The Canadian Neonatal Network™

Le Réseau Néonatal Canadien™

Annual Report Revised

Rapport Annual Révisé

2006

Acknowledgements

Structure of the CNN

The Canadian Neonatal Network™ is a group of Canadian researchers who collaborate on research issues relating to neonatal care. The Network was founded in 1995 by Dr Shoo Lee and included members from 24 hospitals that represented 17 universities across Canada during the year 2006. In the current year (2007) a total of 28 centers are contributing data to CNN. The Network maintains a standardized NICU database and provides a unique opportunity for researchers to participate in collaborative projects on a national and an international scale. Health care professionals, health services researchers and health administrators participate actively in clinical, epidemiologic, outcomes, health services, health policy and informatics research aimed at improving efficacy and efficiency of neonatal care. Research results are published in Network reports and in peer-reviewed journals.

Funding

Coordinating Centre of the CNN

The Integrated Centre for Care Advancement through Research (*i*CARE), University of Alberta, Edmonton, Alberta:

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Cover page by Haley Shandro

Table of Contents

E. Site Comparisons: *Mortality*

F. Site Comparisons: *Morbidity Outcomes*

G. Site Comparisons: *Risks Adjusted Analysis*

A. Executive Summary

The Canadian Neonatal Network™ is currently comprised of 28 tertiary neonatal intensive care units (NICUs) across Canada. This report is based on data from 24 of these tertiary NICUs which contributed data in the year 2006. The CNN is funded through the Canadian Institutes of Health Research (CIHR) and additional institutional resources (see Acknowledgements). The purposes of the Network are to:

❖ Maintain a national network of multidisciplinary researchers interested in neonatal-perinatal research.

❖ Maintain a national neonatal-perinatal database and provide the infrastructure to facilitate collaborative research.

❖ Study longitudinal outcomes and variations in medical care including cost-effectiveness.

❖ Examine the impact of resource utilization and practice patterns on patient outcomes and costs of care, and provide benchmarking information for Canadian NICUs.

❖ Develop innovative research methods that lead to better outcomes.

Summary of Results/Methodology

Canadian Neonatal Network™ Database: Between January 1st, 2006 and December 31st, 2006, 10,789 infants (11,427 admissions including transfers between NICUs and re-admissions) received care from the 24 NICUs included in this report. Infants who were transferred to a "normal newborn care area" (level I nursery) or discharged home within 24 hours of their admission to the NICU were excluded. Data on patient demographics (no patient identifiers are transferred), components of care and outcome until discharge from the hospital were entered into a computer and transferred electronically to the Coordinating Centre, Integrated Centre for Care Advancement through Research (*iCARE*) where the data were verified and analyzed.

Results presented in this report are comprised of the following categories: (1) population demographics, (2) population incidence of common neonatal complications, and (3) descriptive and risk-adjusted analyses of survival and outcomes by site.

Some sites are limited in funding and therefore are only able to contribute data from a subset of the eligible infants admitted to the hospital. This may be evident in the presentations to follow. Moreover, the 'missing' data on outcome variables vary for each presentation and caution should be used in interpreting the data.

B. Background and Objectives

NICUs utilize the combined abilities of health care team members in expanding knowledge and advancing the technology to provide effectively the care of newborn infants. To support continuous improvement in outcomes of Canadian NICUs, the Canadian Neonatal Network™ Database provides ordinal and categorical data to identify variations in mortality, morbidity and resource utilization. The first CNN report saw the validation of a newborn severity score [Score for Acute Neonatal Physiology (SNAPII)[1]], a severity of illness scale [Neonatal Therapeutic Intervention Scoring System (NTISS)[2]], and an instrument for assessing infant transport outcomes [Transport Risk Index of Physiologic Stability (TRIPS)[3]]. The use of these three scores permitted benchmarking of risk-adjusted variations in mortality and morbidity among Canadian NICUs. This demonstrated variations in outcomes and practices among Canadian NICUs, and indicated that different hospitals had different strengths and areas in need for improvement. The results also suggested that practice and outcome variations are associated, and led to the inception of an additional research project investigating the target of specific practices for change to improve outcomes at NICUs across Canada.

The Evidence-based Practice Identification and Change (EPIC) project explores new methodologies for identifying care practices associated with good or poor outcomes, and provides an evidence-based approach to improving quality of care. Building upon traditional Continuous Quality Improvement (CQI) techniques, EPIC uses multidisciplinary teams at CNN sites, who work collaboratively to implement best practice changes and monitor outcomes.

Research using the data was overseen by a Steering Committee, which was elected by members of the Canadian Neonatal Network™. Separate ethics approvals were obtained from the participating institutions for specific projects. Studies conducted by Canadian Neonatal Network™ researchers are supported by the Neonatal-perinatal Interdisciplinary Capacity Enhancement (NICE) Team, comprising leading researchers from across Canada.

C. Information Systems

Patients included in the report are those who were admitted to a CNN participating site between January 1st, 2006 and December 31st, 2006, and were discharged by March 31st, 2007. The patients must have had a length of stay in the tertiary NICU of one of the CNN participating sites for greater than or equal to 24 hours, or died or were transferred to another level 2 or 3 facility within 24 hours. A total of 10,789 patients accounted for 11,427 admissions as some infants were admitted on more than one occasion.

Patient information was retrospectively abstracted from patient charts by trained personnel using standard definitions and protocols contained in a standard manual of operations. Data were usually entered into a laptop computer using a customized data entry program with built-in error checking and subsequently sent electronically to the Canadian Neonatal Network™ Coordinating Centre, located at the Integrated Centre for Care Advancement through Research (iCARE) in Edmonton, Alberta. Patient data at each participating NICU are available to the respective site investigator only. Patient identifiers were stripped prior to data transfer to the Coordinating Centre. Patient confidentiality was strictly observed. Individual-level data are used for analysis, but only aggregate data are reported. The results presented in this report will not identify participating NICUs by name; each site is anonymous using a randomly assigned number. Wherever a small cell size (≤5) was observed in the data output, the data were often grouped to maintain anonymity. This was not always possible due to small number of data among all centres for select outcomes.

At each participating NICU, data are stored in a secured database in the NICU or in an alternate secured site used by the NICU to store patient information (e.g. health records department, computer services department). At the Coordinating Centre, the central database is stored in a secured computer database located on a server and off site back-up that is maintained and secured by the Capital Health Information Systems Department. At the Coordinating Centre, information was verified for completeness and was reviewed for accuracy by looking for "unusual" and missing values on individual data items and by comparison with other information which might be related (e.g. gestational age and birth weight). However, the principal accuracy rests upon the diligence and capabilities of the individual sites. Each site had one (or occasionally two) dedicated person(s) responsible for data acquisition and transmittance.

In the Coordinating Centre, analyses were conducted using univariate, bivariate, and multivariate analyses for the total cohort, and for individual sites. Multivariate regression analysis was used to identify risk factors associated with mortality and major morbidities. Grouped data enabled development of outcome curves by gestational age and birth weight for mortality and selected major morbidities. Similar systems have been used to guide stratification in randomization trials, assist in quality assurance and predict resource utilization.

D. Descriptive Analysis – Canadian Population

Presentation A

Admissions to Canadian NICU Network participating units
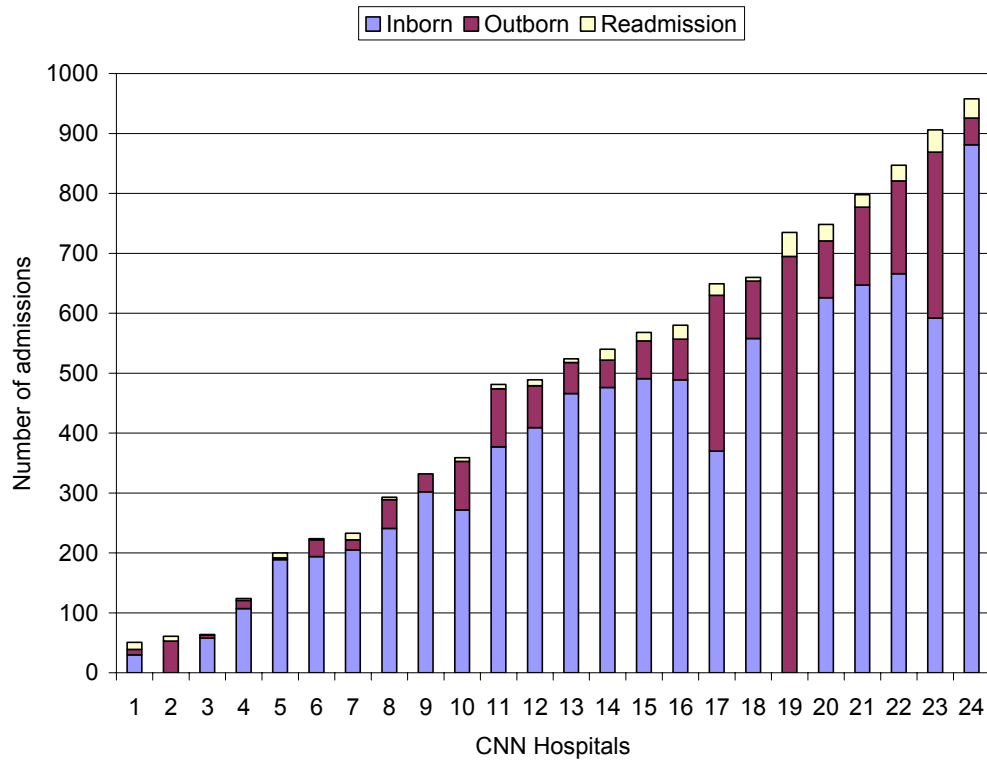
Presentation A (*continued*)
Admissions to Canadian NICU Network participating units

Hospitals		Admission Status			Total	Hospitals	Admission status			Total
		Inborn	Outborn	Readmissions			Inborn	Outborn	Readmissions	
1	Count	30	9	12	51	13	466	52	6	524
	%	58.8	17.6	23.5	100.0		88.9	9.9	1.1	100.0
2	Count	0	53	8	61	14	476	46	18	540
	%	0.0	86.9	13.1	100.0		88.1	8.5	3.3	100.0
3	Count	58	5	1	64	15	491	63	14	568
	%	90.6	7.8	1.6	100.0		86.4	11.1	2.5	100.0
4	Count	107	14	3	124	16	489	68	23	580
	%	86.3	11.3	2.4	100.0		84.3	11.7	4.0	100.0
5	Count	189	3	8	200	17	370	260	19	649
	%	94.5	1.5	4.0	100.0		57.0	40.1	2.9	100.0
6	Count	194	28	2	224	18	558	96	6	660
	%	86.6	12.5	0.9	100.0		84.5	14.5	0.9	100.0
7	Count	205	17	11	233	19	0	695	40	735
	%	88.0	7.3	4.7	100.0		0.0	94.6	5.4	100.0
8	Count	241	48	4	293	20	626	95	27	748
	%	82.3	16.4	1.4	100.0		83.7	12.7	3.6	100.0
9	Count	302	30	0	332	21	647	130	21	798
	%	91.0	9.0	0.0	100.0		81.1	16.3	2.6	100.0
10	Count	272	81	6	359	22	666	155	26	847
	%	75.8	22.6	1.7	100.0		78.6	18.3	3.1	100.0
11	Count	377	97	7	481	23	592	277	37	906
	%	78.4	20.2	1.5	100.0		65.3	30.6	4.1	100.0
12	Count	409	70	10	489	24	881	45	32	958
	%	83.6	14.3	2.0	100.0		92.0	4.7	3.3	100.0
Missing										3
Total number of admissions										11427

COMMENTS: During the period of January 1, 2006 to December 31, 2006 data from 24 participating Canadian NICUs were collected. Analysis of available data produced 11,427 admissions. Adjusting for readmission and transfers, this represents 10,789 infants.

Presentation B
Gestational age at birth
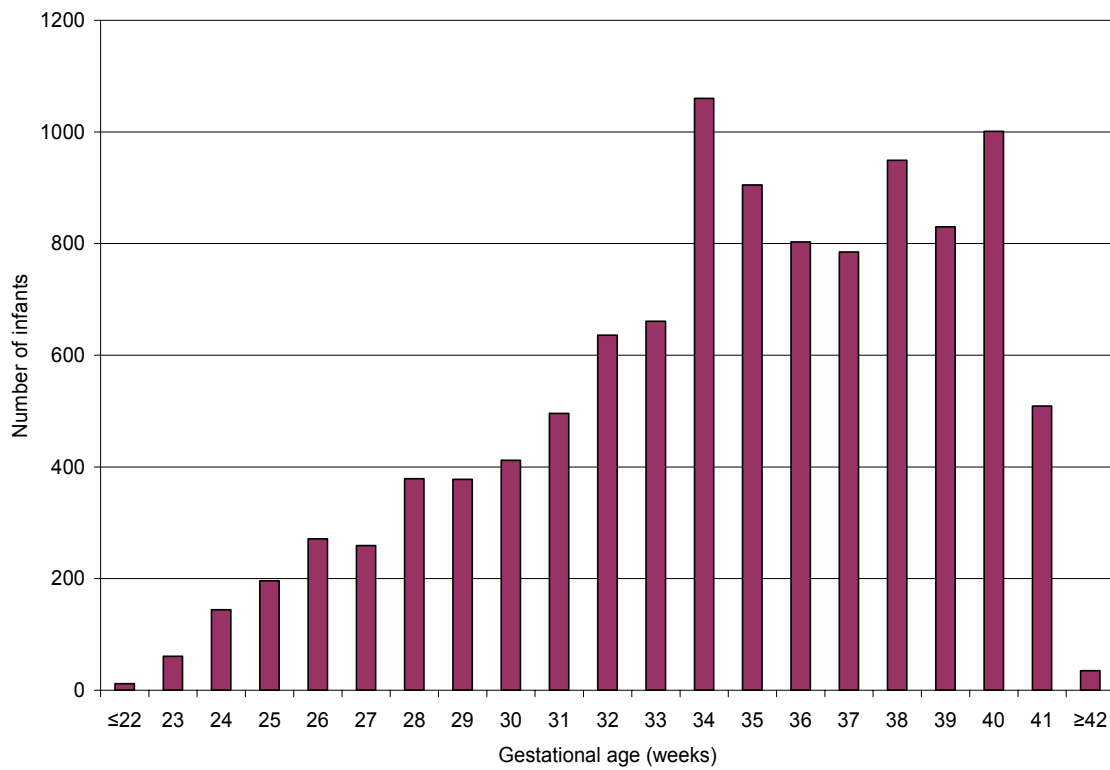
Presentation B (*continued*)
Gestational age at birth

Gestational age at birth	Frequency	Percent	Cumulative Percent
≤22	12	0.2	0.2
23	61	0.6	0.7
24	146	1.4	2.1
25	195	1.8	3.9
26	269	2.5	6.4
27	260	2.4	8.8
28	381	3.5	12.3
29	378	3.5	15.8
30	411	3.8	19.6
31	499	4.6	24.3
32	633	5.9	30.1
33	662	6.1	36.3
34	1059	9.8	46.1
35	906	8.4	54.5
36	802	7.4	61.9
37	784	7.3	69.2
38	949	8.8	78.0
39	833	7.7	85.7
40	998	9.3	95.0
41	509	4.7	99.7
≥42	35	0.3	100.0
Total included	**10782**	100.0	
Missing (GA)	**7**		
Total # of infants	**10789**		

COMMENTS: The gestational age distribution of infants is shown here. Term babies (≥37 weeks) represent about 38% of the total.

Presentation C
Birth Weight
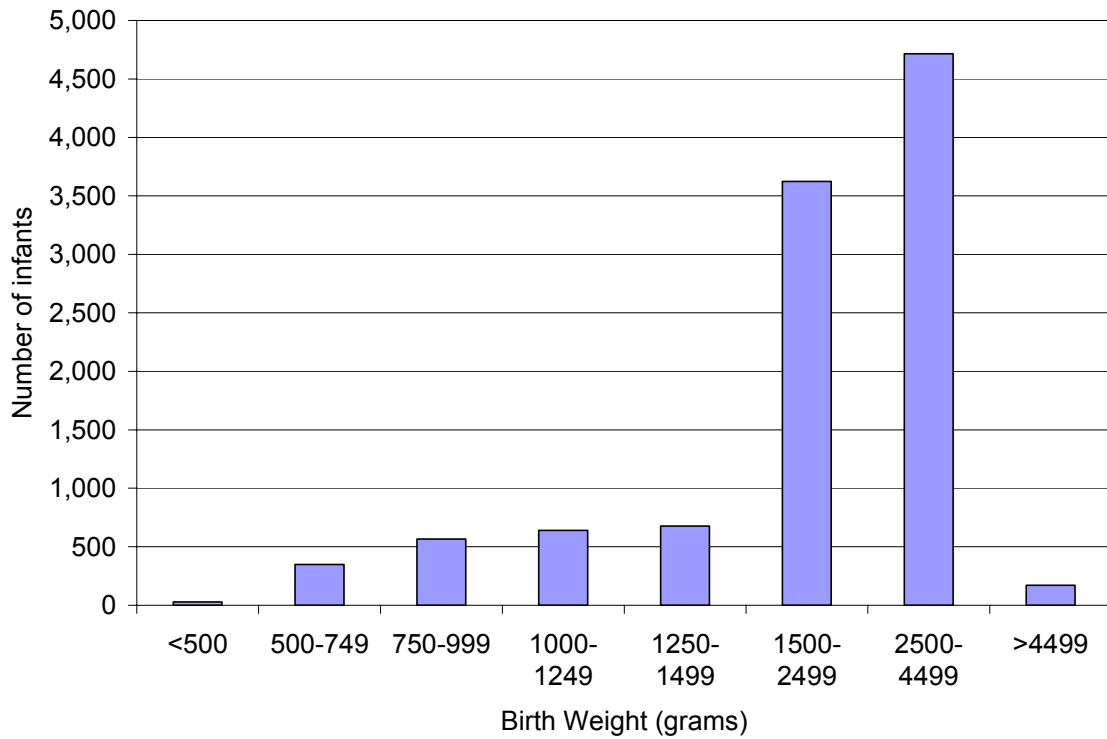
Birth Weight (grams)

Birth weight	Frequency	Percent	Cumulative Percent
<500	27	0.3	0.3
500-749	348	3.2	3.5
750-999	566	5.3	8.7
1000-1249	640	5.9	14.7
1250-1499	676	6.3	21.0
1500-2499	3623	33.6	54.6
2500-4499	4716	43.8	98.4
>4499	171	1.6	100.0
Total included	**10767**	100.0	
Missing (BW)	**22**		
Total # of infants	**10789**		

COMMENTS: The birth weight distribution of infants admitted to NICUs. Seventy-nine percent weighed over 1500g at birth and 45.4% weighed over 2500g.

Presentation # 1
Gestational age at birth and survival to NICU discharge
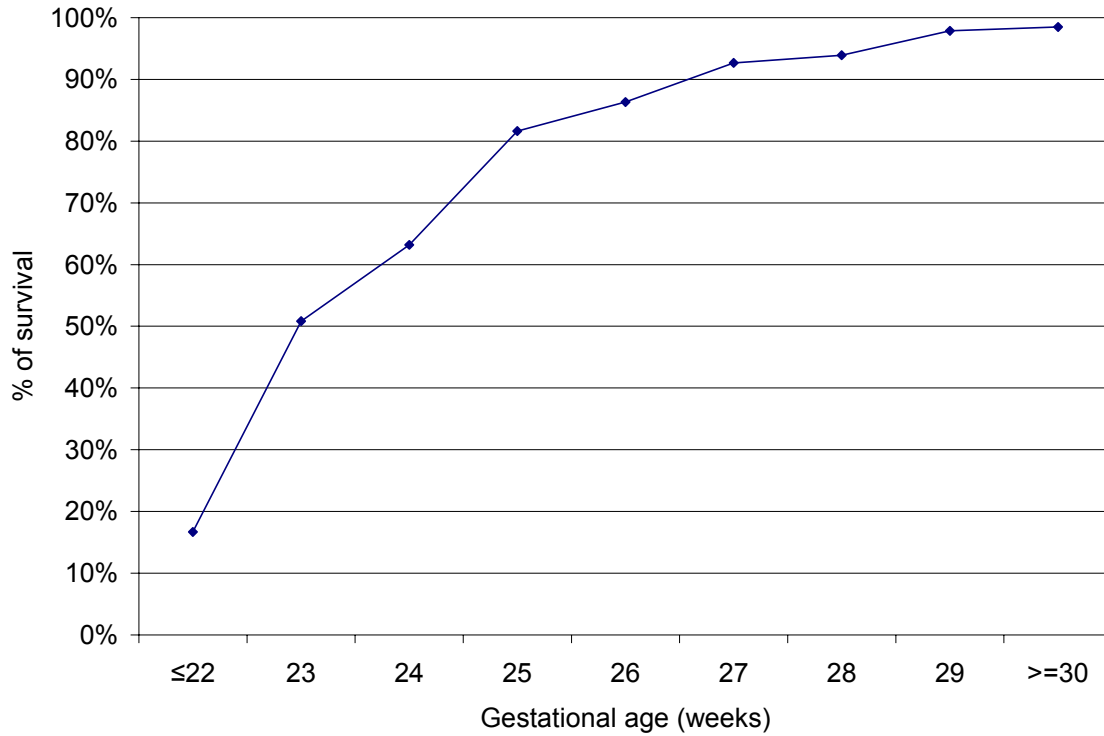
Gestational age (weeks)	Number of infants	Number of survivors	% of survivors
≤22	12	2	16.7
23	61	29	47.5
24	146	90	61.6
25	195	158	81.0
26	269	230	85.5
27	260	237	91.2
28	381	354	92.9
29	378	368	97.4
≥30	9080	8936	98.4
Total included	10782	10404	96.5
Missing (GA)	7		
Total # of infants	**10789**		

Caveat: The survival rates only refer to infants admitted to the NICU and should be used cautiously for antenatal counseling.

COMMENTS: The survival rate is based upon the final discharge from the participating neonatal site. Note that this only includes infants admitted to the NICU and thus, is not reflective of the Canadian population. Figures do not represent infants (especially those at very low gestational ages) who died prior to admission to the NICU.

Presentation #2
Birth weight and survival to NICU discharge
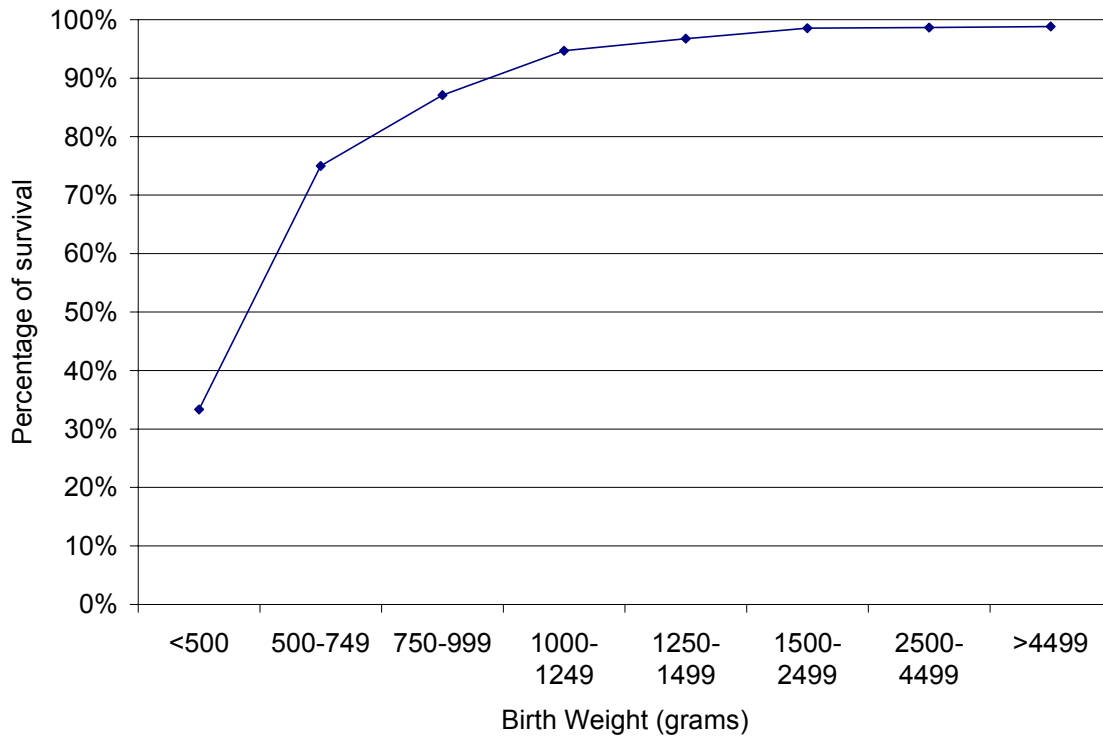
Birth weight (g)	Number of infants	Number of survivors	% of survivors
<500	27	9	33.3
500-749	348	254	73.0
750-999	566	488	86.2
1000-1249	640	602	94.1
1250-1499	676	652	96.4
1500-2499	3623	3566	98.4
2500-4499	4716	4652	98.6
>4499	171	169	98.8
Total included	**10767**	10392	96.5
Missing (BW)	**22**		
Total # of infants	**10789**		

Caveat: The survival rates refer only to infants admitted to the NICU, and should be used cautiously for antenatal counseling.

COMMENTS: The survival rate is based upon the final discharge from the participating neonatal site. Note that this only includes infants admitted to the NICU and thus, is not reflective of the Canadian population. Figures do not represent infants (especially those at very low gestational ages) who died prior to admission to the NICU.

