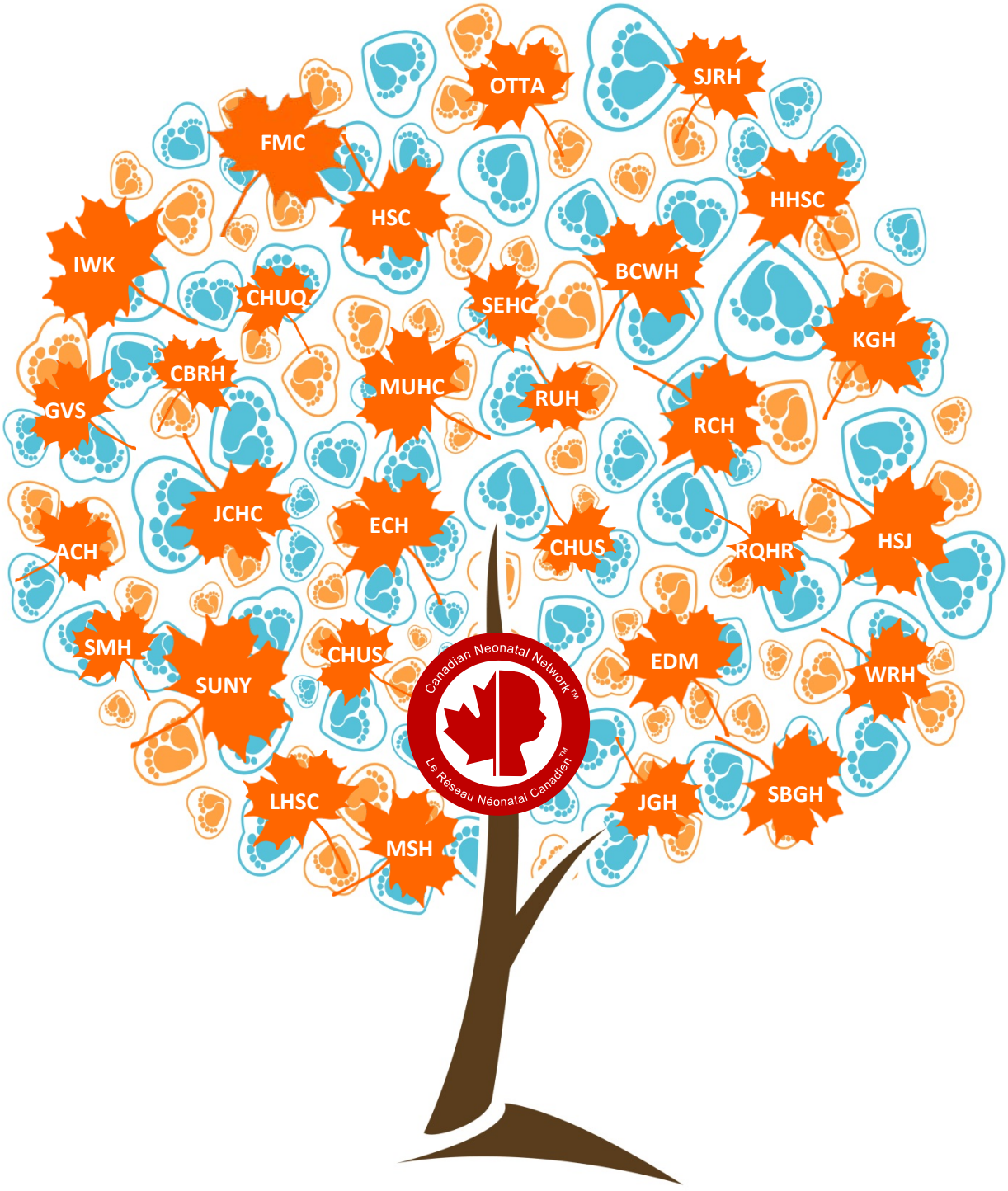


The Canadian Neonatal Network ™

Le Réseau Néonatal Canadien ™

Annual Report 2014 Rapport Annuel

Acknowledgements

This report is based upon data collected from 31 Health Care Organizations from across Canada that were members of the Canadian Neonatal Network™ during the year 2014. In addition to all investigators and the funding agency, we would like to recognize the invaluable support of the Neonatal Intensive Care Units (NICUs) that contributed to this information, the support of all of the participating sites and most importantly, the dedication and hard work of the Site Investigators, NICU Medical Directors and Data Abstractors.

Structure of the CNN

The Canadian Neonatal Network™ (CNN) 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. The Network maintains a standardized neonatal database and provides unique opportunities for researchers to participate in collaborative projects on a national and an international scale. Health care professionals, health services researchers, and health care administrators participate actively in clinical, epidemiologic, outcomes, health services, health policy and informatics research aimed at improving quality, effectiveness and efficiency of neonatal care. Research results are published in Network reports and in peer-reviewed journals.

Funding

The CNN infrastructure is funded by the Canadian Institutes of Health Research. Individual participating sites provided additional funding for data collection and other related resources. The coordinating center, Maternal-Infant Care Research Center, is supported by Mount Sinai Hospital, Toronto, Ontario.

Coordinating Centre of the CNN

Maternal-Infant Care Research Centre, Mount Sinai Hospital, Toronto, Ontario

Network Chairman:	Dr. Shoo K. Lee, University of Toronto
Network Director:	Dr. Prakesh Shah, University of Toronto
Executive Committee:	Ms. Martine Claveau, McGill University
	Dr. Kimberly Dow, Queen's University
	Dr. Christoph Fusch, McMaster University
	Dr. Adele Harrison, University of British Columbia
	Dr. Abhay Lodha, University of Calgary
	Dr. Vibhuti Shah, University of Toronto
CNN Coordinator:	Ms. Priscilla Chan, Mount Sinai Hospital
Analyst:	Mr. Eugene W. Yoon, Mount Sinai Hospital

Report Review Committee: Dr. Alexander Allen, Dalhousie University
Dr. Keith Barrington, University of Montreal
Dr. Orlando Da Silva, University of Western Ontario
Dr. Akhil Deshpandey, Memorial University
Dr. Michael Dunn, University of Toronto
Dr. Nicole Rouvinez-Bouali, University of Ottawa
Ms. Wendy Seidlitz, Hamilton Health Sciences
Dr. Mary Seshia, University of Manitoba
Dr. Prakesh Shah, University of Toronto (Chair)
Dr. Nalini Singhal, University of Calgary

Participating CNN Sites and Site Investigators for the 2014 Report:

Victoria General Hospital, Victoria, British Columbia	Dr. Adele Harrison
BC Women's Hospital, Vancouver, British Columbia	Dr. Anne Synnes & Dr. Joseph Ting
Royal Columbian Hospital, New Westminster, British Columbia	Dr. Zenon Cieslak
Surrey Memorial Hospital, Surrey, British Columbia	Dr. Todd Sorokan
Foothills Medical Centre, Calgary, Alberta	Dr. Wendy Yee
Alberta Children's Hospital, Calgary, Alberta	Dr. Carlos Fajardo
Royal Alexandra Hospital, Edmonton, Alberta & University of Alberta Hospital – Stollery Children's, Edmonton, Alberta	Dr. Khalid Aziz
Royal University Hospital, Saskatoon, Saskatchewan	Dr. Koravangattu Sankaran & Dr. Sibasis Daspal
Regina General Hospital, Regina, Saskatchewan	Dr. Zarin Kalapesi
Winnipeg Health Sciences Centre, Winnipeg, Manitoba	Dr. Mary Seshia
St. Boniface General Hospital, Winnipeg, Manitoba	Dr. Ruben Alvaro
Windsor Regional Hospital, Windsor, Ontario	Dr. Chuks Nwaesei
London Health Sciences Centre, London, Ontario	Dr. Orlando Da Silva
Hamilton Health Sciences, Hamilton, Ontario	Dr. Sandesh Shivananda
Mount Sinai Hospital, Toronto, Ontario	Dr. Prakesh Shah
Hospital for Sick Children, Toronto, Ontario	Dr. Kyong-Soon Lee
Sunnybrook Health Sciences Centre, Toronto, Ontario	Dr. Michael Dunn
Kingston General Hospital, Kingston, Ontario	Dr. Kimberly Dow
Children's Hospital of Eastern Ontario, Ottawa, Ontario The Ottawa Hospital, Ottawa, Ontario	Dr. Nicole Rouvinez-Bouali
Jewish General Hospital, Montréal, Québec	Dr. Ermelinda Pelausa
Hôpital Sainte-Justine, Montréal, Québec	Dr. Keith Barrington
Montréal Children's Hospital, Montréal, Québec	Dr. Patricia Riley
Centre Hospitalier Universitaire de Québec, Sainte Foy, Québec	Dr. Bruno Piedboeuf & Dr. Christine Drolet
Royal Victoria Hospital, Montréal, Québec	Dr. Daniel Faucher
Centre Hospitalier Universitaire de Sherbrooke, Sherbrooke, Québec	Dr. Valerie Bertelle
Dr. Everett Chalmers Hospital, Fredericton, New Brunswick	Dr. Hala Makary

