irish Air Corps for the use of this service. Routine Air transport training, including information on the physiological and safety aspects of flying, is provided by the NNTP and the Irish Air Corps in Baldonnell Airport for all NNTP clinical team members.





6 PROGRAMME DEVELOPMENTS

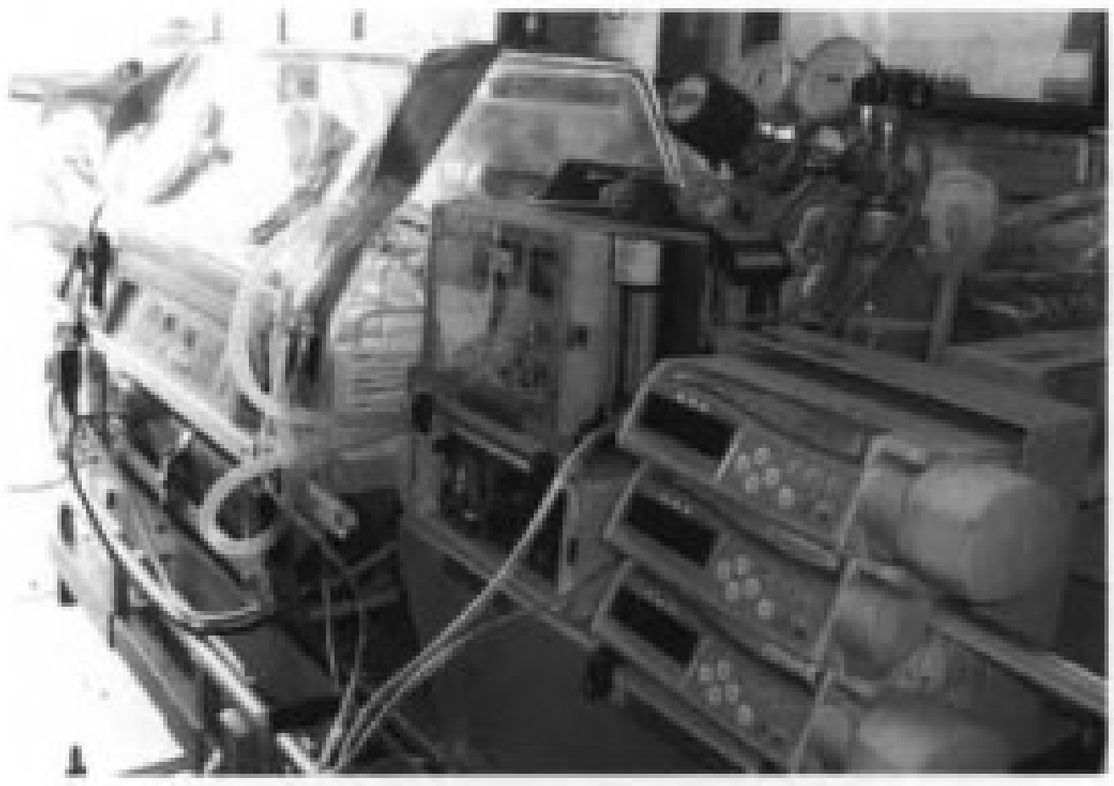
Nitric Oxide Therapy

The transport of critically ill newborns has become an integral part of regionalised neonatal care and here in Ireland, the increased use of inhaled Nitric Oxide (iNO) therapy in neonatal centres has necessitated the development of a system to continue the delivery of iNO throughout the transport process. The NNTP has addressed the additional logistical and safety concerns that the provision of iNO in the transport environment involves and since January 2006 the availability of iNO therapy has been routine. The system developed by the NNTP to provide iNO routinely on ground and air transport using 1000ppm includes:

- NoxBox monitor and delivery device & tubings
- 2 NO Cylinders
- 2 Regulators with quick release adapters
- NO & NO2 environment monitors, NO and scavenging filters
- Mounting devices on trolleys

All necessary iNO equipment is kept in the NNTP ambulance to facilitate its use even when not anticipated. Staff training including environmental safety and criteria for the use of iNO therapy in transport are in place. iNO therapy is initiated in consultation with the referring and receiving consultants based on infant diagnosis, oxygenation index and ventilation requirements. Once initiated, iNO therapy is continued for the duration of the transport.