Presentation #3
Cesarean or vaginal birth according to fetal presentation (by gestational age)

Delivery mode	Gestational age (birth)		Presentation				
			Vertex	Breech	Other*	Unknown**	Total
Vaginal	≤24	N	95	33	5	12	145
		%	65.5%	22.8%	3.4%	8.3%	100.0%
	25-26	N	154	28	0	10	192
		%	80.2%	14.6%	.0%	5.2%	100.0%
	27-28	N	208	18	4	11	241
		%	86.3%	7.5%	1.7%	4.6%	100.0%
	29-30	N	249	20	6	10	285
		%	87.4%	7.0%	2.1%	3.5%	100.0%
	31-32	N	416	26	7	12	461
		%	90.2%	5.6%	1.5%	2.6%	100.0%
	33-34	N	781	35	12	20	848
		%	92.1%	4.1%	1.4%	2.4%	100.0%
	35-36	N	846	28	18	29	921
		%	91.9%	3.0%	2.0%	3.1%	100.0%
	>=37	N	2339	18	62	71	2490
		%	93.9%	.7%	2.5%	2.9%	100.0%
	Total included	N	5088	206	114	175	5583
		%	91.1%	3.7%	2.0%	3.1%	100.0%
	Missing (GA)	N					3
Cesarean	≤24	N	10	43	12	6	71
		%	14.1%	60.6%	16.9%	8.5%	100.0%
	25-26	N	89	117	19	36	261
		%	34.1%	44.8%	7.3%	13.8%	100.0%
	27-28	N	158	162	22	51	393
		%	40.2%	41.2%	5.6%	13.0%	100.0%
	29-30	N	220	175	18	85	498
		%	44.2%	35.1%	3.6%	17.1%	100.0%
	31-32	N	324	221	25	97	667
		%	48.6%	33.1%	3.7%	14.5%	100.0%
	33-34	N	436	273	41	116	866
		%	50.3%	31.5%	4.7%	13.4%	100.0%
	35-36	N	469	185	21	107	782
		%	60.0%	23.7%	2.7%	13.7%	100.0%
	>=37	N	1129	215	27	223	1594
		%	70.8%	13.5%	1.7%	14.0%	100.0%
	Total included	N	2835	1391	185	721	5132
		%	55.2%	27.1%	3.6%	14.0%	100.0%
	Missing (GA)	N					4
Total							10715
Missing(Pres/GA)							7
Missing(mode)							67
Total # of infants							10789

*Other includes: shoulder, transverse, brow, face, oblique vertex, compound presentation
**Unknown: no mention of presentation, may include multiple pregnancies

Presentation #4
Vaginal or cesarean birth in relation to gestational age
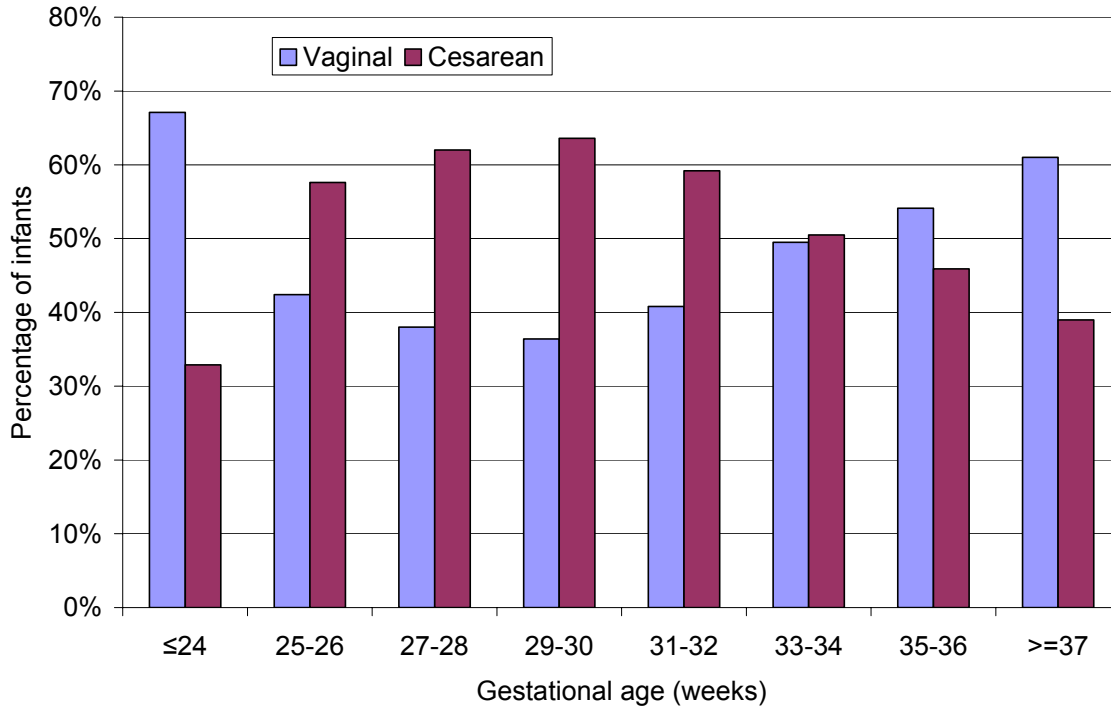
Birth gestational age (weeks)	Delivery type					Total
	Vaginal		Cesarean			
	Number	%	Number	%		
≤24	145	67.1%	71	32.9%		216
25-26	192	42.4%	261	57.6%		453
27-28	241	38.0%	393	62.0%		634
29-30	285	36.4%	498	63.6%		783
31-32	461	40.8%	668	59.2%		1129
33-34	848	49.5%	866	50.5%		1714
35-36	922	54.1%	783	45.9%		1705
≥37	2490	61.0%	1595	39.0%		4085
Total included	5584	52.1%	5135	47.9%		10719
Missing (GA/delivery type)						**70**
Total # of infants						**10789**

Presentation #5
Vaginal or cesarean birth in relation to birth weight
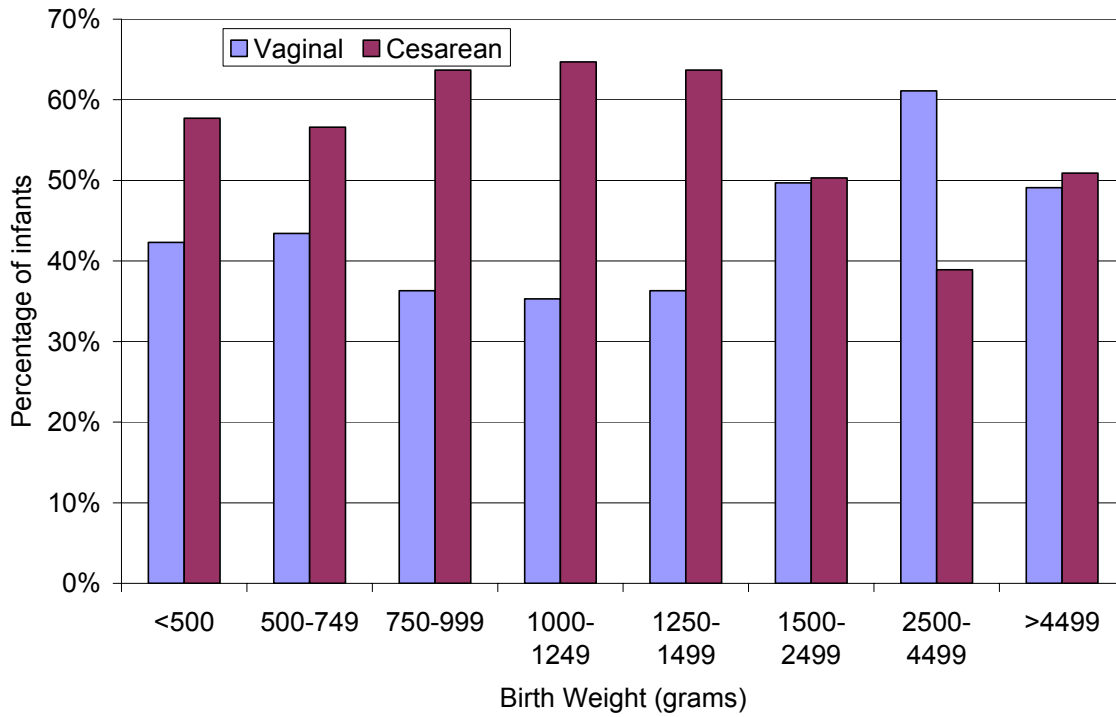
Birth weight (g)	Delivery type				Total
	Vaginal		Cesarean		
	Number	%	Number	%	
<500	11	42.3%	15	57.7%	26
500-749	148	43.4%	193	56.6%	341
750-999	202	36.3%	354	63.7%	556
1000-1249	224	35.3%	411	64.7%	635
1250-1499	243	36.3%	427	63.7%	670
1500-2499	1795	49.7%	1817	50.3%	3612
2500-4499	2867	61.1%	1824	38.9%	4691
>4499	84	49.1%	87	50.9%	171
Total included	5574	52.1%	5128	47.9%	10702
Missing (BW/delivery type)					**87**
Total # of infants					**10789**

Presentation #6
Incidence of patent ductus arteriosus (by gestational age)
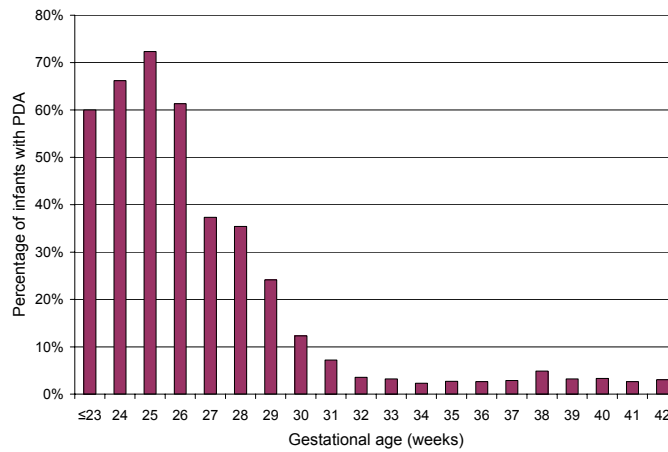
Gestational age(birth)	Number of infants	with PDA	%
≤23	60	36	60.0%
24	139	94	67.6%
25	189	137	72.5%
26	262	162	61.8%
27	258	98	38.0%
28	368	134	36.4%
29	370	90	24.3%
30	406	52	12.8%
31	487	37	7.6%
32	620	23	3.7%
33	652	21	3.2%
34	1033	24	2.3%
35	886	26	2.9%
36	790	21	2.7%
37	762	23	3.0%
38	924	46	5.0%
39	808	26	3.2%
40	965	34	3.5%
41	493	13	2.6%
42	33	1	3.0%
Total included	10505	1098	10.5%
Missing (GA/PDA)	**284**		
Total # of infants	**10789**		

COMMENTS: Diagnosis of PDA was clinical and did not require cardiac ultrasound confirmation. Incidence of PDA included infants who received treatment (indomethacin >24 hours following admission and/or surgical ligation), and those who were diagnosed as "clinically significant/severe" but not treated due to other medical reasons. Infants who died before being diagnosed are included in the "missing" category.

Presentation #7
Incidence of patent ductus arteriosus (by birth weight)
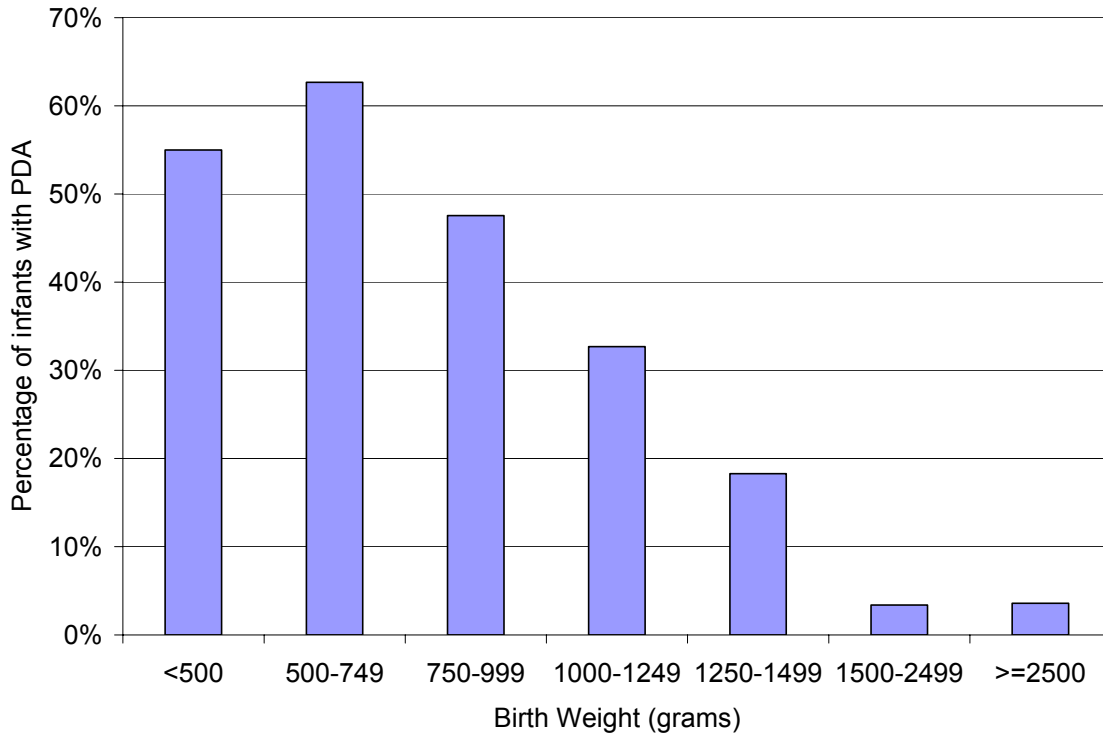
Birth weight(g)	Number of infants	with PDA	%
<500	20	11	55.0%
500-749	335	210	62.7%
750-999	551	262	47.5%
1000-1249	624	204	32.7%
1250-1499	662	121	18.3%
1500-2499	3553	120	3.4%
≥2500	4745	170	3.6%
Total included	10490	1098	10.5%
Missing (BW/PDA)	299		
Total	10789		

COMMENTS: Incidence of clinically diagnosed patent ductus arteriosus (PDA) in relation to gestational age and birthweight is shown in Presentation #6 and #7. Diagnosis was made by a physician and did not require cardiac ultrasound confirmation. Incidence of PDA included infants who received treatment (indomethacin >24 hours following admission and/or surgical ligation), and those who were diagnosed as "clinically significant/severe" but not treated due to other medical reasons. Infants who died before being diagnosed are included in the "missing" category.

Presentation #8
Treatment of patent ductus arteriosus (by gestational age)
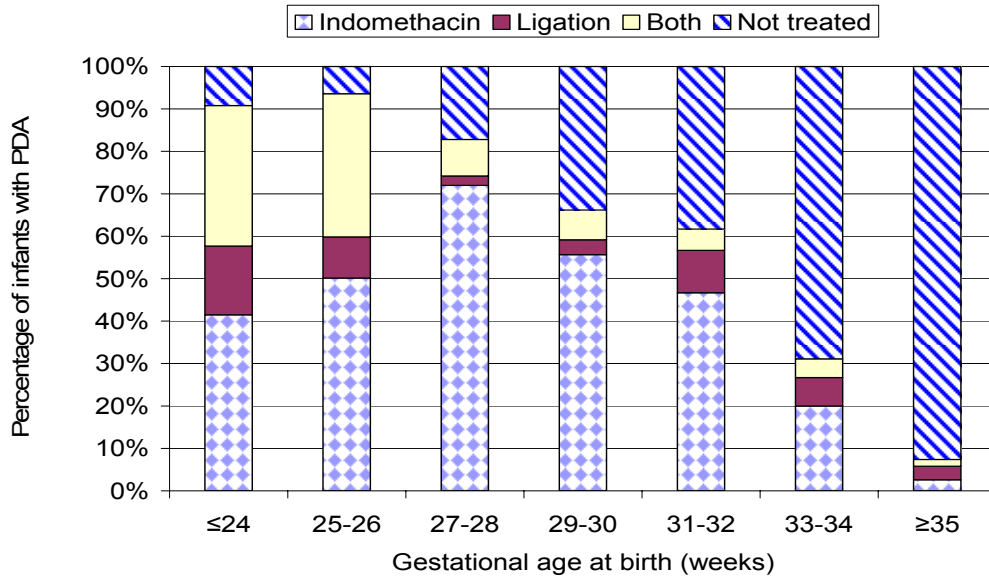
Birth gestational age (weeks)		Infants with PDA	Treatment			Not treated
			Indomethacin	Ligation	Both	
≤24	N	130	54	21	43	12
	%	100.0%	41.5%	16.2%	33.1%	9.2%
25-26	N	299	150	29	101	19
	%	100.0%	50.2%	9.7%	33.8%	6.4%
27-28	N	232	167	5	20	40
	%	100.0%	72.0%	2.2%	8.6%	17.2%
29-30	N	142	79	5	10	48
	%	100.0%	55.6%	3.5%	7.0%	33.8%
31-32	N	60	28	6	3	23
	%	100.0%	46.7%	10.0%	5.0%	38.3%
33-34	N	45	9	3	2	31
	%	100.0%	20.0%	6.7%	4.4%	68.9%
≥35	N	190	5	6	3	176
	%	100.0%	2.6%	3.2%	1.6%	92.6%
Total included	N	1098	492	75	182	349
	%	100.0%	44.8%	6.8%	16.6%	31.8%
Missing (GA/PDA treatment)		284				
Total # of infants without PDA		9407				

COMMENTS: Specific reasons for treatment of indomethacin and frequency of repeat course of indomethacin were not recorded. Excludes indomethacin prophylaxis started on the first day of birth. Only one hospital used ibuprofen for PDA and data on ibuprofen administration are not included. Infants without PDA followed criteria: no PDA noted, PDA not considered serious enough to treat, or PDA treated with indomethacin in the first 24 hours after admission and not restarted after 24 hours following admission.

Presentation #9
Treatment of patent ductus arteriosus (by birth weight)
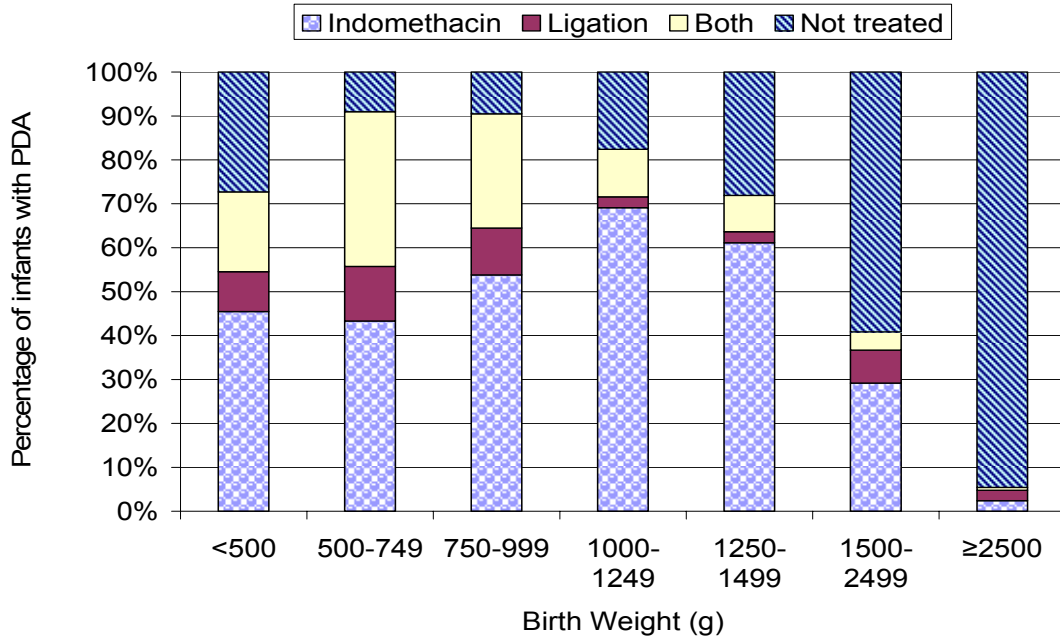
Birth weight (g)		Infants with PDA	Treatment			Not treated
			Indomethacin	Ligation	Both	
<500	N	11	5	1	2	3
	%	100.0%	45.5%	9.1%	18.2%	27.3%
500-749	N	210	91	26	74	19
	%	100.0%	43.3%	12.4%	35.2%	9.0%
750-999	N	262	141	28	68	25
	%	100.0%	53.8%	10.7%	26.0%	9.5%
1000-1249	N	204	141	5	22	36
	%	100.0%	69.1%	2.5%	10.8%	17.6%
1250-1499	N	121	74	3	10	34
	%	100.0%	61.2%	2.5%	8.3%	28.1%
1500-2499	N	120	35	9	5	71
	%	100.0%	29.2%	7.5%	4.2%	59.2%
≥2500	N	170	4	4	1	161
	%	100.0%	2.4%	2.4%	.6%	94.7%
Total included	N	1098	491	76	182	349
	%	100.0%	44.8%	6.9%	16.6%	31.8%

Missing (BW/PDA treatment)	284
Total # of infants without PDA	9407

COMMENTS: Specific reasons for treatment of indomethacin and frequency of repeat course of indomethacin were not recorded. Excludes indomethacin prophylaxis started on the first day of birth. Only one hospital used ibuprofen for PDA and data on ibuprofen administration are not included. Infants without PDA followed criteria: no PDA noted, PDA not considered serious enough to treat, or PDA treated with indomethacin in the first 24 hours after admission and not restarted after 24 hours following admission.

Presentation #10
Incidence of intraventricular hemorrhage (by gestational age)
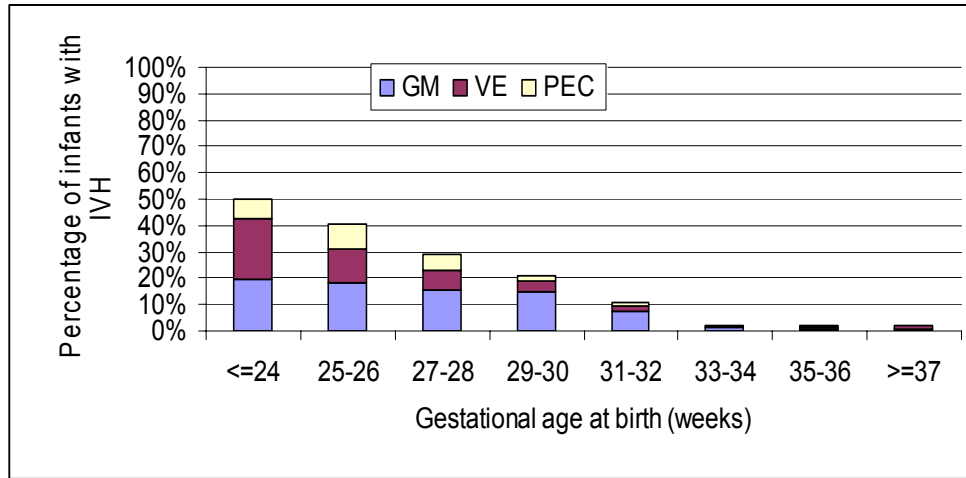
Birth gestational age (weeks)		IVH					Number of infants
		None	GM	VE	PEC	Not screened	
≤24	N	61	43	50	16	49	219
	%	27.9%	19.6%	22.8%	7.3%	22.4%	100.0%
25-26	N	221	85	59	43	55	463
	%	47.7%	18.4%	12.7%	9.3%	11.9%	100.0%
27-28	N	393	100	47	39	62	641
	%	61.3%	15.6%	7.3%	6.1%	9.7%	100.0%
29-30	N	477	117	35	16	143	788
	%	60.5%	14.8%	4.4%	2.0%	18.1%	100.0%
31-32	N	498	81	24	17	512	1132
	%	44.0%	7.2%	2.1%	1.5%	45.2%	100.0%
33-34	N	284	19	11	9	1397	1720
	%	16.5%	1.1%	.6%	.5%	81.2%	100.0%
35-36	N	233	10	15	7	1441	1706
	%	13.7%	.6%	.9%	.4%	84.5%	100.0%
≥37	N	781	30	49	11	3234	4105
	%	19.0%	.7%	1.2%	.3%	78.8%	100.0%
Total included	N	2948	485	290	158	6893	10774
	%	27.4%	4.5%	2.7%	1.5%	64.0%	100.0%
Missing (GA/IVH)							15
Total # of infants							10789

Footnote: not all infants at these gestational groups were screened.

COMMENTS: These analyses are based on those examined (detection rate). The incidence of intraventricular hemorrhage (IVH) in relation to gestational age and birthweight is shown in Presentation #10 and #11, respectively. GM and VE diagnoses are based on cranial ultrasound examination, CT Scans or MRIs in the first two weeks of life. PEC diagnoses are based on cranial ultrasound examination, CT Scans or MRIs after 21 days of life.

Presentation #11
Incidence of intraventricular hemorrhage (by birth weight)
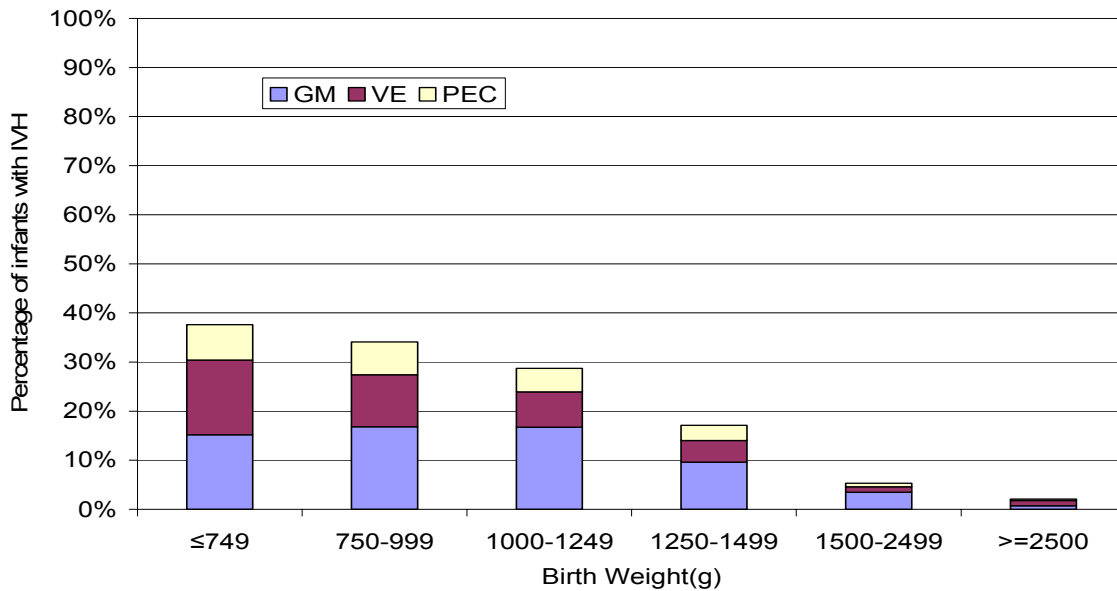
Birth weight (g)		IVH					Number of infants
		None	GM	VE	PEC	Not screened	
≤749	N	167	57	57	27	67	375
	%	44.5%	15.2%	15.2%	7.2%	17.9%	100.0%
750-999	N	304	95	60	38	67	564
	%	53.9%	16.8%	10.6%	6.7%	11.9%	100.0%
1000-1249	N	375	107	46	31	81	640
	%	58.6%	16.7%	7.2%	4.8%	12.7%	100.0%
1250-1499	N	421	65	30	21	139	676
	%	62.3%	9.6%	4.4%	3.1%	20.6%	100.0%
1500-2499	N	842	127	39	25	2588	3621
	%	23.3%	3.5%	1.1%	.7%	71.5%	100.0%
≥2500	N	832	32	56	16	3946	4882
	%	17.0%	.7%	1.1%	.3%	80.8%	100.0%
Total included	N	2941	483	288	158	6888	10758
	%	27.3%	4.5%	2.7%	1.5%	64.0%	100.0%
Missing (BW/ IVH)							31
Total # of infants							10789

COMMENTS: These analyses are based on those examined (detection rate). The incidence of intraventricular hemorrhage (IVH) in relation to gestational age and birthweight is shown in Presentation #10 and #11, respectively. GM and VE diagnoses are based upon cranial ultrasound examination, CT Scans or MRIs in the first two weeks of life. PEC diagnoses are based on cranial ultrasound examination, CT Scans or MRIs after 21 days of life.

Presentation #12
Primary infection (by gestational age)
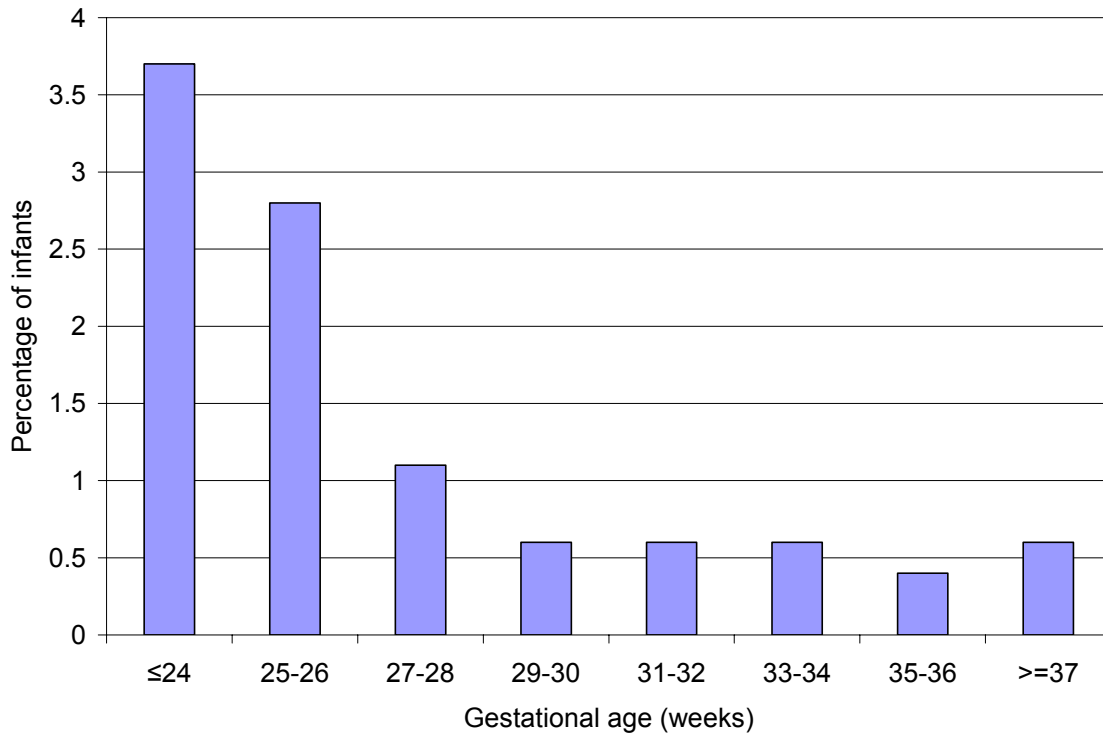
Gestational age at birth	Infants	No. of infants with infection	%
≤24	219	8	3.7
25-26	464	13	2.8
27-28	641	7	1.1
29-30	789	5	0.6
31-32	1132	7	0.6
33-34	1721	10	0.6
35-36	1708	6	0.4
≥37	4108	26	0.6
Total included	10782	82	0.8
Missing (GA)	**7**		
Total # of infants	**10789**		

COMMENTS: Primary infection is indicated by positive blood and/or cerebrospinal fluid, bacterial or candida culture in the first two days after birth (adjusted for readmission and transfers).

Presentation #13
Nosocomial infection (by gestational age)
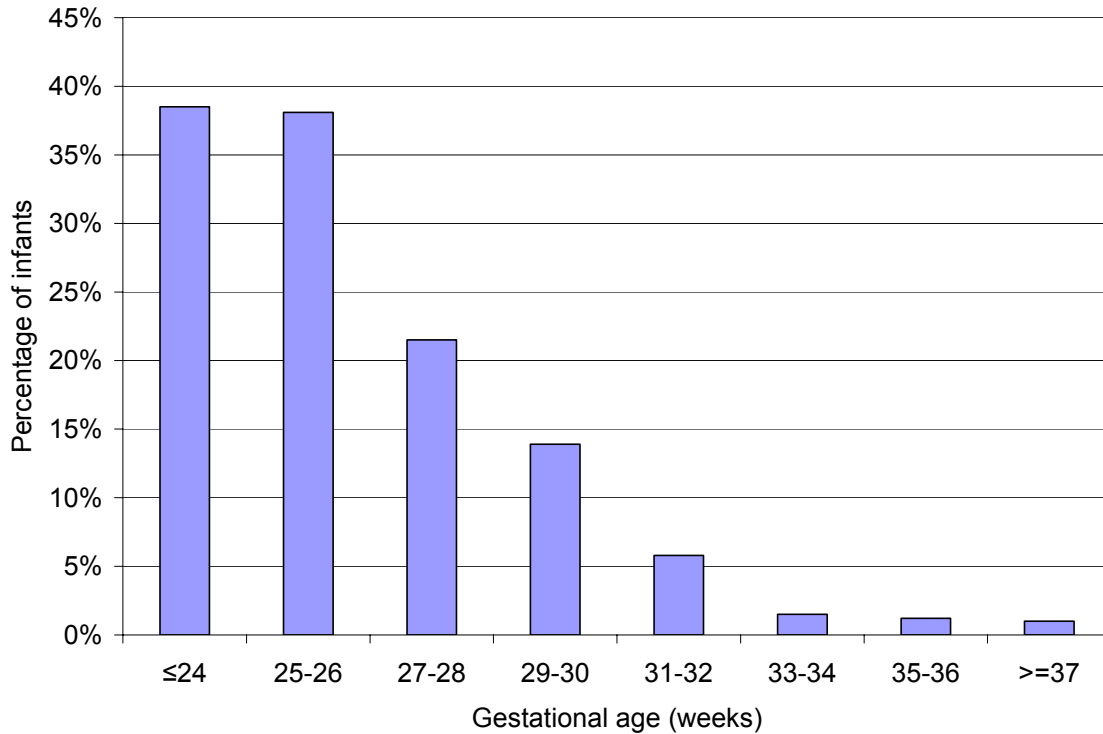
Gestational age at birth	Infants	# with at least one infection	%
≤24	187	72	38.5%
25-26	446	170	38.1%
27-28	633	136	21.5%
29-30	786	109	13.9%
31-32	1130	66	5.8%
33-34	1717	26	1.5%
35-36	1700	20	1.2%
≥37	4095	41	1.0%
Total included	10694	640	6.0%
Missing (GA)	7		
Total # of infants	**10701**		

COMMENTS: Nosocomial infection (likely hospital acquired after two days of age) at varying gestational ages and birthweights is shown in Presentation #13 and #14, respectively. The number is adjusted for readmission and transfer. These analyses include only positive blood and/or cerebrospinal fluid, bacterial or candidal cultures, and do not include pneumonia, urinary tract infections, or skin infections. Deaths at <3 days of life were excluded from analysis.