Saint John Regional Hospital, Saint John, New Brunswick	Dr. Cecil Ojah & Dr. Luis Monterrosa
Moncton Hospital, Moncton, New Brunswick	Dr. Rody Canning
IWK Health Centre, Halifax, Nova Scotia	Dr. Jehier Afifi
Cape Breton Regional Hospital, Sydney, Nova Scotia	Dr. Andrzej Kajetanowicz
Janeway Children's Health and Rehabilitation Centre, St. John's, Newfoundland	Dr. Akhil Deshpandey

Written & Prepared By:

Dr. Prakesh Shah, Eugene W. Yoon, Priscilla Chan and Members of the Annual Report Review Committee

Cover page adapted by Priscilla Chan

Table of contents

A. Executive Summary

This report from the Canadian Neonatal Network™ (CNN) is based on data from 31 tertiary sites, which contributed data in the year 2014. The CNN is funded through the Canadian Institutes of Health Research and the coordinating center at the Maternal-Infant Care Research Center is supported by Mount Sinai Hospital, Toronto, Ontario. The individual centers contribute financially by providing funding for data abstraction. The purposes of the Network are to:

- Maintain a national neonatal-perinatal database and provide the infrastructure to facilitate collaborative research
- Provide benchmarking information for Canadian sites
- Maintain a national network of multidisciplinary researchers interested in neonatal-perinatal research
- Longitudinally study outcomes and variations in medical care and
- Examine the impact of resource utilization and practice patterns on patient outcomes and costs of care
- Act on variations by informing anonymized results to sites and establishing benchmark for future quality improvement initiatives

Summary of Results/Methodology

Canadian Neonatal Network™ Database: Admissions between January 1, 2014 and December 31, 2014 who were discharged by March 31, 2015 were included.

Total number of eligible admissions to participating Canadian sites (See section D.1 for analyses)	16 073
Total number of eligible individual neonates (See section D.2. for analyses)	15 045
Total number of eligible very preterm (<33 weeks GA) neonates (See section D.3. for analyses)	4 387
Total number of eligible very low birth weight (VLBW) neonates (See section D.3. for analyses)	2 980

Neonates who were transferred to a "normal newborn care area" (level I nursery) or discharged home within 24 hours of their admission to the site were excluded. Data on patient demographics, components of care and outcome until discharge from the participating site were entered into a computer and transferred electronically to the Coordinating Centre, at the Maternal-Infant Care Research Centre (MiCare), where the data were verified and analyzed.

Results presented in this report are comprised of:

Section D: Descriptive Analyses
Section E: Site Comparisons
Section F: Discharge Disposition and Status
Section G: Hypoxic Ischemic Encephalopathy
Section H: Trend Analyses over last 5 years

Cautionary notes for interpretation of data in this report

1. Six sites during 2014 were limited by funding and therefore were only able to contribute data from a subset of the eligible neonates admitted to their sites.
2. Characteristics of participating CNN sites are highlighted at the outset of the presentations to provide basic information regarding network sites.
3. The 'missing' data on outcome variables vary for each presentation and caution should be used in interpreting the information.
4. All reported percentages used in this report use denominator as neonates for whom data for that particular item were available.
5. Data are only from patients admitted to the NICUs in all presentations unless indicated (Presentations #4 and #6).
6. Data should be used with caution and understanding that neonates who were not admitted to participating NICUs were not included in this report.

B. Background and Objectives

Neonatal Intensive Care Units (NICUs) utilize the combined abilities of health care team members in expanding knowledge and advancing the technology to provide effective care of neonates. To support continuous improvement in newborn outcomes of Canadian sites, the CNN 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 (SNAP-II) [1]], a severity of illness scale. In addition we also use [Neonatal Therapeutic Intervention Scoring System (NTISS)[2]], and an instrument for assessing neonatal 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 sites. This demonstrated variations in outcomes and practices among Canadian sites, and indicated that different sites had different strengths as well as areas that should be targeted for improvement. The results suggested that practice and outcome variations are associated, and led to the inception of an additional research project investigating the targeting of specific practices for change in order to improve outcomes in sites across Canada.

The first Evidence-based Practice for Improving Quality (EPIQ1) project explored new methodologies for identifying care practices associated with good or poor outcomes, and provided an evidence-based approach to improving quality of care. Building upon traditional continuous quality improvement techniques, EPIQ1 used multidisciplinary teams at CNN sites, who worked collaboratively to implement best practice changes. Results of this study were published in 2009.[1] The second version of this project, EPIQ2, is recently completed and is published.[2] This project targeted quality improvement in all five major morbidities of preterm infants and it will also link with neurodevelopmental outcomes up at 2 years of age. The neonatal component of the study is completed and follow-up data collection is ongoing. Based on successes of EPIQ1 and EPIQ2, we have launched EPIQ 3 – Drive to zero, in July 2014.

Research using the data was overseen by the Executive Committee, which was elected by members of the Canadian Neonatal Network™. Separate ethics approvals were obtained from the participating institutions for specific projects as indicated.

---

[1] Shoo K. Lee et al. **Improving the quality of care for neonates: a cluster randomized controlled trial.** Can. Med. Assoc. J., Oct 2009; 181: 469 – 476

[2] Shoo K. Lee, Prakesh S. Shah et al. **Association of a quality improvement program with neonatal outcomes in extremely preterm infants: a prospective cohort study.** Can. Med. Assoc. J., Aug 2014; E485-494

CNN Site Characteristics

SITE	CNN data collection criteria	Level II / Step-down nursery ?	Level II / Step-down data included in CNN?	Delivery room deaths included in CNN 2014 data	ROP surgical / laser service?	PDA surgical service?
Victoria General Hospital	All eligible admissions	y	y	y	y	y
Children's & Women's Health Centre of BC	All eligible admissions	y	n	n	y	y
Royal Columbian Hospital	All eligible admissions	y	y	y	y	n
Surrey Memorial Hospital	All eligible admissions	y	y	y	n	n
Foothills Medical Centre	All eligible admissions	n	n/a	n	y	y
Alberta Children's Hospital	All eligible admissions	n	n/a	n/a	y	y
Royal Alexandra Hospital (Edmonton)*	< 33 weeks GA & all HIE	y	y	y	y	n
University of Alberta Hospital - Stollery (Edmonton)*	All eligible admissions	n	n/a	n/a	n	y
Regina General Hospital	All eligible admissions	y	y	y	n	n
Royal University Hospital	≤ 33 weeks GA, all transferred out & deaths	n	n/a	n	n	y
Health Sciences Centre Winnipeg	All eligible admissions	y	y	y	y	y
St. Boniface General Hospital	All eligible admissions	n	n/a	y	y	y
Hamilton Health Sciences	All eligible admissions	y	n	y	y	y
London Health Sciences Centre	All eligible admissions	y	y	y	y	y
Windsor Regional Hospital	< 33 weeks GA and/or < 1500g	n	n/a	n	y	n
Hospital for Sick Children	All eligible admissions	n	n/a	n/a	y	y
Mount Sinai Hospital	All eligible admissions	y	y	y	n	n
Sunnybrook Health Sciences Centre	All eligible admissions	n	n/a	y	n	n
Children's Hospital of Eastern Ontario	< 33 weeks GA	y	y	y	y	y
Kingston General Hospital	All eligible admissions	y	y	y	y	y
Jewish General Hospital	All eligible admissions	y	y	y	y	n
Hôpital Sainte-Justine	All eligible admissions	y	n	y	y	y
Centre Hospitalier Universitaire de Quebec	< 29 weeks GA	y	n	y	y	y
Montreal Children's Hospital	All eligible admissions	n	n/a	n/a	y	y
Royal Victoria Hospital	All eligible admissions	n	n/a	y	y	n
Centre Hospitalier Universitaire de Sherbrooke	< 33 weeks GA	y	n	y	n	n
The Moncton Hospital	All eligible admissions	n	n/a	y	n	n
Dr. Everett Chalmers Hospital	All eligible admissions	n	n/a	y	n	n
Saint John Regional Hospital	All eligible admissions	n	n	y	n	n
Janeway Children's Health and Rehabilitation Centre	All eligible admissions	y	y	y	y	y
IWK Health Centre	All eligible admissions	y	y	y	y	y
Cape Breton Regional Hospital	All eligible admissions	n	n/a	y	n	n

* Royal Alexandra Hospital & University of Alberta Hospital transmit data as one site

C. Information Systems

Neonates included in this report are those who were admitted to a CNN participating site between January 1, 2014 and December 31, 2014, and were discharged by March 31, 2015. The neonates must have had a length of stay in the site 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 15 045 patients accounted for 16 073 admissions as some neonates were admitted on more than one occasions.