- In 2007 an audit of iNO therapy use during NNTP transports was completed and the results presented as a poster presentation at the Irish Paediatric Association's annual conference. (Abstract included later in this report.)

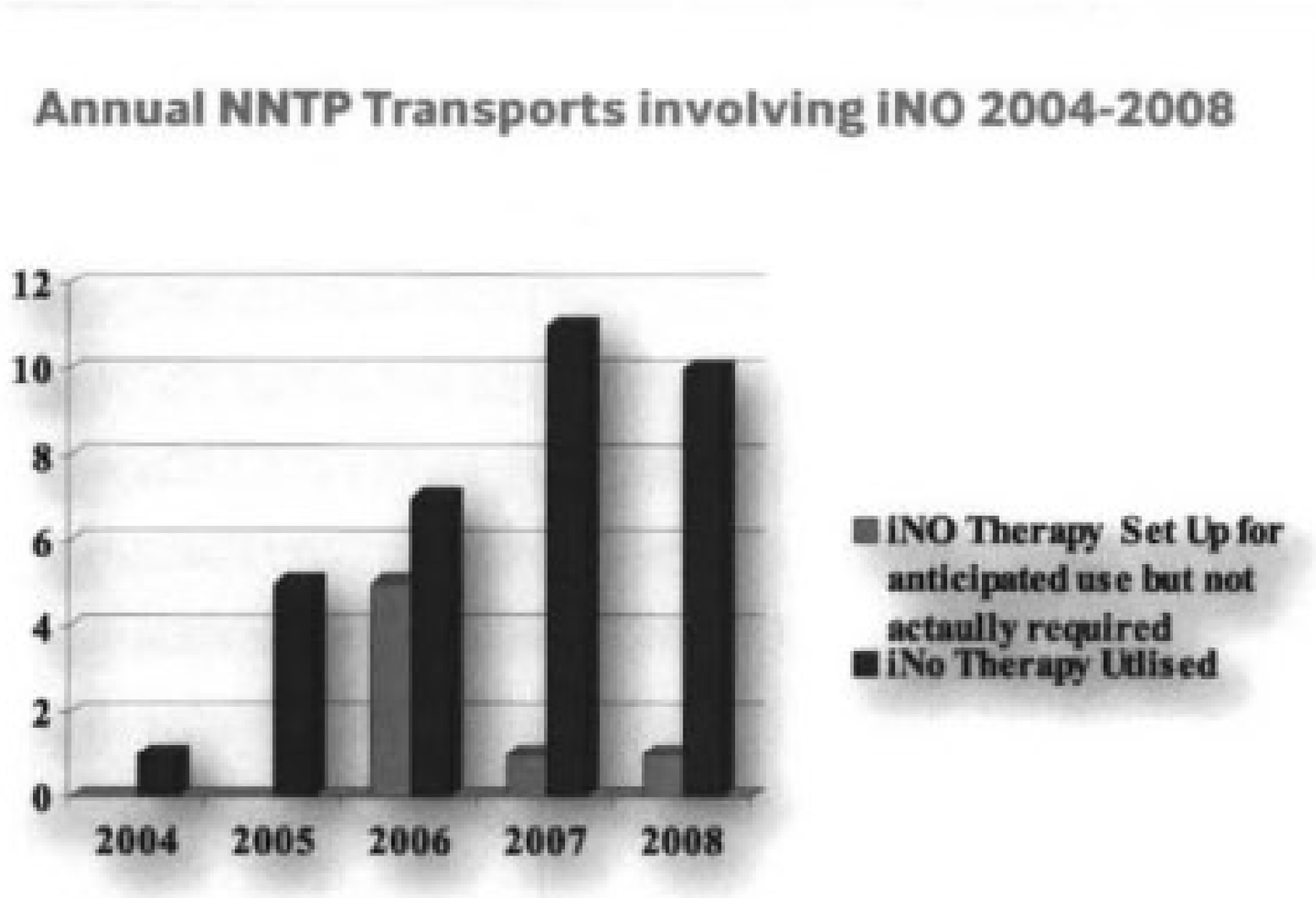


Poster presentation for IPA 2007

6 PROGRAMME DEVELOPMENTS