Presentation #14
Nosocomial infection (by birth weight)
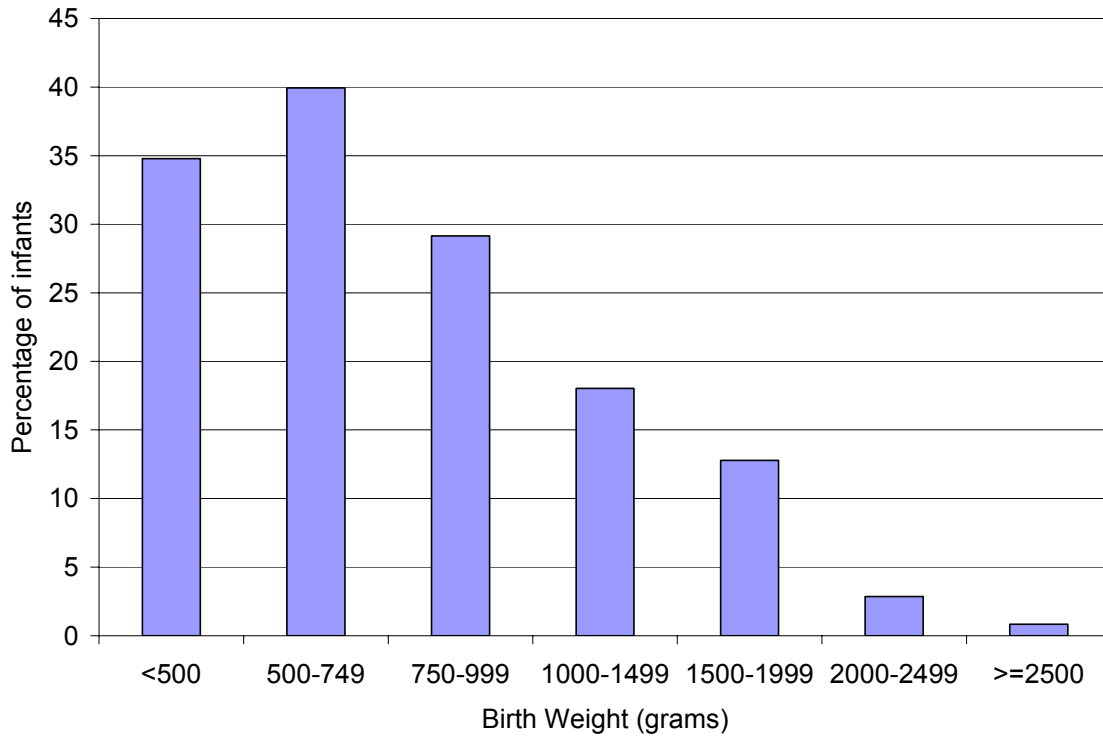
Birth Weight(g)	Infants	# with at least one infection	%
<500	23	8	34.8%
500-749	318	127	39.9%
750-999	549	160	29.1%
1000-1499	632	114	18.0%
1500-1999	673	86	12.8%
2000-2499	3613	103	2.9%
≥2500	4872	41	0.8%
Total included	10680	639	6.0%
Missing (BW)	**21**		
Total # of infants	**10701**		

COMMENTS: Nosocomial infection (likely hospital acquired after two days of age) at varying gestational ages and birth weights is shown in Presentation #13 and #14, respectively. The number is adjusted for readmission and transfer. These analyses include only positive blood and/or cerebrospinal fluid, bacterial or candidal cultures, and do not include pneumonia, urinary tract infections, or skin infections. Deaths at <3 days of life were excluded from analysis.

Presentation #15
Incidence of necrotizing enterocolitis (by gestational age)
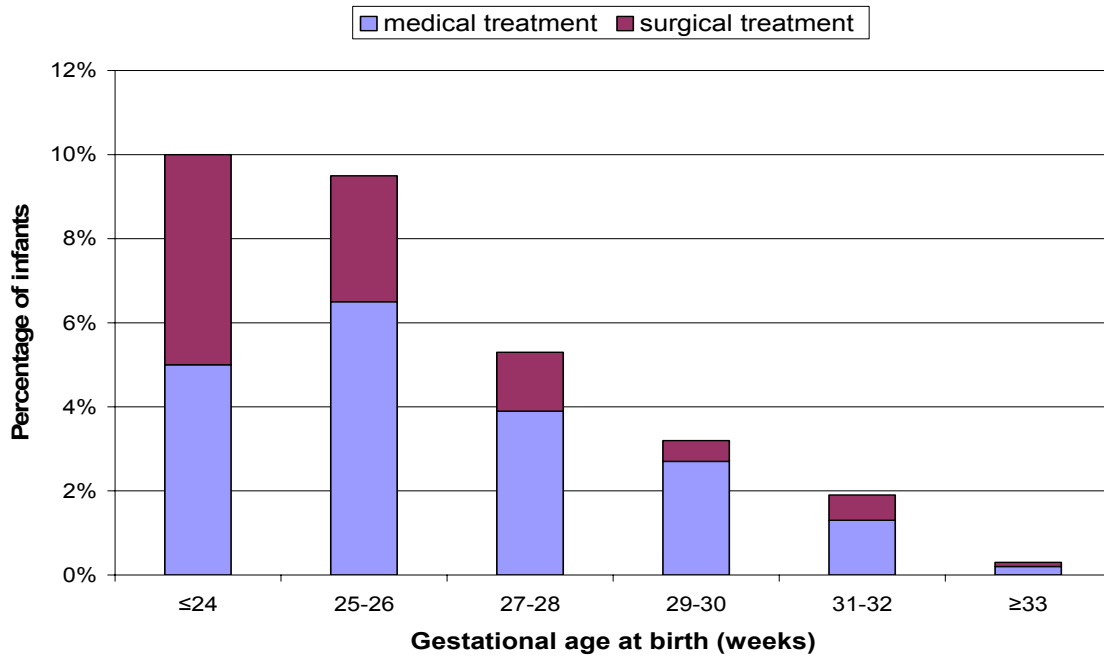
Birth gestational age (weeks)		Number of infants	Necrotizing Enterocolitis		
			none	medical treatment	surgical treatment
≤24	N	200	180	10	10
	%	100.0%	90.0%	5.0%	5.0%
25-26	N	461	417	30	14
	%	100.0%	90.5%	6.5%	3.0%
27-28	N	635	601	25	9
	%	100.0%	94.6%	3.9%	1.4%
29-30	N	786	761	21	4
	%	100.0%	96.8%	2.7%	0.5%
31-32	N	1124	1102	15	7
	%	100.0%	98.0%	1.3%	0.6%
≥33	N	7481	7461	16	4
	%	100.0%	99.7%	0.2%	0.1%
Total included	N	10687	10522	117	48
	%	100.0%	98.5%	1.1%	0.4%
Missing (GA/NEC)		102			
Total # of infants		10789			

COMMENTS: Necrotizing enterocolitis is scored according to the following criteria: a) definite pneumatosis (air in the bowel wall) or portal/hepatic air as diagnosed by x-ray, or b) if there is a surgical or autopsy diagnosis of NEC. Diagnoses of 'suspected NEC' or x-rays showing free air without pneumatosis are not classified as NEC.

Presentation #16
Incidence of necrotizing enterocolitis (by birth weight)
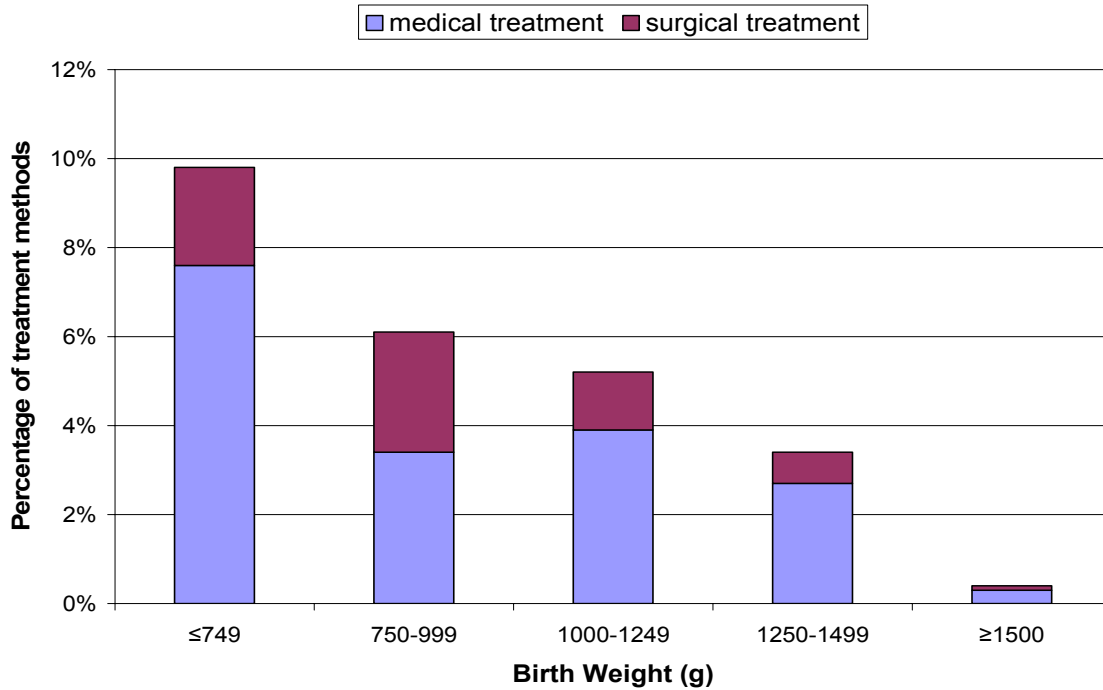
Birth weight (g)		Number of infants	Necrotizing Enterocolitis		
			none	medical treatment	surgical treatment
≤749	N	356	321	27	8
	%	100.0%	90.2%	7.6%	2.2%
750-999	N	559	525	19	15
	%	100.0%	93.9%	3.4%	2.7%
1000-1249	N	637	604	25	8
	%	100.0%	94.8%	3.9%	1.3%
1250-1499	N	672	649	18	5
	%	100.0%	96.6%	2.7%	.7%
≥1500	N	8447	8407	28	12
	%	100.0%	99.5%	.3%	.1%
Total included	N	10671	10506	117	48
	%	100.0%	98.5%	1.1%	.4%
Missing (BW/NEC)		118			
Total # of infants		10789			

COMMENTS: Necrotizing enterocolitis is scored according to the following criteria: a) definite pneumatosis (air in the bowel wall) or portal/hepatic air as diagnosed by x-ray, or b) if there is a surgical or autopsy diagnosis of NEC. Diagnoses of 'suspected NEC' or x-rays showing free air without pneumatosis are not classified as NEC.

Presentation #17
Incidence of retinopathy of prematurity (by gestational age)
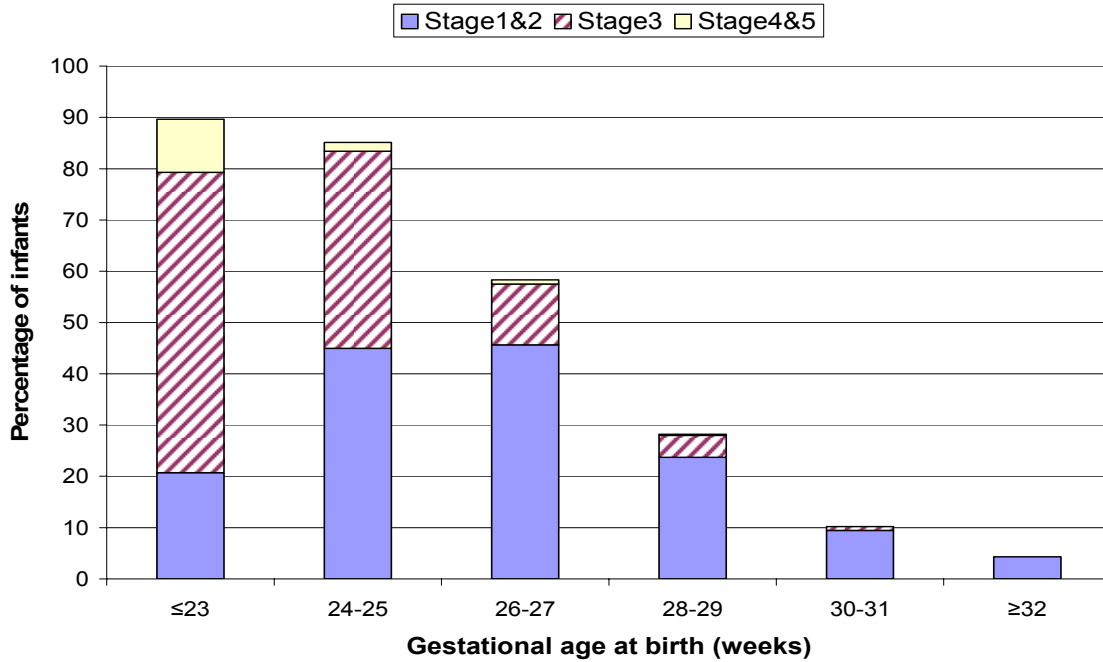
Birth gestational age (weeks)		Retinopathy of prematurity				Number of infants received eye examination
		none	Stages 1 & 2	Stage 3	Stage 4 & 5	
≤23	N	3	6	17	3	29
	%	10.3%	20.7%	58.6%	10.3%	100.0%
24-25	N	34	103	88	4	229
	%	14.8%	45.0%	38.4%	1.7%	100.0%
26-27	N	158	173	45	3	379
	%	41.7%	45.6%	11.9%	.8%	100.0%
28-29	N	318	105	19	1	443
	%	71.8%	23.7%	4.3%	.2%	100.0%
30-31	N	238	25	2	0	265
	%	89.8%	9.4%	.8%	.0%	100.0%
≥32	N	224	10	0	0	234
	%	95.7%	4.3%	.0%	.0%	100.0%
Total included	N	975	422	171	11	1579
	%	61.7%	26.7%	10.8%	.7%	100.0%
Missing (GA/ROP)						0
Total # of infants						1579

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). Information is based on infants who received eye examinations. More advanced stages may have been detected in infants transferred from network NICUs to level II hospitals or units. Caution should be used in interpreting these data.

Presentation #18
Incidence of retinopathy of prematurity (by birth weight)
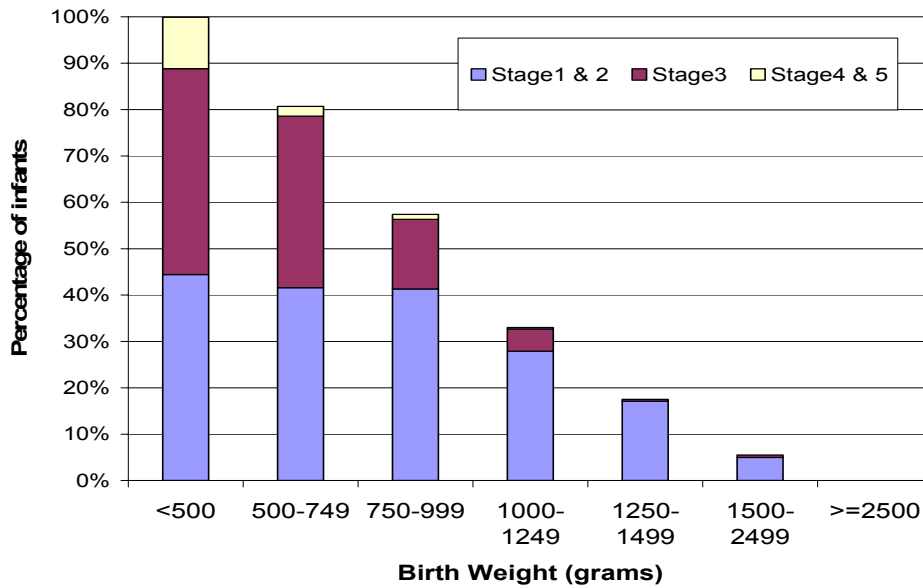
Birth weight (grams)		Retinopathy of prematurity				Number of infants received eye examination
		none	Stages 1 & 2	Stage 3	Stage 4 & 5	
<500	N	0	4	4	1	9
	%	.0%	44.4%	44.4%	11.1%	100.0%
500-749	N	46	99	88	5	238
	%	19.3%	41.6%	37.0%	2.1%	100.0%
750-999	N	162	157	57	4	380
	%	42.6%	41.3%	15.0%	1.1%	100.0%
1000-1249	N	253	105	18	1	377
	%	67.1%	27.9%	4.8%	.3%	100.0%
1250-1499	N	222	46	1	0	269
	%	82.5%	17.1%	.4%	.0%	100.0%
1500-2499	N	207	11	1	0	219
	%	94.5%	5.0%	.5%	.0%	100.0%
≥2500	N	83	0	0	0	83
	%	100.0%	.0%	.0%	.0%	100.0%
Total included	N	973	422	169	11	1575
	%	61.8%	26.8%	10.7%	.7%	100.0%
Missing (BW)						**4**
Total # of infants						**1579**

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). Information is based on infants who received eye examinations. More advanced stages may have been detected in infants transferred from network NICUs to level II hospitals or units. Caution should be used in interpreting these data.

Presentation #18a
Incidence of cryo/laser therapy for infants with retinopathy of prematurity (by gestational age)
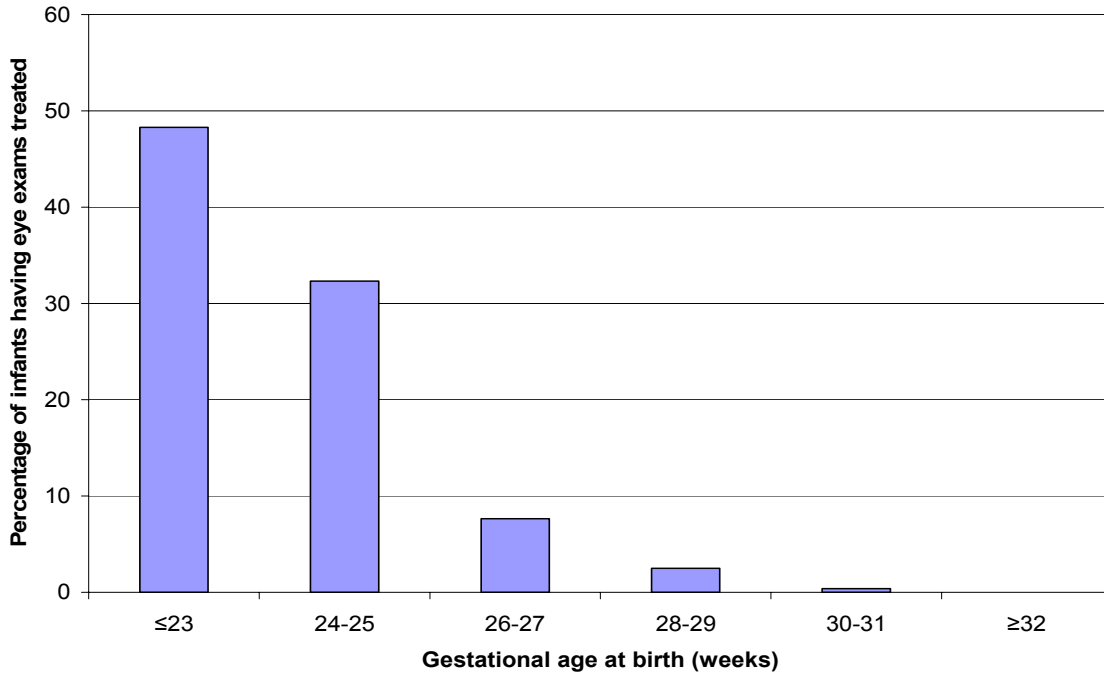
Birth gestational age (weeks)		Number of infants received eye examination	Therapy
≤23	N	29	14
	%	100.0%	48.3%
24-25	N	229	74
	%	100.0%	32.3%
26-27	N	379	29
	%	100.0%	7.7%
28-29	N	443	11
	%	100.0%	2.5%
30-31	N	265	1
	%	100.0%	.4%
≥32	N	234	0
	%	100.0%	.0%
Total included	N	1579	129
	%	100.0%	8.2%
Missing (GA/ROP)		0	
Total # of infants		1579	

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). Information is based on infants who received eye examinations. More advanced stages may have been detected in infants transferred from network NICUs to level II hospitals or units. Caution should be used in interpreting these data.

Presentation #18b
Incidence of cryo/laser therapy for infants with retinopathy of prematurity (by birth weight)
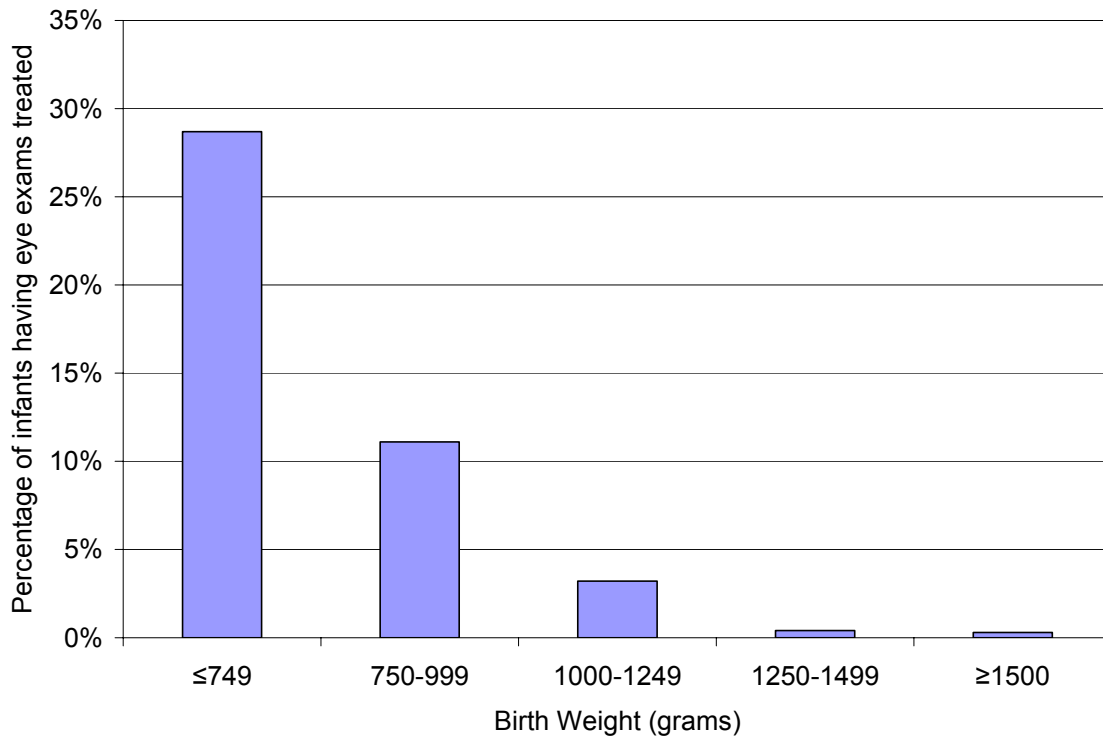
Birth weight (grams)		Number of infants received eye examination	Therapy
≤749	N	247	71
	%	100.0%	28.7%
750-999	N	380	42
	%	100.0%	11.1%
1000-1249	N	377	12
	%	100.0%	3.2%
1250-1499	N	269	1
	%	100.0%	0.4%
≥1500	N	302	1
	%	100.0%	0.3%
Total included	N	1575	127
	%	100.0%	8.1%
Missing (BW)		4	
Total # of infants		1579	

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). Information is based on infants who received eye examinations. More advanced stages may have been detected in infants transferred from network NICUs to level II hospitals or units. Caution should be used in interpreting these data.

Presentation #19
Incidence of bronchopulmonary dysplasia (by gestational age) among infants with
GA ≤32 weeks
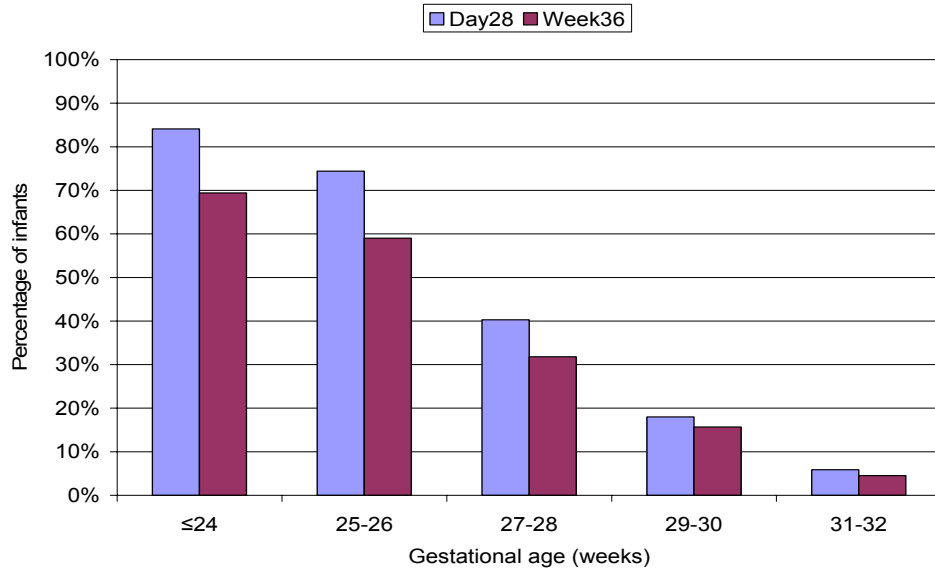
Birth gestational age (weeks)	Day 28						Week 36					
	Infants	with BPD	% with BPD	Number of infants without BPD	% Survival without BPD	# of death prior to day28 of life	Infants	with BPD	% with BPD	Number of infants without BPD	% Survival without BPD	# of death prior to week36
≤24	132	111	84.1%	21	100.0%	73	124	86	69.4%	38	100.0%	81
25-26	407	303	74.4%	104	96.2%	55	393	232	59.0%	161	100.0%	69
27-28	610	246	40.3%	364	98.4%	30	601	191	31.8%	410	99.3%	39
29-30	774	139	18.0%	635	99.8%	14	773	121	15.7%	652	100.0%	15
31-32	1124	66	5.9%	1058	99.9%	7	1123	51	4.5%	1072	99.6%	8
Total included	3047	865	28.4%	2182	99.5%	179	3014	681	22.6%	2333	99.7%	212
Missing (GA)	0	0				0	0	0				0
Total # of infants	**3047**	**865**				**179**	**3014**	**681**				212

COMMENTS: Bronchopulmonary dysplasia is defined as: a) receiving supplemental oxygen on day 28 or week 36 or b) prior to day 28 of life or week36, and discharged with supplemental oxygen support. Infants were excluded from analysis if they died prior to day 28 of life or week 36. The information is for infants with gestational age ≤32 weeks at birth. There were no requirements for chest radiographs at the time of diagnosis.