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 Maternal-Infant Care Research Centre (MiCare) in Toronto, Ontario. Patient data at each participating site are available to the respective site investigator and data abstractor only. Patient identifiers were stripped prior to data transfer to the Coordinating Centre. Patient confidentiality was strictly observed. A unique identifier was generated for each entry of neonate in the system and that identifier was followed throughout the stay at one or more hospitals. Individual-level data are used for analyses, but only aggregate data are reported. The results presented in this report will not identify participating sites 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 grouped to maintain anonymity.

At each participating site, data are stored in a secured database in the site or in an alternate secured site used by the site 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 Mount Sinai Hospital Information Technology 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 that might be related (e.g. GA and birth weight [BW]). 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 transmission.

At the Coordinating Centre, analyses were conducted using univariate, bivariate, and multivariate analyses for the total cohort, and for individual sites. Multivariable regression analysis was used to identify risk factors associated with mortality and major morbidities. Grouped data enabled development of outcome graphs by GA and BW for mortality and selected major morbidities. Similar systems have been used to assist in quality assurance, and predict resource utilization.

D. Descriptive Analyses

This section is divided into three sub-sections.

Section D.1. Analyses based on number of eligible admissions to participating sites

These include data from 16 073 eligible admissions (including readmissions) to 31 sites. 25 of these sites submitted complete data (n=14 136) on all admissions and 6 sites submitted data on a selected admission cohort (n=1 937).

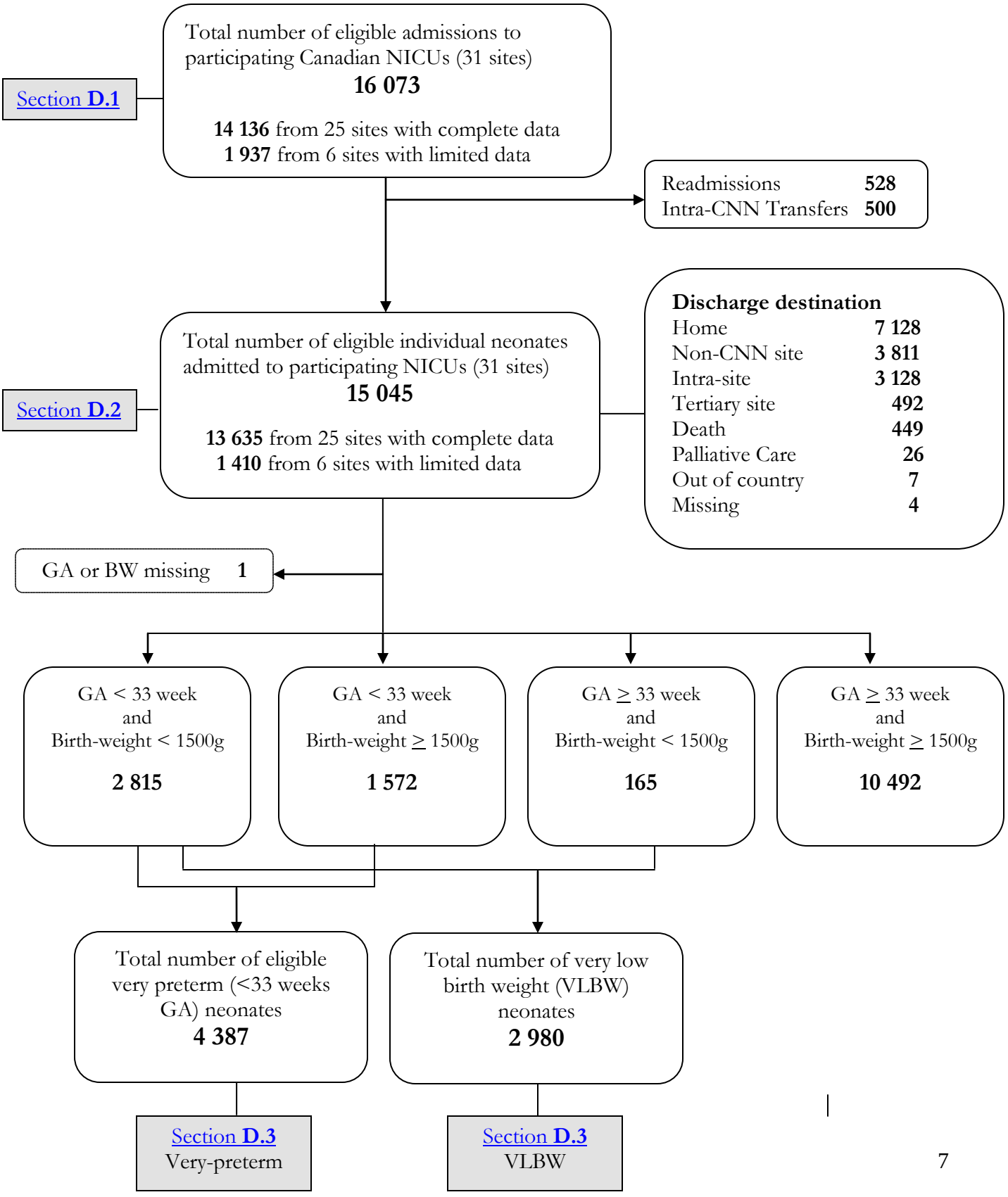
Section D.2. Analyses based on number of eligible neonates admitted to participating sites

These include data from 15 045 eligible neonates admitted to 31 sites. 25 of these sites submitted complete data (n=13 635) on all eligible admitted neonates and 6 sites submitted data on selected eligible admitted neonates (n=1 410).

Section D.3. Analyses based on number of eligible very preterm (< 33 weeks GA) or very low BW (<1500g BW) neonates

These include data from 4 387 eligible very preterm neonates and 2 980 eligible VLBW neonates.

Canadian Neonatal Network™ Database: Admissions between January 1, 2014 and December 31, 2014 who were discharged by March 31, 2015. Readmissions from 2013, moribund, and delivery room deaths were excluded.