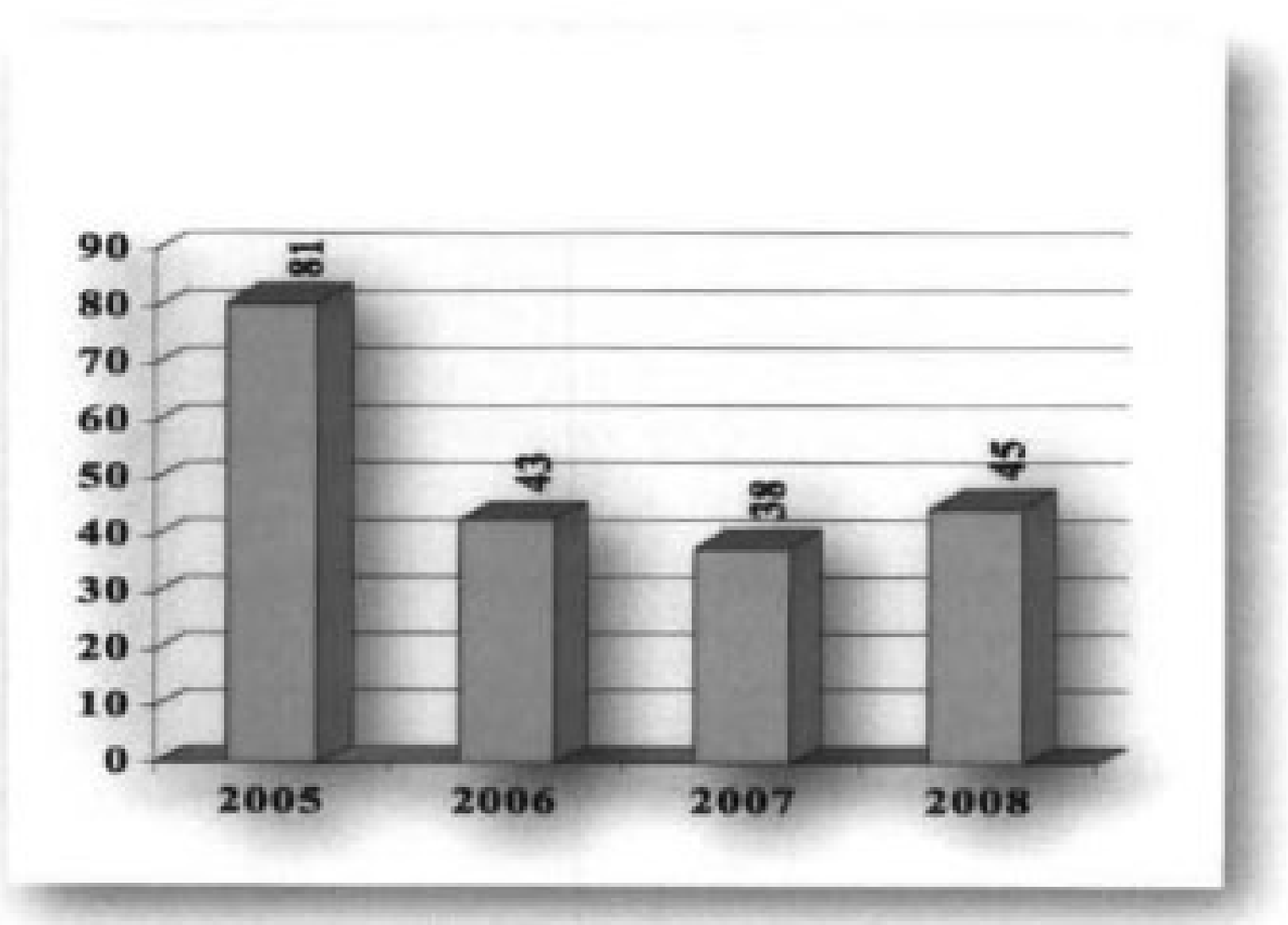
national neonatal transport programme

Annual NNTP Transports involving iNO 2004-2008



- Since the introduction of the routine availability of iNo on NNTP transports in 2006, the mobilisation times for transports where it is anticipated that iNO may be required is almost half of that in 2005.