Presentation #20
Incidence of bronchopulmonary dysplasia (by birth weight) among infants with GA ≤32 weeks
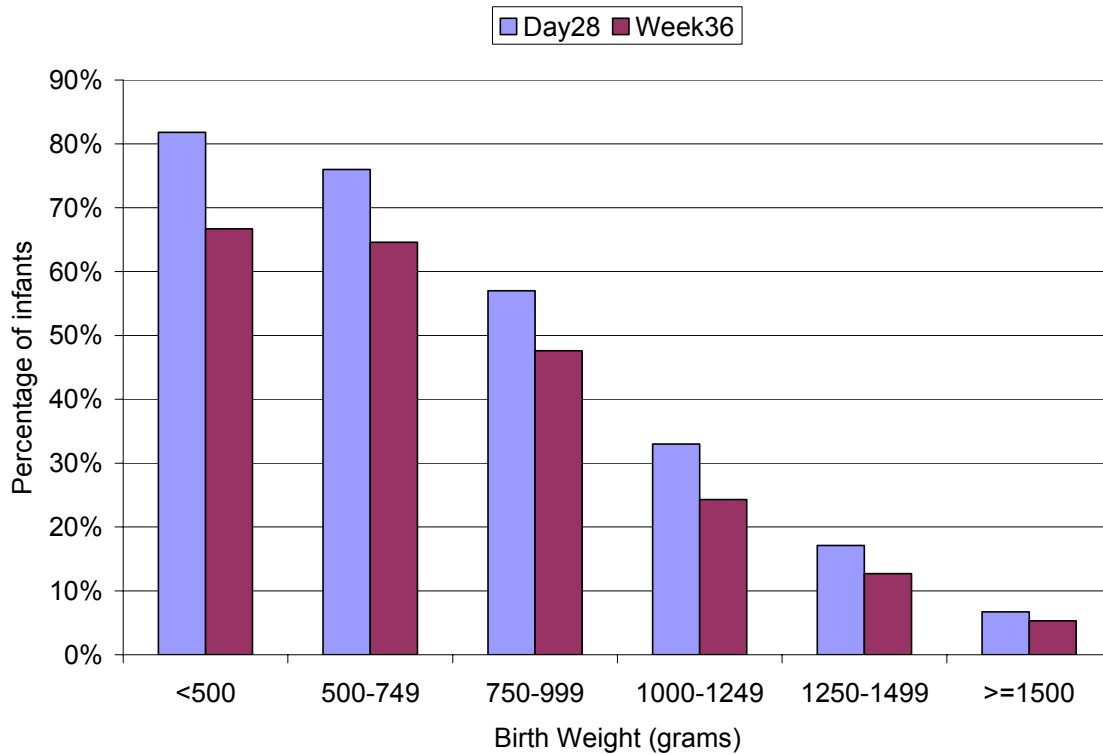
Birth weight (g)	Day 28				Week 36			
	Infants	with BPD	%	# of death prior to day28 of life	Infants	with BPD	%	# of death prior to week36
<500	11	9	81.8%	10	9	6	66.7%	12
500-749	271	206	76.0%	67	260	168	64.6%	78
750-999	502	286	57.0%	60	492	234	47.6%	70
1000-1249	582	192	33.0%	23	575	140	24.3%	30
1250-1499	568	97	17.1%	10	565	72	12.7%	13
>=1500	1107	74	6.7%	7	1107	59	5.3%	7
Total	**3041**	**864**	**28.4%**	**177**	**3008**	**679**	**22.6%**	**210**
Missing (BW)	**6**	**1**		**2**	**6**	**2**		**2**
Total # of infants	**3047**	**865**		**179**	**3014**	**681**		**212**

COMMENTS: Bronchopulmonary dysplasia is defined as: a) receiving supplemental oxygen on day 28 or week 36 or b) prior to day 28 of life or week36, and discharged with supplemental oxygen support. Infants were excluded from analysis if they died prior to day 28 of life or week 36. The information is for infants with gestational age ≤32 weeks at birth. There were no requirements for chest radiographs at the time of diagnosis.

Presentation #21
Days on assisted ventilation and oxygen (by birth weight) for infants discharged home
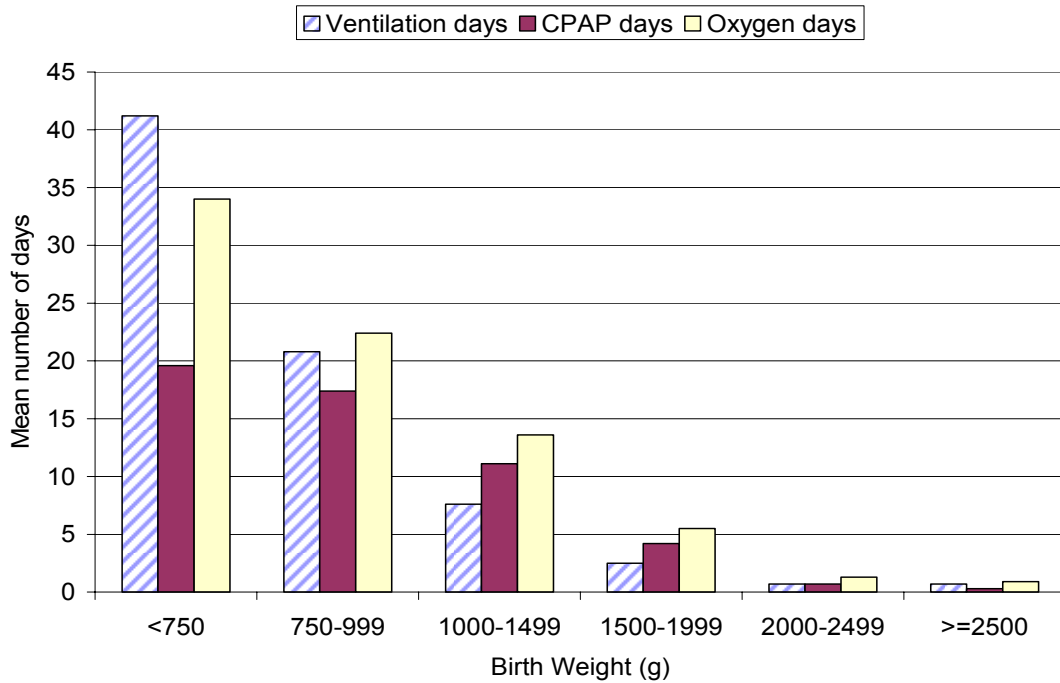
		Birth Weight (g)						
		<750	**750-999**	**1000-1249**	**1250-1499**	**1500-2499**	**≥2500**	**Total # of infants**
Ventilation days*	N	105	180	221	240	1796	2432	4974
	Mean	41.2	20.8	7.6	2.5	0.7	0.7	2.7
	SEM	2.2	1.4	0.8	0.3	0.1	0.1	0.1
	Median	43	15.5	3	0	0	0	0
CPAP days*	N	105	180	221	240	1796	2432	4974
	Mean	19.6	17.4	11.1	4.2	0.7	0.3	2.2
	SEM	1.5	1.2	0.9	0.5	0.1	0.0	0.1
	Median	17	14	6	1	0	0	0
Oxygen days*	N	105	180	221	240	1796	2432	4974
	Mean	34.0	22.4	13.6	5.5	1.3	0.9	3.3
	SEM	2.4	1.6	1.2	0.7	0.1	0.1	0.1
	Median	30	17	7	0	0	0	0

COMMENTS: This presentation represents respiratory support information collected at time of discharge where only the highest form of support is recorded for each day (please see Appendix A on CD for specific criteria). Oxygen days indicate days where the infant is only on oxygen for the day(s), with no assisted ventilation. The information is for all infants discharged home directly from network hospitals.

Presentation #22
Length of stay prior to discharge home from the Network hospital in relation to gestational age at birth*
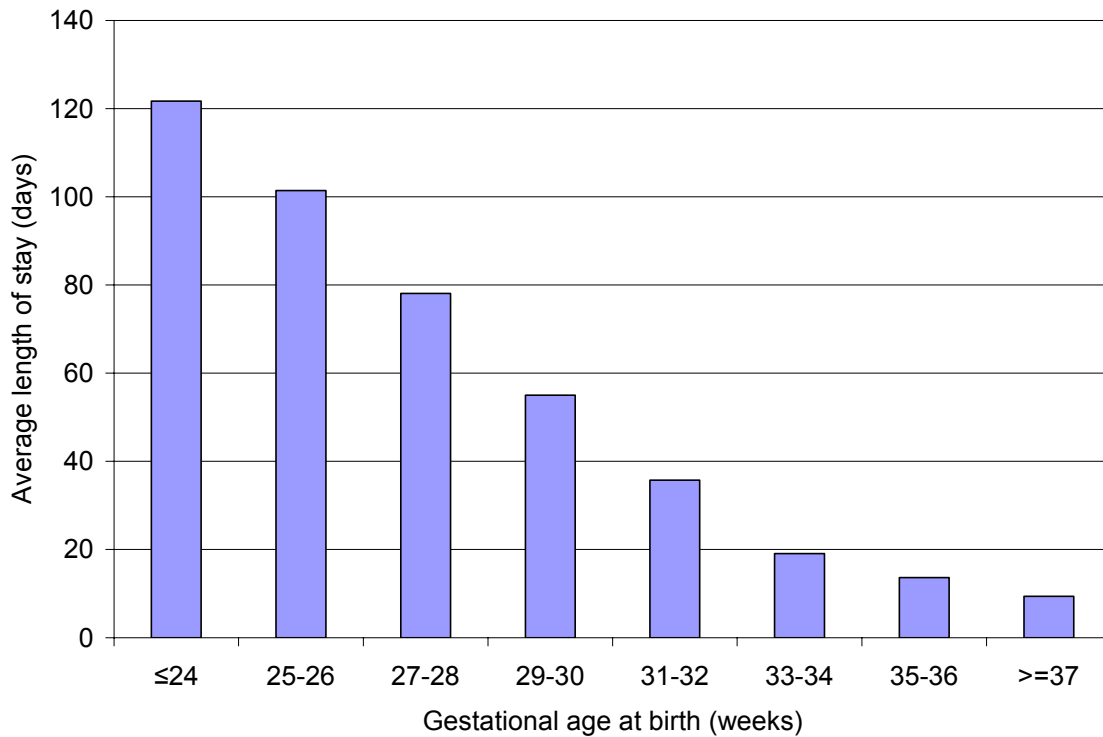
Gestational age at birth	# of infants	Mean	SEM	Median
≤24	49	121.7	3.3	122
25-26	143	101.4	2.2	101
27-28	225	78.1	1.5	74
29-30	256	55.0	1.1	53
31-32	461	35.7	0.7	32
33-34	942	19.1	0.4	17
35-36	933	13.6	0.4	11
≥37	1970	9.4	0.2	7
Total included	4979	23.7	0.4	13
Missing (GA)	**2**			
Total # of infants	**4981**			

*Data shown apply to infants discharged home from network hospitals (data for infants transferred to other units are presently unavailable)

COMMENTS: For infants discharged home from a network hospital, the length of stay in hospital from the day of admission to the day when the patient went home from the hospital, in relation to gestational age at birth, is illustrated. It is unknown whether those transferred to another hospital have different lengths of stay.

Presentation #23
Post-menstrual age at discharge home*
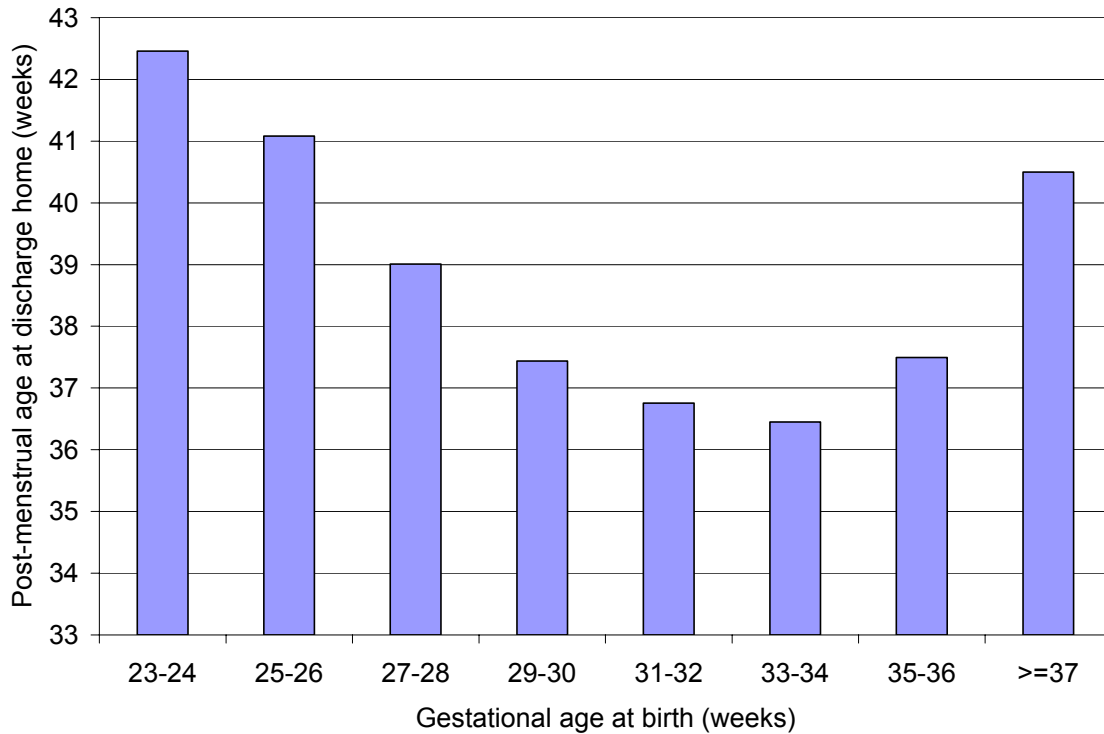
Gestational age at birth	Post-menstrual age (weeks) at discharge home			
	# of infants	Mean	SEM	Median
≤24	49	42.5	0.5	41.9
25-26	143	41.1	0.3	40.1
27-28	225	39.0	0.2	38.3
29-30	256	37.4	0.2	37.1
31-32	461	36.8	0.1	36.3
33-34	942	36.4	0.1	36.1
35-36	933	37.5	0.1	37.1
≥37	1970	40.5	0.0	40.3
Total included	4979	38.6	0.0	38.3
Missing (GA)	**2**			
Total # of infants	**4981**			

*Data shown apply to infants discharged home from network NICUs (data for infants transferred to other units are presently unavailable)

COMMENTS: For infants discharged home from a network hospital, the length of stay in hospital from the day of admission to the day when the patient went home from the hospital, in relation to gestational age at birth, is illustrated. It is unknown whether those transferred to another hospital have different lengths of stay.

Presentation #24
Use of oxygen at discharge home

Gestational age (weeks)	Infants	Oxygen	
		N	%
≤24	49	20	40.8%
25-26	143	40	28.0%
27-28	225	13	5.8%
29-30	256	1	.4%
31-32	461	0	0%
33-34	942	1	.1%
35-36	933	1	.1%
≥37	1970	9	.5%
Total included	4979	85	1.7%
Missing (GA)	2		
Total # of infants	4981		

COMMENTS: The very preterm infants were likely to require oxygen support when discharged home.

E. Site Comparisons – Mortality

Presentation #25
Site specific gestational age categories of infants
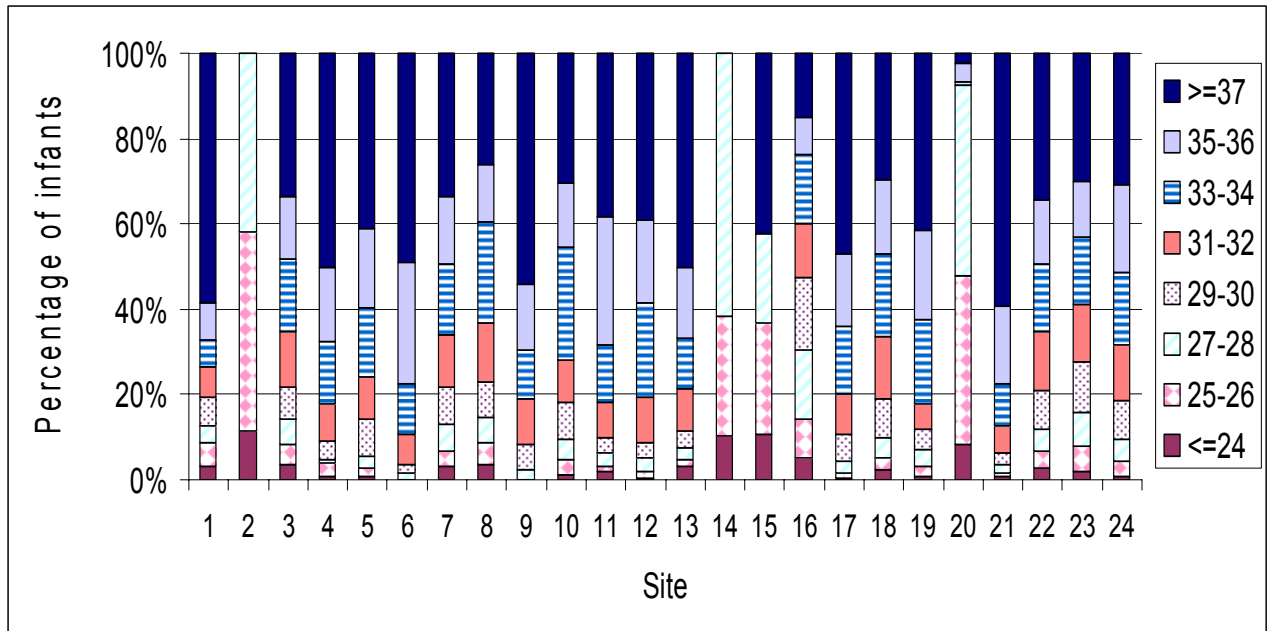
Presentation #25 (*continued*)
Site specific gestational age categories of infants

		Gestational age (weeks)								Total %
		≤24	25-26	27-28	29-30	31-32	33-34	35-36	≥37	
Infants per site (%)	1	3.10%	5.80%	3.90%	6.60%	7.00%	6.30%	8.80%	58.60%	100.0%
	2	11.30%	46.80%	41.90%	NA	NA	NA	NA	NA	100.0%
	3	2.30%	5.00%	5.80%	7.60%	13.40%	17.30%	14.50%	34.10%	100.0%
	4	0.30%	3.10%	1.10%	4.40%	8.60%	14.70%	17.30%	50.50%	100.0%
	5	0.70%	1.80%	2.80%	8.90%	9.90%	16.00%	18.80%	41.10%	100.0%
	6	NA	NA	1.60%	2.10%	6.80%	12.10%	28.40%	48.90%	100.0%
	7	3.00%	3.60%	6.40%	8.90%	12.10%	16.60%	15.70%	33.80%	100.0%
	8	3.70%	5.10%	6.00%	8.20%	13.60%	23.70%	13.80%	25.90%	100.0%
	9	NA	NA	2.30%	6.00%	10.60%	11.60%	15.30%	54.20%	100.0%
	10	1.30%	3.30%	5.00%	8.70%	9.60%	26.60%	15.20%	30.30%	100.0%
	11	1.40%	1.40%	3.20%	3.60%	8.10%	13.60%	30.30%	38.50%	100.0%
	12	0.40%	1.70%	3.10%	3.40%	10.90%	22.00%	19.50%	39.00%	100.0%
	13	1.40%	1.40%	2.90%	4.10%	9.90%	12.20%	17.00%	51.10%	100.0%
	14	10.30%	28.20%	61.50%	NA	NA	NA	NA	NA	100.0%
	15	10.50%	26.30%	21.10%	NA	NA	NA	NA	42.10%	100.0%
	16	5.20%	9.20%	16.20%	16.80%	12.60%	16.40%	8.50%	15.10%	100.0%
	17	0.30%	1.10%	3.10%	6.20%	9.60%	15.50%	17.20%	46.90%	100.0%
	18	2.30%	2.80%	4.80%	9.00%	14.50%	19.60%	17.10%	29.80%	100.0%
	19	0.40%	2.40%	4.10%	4.90%	6.00%	19.70%	20.70%	41.70%	100.0%
	20	8.30%	39.70%	44.60%	NA	NA	0.80%	4.10%	2.50%	100.0%
	21	0.90%	0.70%	1.80%	3.10%	6.30%	9.80%	18.20%	59.10%	100.0%
	22	2.80%	3.80%	5.30%	9.00%	14.00%	15.60%	15.10%	34.50%	100.0%
	23	2.10%	5.80%	8.00%	11.90%	13.30%	16.00%	13.00%	29.90%	100.0%
	24	0.90%	3.30%	5.40%	8.80%	13.00%	17.20%	20.50%	30.80%	100.0%
Total		2.0%	4.3%	5.9%	7.3%	10.5%	16.0%	15.8%	38.1%	100.0%

COMMENTS: Proportion of the gestational age categories of infants varied considerably among sites. Note some centres are only submitting a subset of the eligible population.

Presentation #26
Site specific birth weight categories of infants
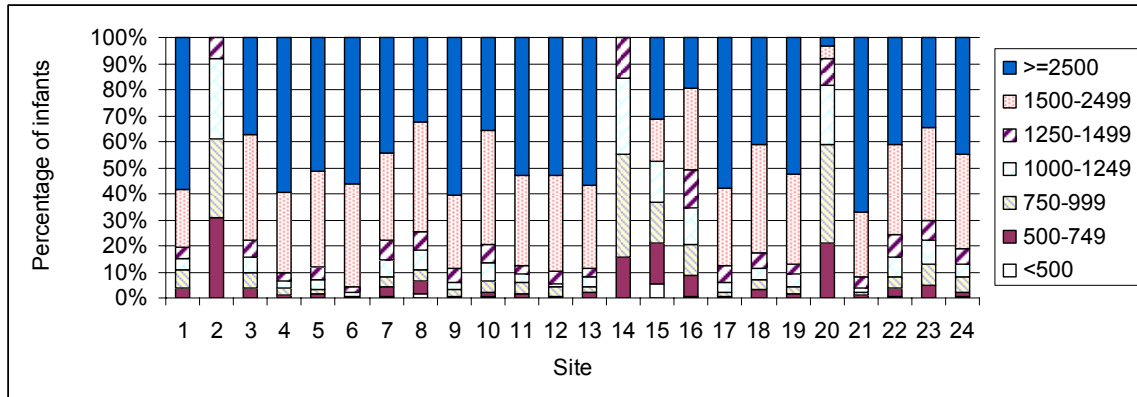
Birth weight (g)		<500	500-749	750-999	1000-1249	1250-1499	1500-2499	≥2500	Total
	1	0.2	3.4	7.1	4.5	4.5	21.7	58.6	100
	2	NA	30.6	30.6	30.6	8.1	NA	NA	100
	3	0.1	3.5	6.1	6.0	6.6	40.5	37.1	100
	4	NA	1.3	2.3	2.8	3.3	30.8	59.5	100
	5	NA	1.4	1.8	3.9	5.0	36.7	51.2	100
	6	NA	0.5	NA	1.6	2.1	39.5	56.3	100
	7	0.3	3.7	4.2	6.4	7.8	33.2	44.4	100
	8	1.4	5.2	4.3	7.4	7.4	42.1	32.2	100
	9	NA	0.5	2.8	2.8	5.1	28.4	60.5	100
Infants per site (%)	10	0.4	1.9	4.0	7.1	7.3	43.7	35.5	100
	11	NA	1.8	4.1	3.2	3.6	34.4	52.9	100
	12	NA	0.4	4.0	1.3	4.4	36.9	53.0	100
	13	0.1	1.8	2.5	3.8	3.3	31.8	56.6	100
	14	NA	15.8	39.5	28.9	15.8	NA	NA	100
	15	5.3	15.8	15.8	15.8	NA	15.8	31.6	100
	16	0.5	8.3	11.5	14.2	14.6	31.5	19.3	100
	17	0.3	0.3	1.7	3.7	6.3	29.9	57.8	100
	18	NA	3.0	4.2	3.9	6.5	41.1	41.3	100
	19	0.1	1.5	2.8	4.8	3.8	34.7	52.2	100
	20	NA	20.8	38.3	22.5	10.0	5.0	3.3	100
	21	NA	1.1	1.3	1.5	4.1	25.2	66.9	100
	22	0.5	3.1	4.8	7.5	8.7	34.3	41.1	100
	23	0.2	4.5	8.4	8.9	8.0	35.4	34.6	100
	24	0.3	1.8	5.7	5.1	6.0	36.3	44.7	100
Total		0.3	3.2	5.3	5.9	6.3	33.6	45.4	100

COMMENTS: Some centres are only submitting a subset of the eligible population.

Presentation #27
Antenatal corticosteroid treatment of infants ≤34 weeks gestational age
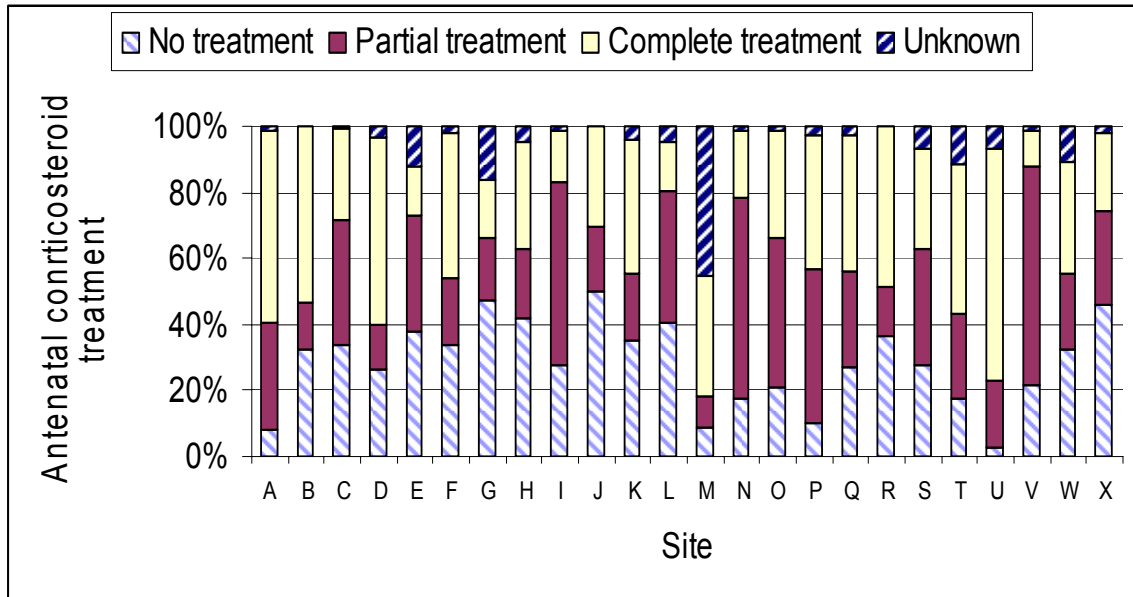
COMMENTS: Doses of antenatal corticosteroid are scored according to the following criteria: a) complete = at least 1 dose of corticosteroids (including bethmethasone, beta celestone, dexamethasone, cortisone, or dihydrocortisone but NOT prednisone) 24 hours or greater before delivery AND a second dose at 7 days or less prior to delivery; a complete course is therefore comprised of 2 doses, and b) partial = at least 1 dose <24 hours or more than 7 days prior to delivery.