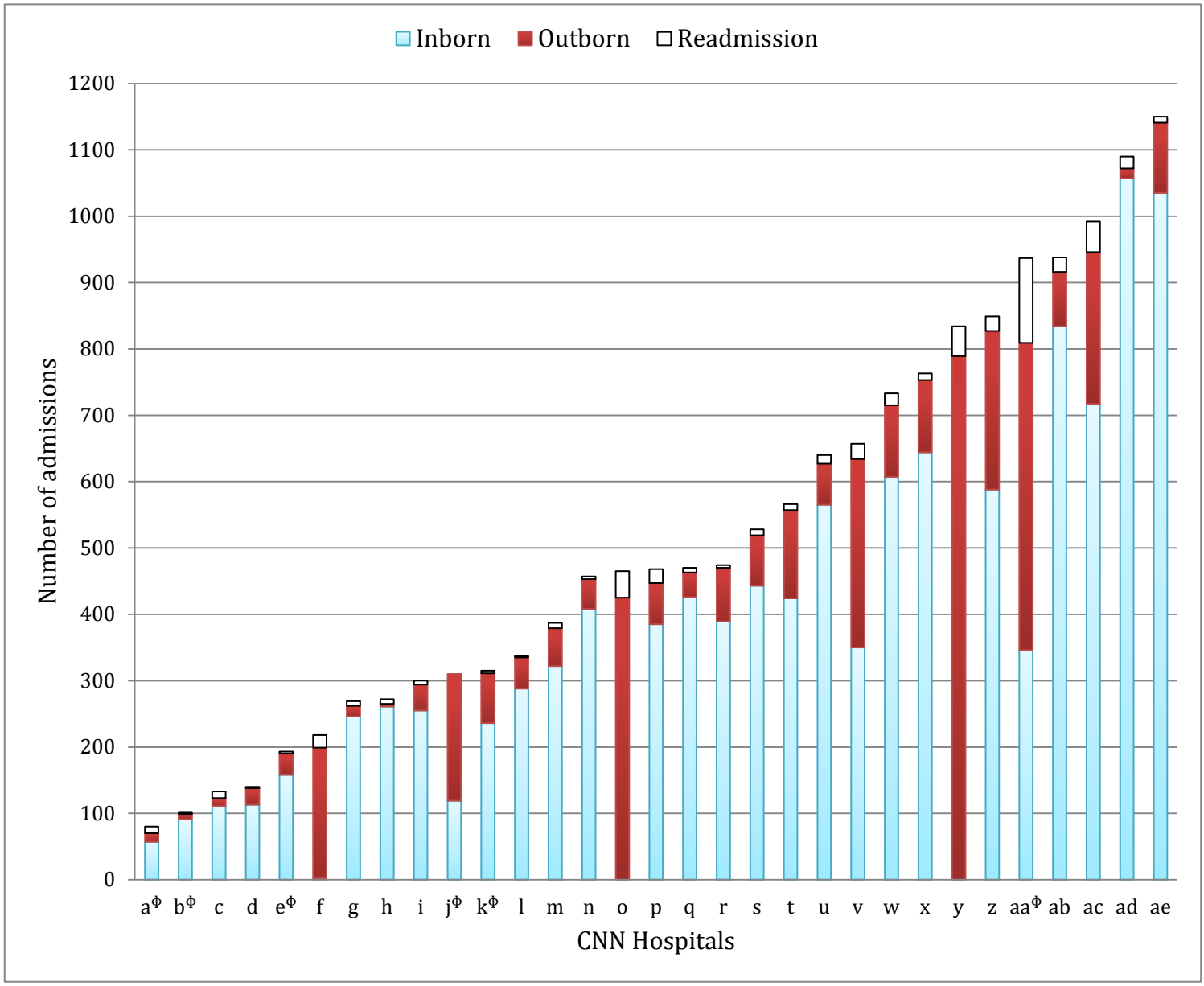


Section D.1

Analyses based on number of eligible admissions to participating sites

These include data from 16 073 eligible admissions (including readmissions) to 31 sites. 25 of these sites submitted complete data (n=14 136) on all admissions and 6 sites submitted data on a selected admission cohort (n=1 937).

Presentation #1
Admissions to Canadian Neonatal Network™ participating sites



Φ Data collected on selected cohort of eligible admissions only.

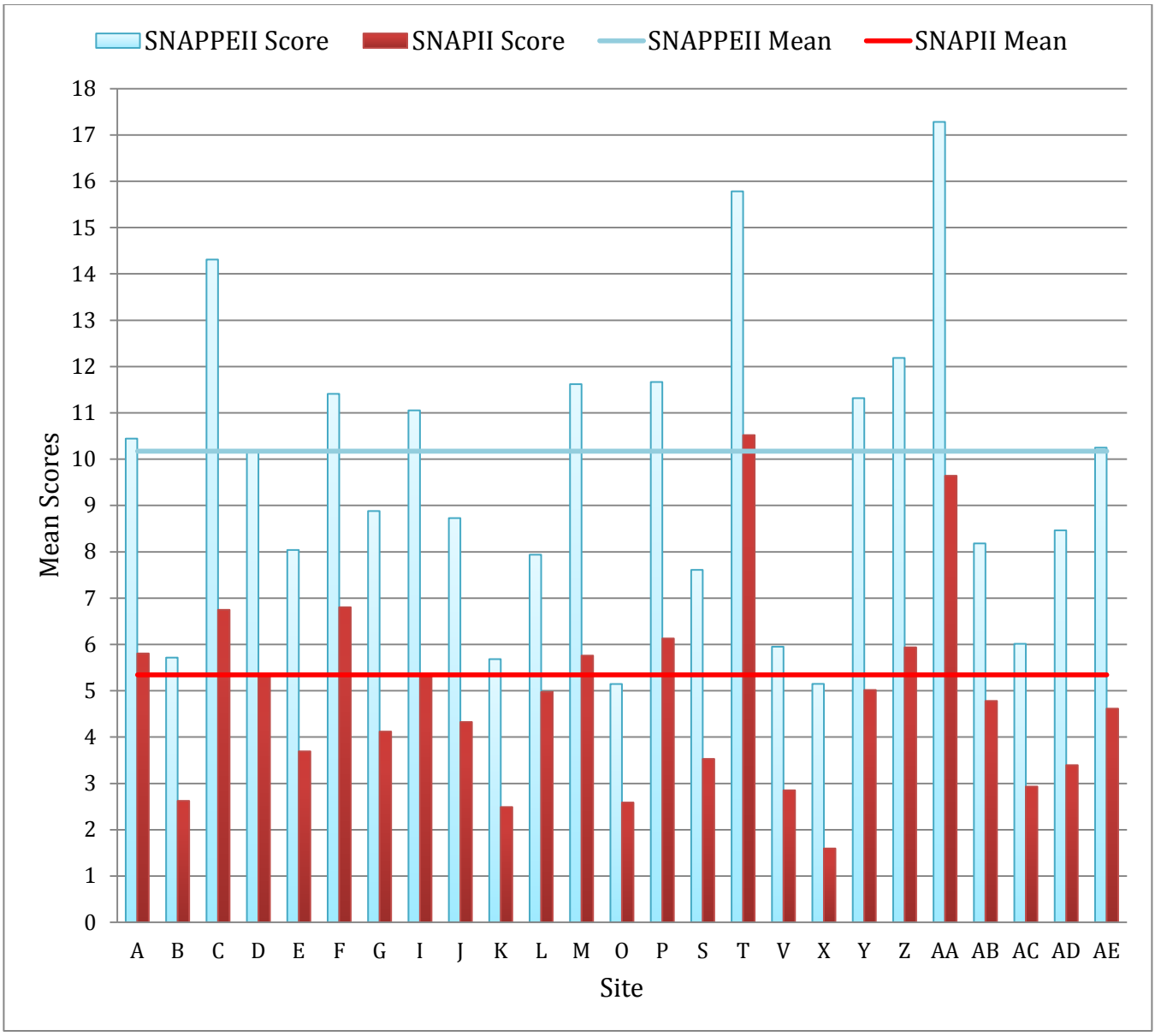
Presentation #1 (continued)
Admissions to Canadian Neonatal Network participating sites

Sites		Admission Status			Total	Sites		Admission status			Total
		Inborn	Outborn	Readmission				Inborn	Outborn	Readmission	
a[ϕ]	Count	57	13	10	80	q	Count	426	37	7	470
	%	71.3	16.3	12.5	(100.0)		%	90.6	7.9	1.5	(100.0)
b[ϕ]	Count	91	8	2	101	r	Count	389	81	4	474
	%	90.1	7.9	2.0	(100.0)		%	82.1	17.1	0.8	(100.0)
c	Count	111	12	10	133	s	Count	443	76	9	528
	%	83.5	9.0	7.5	(100.0)		%	83.9	14.4	1.7	(100.0)
d	Count	113	25	2	140	t	Count	424	133	9	566
	%	80.7	17.9	1.4	(100.0)		%	74.9	23.5	1.6	(100.0)
e[ϕ]	Count	158	32	3	193	u	Count	565	62	13	640
	%	81.9	16.6	1.6	(100.0)		%	88.3	9.7	2.0	(100.0)
f	Count	2	197	19	218	v	Count	350	284	23	657
	%	0.9	90.4	8.7	(100.0)		%	53.3	43.2	3.5	(100.0)
g	Count	246	16	7	269	w	Count	607	108	18	733
	%	91.5	6.0	2.6	(100.0)		%	82.8	14.7	2.5	(100.0)
h	Count	261	4	7	272	x	Count	644	109	10	763
	%	96.0	1.5	2.6	(100.0)		%	84.4	14.3	1.3	(100.0)
i	Count	255	39	6	300	y	Count	0	789	45	834
	%	85.0	13.0	2.0	(100.0)		%	0.0	94.6	5.4	(100.0)
j[ϕ]	Count	119	191	0	310	z	Count	588	239	22	849
	%	38.4	61.6	0.0	(100.0)		%	69.3	28.2	2.6	(100.0)
k[ϕ]	Count	236	75	4	315	aa[ϕ]	Count	346	463	128	937
	%	74.9	23.8	1.3	(100.0)		%	36.9	49.4	13.7	(100.0)
l	Count	288	47	2	337	ab	Count	834	82	22	938
	%	85.5	14.0	0.6	(100.0)		%	88.9	8.7	2.4	(100.0)
m	Count	322	57	8	387	ac	Count	717	229	46	992
	%	83.2	14.7	2.1	(100.0)		%	72.3	23.1	4.6	(100.0)
n	Count	408	45	4	457	ad	Count	1057	15	18	1090
	%	89.3	9.9	0.9	(100.0)		%	97.0	1.4	1.7	(100.0)
o	Count	0	425	40	465	ae	Count	1035	106	9	1150
	%	0.0	91.4	8.6	(100.0)		%	90.0	9.2	0.8	(100.0)
p	Count	385	62	21	468						
	%	82.3	13.3	4.5	(100.0)						