Mean Mobilisation Times for Transports involving iNO Therapy



7 OUTREACH EDUCATION

Outreach Education

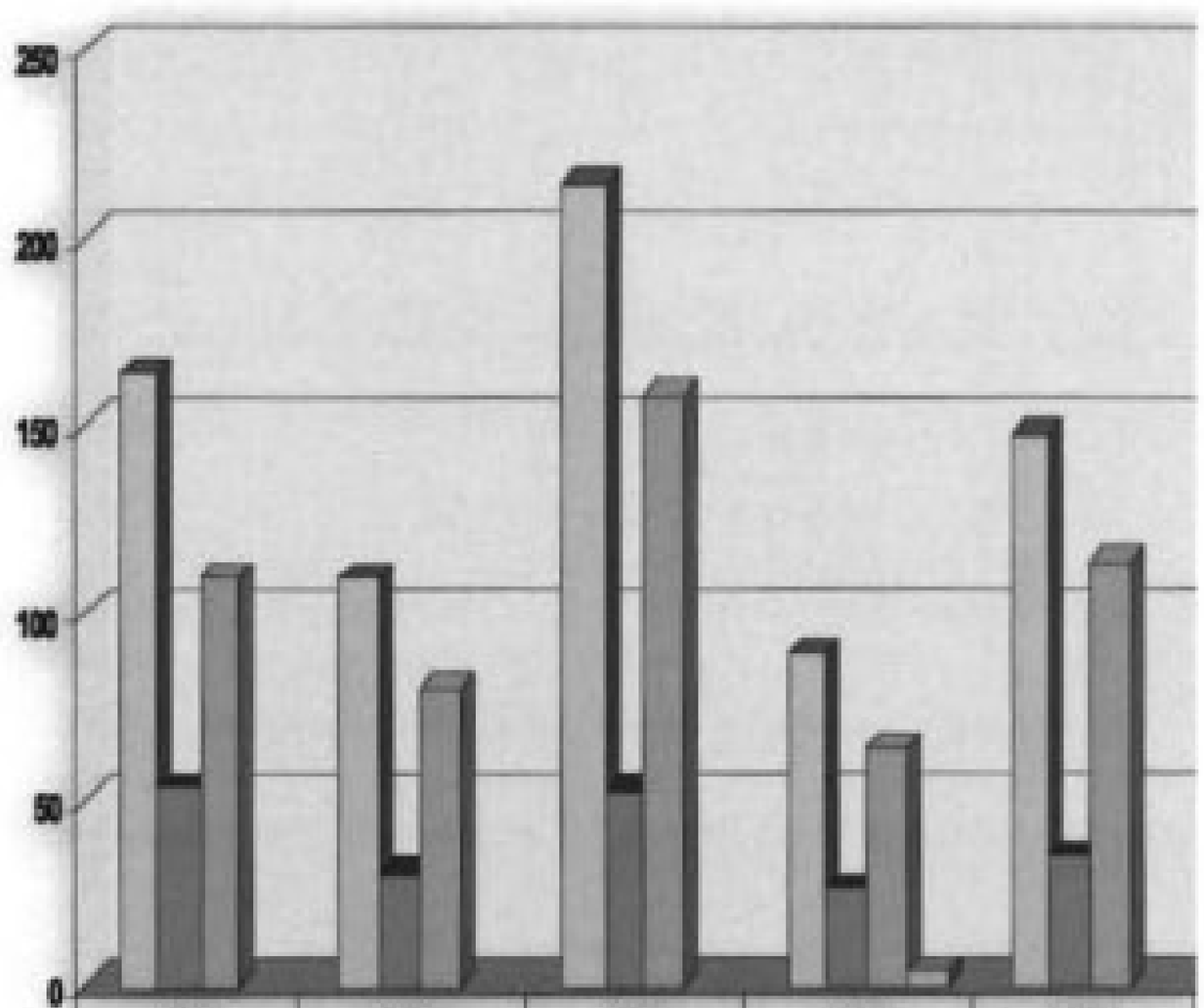
Outreach education is an integral part of any neonatal transport programme. As part of this education, the NNTP conducts the 'STABLE program' in hospitals nationally. STABLE is an educational tool developed for maternal/child health care providers to organise care during the post resuscitation / pre-transport stabilisation period. The aim of the programme is to enhance the knowledge and skills of all staff involved in the pre-transport care of neonates, so that they can recognise, anticipate and treat potential problems before the arrival of the transport team.