Presentation #27 (*continued*)
Antenatal corticosteroid treatment of infants ≤34 weeks gestational age

| Site	All Population Antenatal corticosteroid (%)				Inborn population Antenatal corticosteroid (%)				Outborn population Antenatal corticosteroid (%)			
	No treatment	Partial treatment	Complete treatment	Unknown	No treatment	Partial treatment	Complete treatment	Unknown	No treatment	Partial treatment	Complete treatment	Unknown
A	8.1	32.3	58.1	1.6	5.2	34.5	60.3	0	50.0	0	25.0	25.0
B	32.6	14.0	53.5	0.0	31.0	14.3	54.8	0	100.0	0	0	0
C	33.8	37.9	27.3	1.0	28.9	39.9	30.4	0.7	68.4	23.7	5.3	2.6
D	26.1	14.1	56.6	3.2	23.5	13.5	60.8	2.3	56.5	21.7	8.7	13.0
E	38.0	34.9	15.1	12.0	0	0	0	100	39.7	36.4	15.8	8.2
F	34.0	19.9	44.4	1.7	28.1	20.5	50.0	1.4	63.4	16.9	16.9	2.8
G	47.1	19.4	17.5	16.0	48.7	20.1	17.5	13.8	29.4	11.8	17.6	41.2
H	41.6	21.2	32.8	4.4	37.5	22.9	35.4	4.2	64.7	11.8	17.6	5.9
I	27.5	55.7	15.4	1.4	22.3	57.8	18.2	1.7	47.8	47.8	4.4	0
J	50.0	19.7	30.3	0.0	45.6	21.1	33.3	0	77.8	11.1	11.1	0
K	34.8	20.3	40.5	4.3	35.8	20.9	41.8	1.5	0	0	0	100.0
L	40.4	39.9	15.1	4.5	38.5	41.4	16.7	3.4	54.2	29.2	4.2	12.5
M	9.1	9.1	36.4	45.5	0	0	0	100	10.0	10.0	40.0	40.0
N	17.7	60.5	20.2	1.6	16.1	61.3	21.7	0.9	30.8	53.8	7.7	7.7
O	21.0	45.5	32.1	1.4	18.3	46.0	35.5	0.3	36.5	42.9	12.7	7.9
P	10.3	46.2	41	2.6	0	43.3	53.3	3.3	44.4	55.6	0	0
Q	26.8	29.1	41.7	2.4	25.0	30.2	44.0	0.9	45.5	18.2	18.2	18.2
R	36.6	14.6	48.8	0.0	33.3	14.9	51.8	0	77.8	11.1	11.1	0
S	27.8	34.8	30.4	7.0	28.2	35.1	33.7	3.0	25.0	32.1	7.1	35.7
T	17.3	26.1	45.2	11.4	12.1	25.5	54.0	8.4	35.3	27.9	14.7	22.1
U	2.7	20.4	69.9	7.1	2.0	20.0	77.0	1.0	7.7	23.1	15.4	53.8
V	21.6	66.2	10.9	1.3	20.8	66.9	11.4	0.8	33.3	54.5	3.0	9.1
W	32.3	23.0	34.2	10.6	33.3	24.5	34.7	7.5	21.4	7.1	28.6	42.9
X	46.1	28.3	23.4	2.2	45.0	28.9	24.4	1.7	53.8	23.1	15.4	7.7
Mean	29.0	36.3	29.7	4.2	26.1	37.1	34.0	2.8	43.9	32.2	12.4	11.5

Presentation #28
Mean illness severity on admission by hospital
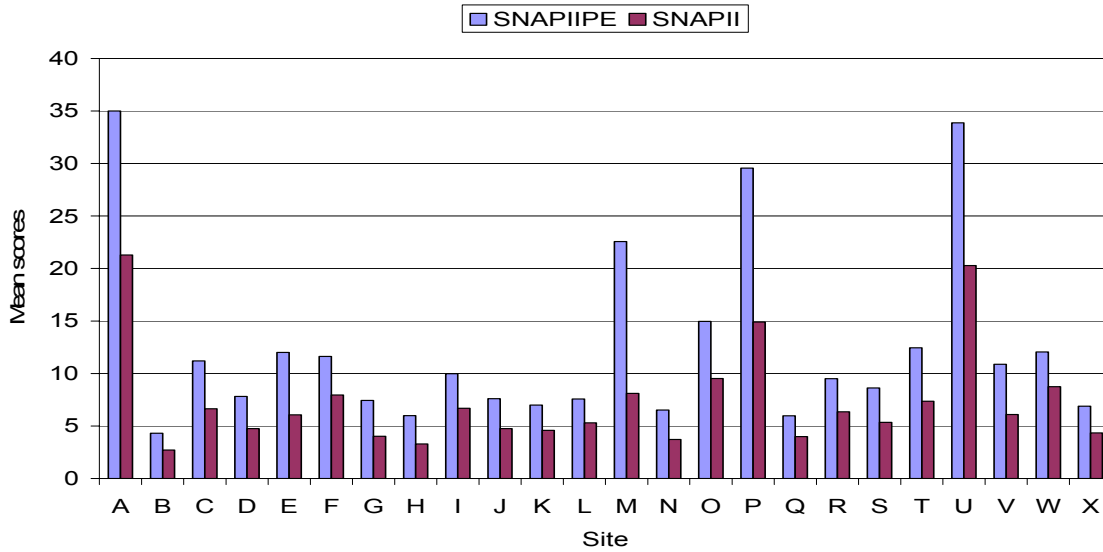
Site		SNAPIIPE	SNAPII	Site		SNAPIIPE	SNAPII
A	Mean	35.0	21.3	M	Mean	22.6	8.1
	SEM	2.7	1.9		SEM	2.0	1.9
B	Mean	4.3	2.7	N	Mean	6.5	3.7
	SEM	0.6	0.4		SEM	0.4	0.3
C	Mean	11.2	6.6	O	Mean	15.0	9.5
	SEM	0.7	0.4		SEM	0.7	0.5
D	Mean	7.8	4.8	P	Mean	29.6	14.9
	SEM	0.7	0.4		SEM	3.0	2.5
E	Mean	12.0	6.1	Q	Mean	6.0	4.0
	SEM	0.6	0.4		SEM	0.6	0.4
F	Mean	11.6	7.9	R	Mean	9.5	6.4
	SEM	0.5	0.4		SEM	0.6	0.4
G	Mean	7.4	4.0	S	Mean	8.6	5.4
	SEM	0.5	0.4		SEM	0.7	0.4
H	Mean	6.0	3.3	T	Mean	12.5	7.4
	SEM	0.6	0.4		SEM	0.7	0.5
I	Mean	10.0	6.7	U	Mean	33.9	20.3
	SEM	0.5	0.3		SEM	1.9	1.3
J	Mean	7.6	4.8	V	Mean	10.9	6.1
	SEM	0.8	0.5		SEM	0.5	0.3
K	Mean	7.0	4.6	W	Mean	12.0	8.8
	SEM	0.8	0.5		SEM	0.9	0.6
L	Mean	7.6	5.3	X	Mean	6.9	4.3
	SEM	0.6	0.5		SEM	0.5	0.4
Total	Mean	10.1	6.1				
	SEM	0.1	0.1				

Presentation #28a
Mean illness severity on admission among sites
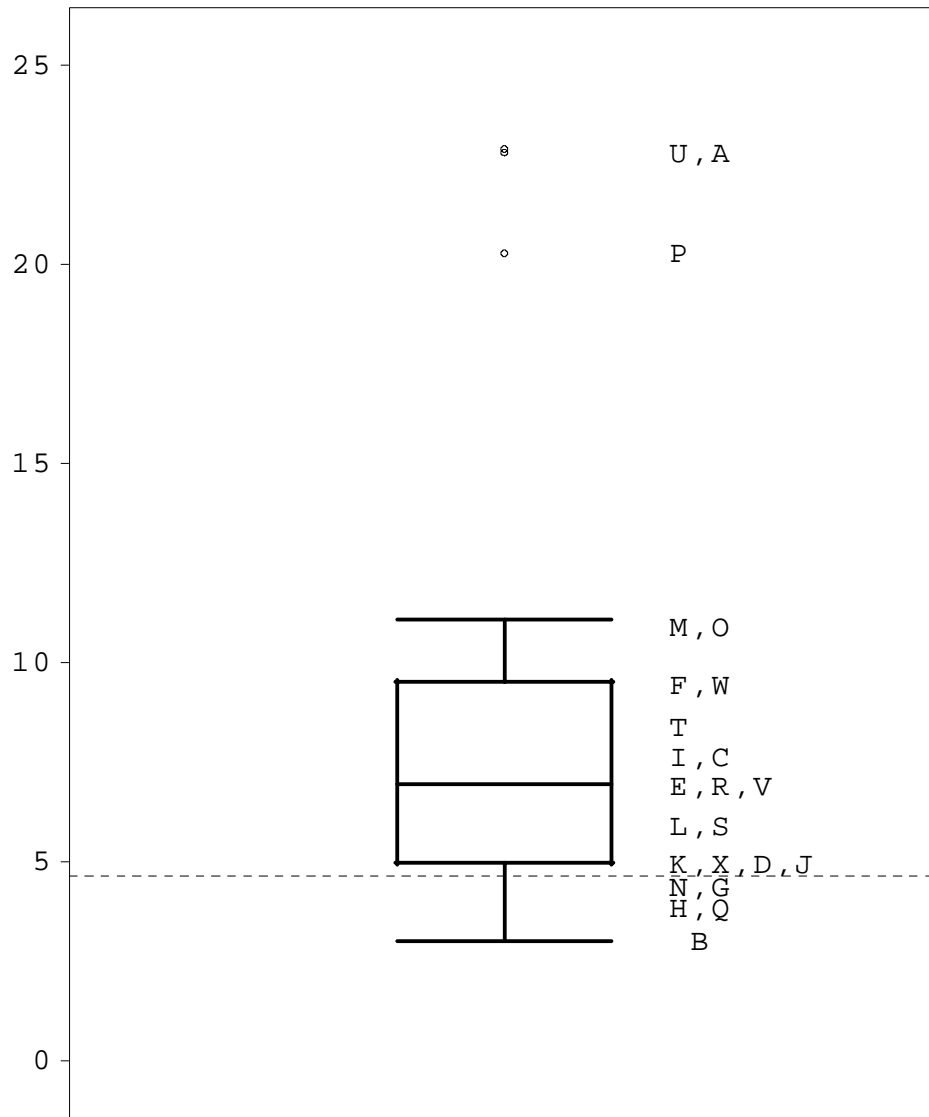
This BOX plot shows the smallest observation, 25th percentile, median, 75th percentile and largest observation. It also indicates which observations, if any, might be considered outliers.

…..- a line indicating the 5 sites with the lowest rate.

Presentation #29
Survival rate by gestational age in each site

Site	Percentage survival for each gestational age (weeks)							
	≤26	27-28	29-30	31-32	33-34	35-36	≥37	Mean*
A	66.7	73.1	NA	NA	NA	NA	NA	69.4
B	NA	100.0	75.0	100.0	100.0	100.0	100.0	99.5
C	57.8	96.8	97.6	100.0	99.2	95.8	94.7	93.8
D	62.5	92.3	100.0	98.0	99.3	98.7	98.1	96.7
E	76.9	91.3	92.3	92.7	97.3	82.7	93.6	91.2
F	95.0	97.9	98.4	99.1	97.2	99.2	99.3	98.4
G	81.8	85.7	92.9	98.2	97.9	97.3	100.0	98.0
H	100.0	100.0	100.0	100.0	100.0	100.0	98.3	99.3
I	70.2	94.5	100.0	99.0	97.9	100.0	97.6	96.4
J	NA	80.0	84.6	100.0	100.0	100.0	99.1	98.1
K	50.0	85.7	100.0	100.0	100.0	100.0	98.8	97.7
L	70.0	86.7	100.0	100.0	98.1	100.0	98.9	98.1
M	85.7	75.0	NA	NA	NA	NA	75.0	78.9
N	63.6	95.5	100.0	100.0	97.8	96.9	99.2	97.6
O	81.3	95.6	94.6	100.0	98.9	100.0	98.8	95.3
P	66.7	87.5	NA	NA	NA	NA	NA	79.5
Q	60.0	90.9	100.0	97.1	98.2	100.0	98.8	98.0
R	33.3	90.0	100.0	100.0	100.0	100.0	98.8	98.0
S	81.8	90.5	100.0	96.8	98.8	100.0	100.0	97.9
T	85.0	90.6	100.0	98.8	96.8	95.7	96.7	96.1
U	81.0	96.3	NA	NA	100.0	100.0	100.0	89.3
V	72.2	90.4	98.2	97.5	98.0	99.2	98.9	95.7
W	64.3	94.4	100.0	100.0	100.0	100.0	100.0	98.2
X	55.0	89.7	97.1	100.0	100.0	99.3	99.7	97.9
Mean**	74.5%	92.2%	97.7%	98.8%	98.5%	98.4%	98.3%	96.5%

Mean* = (number of infants survived for site / total number of infants for site)*100
Mean** = (number of infants for gestational age category / total number of infants in gestational age category)*100
NA = non-applicable

Presentation #30
Survival rate by birth weight in each site

| Site	Percentage survival for each birth weight (g) category								
	<500	500-749	750-999	1000-1249	1250-1499	1500-2499	2500-4499	>4499	Mean*
A	NA	68.4	73.7	68.4	60.0	NA	NA	NA	69.4
B	NA	100.0	NA	100.0	75.0	100.0	100.0	100.0	99.5
C	14.3	63.0	86.4	97.4	97.4	96.8	97.5	100.0	93.8
D	0.0	70.0	76.2	94.6	100.0	99.1	98.3	100.0	96.7
E	0.0	80.0	75.6	92.3	96.2	88.9	94.2	92.3	91.0
F	100.0	96.6	96.0	95.9	94.4	99.7	98.7	100.0	98.4
G	NA	75.0	86.7	88.9	85.7	99.0	99.4	100.0	98.0
H	NA	100.0	100.0	100.0	100.0	99.0	100.0	100.0	99.6
I	33.3	71.9	83.3	96.4	100.0	98.6	97.8	100.0	96.4
J	NA	100.0	66.7	83.3	100.0	100.0	99.2	100.0	98.1
K	NA	25.0	88.9	100.0	100.0	100.0	99.1	100.0	97.7
L	NA	50.0	89.5	83.3	95.2	98.9	99.2	100.0	98.1
M	100.0	100.0	100.0	33.3	NA	100.0	66.7	NA	78.9
N	0.0	57.1	94.7	96.6	96.0	98.3	99.0	100.0	97.6
O	66.7	78.3	89.1	97.5	95.1	98.9	100.0	100.0	95.3
P	NA	83.3	86.7	72.7	83.3	NA	NA	NA	81.6
Q	0.0	100.0	83.3	92.3	95.5	99.0	99.0	100.0	98.0
R	NA	33.3	57.1	100.0	100.0	99.3	99.1	100.0	98.0
S	NA	61.5	94.4	100.0	100.0	98.9	99.4	100.0	97.9
T	100.0	89.5	86.2	95.7	96.2	96.7	97.5	88.9	96.1
U	NA	72.0	91.3	92.6	100.0	100.0	100.0	NA	89.2
V	0.0	63.4	88.3	95.1	98.6	98.1	99.7	100.0	95.8
W	0.0	83.3	89.5	94.1	95.0	100.0	100.0	100.0	98.2
X	0.0	63.6	70.0	97.1	96.3	99.6	99.7	100.0	97.9
Mean**	33.3%	73.0%	86.2%	94.1%	96.4%	98.4%	98.6%	98.8%	96.5%

Mean* = (number of infants survived for site / total number of infants for site)*100
Mean** = (number of infants survived for gestational category / total number of infants in gestational category)*100
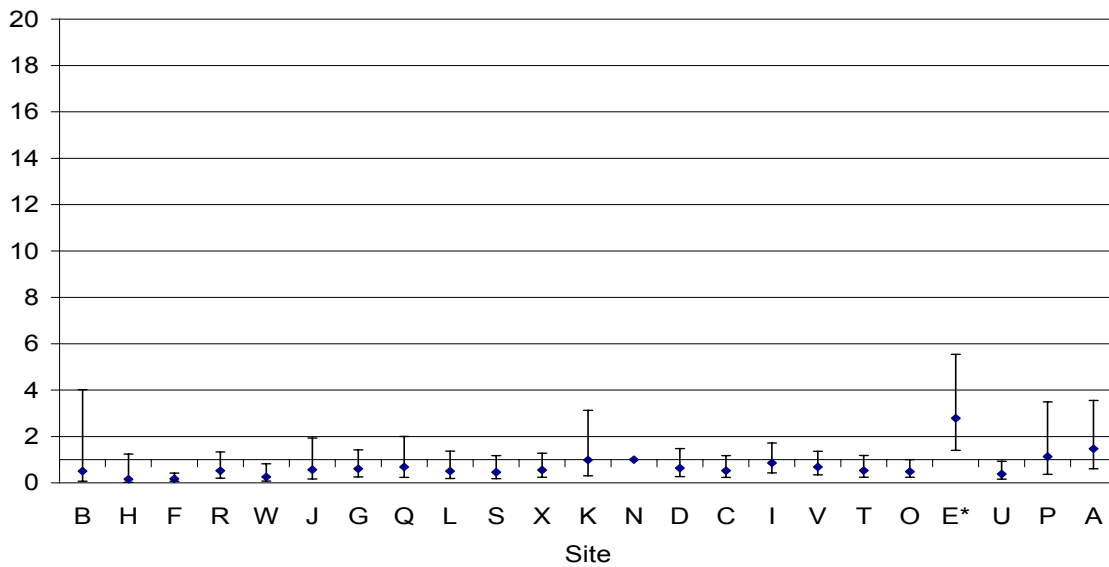NA = non-applicable

Presentation #30 *(continued)*
Site comparison of mortality (no adjustment for congenital anomalies)
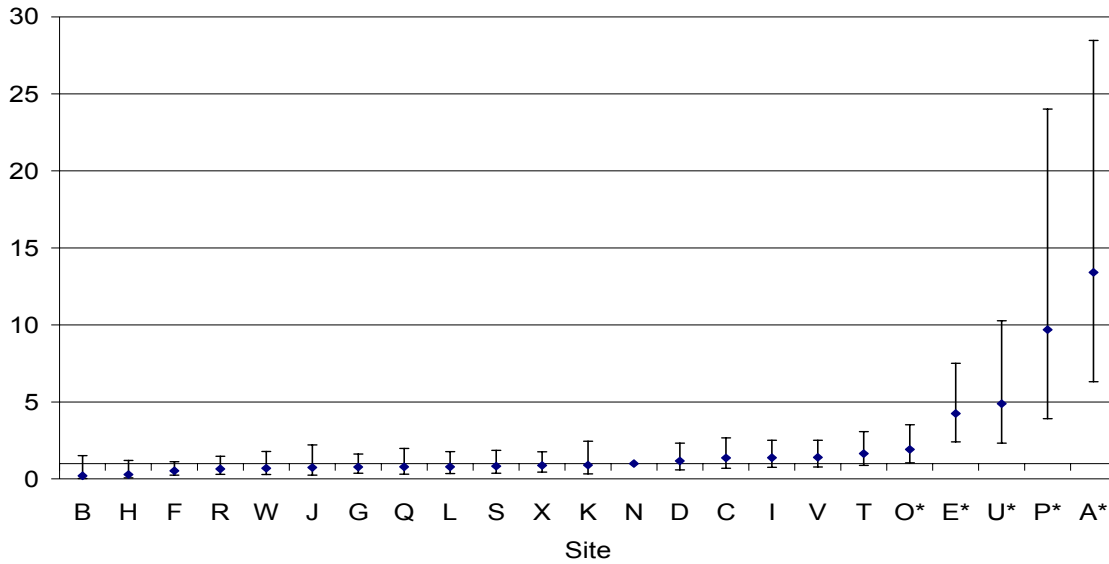
Crude Odds Ratio

Adjusted Odds Ratio

Reference site: N (Site M excluded due to small sample size)
*Sites significantly different from reference site (P<0.05)

Inclusion criteria:
Age at admission less than 4 days
Not moribund on admission

Mortality is attributed to the Network hospital of first admission.

Significant predictors identified by multivariate analysis and adjusted for:

SNAP-II
Apgar at 5 min
Gestational age
Birth weight
Antenatal steroids

Presentation#30 *(continued)*
Site comparison of mortality (adjustment for congenital anomalies)

Crude Odds Ratio

Adjusted Odds Ratio

Reference site: N (site M excluded due to small sample size)
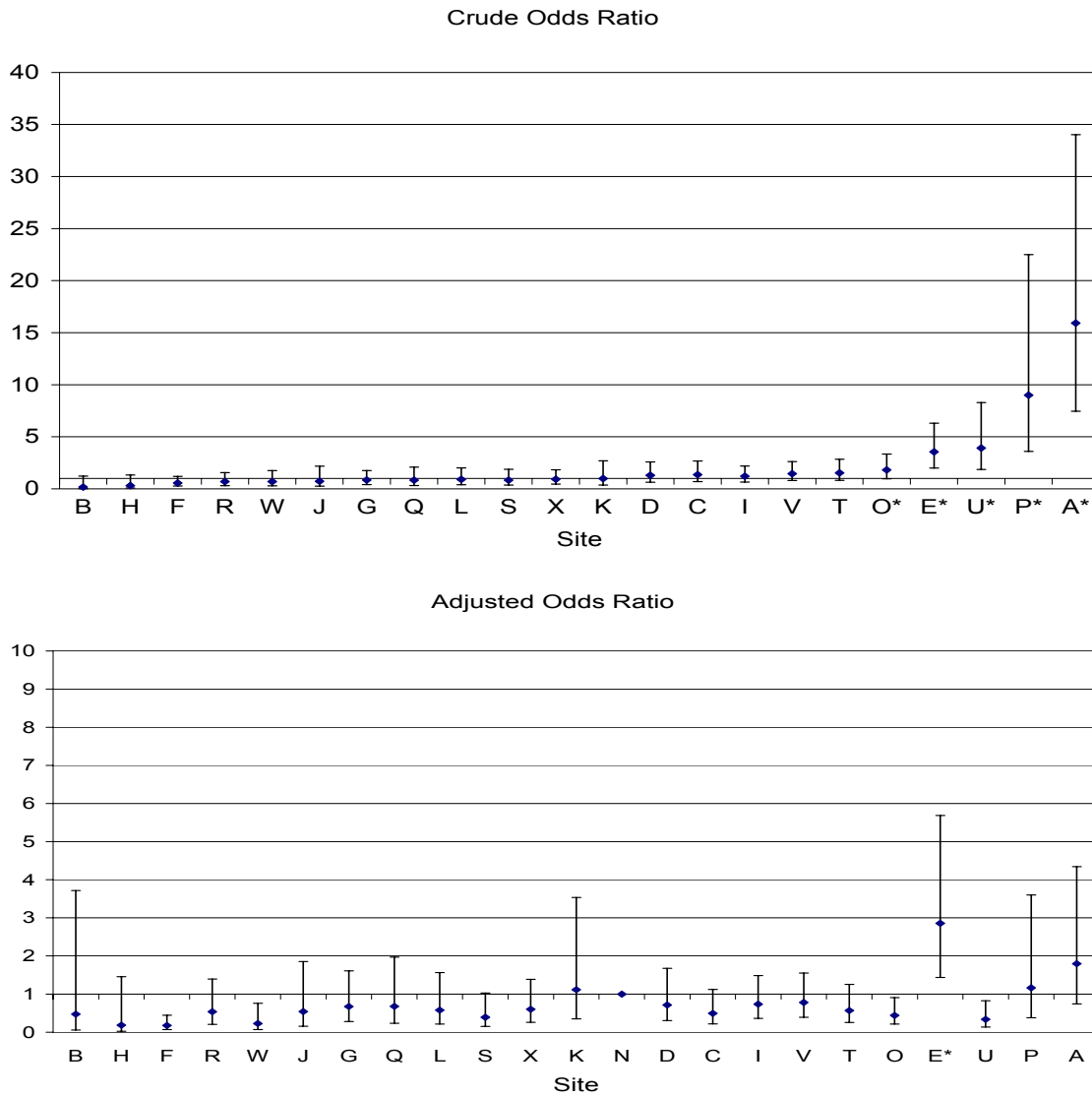***Sites significantly different from reference site (P<0.05)**

Inclusion criteria:
Age at admission less than 4 days
Not moribund on admission

Mortality is attributed to the Network hospital of first admission.

Significant predictors identified by multivariate analysis and adjusted for:

Congenital anomalies
SNAP-II
Apgar at 5 min
Birth weight
Antenatal steroids
Gestational age

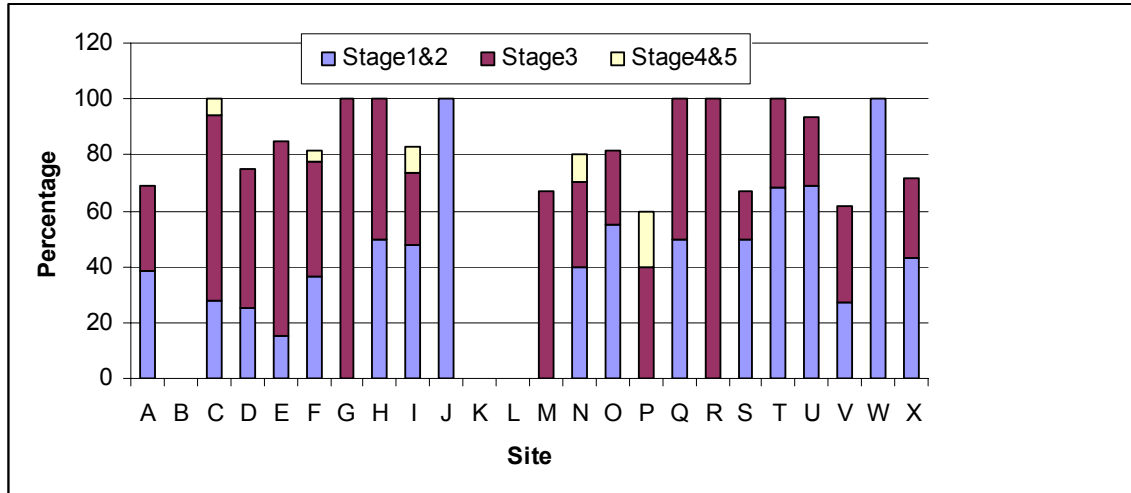**Presentation #31**
SNAP-II PE adjustment site mortality rates

☐ Crude mortality rate ☐ SNAPIIPE standardized mortality rate
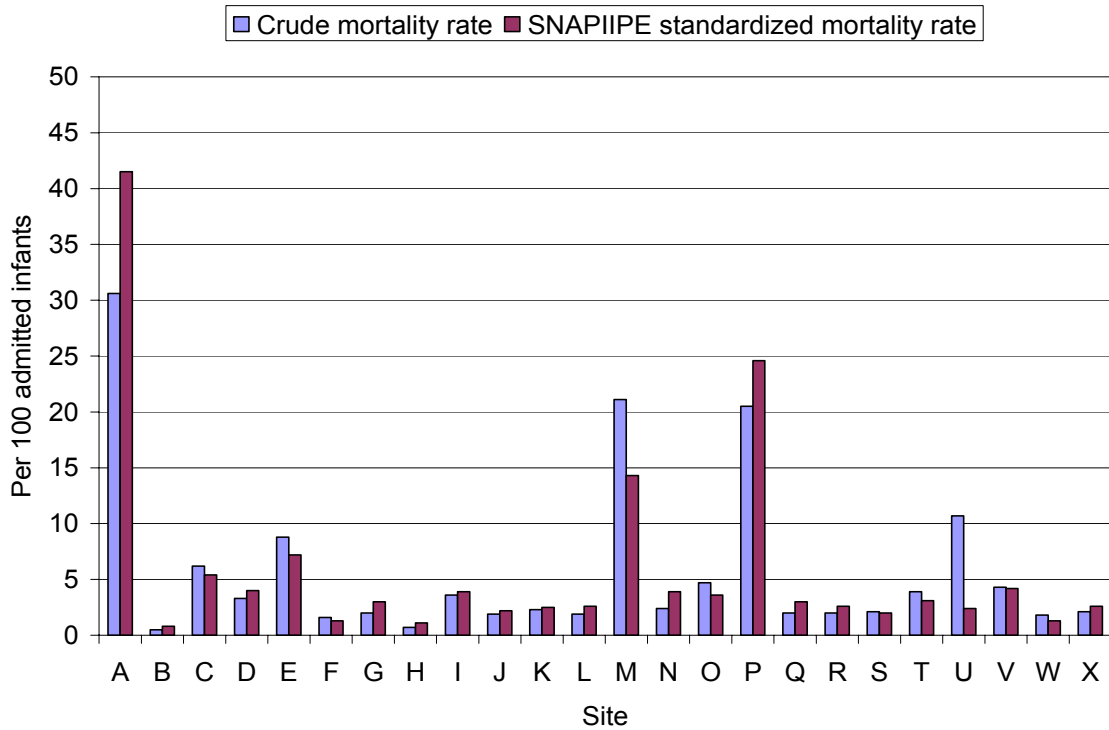
Site	Mortality rate (%)	SNAP-II PE Standardized rate (%)
A	30.6	41.5
B	0.5	0.8
C	6.2	5.4
D	3.3	4.0
E	8.8	7.2
F	1.6	1.3
G	2	3.0
H	0.7	1.1
I	3.6	3.9
J	1.9	2.2
K	2.3	2.5
L	1.9	2.6
M	21.1	14.3
N	2.4	3.9
O	4.7	3.6
P	20.5	24.6
Q	2	3.0
R	2	2.6
S	2.1	2.0
T	3.9	3.1
U	10.7	2.4
V	4.3	4.2
W	1.8	1.3
X	2.1	2.6
Mean	3.5	3.5

COMMENTS: SNAP-II PE standardized mortality rates were calculated by adjusting mortality for illness severity. Mortality is attributed to the hospital of first admission.
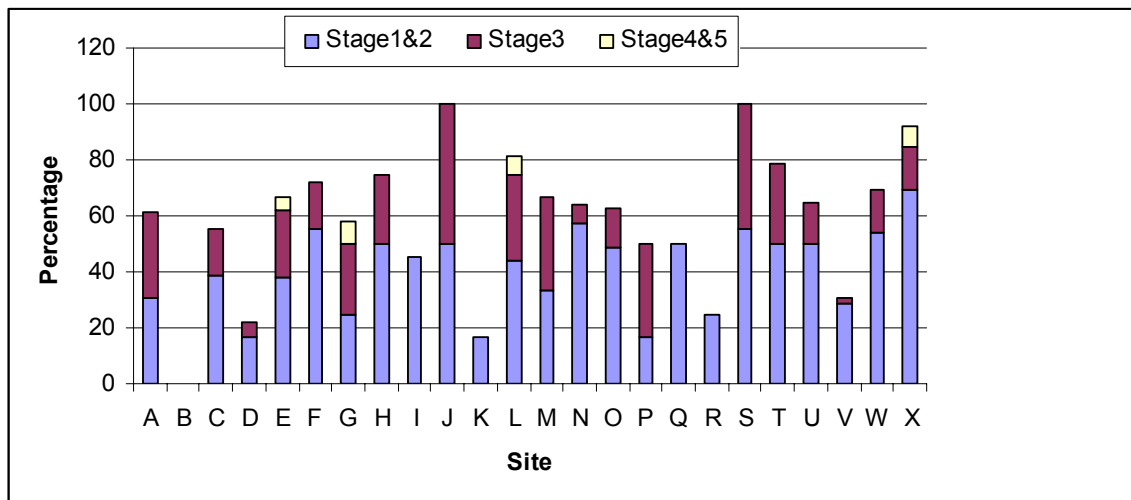
F. Site Comparisons – Morbidity Outcomes

Presentation #32
Incidence of retinopathy of prematurity among infants with eye exams with birth weight <1500g

A. <750g

B. 750-999g

Presentation #32 (*continued*)
Incidence of retinopathy of prematurity among infants with eye exams with birth weight <1500g

C. 1000-1249g

D. 1250-1499g (note: no sites in this BW category with infants diagnosed with Stage 4/5 ROP)

COMMENTS: Not all centres have infants in each birth weight category. Infants who are transferred to non-participating CNN centres are not captured here.