Total number of admissions: 16 073
Inborn: 11 477 (71.4%)
Outborn: 4 061 (25.3%)
Readmission: 528 (3.3%)
Missing data on admission status: 7 (0.04%)

COMMENTS: These analyses include 16 073 admissions to participating sites across Canada during the period of January 1, 2014 to December 31, 2014. Adjusting for readmission, these represent 15 045 Neonates. **Twenty-five sites collected data on all eligible admissions whereas six sites (marked by ϕ) collected data on selected cohort of eligible admissions only.**

Presentation #2
Admission illness severity scores (SNAP-II and SNAP-IIPE) by site
(only for sites that contributed data on all eligible admissions)
(n=25 sites, 14 136 admissions, 485 missing data on SNAP score)



Presentation #2 (continued)

Admission illness severity scores (SNAP-II and SNAP-IIPE) by site

Site		SNAP-IIPE	SNAP-II	Site		SNAP-IIPE	SNAP-II
A	Mean	10.4	5.8	**Q**ϕ	Mean	7.3	2.0
	SEM	0.5	0.3		SEM	0.7	0.3
B	Mean	5.7	2.6	**R**ϕ	Mean	14.2	7.6
	SEM	0.6	0.4		SEM	1.7	0.9
C	Mean	14.3	6.7	**S**	Mean	7.6	3.5
	SEM	0.9	0.6		SEM	0.7	0.4
D	Mean	10.2	5.4	**T**	Mean	15.8	10.5
	SEM	0.7	0.5		SEM	0.5	0.3
E	Mean	8.0	3.7	**U**ϕ	Mean	18.5	10.1
	SEM	0.5	0.3		SEM	1.4	0.8
F	Mean	11.4	6.8	**V**	Mean	5.9	2.8
	SEM	0.5	0.3		SEM	0.5	0.3
G	Mean	8.9	4.1	**W**ϕ	Mean	17.1	8.3
	SEM	0.8	0.4		SEM	0.6	0.4
Hϕ	Mean	15.1	8.9	**X**	Mean	5.1	1.6
	SEM	1.2	0.8		SEM	1.0	0.5
I	Mean	11.1	5.3	**Y**	Mean	11.3	5.0
	SEM	1.4	0.8		SEM	1.1	0.6
J	Mean	8.7	4.3	**Z**	Mean	12.2	5.9
	SEM	0.6	0.4		SEM	0.6	0.4
K	Mean	5.7	2.5	**AA**	Mean	17.3	9.6
	SEM	0.5	0.3		SEM	0.7	0.5
L	Mean	7.9	5.0	**AB**	Mean	8.2	4.8
	SEM	0.7	0.5		SEM	0.6	0.4
M	Mean	11.6	5.8	**AC**	Mean	6.0	2.9
	SEM	0.7	0.4		SEM	0.7	0.4
Nϕ	Mean	6.6	3.2	**AD**	Mean	8.5	3.4
	SEM	1.3	0.8		SEM	0.5	0.3
O	Mean	5.1	2.6	**AE**	Mean	10.2	4.6
	SEM	0.6	0.4		SEM	0.7	0.4
P	Mean	11.7	6.1				
	SEM	0.6	0.4				

All eligible admissions overall (25 sites) – Mean (SEM): SNAP-IIPE 10.2 (0.1), SNAP-II 5.3 (0.1)
Selected admissions overall (6 sites) – Mean (SEM): SNAP-IIPE 14.8 (0.4), SNAP-II 7.3 (0.3)

COMMENTS: These analyses include 16 073 admissions (508 missing data on SNAP score) to participating sites across Canada during the year 2014. Adjusting for readmission, these analyses represent 15 045 Neonates. **Twenty-five sites collected data on all eligible admissions whereas six sites (marked by ϕ) collected data on a selected cohort of eligible admissions only.** These six sites have not been included in the previous bar graph but have been included in the above Table.

ϕ Please note that the criteria for entering neonates in the CNN dataset are not the same for these six sites and thus, the scores are not comparable with each other or with centers contributing complete data. These six sites may have included neonates at lower GAs and/or lower BWs; thus, their severity of illness scores may be different.

Section D.2

Analyses based on number of eligible neonates admitted to participating sites

These include data from 15 045 eligible neonates admitted to 31 sites. 25 of these sites submitted complete data (n=13 635) on all eligible admitted neonates and 6 sites submitted data on a selected cohort of eligible admitted neonates (n=1 410).

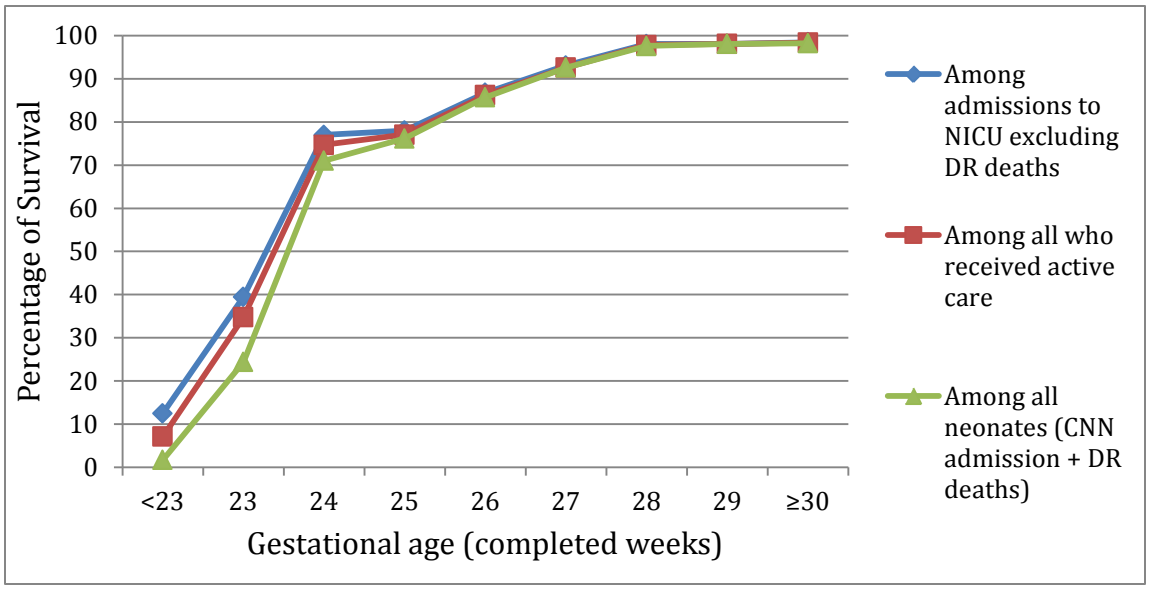
Presentation #3
Gestational age at birth

Presentation #3 (continued)
Gestational age at birth

GA in completed weeks at birth	Frequency	Percent	Cumulative percent
<23	8	0.1	0.1
23	81	0.5	0.6
24	226	1.5	2.1
25	250	1.7	3.8
26	332	2.2	6.0
27	362	2.4	8.4
28	412	2.7	11.1
29	517	3.4	14.5
30	585	3.9	18.4
31	743	4.9	23.4
32	871	5.8	29.2
33	871	5.8	35.0
34	1216	8.1	43.0
35	1115	7.4	50.4
36	1229	8.2	58.6
37	1220	8.1	66.7
38	1402	9.3	76.0
39	1503	10.0	86.0
40	1358	9.0	95.1
41	695	4.6	99.7
≥42	49	0.3	100.0
Total included	15 045	100.0	
Total # of missing (GA)	0		
Total # of infants	15 045		

COMMENTS: The GA distribution of neonates is shown here. Term babies (≥37 weeks) represent approximately 41.4% of the total number of neonates. Twenty-five sites collected data on all eligible admissions whereas six sites collected data on a selected cohort of eligible admissions.