S.T.A.B.L.E. involves an eight-hour interactive didactic presentation and on successful completion of the course, participants become registered **S.T.A.B.L.E.** providers. The programme is endorsed by the American Academy of Pediatrics and by the Faculty of Paediatrics in Ireland and has Category 1 approval from An Bord Altranais. . A new 5th edition of the STABLE provider course became available in mid 2006 and the interest in this programme is reflected in the increased demand for the delivery of the course in that year.

In addition to instruction in the management of the STABLE modules, the NNTP takes the opportunity to share information about our transport programme and to discuss issues relevant to individual units. Feedback from these courses is extremely positive.

- To date the NNTP has been involved in the provision of 'STABLE' at outreach locations in all areas of the Republic of Ireland, and over the last five years 48 courses have been conducted, and 35 different institutes represented
- Up until the 31/12/2008 a total of 1185 participants nationally have become registered 'STABLE' providers through the NNTP courses
- 725 of these attendees completed courses between 2004-2008, 197 (27.5%) of whom were medical Staff, 524 (72%) Nursing Staff and 4(0.5 %) EMTs

1185 Participants have completed the 'STABLE Program' to 31/12/2008

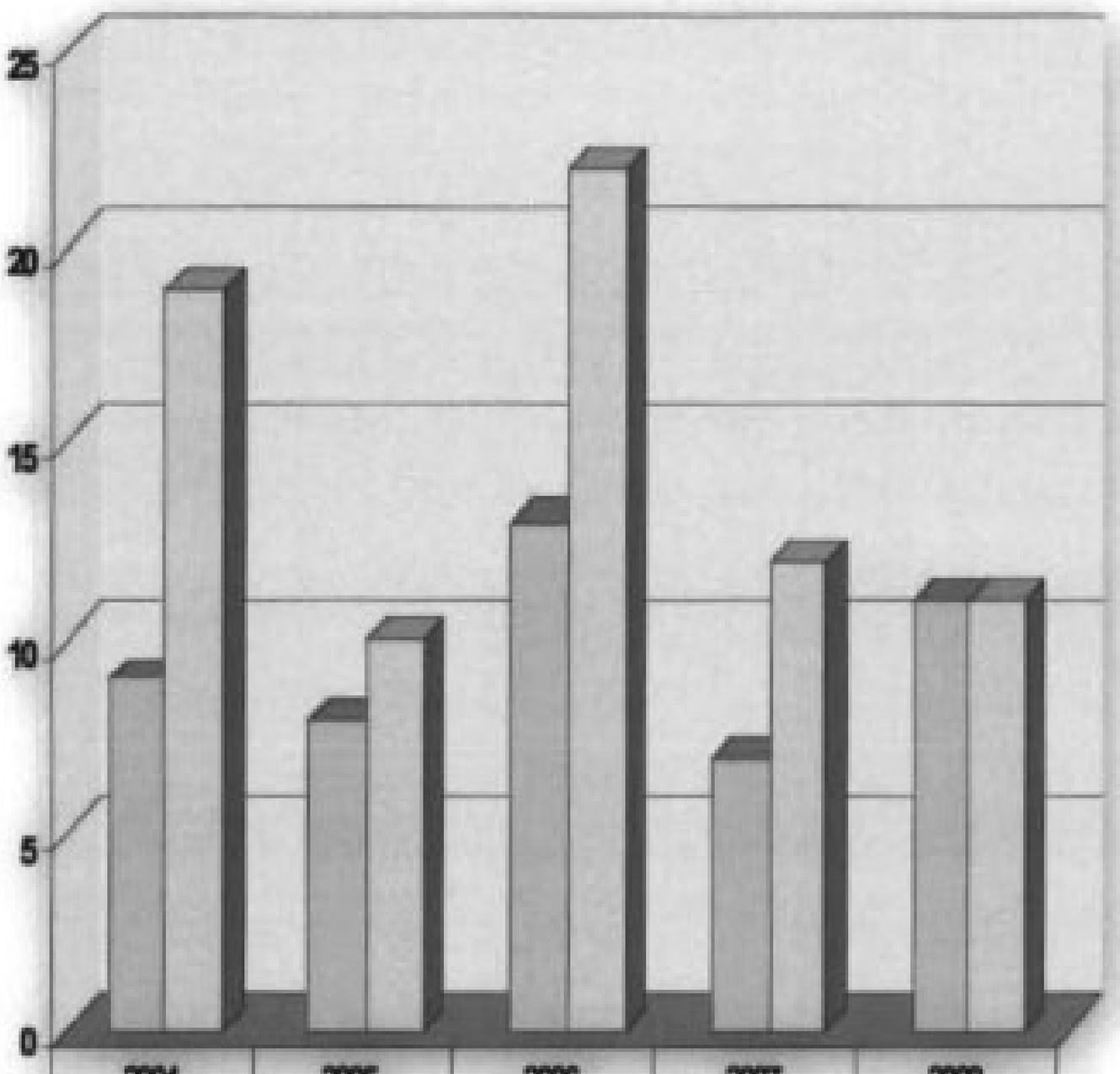


	2004	2005	2006	2007	2008
Total participants	164	110	214	89	148
Medical	54	30	53	26	34
Nursing	110	80	158	63	114
EMT				4	

7 OUTREACH EDUCATION

national neonatal transport programme

The NNTP has conducted 74 STABLE Courses to 31/12/2008



	2004	2005	2006	2007	2008
No. Courses	9	8	13	7	11
No. Institutes Represented	19	10	22	12	11

In addition to the STABLE program, presentations have also been made at other study days and conferences by the Transport Co-ordinator, Medical Director and other members of the NNTP throughout 2004-2007. These include:

March 2004	Post Graduate Nursing Study Day, Temple Street, Dublin
September 2004	Post Graduate Nursing Study Day, Temple Street, Dublin
October 2004	Faculty of Paediatrics, College of Physicians, Dublin