Presentation #33
Treatment for retinopathy of prematurity among infants with eye exams with birth weight <1500g
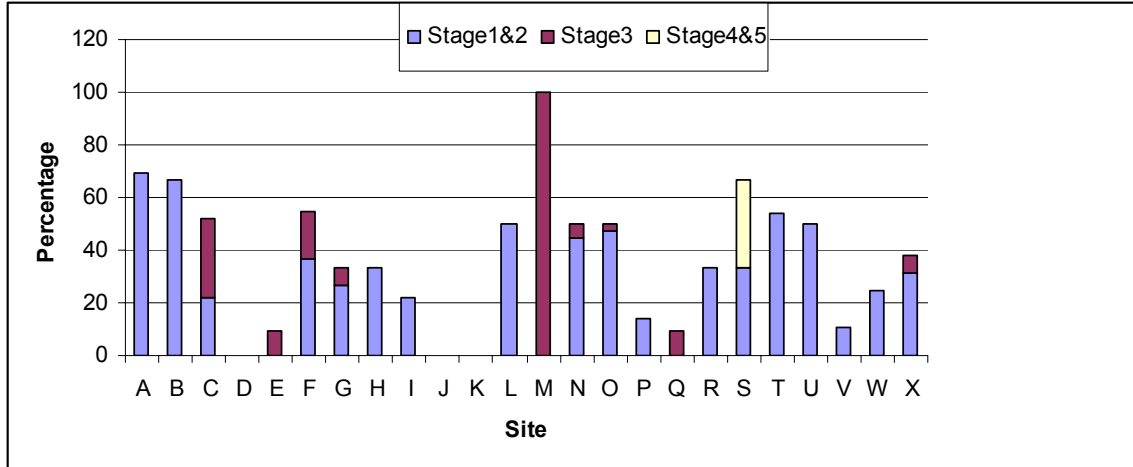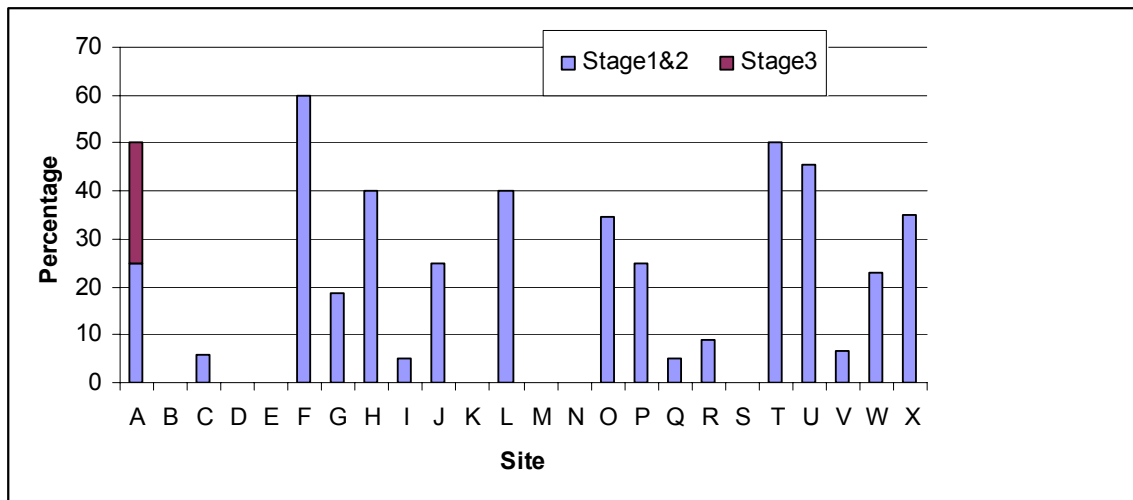
A. <750g

B. 750-999g

Presentation #33 (*continued*)
Treatment for retinopathy of prematurity among infants with eye exams with birth weight <1500g

C. 1000-1249g
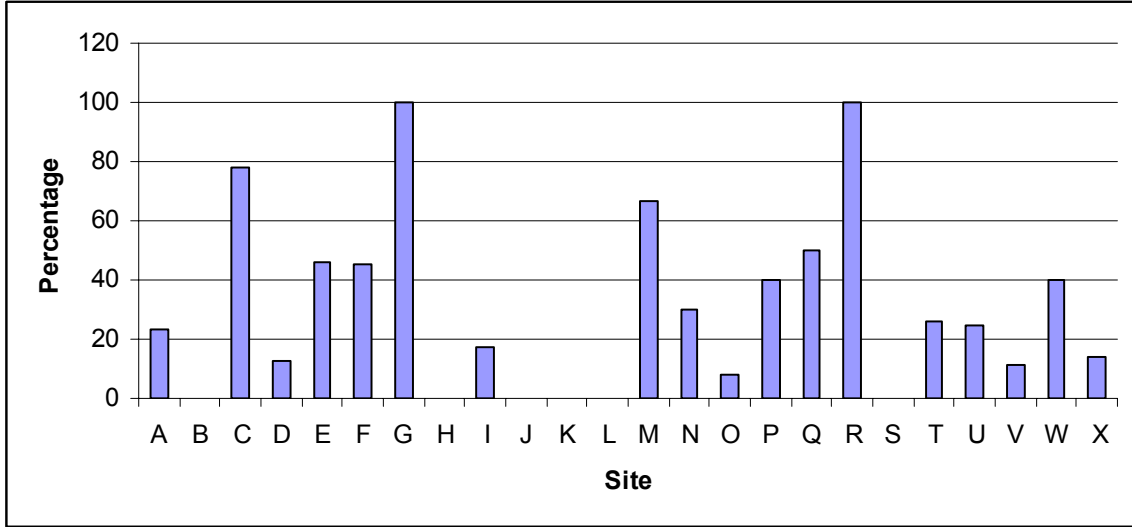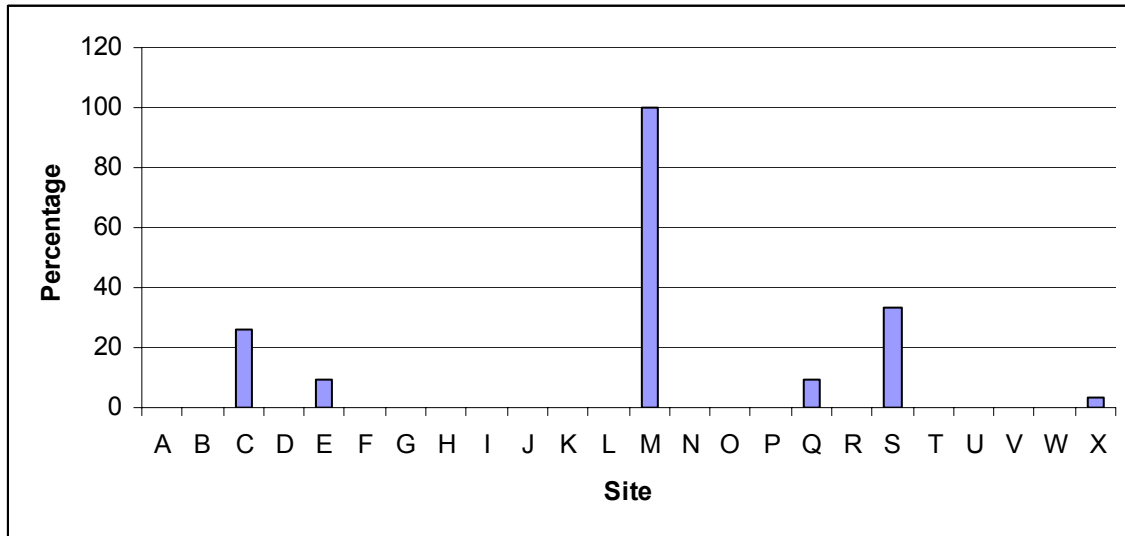

D. 1250-1499g
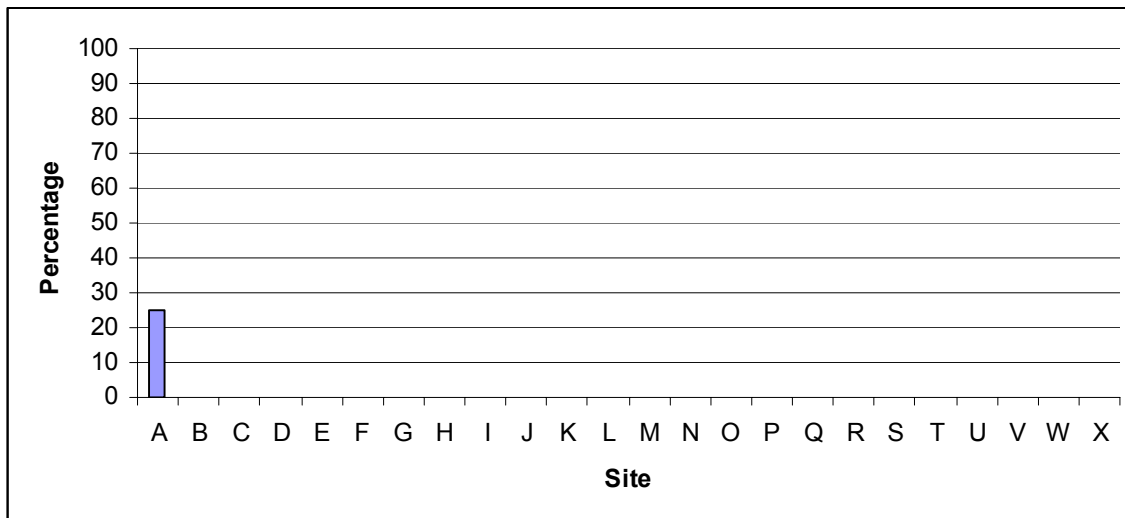
COMMENTS: Not all centres have infants in each birth weight category. Infants who are transferred to non-participating CNN centres are not captured here.
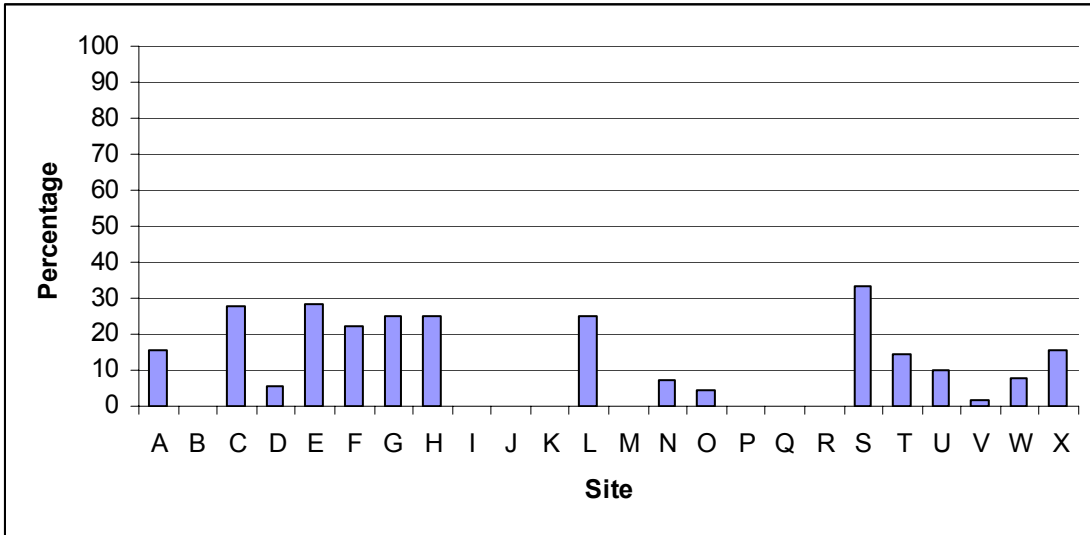
Presentation #34
Incidence of necrotizing enterocolitis
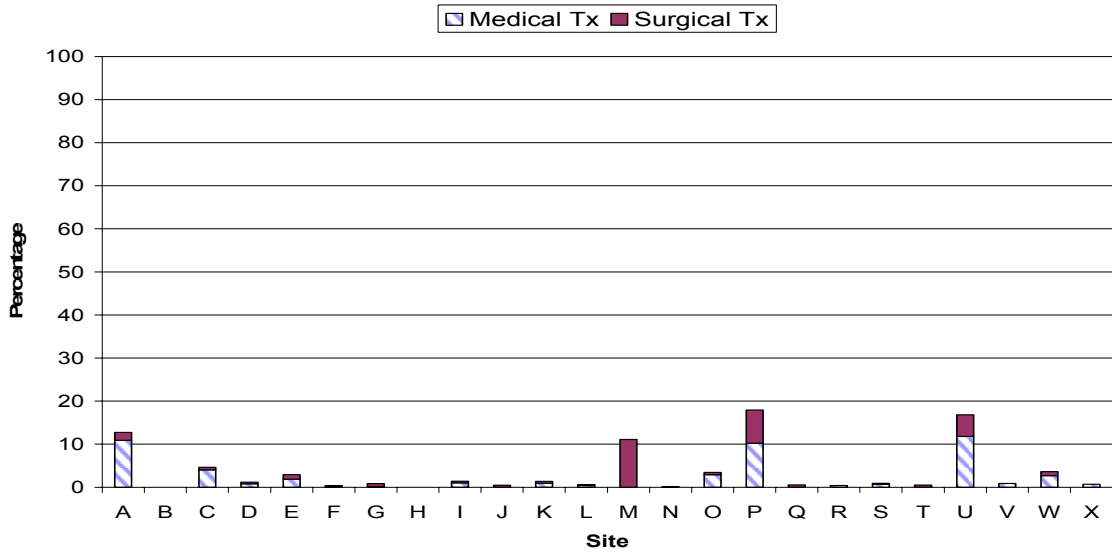
Site	Treatment (%)		
	Medical Tx	Surgical Tx	Any
A	10.9	1.8	12.7
B	0.0	0.0	0.0
C	4.0	0.6	4.6
D	0.8	0.4	1.2
E	1.9	1.0	2.9
F	0.1	0.2	0.4
G	0.2	0.7	0.8
H	0.0	0.0	0.0
I	1.0	0.3	1.4
J	0.0	0.5	0.5
K	0.9	0.5	1.4
L	0.4	0.2	0.6
M	0.0	11.1	11.1
N	0.0	0.1	0.1
O	2.9	0.5	3.4
P	10.3	7.7	17.9
Q	0.0	0.6	0.6
R	0.4	0.0	0.4
S	0.7	0.2	0.9
T	0.0	0.5	0.5
U	11.8	5.0	16.8
V	0.9	0.0	0.9
W	2.7	0.9	3.6
X	0.7	0.0	0.7
Total	1.1	0.4	1.5

Presentation #34a
Incidence of necrotizing enterocolitis for infants <32 weeks gestational age
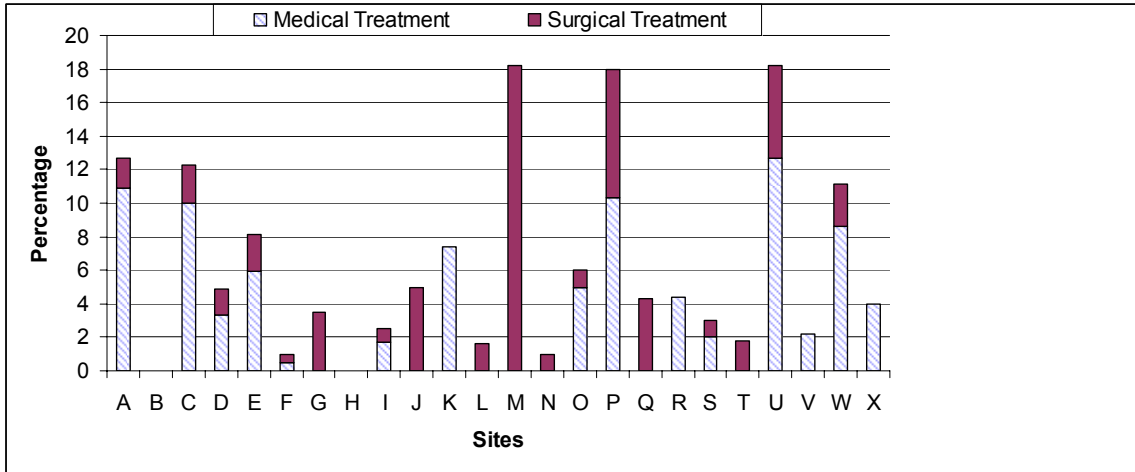
Site	Treatment (%)		
	Medical Tx	**Surgical Tx**	**Any**
A	10.9	1.8	12.7
B	0.0	0.0	0.0
C	10.0	2.3	12.3
D	3.3	1.6	4.9
E	5.9	2.2	8.1
F	.5	.5	1.0
G	0.0	3.5	3.5
H	0.0	0.0	0.0
I	1.7	.8	2.5
J	0.0	5.0	5.0
K	7.4	0.0	7.4
L	0.0	1.6	1.6
M	0.0	18.2	18.2
N	0.0	1.0	1.0
O	5.0	1.0	6.0
P	10.3	7.7	18.0
Q	0.0	4.3	4.3
R	4.4	0.0	4.4
S	2.0	1.0	3.0
T	0.0	1.8	1.8
U	12.7	5.5	18.2
V	2.2	0.0	2.2
W	8.6	2.5	11.1
X	4.0	0.0	4.0
Total	3.6	1.6	5.2

Presentation #35
Use of antibiotics on Day 1 and primary infection rates

Site	Mean number of days in NICU	Antibiotic use on day 1 % of infants	Primary infection infants	Primary infection %
A	71.08	90.5%	1	1.6%
B	18.32	18.2%	3	1.6%
C	24.35	64.0%	1	.2%
D	18.90	42.2%	7	1.3%
E	15.12	86.6%	1	.1%
F	12.72	56.7%	4	.5%
G	15.37	65.7%	3	.5%
H	18.80	43.6%	1	.3%
I	15.80	71.0%	4	.5%
J	16.70	51.8%	4	1.8%
K	18.17	28.3%	0	
L	18.10	61.5%	4	.8%
M	23.80	56.9%	0	
N	16.68	46.7%	6	.8%
O	21.95	84.8%	14	2.5%
P	49.58	90.0%	2	5.0%
Q	21.50	66.9%	3	.8%
R	12.24	66.1%	3	.5%
S	16.64	59.8%	3	.6%
T	20.25	76.0%	6	.9%
U	64.59	90.2%	2	1.6%
V	17.76	80.4%	0	
W	20.10	39.5%	3	.9%
X	18.06	62.0%	7	1.0%
ALL	18.45	63.7%	82	.7%

Presentation #35 (*continued*)
Positive blood and CSF cultures by admission

Site	Blood culture			CSF culture		
	cultures per admission	positive per admission	% positive	cultures per admission	positive per admission	% positive
A	2.3	0.3	11.6%	0.2	0.000	0.0%
B	0.3	0.0	8.2%	0.1	0.000	0.0%
C	1.1	0.1	11.8%	0.2	0.002	1.1%
D	0.8	0.1	12.8%	0.0	0.000	0.0%
E	1.0	0.2	25.0%	0.3	0.003	0.8%
F	0.9	0.1	6.1%	0.2	0.001	0.5%
G	1.3	0.1	6.4%	0.1	0.000	0.0%
H	0.5	0.0	3.3%	0.0	0.000	0.0%
I	0.9	0.1	10.0%	0.2	0.002	1.3%
J	1.2	0.0	3.7%	0.1	0.000	0.0%
K	0.5	0.1	11.7%	0.0	0.009	25.0%
L	0.9	0.1	5.8%	0.1	0.000	0.0%
M	3.5	0.3	8.8%	0.3	0.016	5.0%
N	0.9	0.1	8.5%	0.1	0.009	6.8%
O	1.3	0.2	15.5%	0.3	0.012	4.2%
P	2.2	0.4	17.0%	0.3	0.000	0.0%
Q	1.0	0.1	12.2%	0.1	0.006	6.3%
R	1.0	0.0	3.6%	0.0	0.000	0.0%
S	1.0	0.1	8.4%	0.1	0.010	10.6%
T	1.1	0.2	16.2%	0.2	0.006	3.9%
U	2.8	0.2	8.4%	0.3	0.008	2.7%
V	1.2	0.1	7.8%	0.2	0.005	2.1%
W	0.7	0.1	22.1%	0.0	0.000	0.0%
X	1.0	0.1	6.1%	0.1	0.001	1.7%

COMMENTS: Percentage of positive cultures of blood or cerebrospinal fluid at any time during hospital stay varied among sites. This does not include cultures that may have been taken in hospitals of birth prior to transfer.

Presentation #36
Incidence of nosocomial infection*
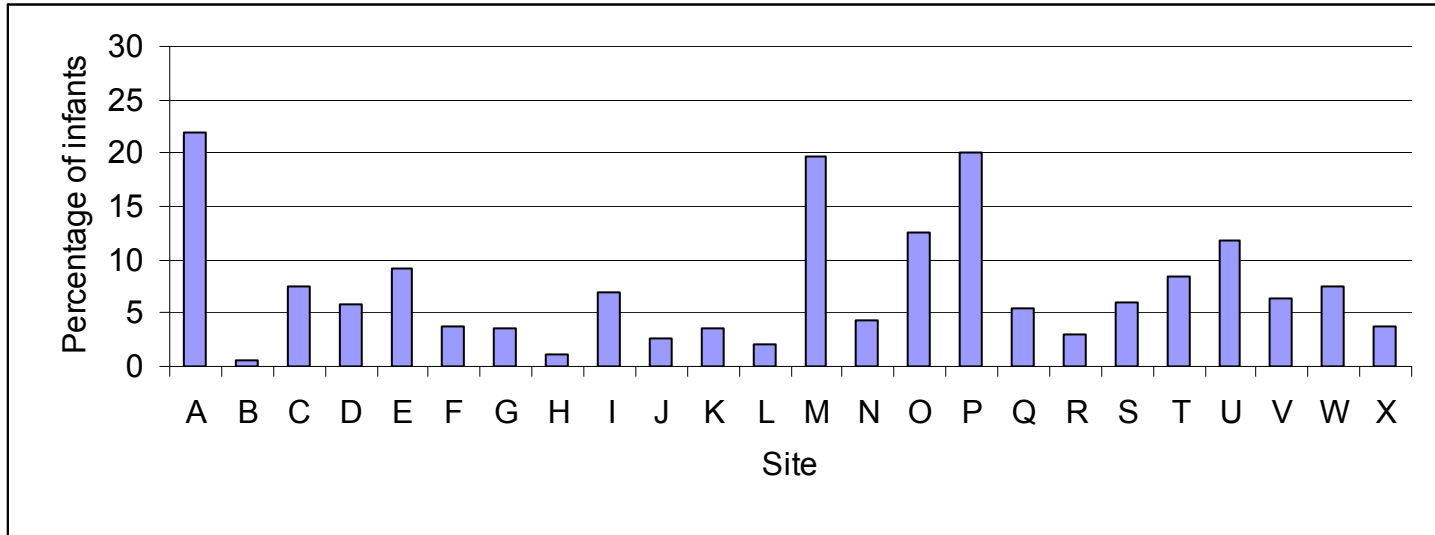
Site	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Mean
%	22.0	0.5	7.6	5.8	9.2	3.8	3.5	1.0	6.9	2.7	3.6	2.1	19.6	4.4	12.5	20.0	5.4	2.9	5.9	8.4	11.8	6.3	7.6	3.8	5.9

*Nosocomial infection indicates any positive blood and/or cerebrospinal fluid culture 2 days following admission (analysis is infant-based and deaths <3 days are excluded).

Presentation #36a
Incidence of nosocomial infection* for infants <32 weeks gestational age
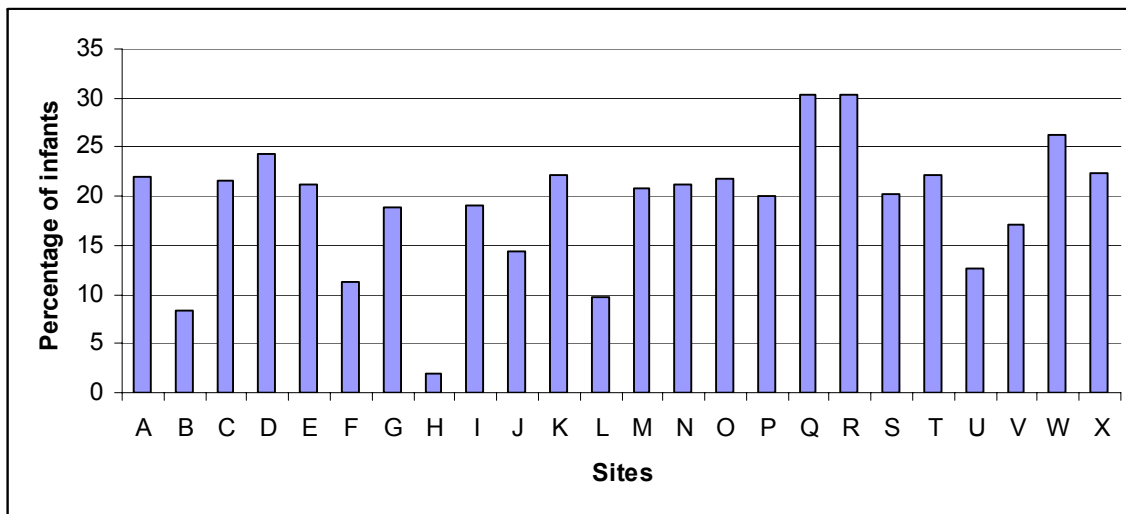
Site	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Mean
%	22.0	8.3	21.5	24.4	21.2	11.3	18.9	2.0	19.1	14.3	22.2	9.8	20.9	21.1	21.8	20.0	30.4	30.4	20.2	22.1	12.7	17.1	26.3	22.4	19.4

*Nosocomial infection indicates any positive blood and/or cerebrospinal fluid culture 2 days following admission (analysis is infant-based and deaths <3 days are excluded).

Presentation #37
**Nosocomial infection per 100 patient days***

Site	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Average Rate
Infections per 100 patient days	0.4	0.1	0.4	0.4	0.8	0.3	0.4	0.1	0.5	0.2	0.3	0.2	0.8	0.4	0.6	0.5	0.4	0.3	0.4	0.5	0.2	0.4	0.5	0.3	0.4

*Nosocomial infection indicates positive blood and/or cerebrospinal fluid culture 2 days following admission (includes all admissions)

COMMENTS: Considerable variation still persists when nosocomial infections are analyzed as infections per 100 patient days. Percentiles are shown in Presentation #38.

Presentation #38
Nosocomial infection per 100 patient days among sites
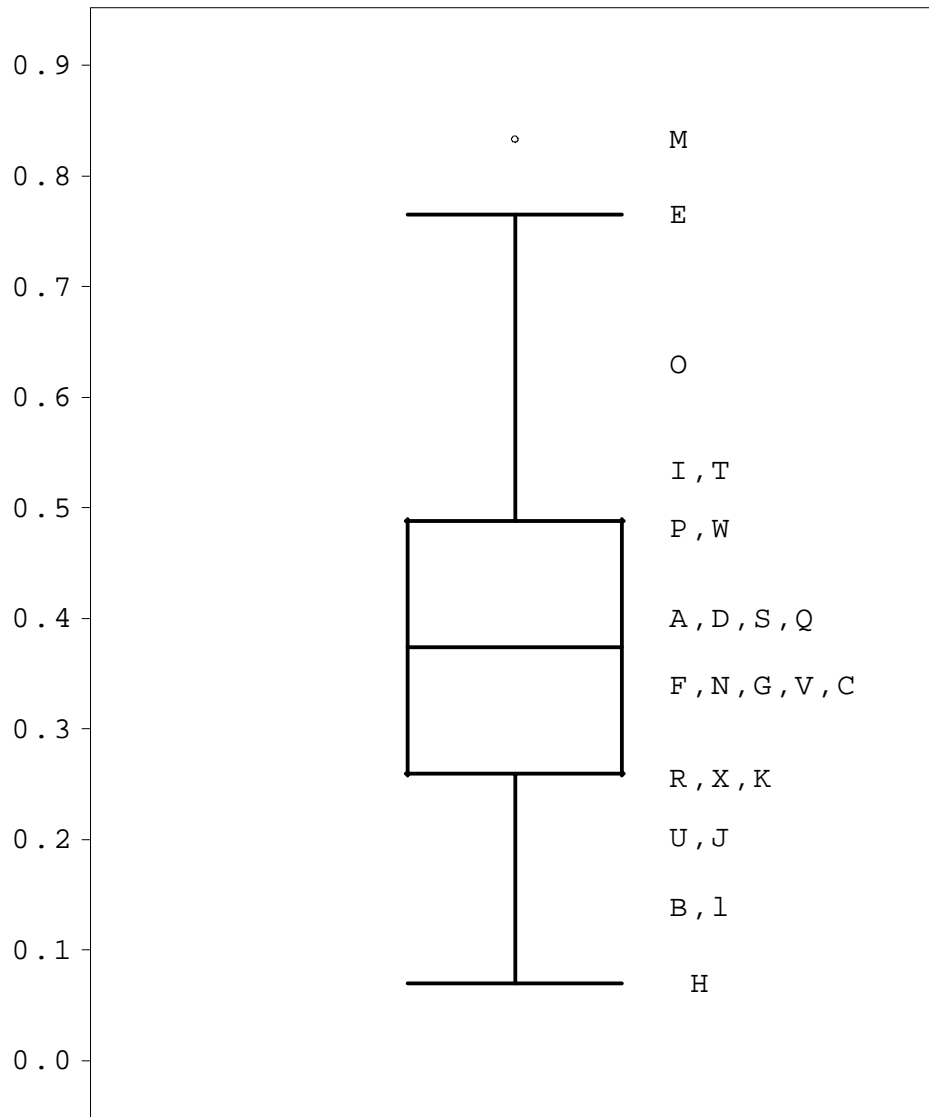
This box plot shows the smallest observation, 25th percentile, median, 75th percentile and largest observation. It also indicates which observations, if any, might be considered outliers.