Presentation #4
Gestational age at birth and survival to discharge (including delivery room deaths)

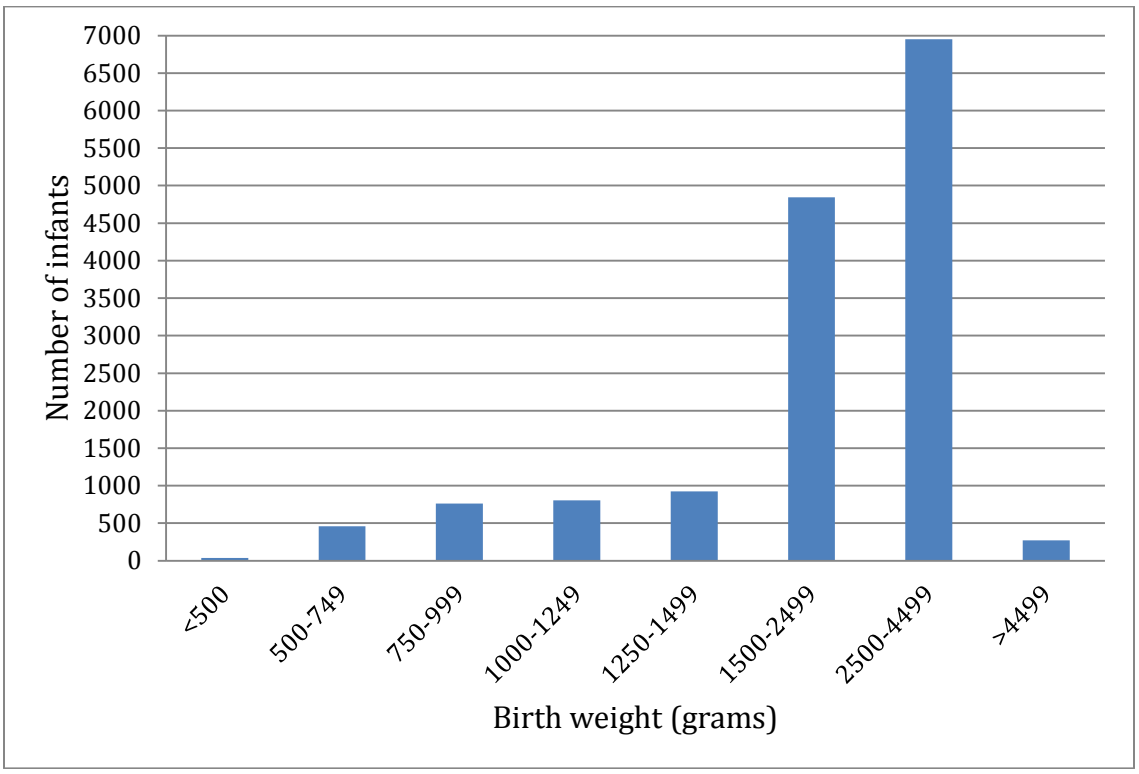


CNN admissions excluding delivery room deaths					Delivery room deaths*		Total CNN admissions including delivery room deaths*				
GA (completed weeks)	**Number of infants**	**Number of survivors**	**Percent survival among admission to NICU, excluding DR deaths**	**Number of infants who received palliative care**	**Palliative care**	**Active care**	**Total**	**Number of infants who received palliative care**	**Number of infants who received active care**	**Percent survival among those who received active care**	**Percent survival among all neonates (CNN admission + DR deaths)**
	a	*b*	*b/a*	*c*	*d*	*e*	*a+d+e*	*c+d*	*(a-c) +e*	*b/ (a-c)+e*	*b/(a+d+e)*
<23	8	1	13	0	44	6	58	44	14	7	2
23	81	32	40	0	39	11	131	39	92	35	24
24	226	174	77	0	12	7	245	12	233	75	71
25	250	195	78	0	3	3	256	3	253	77	76
26	332	288	87	0	2	2	336	2	334	86	86
27	362	337	93	0	0	2	364	0	364	93	93
28	412	404	98	0	1	1	414	1	413	98	98
29	517	507	98	0	0	0	517	0	517	98	98
≥30	12 857	12 658	98	2	20	10	12 887	22	12 865	98	98
Total included	15 045	14 596	97	2	121	42	15 208	123	15 085	97	96
Total # of missing (GA)	0				3	1	4	3	1		
Total # of infants	**15 045**				**124**	**43**	**15 212**	**126**	**15 086**		

***Please note that delivery room deaths are included *only* in Presentations #4 and #6 in this report.**

Note: The results should be used cautiously for antenatal counseling. The survival rates are based upon the final discharge from the participating neonatal site. Note that these rates include only neonates admitted to the sites or died in delivery room of participating sites and thus, are not reflective of the entire Canadian population. Capturing data for delivery room deaths is an ongoing process and not all sites contributed delivery room death data.

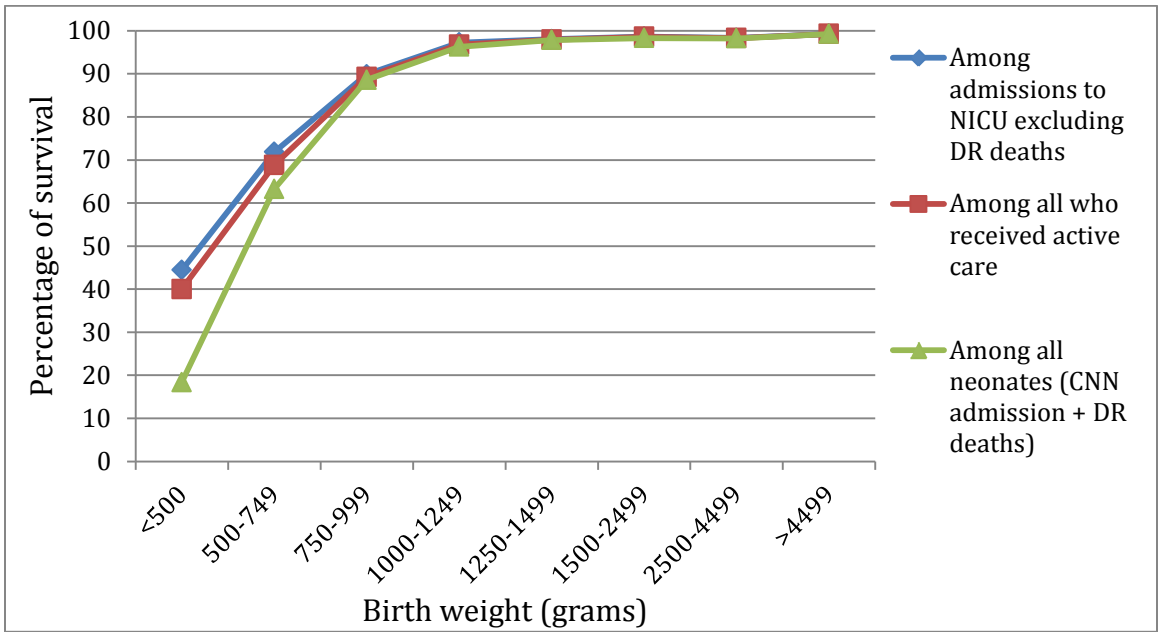
Presentation #5
Birth weight distribution



BW (grams)	Frequency	Percent from total number of neonates	Cumulative percent
<500	36	0.2	0.2
500-749	458	3.0	3.3
750-999	760	5.1	8.3
1000-1249	804	5.3	13.7
1250-1499	922	6.1	19.8
1500-2499	4844	32.2	52.0
2500-4499	6950	46.2	98.2
>4499	270	1.8	100.0
Total included	15 044	100.0	
Missing (BW)	1		
Total # of neonates	15 045		

COMMENTS: The BW distribution of neonates admitted to the sites. Eighty percent weighed more than 1 500g at birth and 48% weighed more than 2 500g. Twenty-five sites collected data on all admissions whereas six sites collected data on a selected cohort of eligible admissions only.