March 2005	Abbott Neonatal Nurse Study Day Radisson, Dublin
March 2005	Post Graduate Nursing Study Day, Temple Street, Dublin
October 2005	Faculty of Paediatrics, College of Physicians, Dublin
January 2006	All Ireland Neonatal Study Day, Cheisi, Belfast
June 2006	Cow and Gate, Neonatal Study day
September 2006	Post Graduate Nursing Study Day, Temple Street, Dublin
October 2006	Faculty of Paediatrics, College of Physicians, Dublin
June 2007	Cow and Gate, Neonatal Conference
January 2007	All Ireland Neonatal Study Day, Cheisi, Dublin
May 2007	Irish Paediatric Association, Limerick (Poster)
October 2007	Faculty of Paediatrics, College of Physicians, Dublin (Report)
May 2008	Irish Paediatric Association, Mullingar , Co Westmeath
September 2008	Annual Neonatal Meeting, National Maternity Hospital

Staff Education

Together with the STABLE course, over the past five years the NNTP has also conducted focused staff orientation sessions and ongoing in-service training on new transport topics, equipment and infant stabilisation. In addition the NNTP has also facilitated the annual attendance of NNTP team members at national and international conferences devoted to or incorporating the subject of Neonatal Transport.

8 AUDIT

An Audit of Nitric Oxide Therapy Provision during Neonatal Transports

A. Bowden, A. Twomey, National Neonatal Transport Programme (NNTP)

Introduction:

The use of inhaled Nitric Oxide (iNO) therapy in neonatal centres in Ireland necessitates the continuation of this therapy when infants require transfer. The provision of iNO in the transport environment involves additional logistical and safety concerns which the NNTP has addressed and since January 2006 the availability of iNO therapy on NNTP transports has been routine. The necessary equipment for iNO therapy is kept in the NNTP ambulance and a bioengineer travels with the team where possible. Staff training and criteria for the use of iNO therapy in transport are in place. iNO is initiated in consultation with the referring and receiving hospital consultants based on infant diagnosis, oxygenation index and ventilatory requirements. One commenced, iNO therapy is continued for the duration of the transport .