Presentation #39
Incidence of bronchopulmonary dysplasia (28 days) in infants with gestational age
≤32 weeks at birth

Site	Gestational age at birth						Mean*
	≤22	23-24	25-26	27-28	29-30	31-32	
A	N/A	100.0	72.0	13.0	N/A	N/A	44.9
B	N/A	N/A	N/A	33.3	N/A	23.1	21.1
C	N/A	80.0	95.7	74.2	31.7	1.4	37.1
D	N/A	100.0	100.0	25.0	6.7	N/A	19.9
E	100.0	45.5	53.3	38.1	16.2	5.3	27.5
F	N/A	83.3	89.7	53.2	33.9	17.6	42.0
G	N/A	100.0	76.5	83.3	22.2	9.1	28.3
H	N/A	50.0	80.0	50.0	12.0	7.1	20.6
I	N/A	69.2	55.6	19.2	5.2	3.8	15.4
J	N/A	N/A	N/A	25.0	18.2	N/A	7.9
K	N/A	N/A	100.0	57.1	12.5	N/A	22.2
L	N/A	100.0	100.0	53.8	6.3	5.8	20.5
M	N/A	N/A	50.0	50.0	N/A	N/A	40.0
N	N/A	100.0	72.7	45.5	12.9	1.3	19.4
O	N/A	100.0	57.4	20.7	9.1	1.4	24.7
P	N/A	100.0	87.5	69.6	N/A	N/A	75.8
Q	N/A	100.0	100.0	40.0	18.2	5.9	21.1
R	N/A	100.0	100.0	88.9	35.3	5.9	30.2
S	N/A	100.0	75.0	42.1	15.4	3.2	23.0
T	N/A	86.7	76.2	32.3	16.4	1.2	23.7
U	N/A	80.0	86.0	45.3	N/A	N/A	64.4
V	N/A	90.0	75.0	48.5	24.3	10.0	32.4
W	N/A	100.0	22.2	35.3	34.5	7.0	23.0
X	N/A	100.0	76.9	35.7	17.6	7.0	25.2
Mean**	50.0	84.6	74.4	40.3	18.0	5.9	28.4

NA = non-applicable
Note: Outcome is attributed to the hospital of first admission

Presentation #40
Incidence of bronchopulmonary dysplasia (36 weeks) in infants with gestational age
**≤32 weeks at birth**

Site			Gestational age at birth				
	≤22	23-24	25-26	27-28	29-30	31-32	Mean*
A	NA	100.0	39.1	25.0	NA	NA	34.1
B	NA	NA	NA	NA	NA	15.4	10.5
C	NA	80.0	82.6	54.8	22.0	1.4	29.4
D	NA	75.0	84.6	20.8	6.7	NA	16.3
E	100.0	72.7	69.0	38.1	16.7	2.6	32.4
F	NA	88.9	69.2	55.3	33.9	17.6	39.8
G	NA	NA	70.6	NA	18.5	3.6	17.9
H	NA	50.0	60.0	50.0	4.0	7.1	16.2
I	NA	53.8	33.3	9.6	3.9	2.9	9.9
J	NA	NA	NA	50.0	9.1	4.3	10.5
K	NA	NA	NA	57.1	12.5	NA	13.9
L	NA	100.0	50.0	23.1	6.3	3.8	11.4
M	100.0	100.0	75.0	66.7	NA	NA	77.8
N	NA	80.0	40.0	40.9	6.5	NA	13.3
O	NA	50.0	22.2	23.0	11.4	1.4	16.5
P	NA	100.0	62.5	36.4	NA	NA	46.9
Q	NA	NA	100.0	10.0	9.1	NA	8.7
R	NA	100.0	100.0	44.4	17.6	NA	15.9
S	NA	33.3	66.7	15.8	10.3	3.2	13.8
T	NA	46.7	65.0	35.5	14.5	NA	19.0
U	NA	100.0	79.1	21.2	NA	NA	50.0
V	NA	100.0	67.4	42.4	21.5	9.2	29.0
W	NA	100.0	71.4	47.1	41.4	4.7	29.6
X	NA	NA	27.3	25.9	17.6	4.7	15.7
Mean**	100.0	60.3	50.0	24.1	11.6	2.9	17.9

NA = non-applicable
Note: Outcome is attributed to the hospital of first admission

Presentation #41
Percentage of infants with gestational age ≤32 weeks at birth with postnatal use of steroids for any indication*
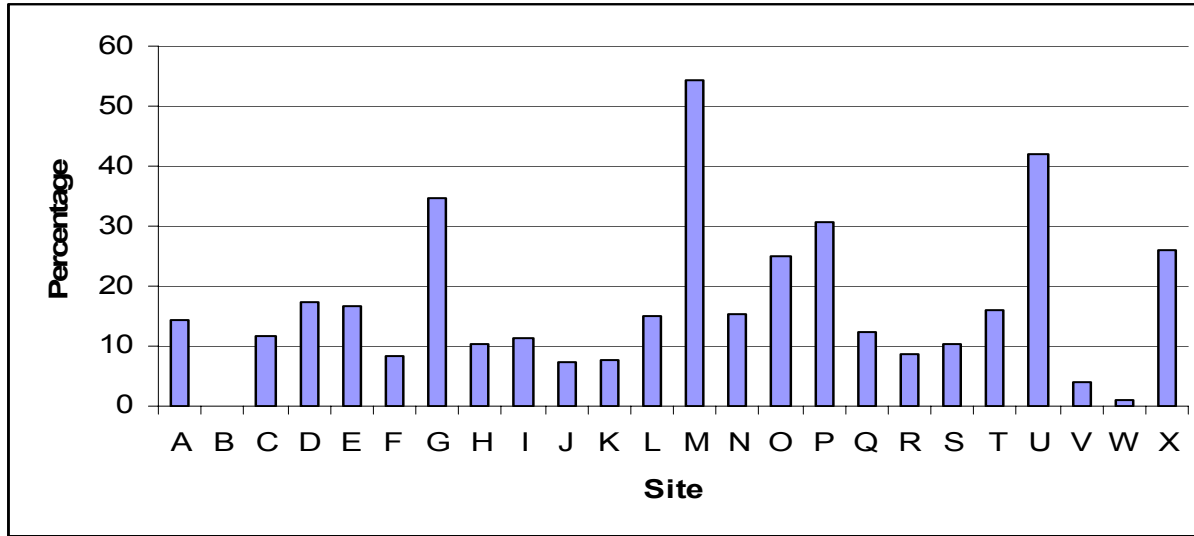
Postnatal Steroid Use	Site																								
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Total
%	14.5	0.0	11.7	17.2	16.8	8.3	34.8	10.3	11.3	7.3	7.7	15.1	54.5	15.3	24.9	30.8	12.5	8.6	10.3	16.0	42.0	4.0	1.0	26.0	15.0

*Percentage of infants to each network NICU and result is attributed to original hospital.

COMMENTS: Specific criteria for these treatments in each hospital are not documented here.

Presentation #42
Use of narcotics on Day 1 (by birth weight)*

Site	<1000		1000-1499		1500-1999		2000-2499		≥2500		Total	
	bolus	infusion	bolus	infusion	bolus	infusion	bolus	infusion	bolus	infusion	bolus	infusion
A	0	0	4.2	0	0	0	0	0	0	0	1.6	0
B	0	0	14.3	0	5.6	0	0	0	0.9	0	1.6	0
C	16.1	7.1	3.8	5.1	8.8	3.5	4.8	5.7	6.0	12.6	7.1	7.5
D	15.8	7.9	22.7	0	4.3	0	5.2	0.7	4.9	3.8	8.2	2.1
E	38.5	48.1	26.7	28.0	25.4	46.3	36.6	50.0	25.3	49.3	28.7	46.6
F	8.6	11.1	5.8	3.9	5.8	3.2	5.1	1.7	6.3	7.9	6.1	5.5
G	25.0	33.3	12.2	14.6	4.8	8.3	4.3	6.0	6.0	7.3	6.6	8.6
H	0	0	14.3	3.6	0	0	0	1.7	2.8	3.4	2.8	2.4
I	23.3	9.6	13.0	4.6	10.9	1.5	12.0	6.0	13.3	11.2	13.5	7.7
J	25.0	0	11.1	0	8.0	0	10.5	0	6.8	0	8.6	0
K	0	0	0	0	0	0	0	0	0.8	0	0.4	0
L	18.2	9.1	17.9	10.7	1.3	5.1	1.0	0	6.3	7.9	5.6	6.0
M	30.0	36.7	16.7	33.3	100	100	50.0	100.0	33.3	33.3	29.4	39.2
N	13.5	10.8	11.1	5.6	8.3	5.2	4.6	3.3	6.8	5.9	7.2	5.5
O	4.4	10.5	2.5	5.0	2.9	3.8	0	2.8	1.9	6.5	2.5	5.9
P	36.4	4.5	70.6	0	0	0	0	0	0	0	52.5	2.5
Q	37.5	25.0	25.7	5.7	15.9	6.8	9.8	4.9	8.4	6.9	11.9	6.8
R	37.5	6.3	9.1	0	3.8	0	5.6	0	9.6	2.2	9.2	1.6
S	14.3	25.7	7.8	3.1	4.0	0	2.0	3.1	2.2	8.4	4.2	6.1
T	9.8	24.6	12.6	11.7	10.7	9.1	16.1	18.3	17.6	26.2	14.5	19.2
U	11.1	4.2	10.3	10.3	0	50.0	75.0	75.0	100.0	50.0	15.6	10.7
V	2.4	3.1	3.8	0.6	4.1	0.5	9.8	4.5	7.6	6.0	5.8	3.3
W	0	15.4	0	2.7	0	0	0	2.8	0.7	1.4	0.3	2.7
X	31.3	25.0	16.4	8.2	8.2	7.1	5.4	4.8	7.7	7.7	9.1	7.7
Total	**15.1**	**14.9**	**11.1**	**6.2**	**6.9**	**5.1**	**6.9**	**5.9**	**8.7**	**10.5**	**9.0**	**8.7**

*percentage of admissions in each birth weight category of each site receiving treatment
Note: This table indicates use of narcotics on Day 1 for any indication.

Presentation #43
**Use of narcotics in ventilated infants***
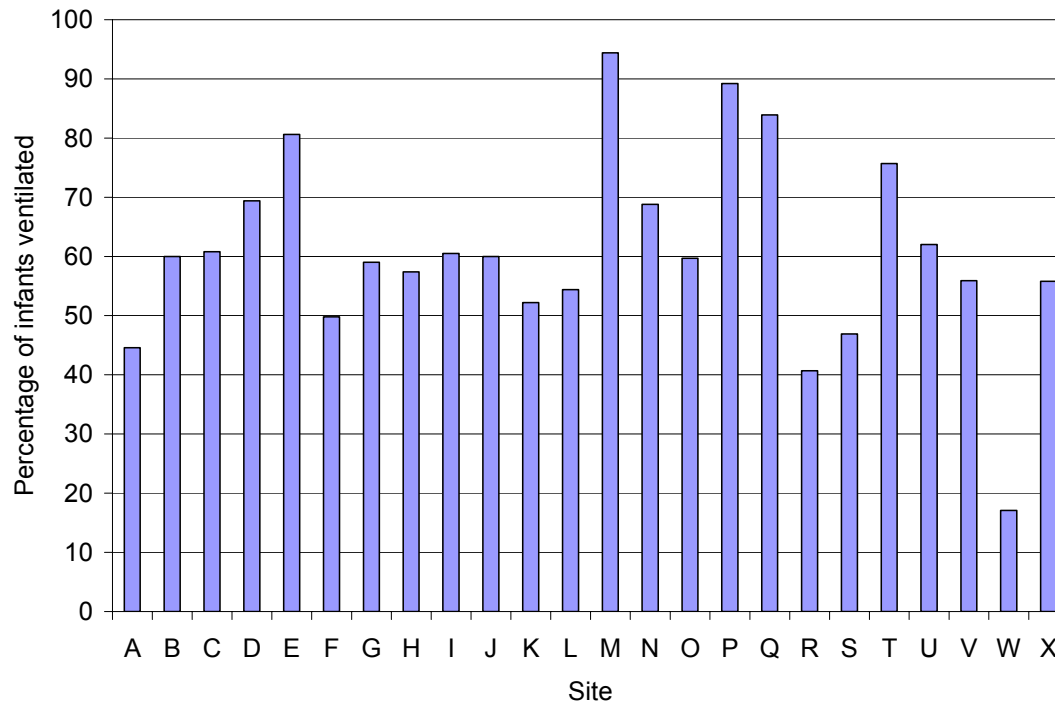
Site	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Mean
%	44.6	60.0	60.8	69.4	80.6	49.8	59.0	57.4	60.5	60.0	52.2	54.4	94.4	68.8	59.7	89.2	83.9	40.7	46.9	75.7	62.0	55.9	17.1	55.8	61.3

*Percentage of ventilated infants receiving narcotics (morphine, fentanyl and codeine) for any indication.

COMMENTS: This represents narcotic use at any time during the hospitalization for an infant who required mechanical ventilation at any time during the hospitalization (this does not necessarily indicate that an infant received narcotic(s) during the same period when s/he was ventilated).

Presentation #44
Discharge destination of infants
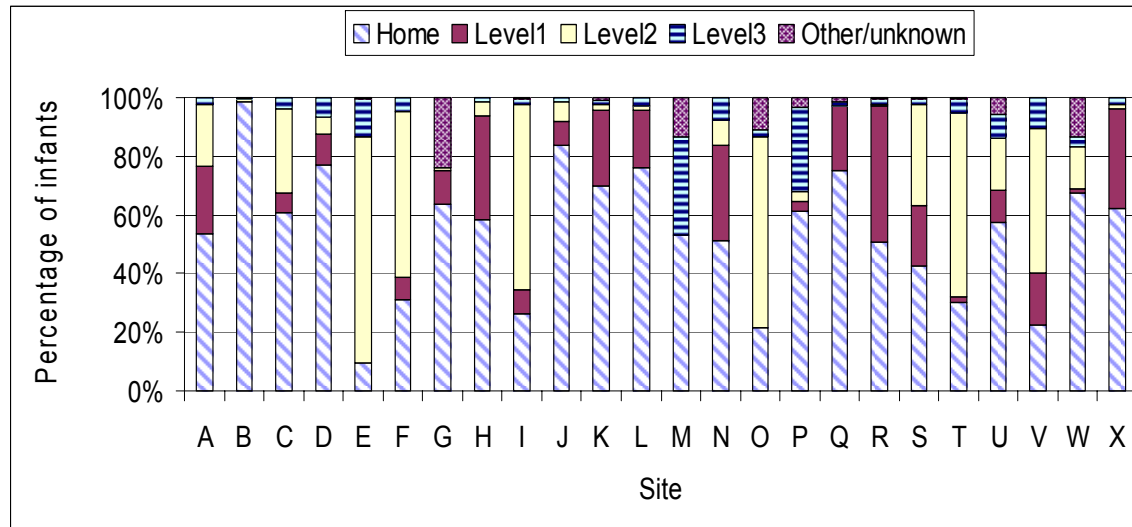
COMMENTS: Discharge destinations varied considerably, possibly affected by the availability of the health care resources, geography and practice variations at different hospitals. Destinations to Level 1 and 2 nurseries may include nursery within own hospital. "Other/unknown" is the pediatric ward(s).

Presentation #45
Post-menstrual age at discharge home directly from NICU
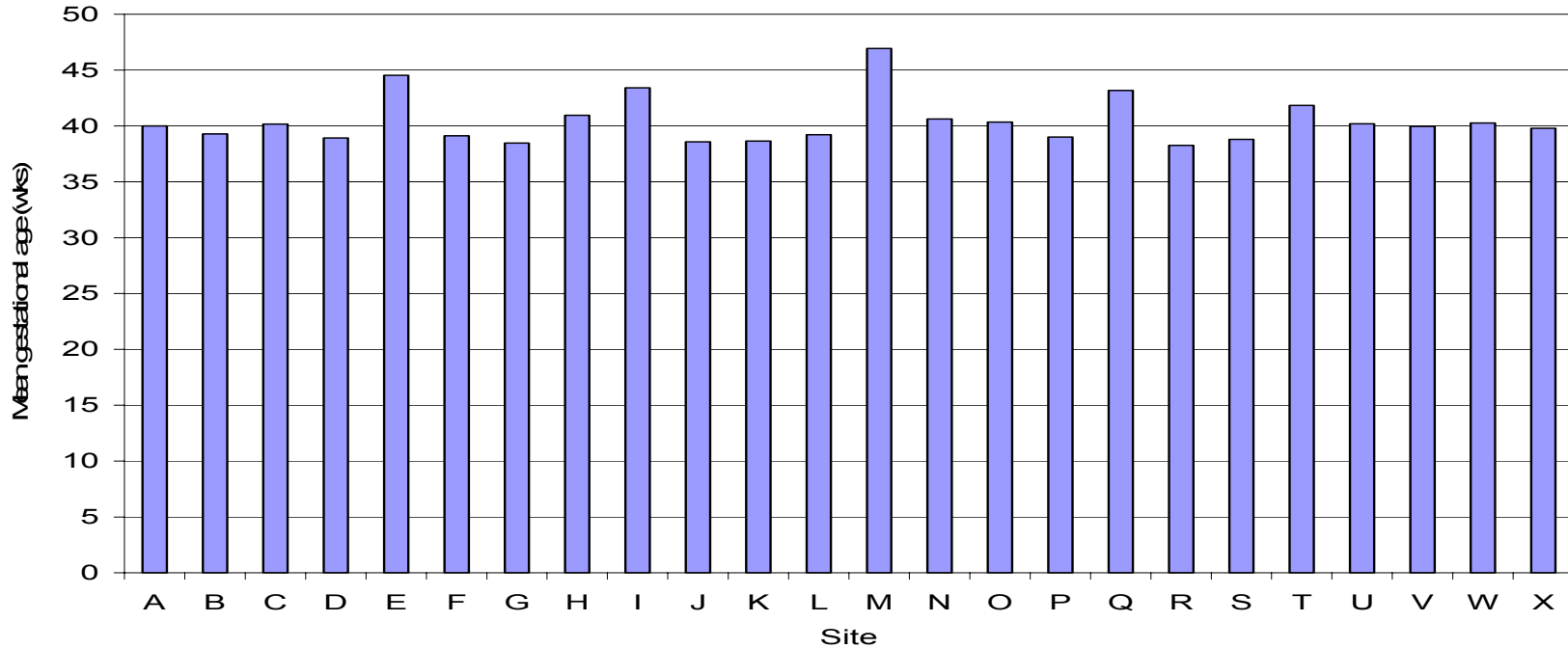
Site	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Mean
Mean	40.0	39.3	40.2	38.9	44.5	39.1	38.5	40.9	43.4	38.6	38.6	39.2	46.9	40.6	40.4	39.0	43.2	38.3	38.8	41.8	40.2	40.0	40.3	39.8	40.1
Std. Error of Mean	0.8	1.1	0.5	0.6	2.8	0.8	0.7	2.2	2.5	0.4	0.4	0.7	2.2	0.8	0.6	0.7	2.5	0.8	0.9	1.1	0.4	0.5	1.0	0.8	0.2
Median	38.6	38.3	40.0	38.4	42.1	40.0	37.0	38.7	40.4	38.6	39.1	38.7	47.0	39.3	40.3	38.4	40.1	37.1	39.4	41.3	40.1	39.4	41.1	38.4	39.4

Comments: This analysis is only for infants whose gestational age at birth is less than 29 weeks.

Presentation #46
Incidence of IVH among infants <32 weeks of gestational age
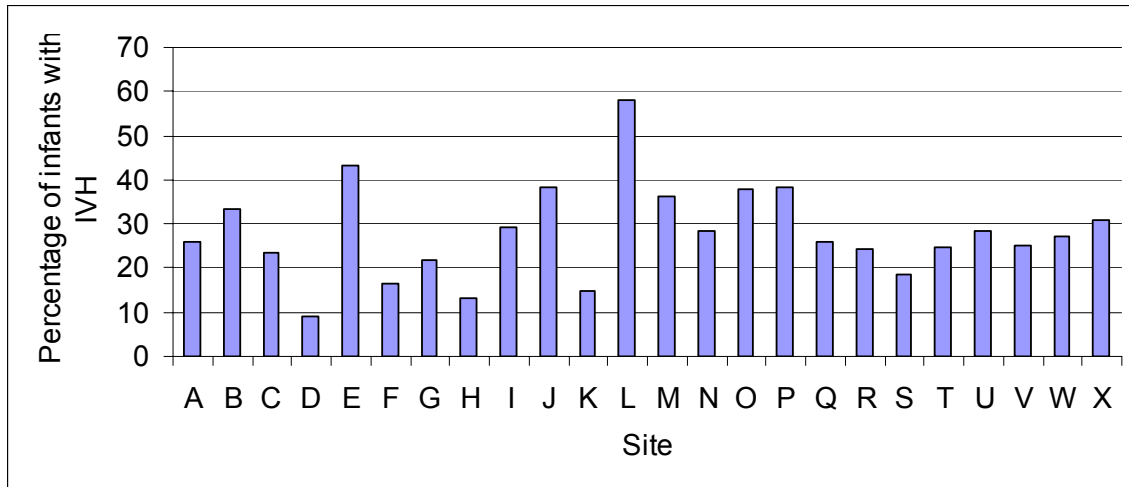
Site	≤22	23-24	25-26	27-28	29-30	31	%*
A	NA	42.9	24.1	23.1	NA	NA	25.8
B	NA	NA	NA	33.3	50.0	20.0	33.3
C	0.0	30.8	50.0	35.5	9.5	7.4	23.4
D	100	16.7	17.6	3.8	8.9	3.6	8.9
E	100	41.2	38.2	47.8	46.2	40.9	43.4
F	NA	42.1	36.6	12.8	8.1	3.8	16.3
G	NA	50.0	55.0	14.3	10.7	10.0	21.8
H	NA	0.0	40.0	0.0	16.0	0.0	13.0
I	0.0	72.0	45.2	27.3	22.1	12.2	29.4
J	NA	NA	NA	60.0	38.5	0.0	38.1
K	100	0.0	33.3	14.3	14.3	0.0	14.8
L	NA	50.0	62.5	60.0	81.3	38.1	58.1
M	0.0	0.0	20.0	75.0	NA	NA	36.4
N	NA	45.5	45.5	27.3	35.5	10.0	28.6
O	NA	65.5	47.1	44.4	26.9	18.6	37.9
P	NA	100.0	45.5	25.0	NA	NA	38.5
Q	NA	100.0	25.0	9.1	36.4	12.5	26.1
R	NA	60.0	25.0	10.0	35.3	0.0	24.4
S	100	55.6	8.3	14.3	17.9	10.0	18.6
T	NA	58.8	27.3	31.3	21.8	7.3	24.6
U	NA	60.0	33.3	18.5	NA	NA	28.6
V	NA	31.6	45.3	32.9	12.8	17.7	25.0
W	NA	33.3	63.6	33.3	20.7	10.0	27.2
X	NA	66.7	70.6	37.9	8.6	18.8	31.0
%**	33.3	50.7	40.4	29.0	21.3	13.0	27.4

%* = (number of infants with IVH for site / total number of infants for site)*100
%** = (number of infants with IVH for gestational age category / total number of infants in gestational category)*100
NA = non-applicable

G. Site Comparisons –
Risks Adjusted Analysis

Comments: Logistic regression is used for this section-- Risk Adjusted Analysis. This technique is used to analyze interactions in which there are one or more independent variables that determine an outcome. The outcome is measured using a dichotomous variable.

The goal of logistic regression is to find the best fitting (yet biologically reasonable) model to describe the relationship between the dichotomous characteristic of interest (dependent variable = response or outcome variable) and a set of independent (predictor or explanatory) variables. Logistic regression generates the coefficients (and its standard errors and significance levels) of a formula to predict a *logit transformation* of the probability of presence of the characteristic of interest:

$$\text{logit}(p) = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \dots + b_k X_k$$

where p is the probability of presence of the characteristic of interest

Presentation #47
Site comparison of retinopathy of prematurity

Crude Odds Ratio

Adjusted Odds Ratio
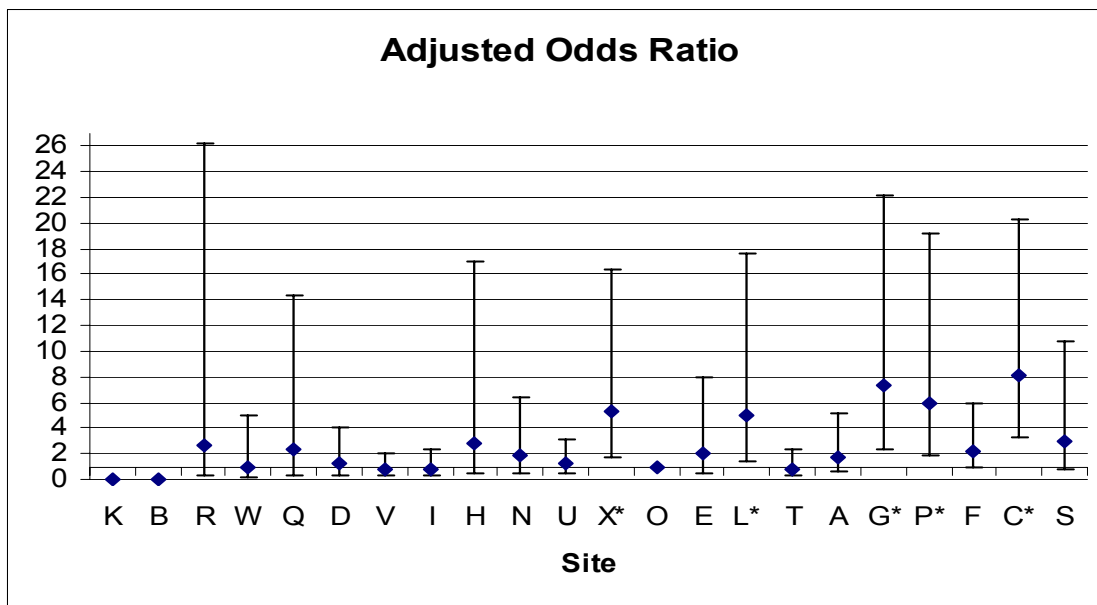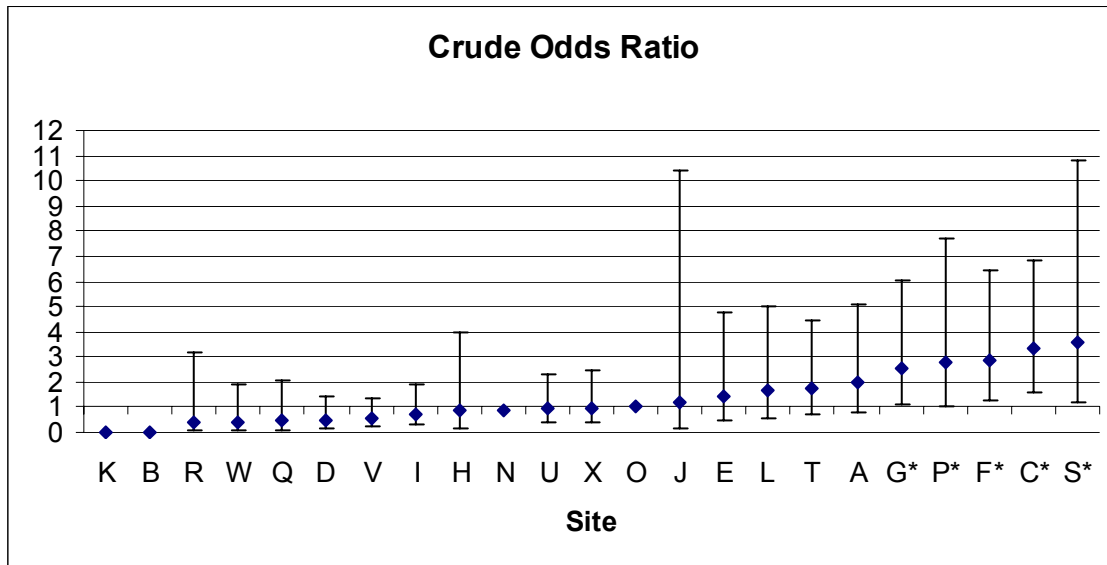
Reference site: O (M excluded due to small sample size. J excluded due to outlier data)

Significant predictors identified by multivariate analysis and adjusted for:

*Sites significantly different from reference site (P<0.05)

Birth weight
Gestational age
Multiple Gestation

Inclusion criteria:
Birth weight <1500g
Screened for ROP
Age at admission less than 4 days

Note: retinopathy of prematurity refers to stage 3 and above

Outcome is attributed to the network hospital of first admission.