Presentation #6
Birth weight and survival to discharge (including delivery room deaths)



CNN Admissions not including DR deaths					Delivery room deaths*		Total CNN admissions + Delivery room deaths*				
BW (grams)	**Number of infants**	**Number of survivors**	**Percent survival among admission to NICU, excluding DR deaths**	**Number of infants who received palliative care**	**Palliative care**	**Active care**	**Total**	**Number of infants who received palliative care**	**Number of infants who received active care**	**Percent survival among those who received active care**	**Percent survival among all neonates (CNN admission + DR deaths)**
	a	*b*	*b/a*	*c*	*d*	*e*	*a+d+e*	*c+d*	*(a-c) +e*	*b/ (a-c)+e*	*b/(a+d+e)*
<500	36	16	44	0	47	4	87	47	40	40	18
500-749	458	329	72	0	42	20	520	42	478	69	63
750-999	760	683	90	0	6	5	771	6	765	89	89
1000-1249	804	782	97	0	4	4	812	4	808	97	96
1250-1499	922	904	98	0	1	1	924	1	923	98	98
1500-2499	4 844	4 778	99	2	12	4	4 860	14	4 846	99	98
2500-4499	6 950	6 835	98	0	5	4	6 959	5	6 954	98	98
>4499	270	268	99	0	0	0	270	0	270	99	99
Total included	15 044	14 595	97	2	117	42	15 203	119	15 084	97	96
Missing (BW)	1				7	1	9	7	2		
Total # of neonates	15 045				**124**	**43**	**15 212**	**126**	**15 086**		

***Please note that delivery room deaths are included *only* in Presentations #4 and #6 in this report.**

Note: The results should be used cautiously for antenatal counseling. The survival rates are based upon the final discharge from the participating neonatal site. Note that these rates include only neonates admitted to the sites or died in delivery room of participating sites and thus, are not reflective of the entire Canadian population. Capturing data for delivery room deaths is an ongoing process and not all sites contributed delivery room death data.

Presentation #7
Maternal characteristics

Characteristics					**GA at birth (completed weeks)**			
		Missing	**Unknown**		**<33**	**33 - 36**	**≥37**	**Total**
Total					**4387**	**4431**	**6227**	**15045**
No prenatal care		33	749	N	61	33	57	151
				%	1.5	0.8	1.0	1.1
Illicit drug use		1		N	219	213	393	825
				%	5.0	4.8	6.3	5.5
Smoking		1		N	604	569	801	1974
				%	13.8	12.8	12.9	13.1
Maternal hypertension		30	538	N	788	842	536	2166
				%	18.6	19.5	9.0	15.0
Maternal diabetes		31	600	N	548	744	853	2145
				%	13.1	17.3	14.4	14.9
Assisted pregnancy		34	736	N	574	503	215	1292
				%	13.8	11.9	3.7	9.1
Multiples				N	1356	1215	218	2789
				%	30.9	27.4	3.5	18.5
$MgSO_4$ for neuroprotection		31	755	N	2192	303	44	2539
				%	53.3	7.3	0.7	17.8
Prenatal steroids	None	30	436	N	531	2797	5925	9253
				%	12.5	65.3	97.9	63.5
	Partial			N	941	263	12	1216
				%	22.2	6.1	0.2	8.3
	Complete			N	2767	1225	118	4110
				%	65.3	28.6	2.0	28.2
Mode of birth	Vaginal	6	44	N	1798	2119	3683	7600
				%	41.1	47.9	59.4	50.7
	C/S			N	2573	2302	2520	7395
				%	58.9	52.1	40.6	49.3
Presentation	Vertex	17	684	N	2728	3439	5582	11749
				%	65.8	81.3	93.5	81.9
	Breech			N	1179	686	315	2180
				%	28.4	16.2	5.3	15.2
	Other			N	238	106	71	415
				%	5.7	2.5	1.2	2.9
Rupture of membranes	<24 h	32	794	N	3324	3697	5470	12491
				%	79.7	87.7	93.8	87.8
	24h to 1wk			N	479	370	353	1202
				%	11.5	8.8	6.1	8.5
	>1 wk			N	366	150	10	526
				%	8.8	3.6	0.2	3.7

Presentation #7 (continued)
Maternal characteristics

Characteristics					**GA at birth (completed weeks)**			
		Missing	**Unknown**		**<33**	**33 - 36**	**≥37**	**Total**
Total					**4387**	**4431**	**6227**	**15045**
Chorioamnionitis*		1	5248	N	672	168	369	1209
				%	21.4	5.7	10.0	12.3
Delayed cord clamping	≤ 29 sec	457	4183	N	148	68	67	283
				%	4.4	2.1	1.7	2.7
	30-44 sec			N	177	95	39	311
				%	5.3	3.0	1.0	3.0
	≥45 sec			N	975	685	210	1870
				%	29.2	21.6	5.4	18.0
	Yes, but timing unknown			N	62	85	61	208
				%	1.9	2.7	1.6	2.0
	No			N	1981	2238	3514	7733
				%	59.3	70.6	90.3	74.3

*Chorioamnionitis is defined as documented "suspected or confirmed clinical chorioamnionitis" in chart **or** presence of maternal fever and *either* leukocytosis *or* uterine tenderness

Presentation #8
Resuscitation (GA < 31 weeks)

Action taken			**GA at birth (completed weeks)**								
			≤23	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**Total**
Total			**89**	**226**	**250**	**332**	**362**	**412**	**517**	**585**	**2773**
Palliative		N	0	0	0	0	0	0	0	0	0
		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No resuscitation needed/provided		N	0	1	0	2	3	9	12	54	81
		%	0.0	0.4	0.0	0.6	0.8	2.2	2.3	9.2	2.9
CPAP		N	20	80	89	162	187	251	321	320	1430
		%	22.7	35.4	35.6	48.8	51.7	60.9	62.2	54.7	51.6
PPV via mask		N	70	182	191	232	258	272	274	277	1756
		%	79.6	80.5	76.4	69.9	71.3	66.0	53.1	47.4	63.4
PPV via ETT		N	78	163	159	169	147	106	107	98	1027
		%	88.6	72.1	63.6	50.9	40.6	25.7	20.7	16.8	37.1
Chest compression		N	21	22	31	26	18	15	9	16	158
		%	23.9	9.7	12.4	7.8	5.0	3.6	1.7	2.7	5.7
Epinephrine		N	13	10	11	11	8	8	3	7	71
		%	14.8	4.4	4.4	3.3	2.2	1.9	0.6	1.2	2.6
Unknown		N	0	3	1	6	1	5	10	6	32
		%	0.0	1.3	0.4	1.8	0.3	1.2	1.9	1.0	1.2
Any resuscitation provided*		N	88	221	248	319	352	385	465	477	2555
		%	100.0	97.8	99.2	96.1	97.2	93.5	90.1	81.5	92.2
Initial gas	Air	N	20	48	36	54	73	97	127	145	600
		%	22.5	21.2	14.4	16.3	20.2	23.5	24.6	24.8	21.6
	Suppl. O_2	N	25	108	125	197	202	222	254	257	1390
		%	28.1	47.8	50.0	59.3	55.8	53.9	49.1	43.9	50.1
	100% O_2	N	32	46	53	41	40	42	37	36	327
		%	36.0	20.4	21.2	12.4	11.1	10.2	7.2	6.2	11.8
	Unknown	N	11	20	33	33	40	35	64	56	292
		%	12.4	8.9	13.2	9.9	11.1	8.5	12.4	9.6	10.5
	Missing	N	1	4	3	7	7	16	35	91	164
		%	1.1	1.8	1.2	2.1	1.9	3.9	6.8	15.6	5.9
Maximum O_2 conc. during resus.	21%	N	0	0	0	2	2	6	5	22	37
		%	0.0	0.0	0.0	0.6	0.6	1.5	1.0	3.8	1.3
	22-40%	N	5	25	35	79	81	127	185	186	723
		%	5.6	11.1	14.0	23.8	22.4	30.8	35.8	31.8	26.1
	41-70%	N	4	36	44	54	79	81	78	86	462
		%	4.5	15.9	17.6	16.3	21.8	19.7	15.1	14.7	16.7
	>70%	N	68	140	138	146	141	126	128	116	1003
		%	76.4	62.0	55.2	44.0	39.0	30.6	24.8	19.8	36.2
	Missing	N	12	25	33	51	59	72	121	175	548
		%	13.5	11.1	13.2	15.4	16.3	17.5	23.4	29.9	19.8

* Number of neonates who received any resuscitation includes those who received CPAP, PPV, chest compression or epinephrine

NOTE: Please note that some of the definitions for items on this table were evolving during this first year of this data collection. Please use caution while interpreting these data. Resuscitation time was defined as first 30 minutes after birth.