Objective: To review the use of iNo therapy by the NNTP since its routine availability

Methods: The audit takes the form of a retrospective study of all NNTP transports that have involved the use of iNO, dating from January 2005 to March 2007. Details recorded on the NNTP's database and individual transport case notes were reviewed. Parameters assessed were: mobilisation times, diagnosis on transport, mode of transport and demographics. The clinical status of the infants involved were also reviewed by noting: the gestational age, age on transport, iNO therapy initiation times, pre and post iNO ventilation and oxygen requirements and stabilisation times. Any other associated problems were also identified.

Results:

A total of 21 transport during the study period involved the use of inhaled Nitric Oxide therapy (iNO). 16(76%) referrals for iNO were from regional neonatal centres and the remaining 5 (34%) were within Dublin.1 of these transports was by air and the remaining 20 by road ambulance Although the iNO system had been set up in anticipation of being used, in 5 (23%) of cases iNO was not required. Since the NNTP has been equipped to provide iNO routinely, the mobilisation times have improved from a mean of 81 minutes in 2005 to a mean 43 minutes in 2006. 14 (66%) infants were a gestational age of >37 weeks when transferred and 14(66%) were in the first 48 hrs of life. The five infants who did not require iNo were diagnosed on transport with sepsis in 3 cases and Congenital Heart Disease (CHD) in 2. The diagnosis of those who travelled on iNo therapy were: Persistent Pulmonary Hypertension of the Newborn, 6 (37.5%), Meconium Aspiration Syndrome, 4 (25%), Congenital Diaphragmatic Hernia, 3 (19%), Patent Ductus Arteriosis,2 (12.5%) and Respiratory Distress Syndrome,1(6%0. Of the 16 infants who were transported on iNO, 6 (37.5%) had commenced iNO therapy prior to NNTP team's arrival and in 10 (62.5%) of cases the NNTP initiated the treatment. The ventialtory requirements decreased in 6 (60%) infants following the initiation of iNo by the NNTP team. Oxygenation also improved in 6 (60%) of these cases. There was no change in the respiratory status of 3 (30%).Of those infants who were already receiving ino on arrival of the NNTP team, their status remained unchanged for the duration of the transport. Three (14%) infants were deemed too unstable to proceed with transportation. The team remained at the referring hospital overnight on two of these occasions and were able to proceed with the transport the following day.

Conclusions:

In line with the easier access to iNO on NNTP transports, the utilisation of this therapy has increased. The NNTP mobilisation times when using nitric oxide are half of those recorded in 2005. There have been no major incidences associated with the use of iNO during NNTP transports to date. The availability of iNo during NNTP transports has enabled the timely transfer of infants who require specialist care.

8 AUDIT

national neonatal transport programme

Audit of Infants - Post PDA Ligation

1344 (39%)of all the transports conducted by NNTP to February 2007 were transferred to Our Lady's Hospital for Sick Children, (OLHSC) Crumlin. In addition there were 265 transfers from OLHSC (20%) and the reason for transport in 148 (56%) of these cases was for further medical management post surgical ligation of PDA. The NNTP is cognisant of the fact that there is a need to ensure timely PDA ligation in addition to maximising the use of ICU beds in OLHSC. With this in mind the NNTP commenced a perspective audit of this cohort of infants in its effort to generate a set of criteria that will help determine which infants are stable enough to be transferred back to their referring unit or which infants may best be served by being transferred to another ICU bed within the city.

This audit took place between February 2007 and February 2008 and took the form of a prospective study of the clinical status of the infant at:

(i) the time of transport initiation

(ii) the time of departure from OLHSC

(iii) the time of arrival at destination hospital

(iv) 48hours post return to destination hospital

A copy of the final report will be included in the next NNTP review.

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