Presentation #48
Site comparison of cryo/laser therapy for retinopathy of prematurity
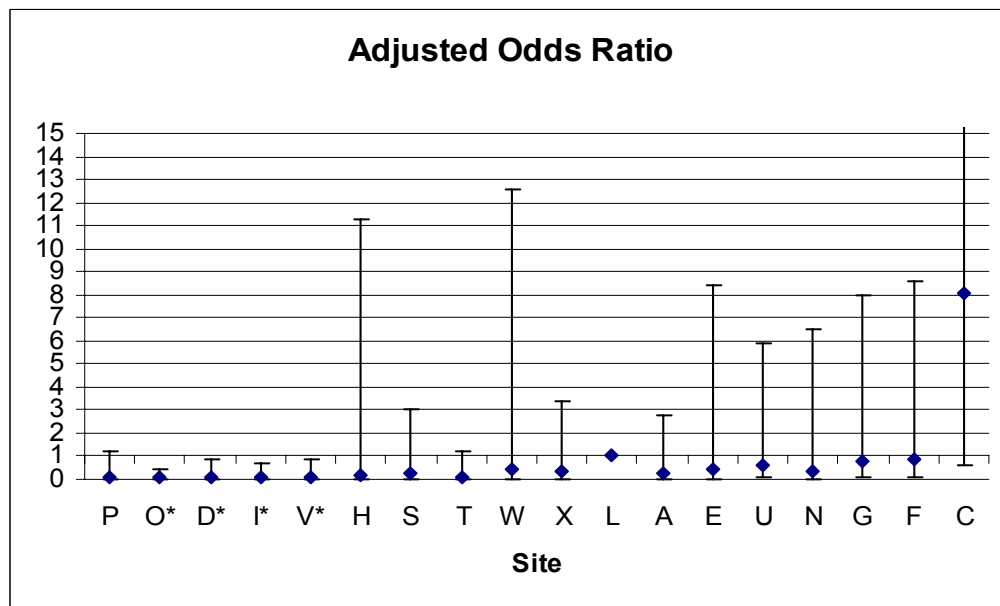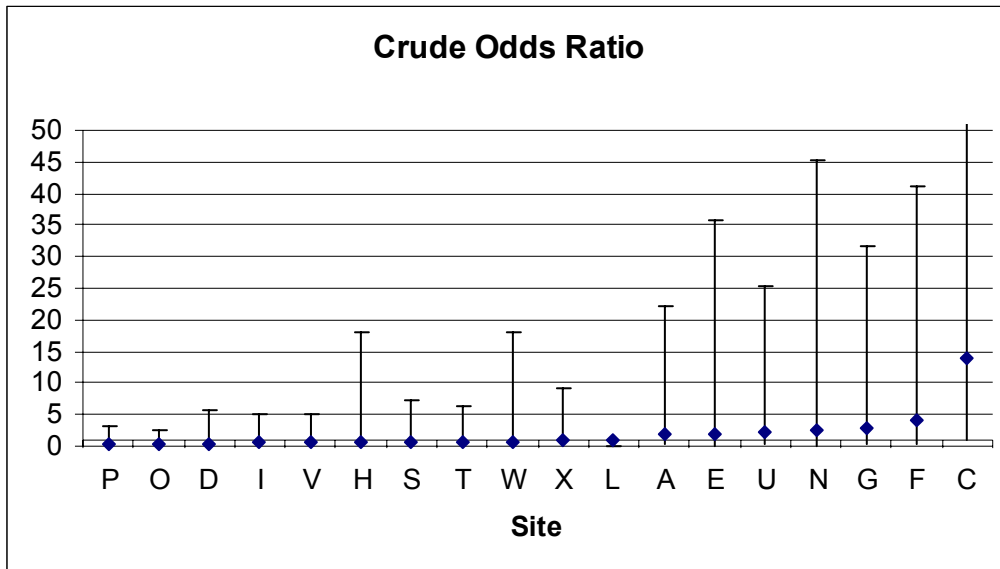
Reference site: L (B, J, K, M, Q, and R excluded due to small sample size)
*Sites significantly different from reference site (P<0.05)

Inclusion criteria:
Birth weight <1500g
Screened for ROP
Age at admission less than 4 days

Outcome is attributed to the network hospital of first admission.

Significant predictors identified by multivariate analysis and adjusted for:

Gestational age
Cesarean

Note: retinopathy of prematurity refers to stage 3 and above

Presentation #49
Site comparison of oxygen dependency at 36 weeks post-menstrual age
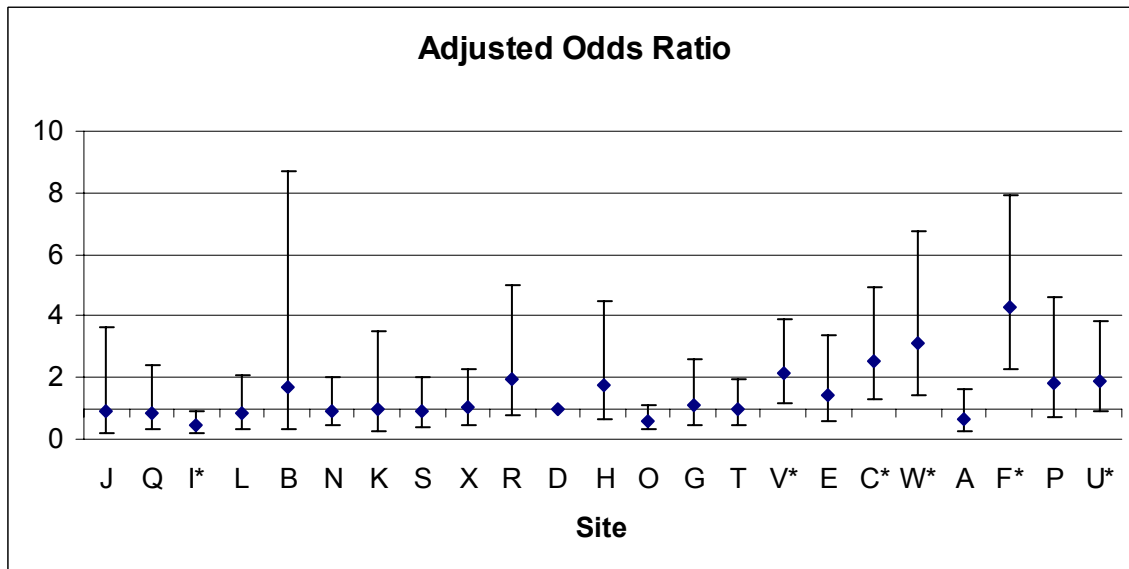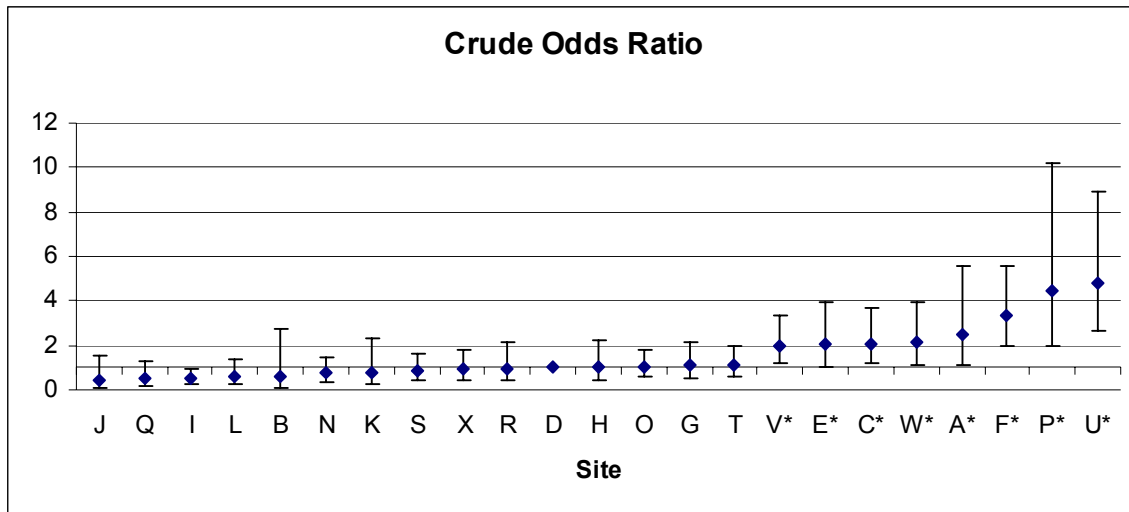
Reference site: D (M excluded due to outlier data)

*Sites significantly different from reference site (P<0.05)

Inclusion criteria:
Gestational age <33 weeks
Age at admission less than 4 days
Survival to 36 weeks post-menstrual age

Outcome is attributed to the network hospital of first admission.

Significant predictors identified by multivariate analysis and adjusted for:

SNAP-II score
Gestational age
Gender
Birth weight
Apgar at 5 mins
Outborn

Presentation #50
Site comparison of oxygen dependency at 36 weeks post-menstrual age or death
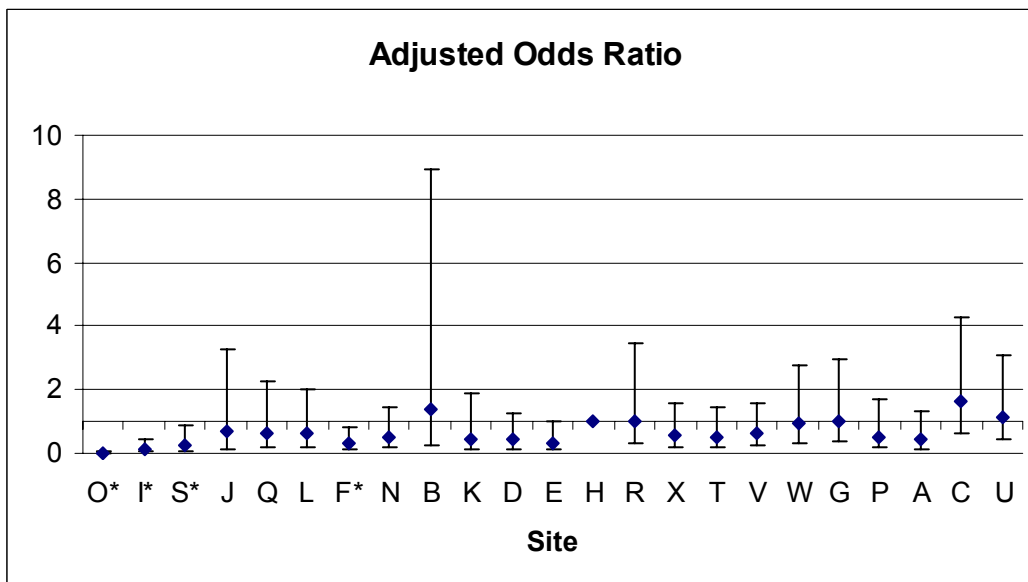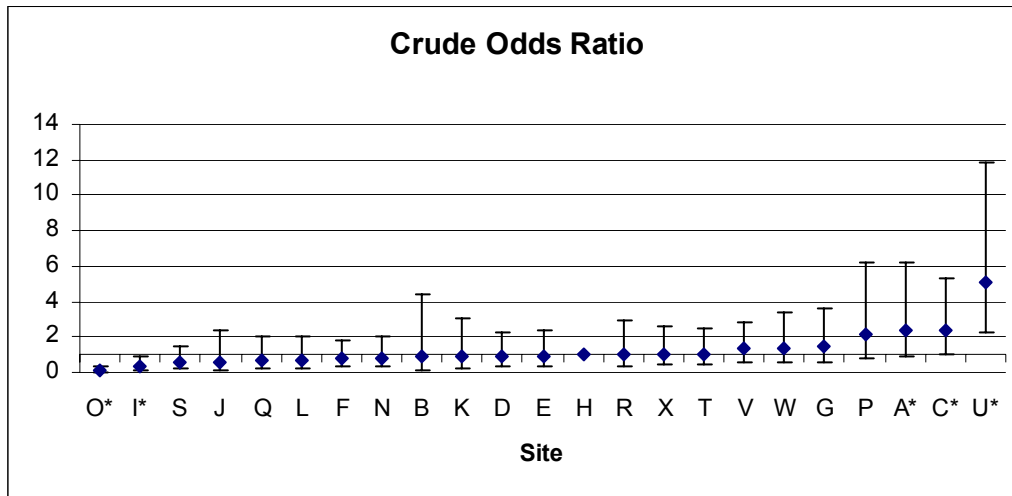
Reference site: H (M excluded due to small sample size)

*Sites significantly different from reference site (P<0.05)

Inclusion criteria:
Gestational age <33 weeks
Age at admission less than 4 days
Survival to 36 weeks post-menstrual age or death before 36 weeks post-menstrual age and beyond 3 days of life

Outcome is attributed to the network hospital of first admission.

Significant predictors identified by multivariate analysis and adjusted for:

Birth weight
Gender
Gestational age

Presentation #51
Site comparison of intraventricular hemorrhage among infants <33 weeks gestational age
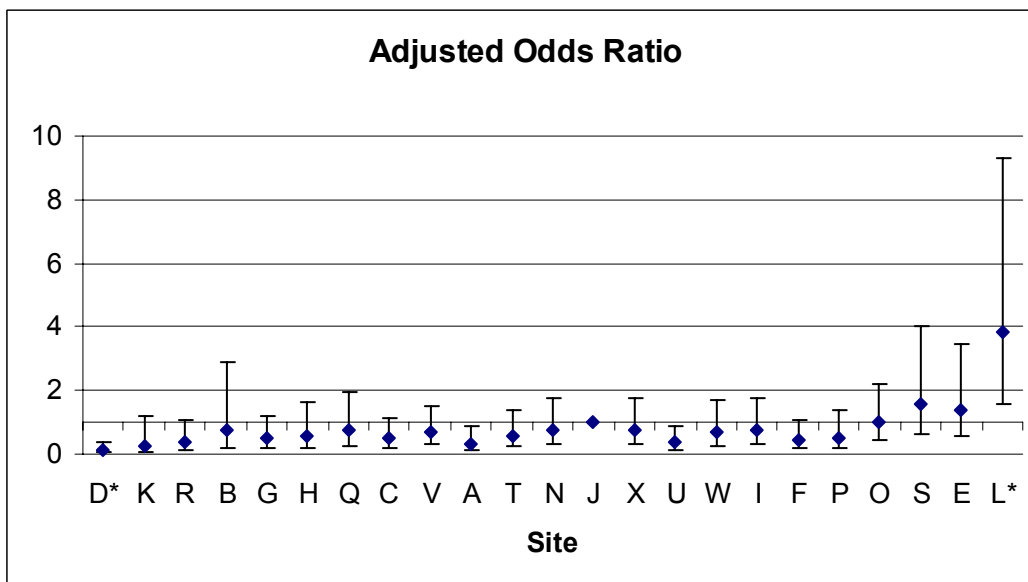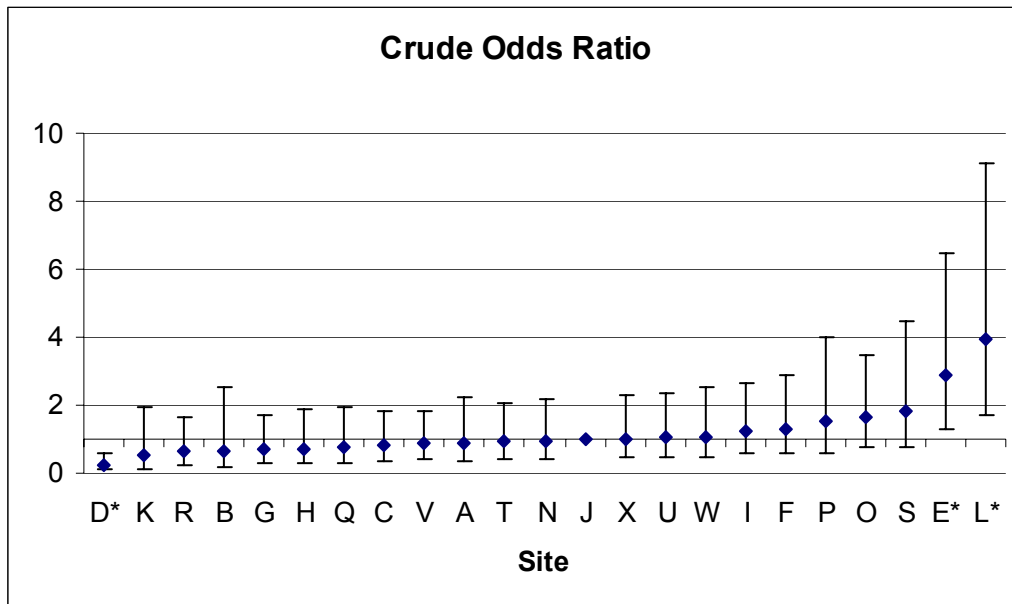
Reference site: J (site M excluded due to small sample size)
***Sites significantly different from reference site (P<0.05)**

Inclusion criteria:
Gestational age <33 weeks
Age at admission less than 4 days
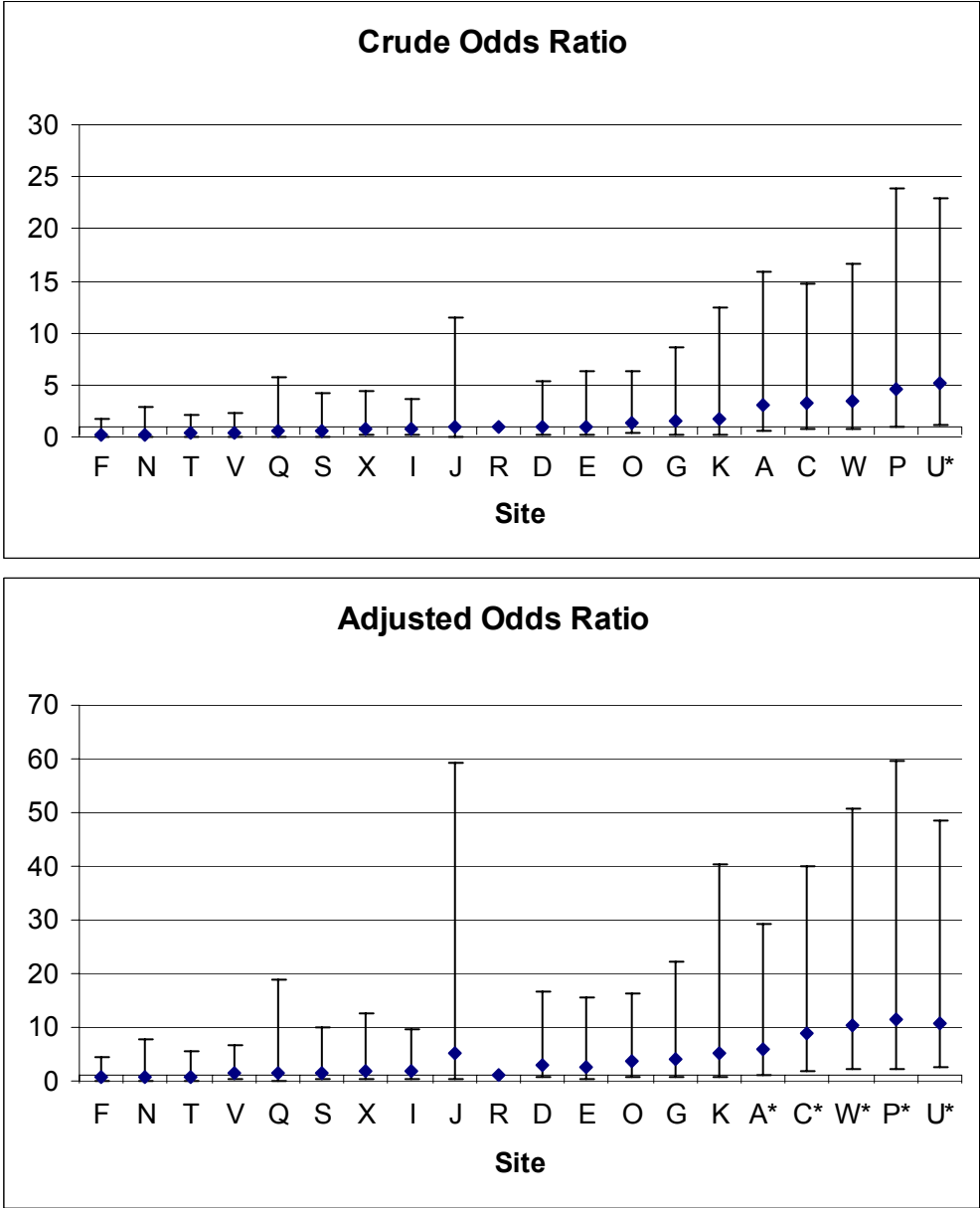Ultrasound reports in the first two weeks of life

Outcome is attributed to the network hospital of first admission.

**Significant predictors identified by multivariate analysis and adjusted for:**

Admission SNAP-II score
Gestational age
Apgar at 5 mins
Cesarean section
Antenatal Corticosteroid use
Outborn

Note: IVH refers to probable or definite IVH.

Presentation #52
Site comparison of necrotizing enterocolitis among infants <1500g at birth

Reference site: R (site B, H, L and M execulded due to small sample size)
*Sites significantly different from reference site (P<0.05)

Inclusion criteria:
Birth weight <1500g
Age at admission less than 4 days

Outcome is attributed to the network hospital of first admission.

Significant predictors identified by multivariate analysis and adjusted for:

Gestational age
Cesarean section

Note: Necrotizing enterocolitis is based on clinical diagnosis (using Bell's criteria, stage 2 or higher) and the presence of pneumatosis on abdominal radiographs and/or compatible surgical/pathological findings.

Presentation #53
Site comparison of nosocomial infection among infants ≥1500g at birth

Crude Odds Ratio

Adjusted Odds Ratio
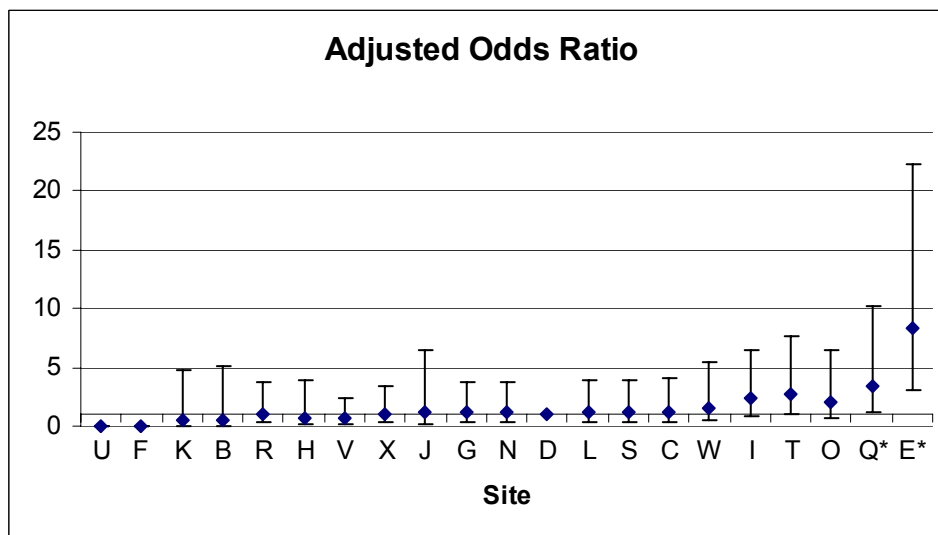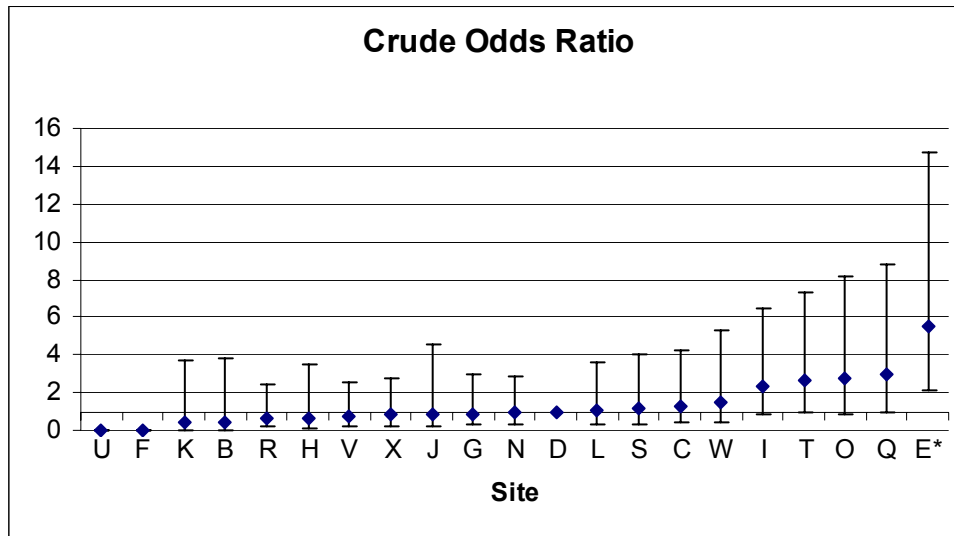
Reference site: D (A, M and P excluded due to no birthweights ≥1500g; K excluded due to small sample size)
*Sites significantly different from reference site (P<0.05)

Inclusion criteria:
Birth weight ≥1500g
Age at admission less than 4 days
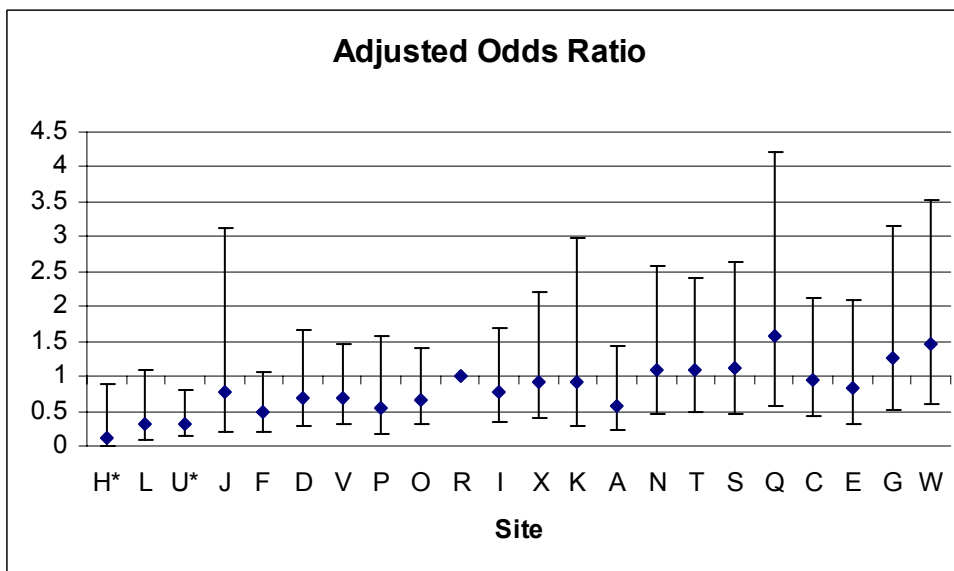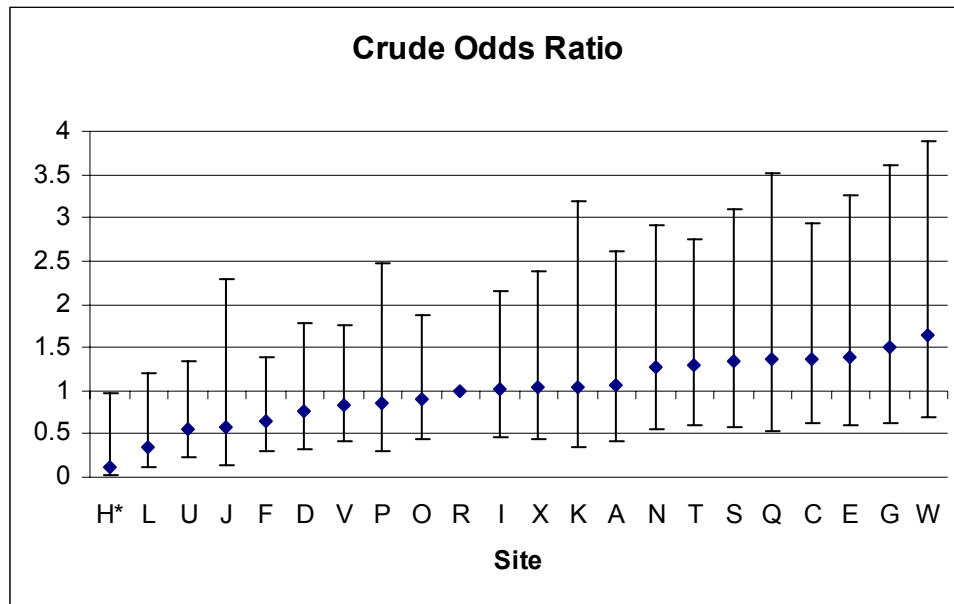Remained hospitalized beyond 2 days after birth

Outcome is attributed to the hospital in which the infection occurred (adjusted for transfer).

Significant predictors identified by multivariate analysis and adjusted for:

Gestational age
Multiple birth
SNAP_II score

Presentation #54
Site comparison of nosocomial infection among infants <1500g at birth

Reference site: R (B and M excluded due to small sample size)
*Sites significantly different from reference site (P<0.05)

Inclusion criteria:
Birth weight <1500g
Age at admission less than 4 days
Remained hospitalized beyond 2 days after birth

Outcome is attributed to the hospital in which the infection occurred (adjusted for transfer).

Significant predictors identified by multivariate analysis and adjusted for:

Gestational age
Birth weight
Outborn

I. Conclusions

The Canadian Neonatal Network™ has been established since 1995. The number of NICUs participating in the national database has continued to increase, now with 24 sites participating in data collection for this report. Currently there are 28 centres participating across the country.

The data demonstrate continuing variations in risk-adjusted outcomes and practices, and provide benchmarking information for Canadian NICUs. Individual hospitals have the opportunity to review their outcomes and launch strategies for improving care.

CNN researchers continue to utilize the database and produce numerous publications that will have significant impact on neonatal care and policy in Canada and internationally. With the participation of additional NICUs for 2007, we anticipate that the CNN will strive to produce NICU population-based data on outcomes and practices, and apply quality improvement strategies.

J. Future Plans

❖ **Database Improvements**: Major improvements are planned for data collection for the CNN database. Over time this will include:

- Report on population-based information and follow-up of all infants equally by capturing information from hospitals to which infants are transferred.
- Enhance the data management capabilities on both data server and client application to facilitate individual hospital analyses of their own data.
- Streamline the data process for data integration for the Annual Report.
- Provision of multiple options in data capture and management to meet the unique needs of individual sites.
- After taking into consideration the input from abstractors and database review committee, certain variables will be improved, deleted or added to database to incorporate changing needs from the database.

❖ **Expansion of Collaborative Efforts:** The CNN is in the process of establishing collaborative ties with other Neonatal Networks around the world. Data from our network will be compared with those from international networks and potential areas for change/improvement will be sought.

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[2]Gray JE, Richardson DK, McCormick MC, Workman-Daniels K, and Goldmann DA. Neonatal therapeutic intervention scoring system: a therapy-based severity-of-illness index. J Pediatr 1992; Oct (90)4: 561-7.

[3]Lee SK, Zupancic JA, Pendray M, Thiessen P, Schmidt B, Whyte R, Shorten D, Stewart S and the Canadian Neonatal Network. Transport risk index of physiologic stability: a practical system for assessing infant transport care. J Pediatr 2001; Aug(139)2: 220-6.