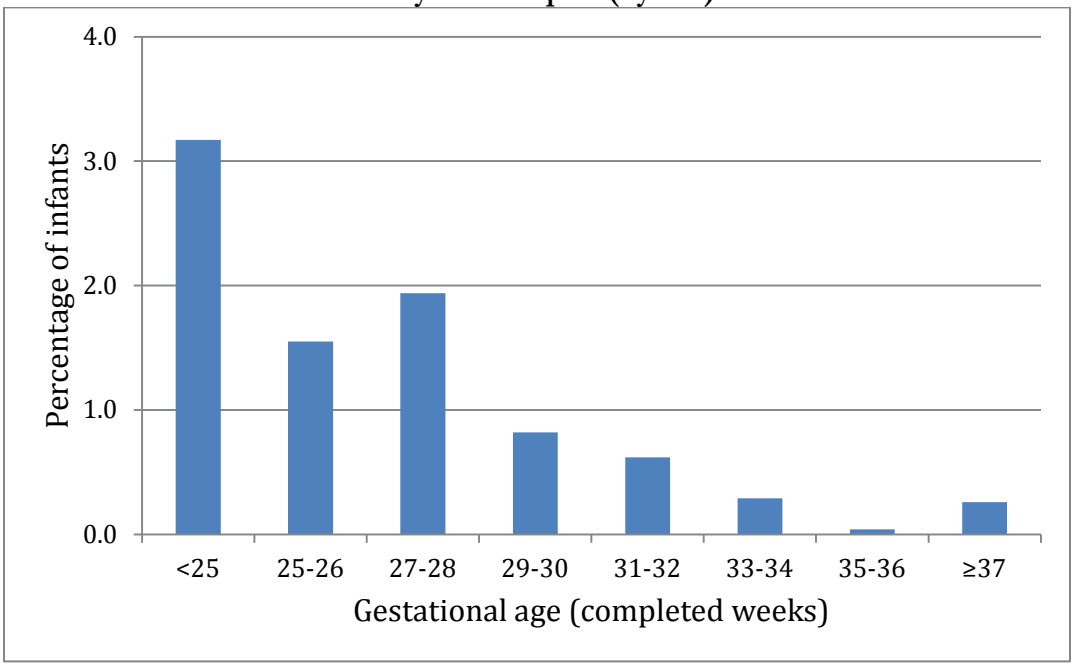
Presentation #8 (continued)
Resuscitation (GA ≥ 31 weeks)

Action taken			**GA at birth (completed weeks)**							
			31	**32**	**33**	**34**	**35**	**36**	**≥37**	**Total**
Total			**743**	**871**	**871**	**1216**	**1115**	**1229**	**6227**	**12272**
Palliative		N	0	0	0	0	0	0	2	2
		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No resuscitation needed / provided		N	101	163	228	435	413	503	2370	4213
		%	13.6	18.7	26.2	35.8	37.0	40.9	38.1	34.3
CPAP		N	408	402	309	339	264	231	1101	3054
		%	54.9	46.2	35.5	27.9	23.7	18.8	17.7	24.9
PPV via mask		N	335	303	266	272	263	279	1705	3423
		%	45.1	34.8	30.5	22.4	23.6	22.7	27.4	27.9
PPV via ETT		N	85	80	53	48	61	79	485	891
		%	11.4	9.2	6.1	4.0	5.5	6.4	7.8	7.3
Chest compression		N	11	12	10	8	21	23	181	266
		%	1.5	1.4	1.2	0.7	1.9	1.9	2.9	2.2
Epinephrine		N	3	5	5	4	11	7	59	94
		%	0.4	0.6	0.6	0.3	1.0	0.6	1.0	0.8
Unknown		N	10	14	16	21	20	16	173	270
		%	1.4	1.6	1.8	1.7	1.8	1.3	2.8	2.2
Any resuscitation provided*		N	553	557	461	485	420	442	2409	5327
		%	74.4	64.0	52.9	39.9	37.7	36.0	38.7	43.4
Initial gas	Air	N	216	235	201	252	238	249	1288	2679
		%	29.1	27.0	23.1	20.7	21.4	20.3	20.7	21.8
	Suppl. O_2	N	283	278	209	247	171	177	851	2216
		%	38.1	31.9	24.0	20.3	15.3	14.4	13.7	18.1
	100% O_2	N	32	28	34	24	43	51	333	545
		%	4.3	3.2	3.9	2.0	3.9	4.2	5.4	4.4
	Unknown	N	70	101	103	106	125	117	803	1425
		%	9.4	11.6	11.8	8.7	11.2	9.5	12.9	11.6
	Missing	N	142	229	324	587	538	635	2952	5407
		%	19.1	26.3	37.2	48.3	48.3	51.7	47.4	44.1
Maximum O_2 conc. during resus	21%	N	39	50	63	89	94	107	490	932
		%	5.3	5.7	7.2	7.3	8.4	8.7	7.9	7.6
	22-40%	N	237	219	166	198	139	145	594	1698
		%	31.9	25.1	19.1	16.3	12.5	11.8	9.5	13.8
	41-70%	N	102	110	63	82	64	47	280	748
		%	13.7	12.6	7.2	6.7	5.7	3.8	4.5	6.1
	>70%	N	109	107	105	95	108	134	825	1483
		%	14.7	12.3	12.1	7.8	9.7	10.9	13.3	12.1
	Missing	N	256	385	474	752	710	796	4038	7411
		%	34.5	44.2	54.4	61.8	63.7	64.8	64.9	60.4

* Number of neonates who received any resuscitation includes those who received CPAP, PPV, Chest compression or epinephrine

NOTE: Please note that some of the definitions for items on this table were evolving during this first year of this data collection. Please use caution while interpreting these data. Resuscitation time was defined as first 30 minutes after birth.

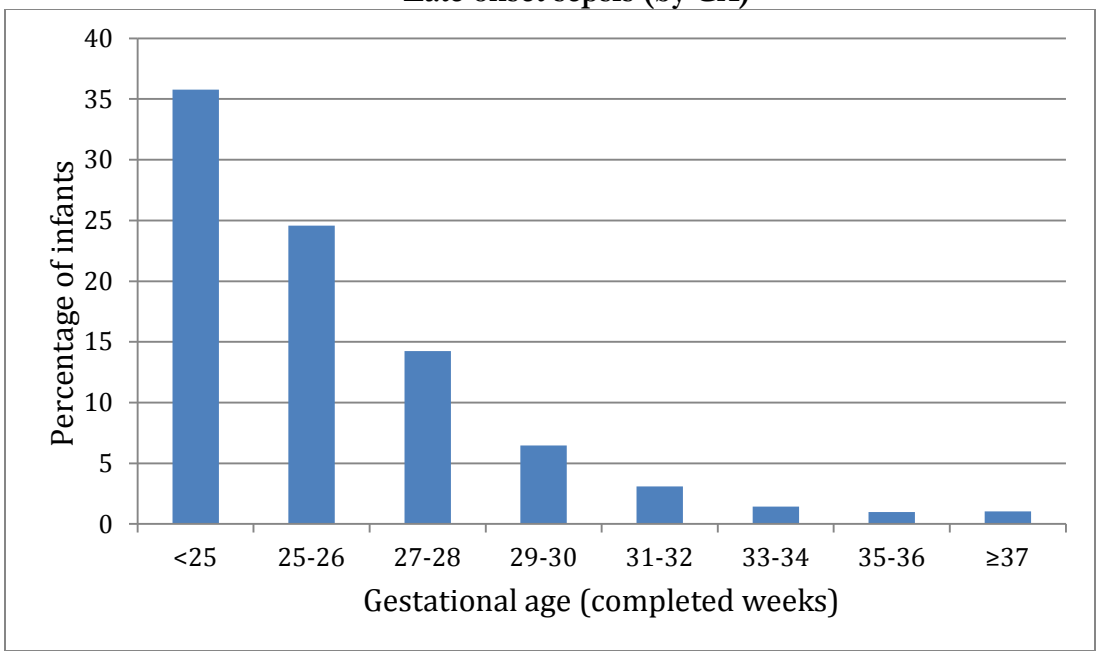
Presentation #9
Early onset sepsis (by GA)



GA at birth (completed weeks)	Total number of neonates	No. of neonates with infection	% of neonates with infection	Total number of organisms	Organism		
					E. Coli	GBS	Others
<25	315	10	3.2	10	4	3	3
25-26	582	9	1.6	9	4	0	5
27-28	774	15	1.9	16	6	2	8
29-30	1 102	9	0.8	9	7	0	2
31-32	1 613	10	0.6	10	4	3	3
33-34	2 087	6	0.3	6	3	1	2
35-36	2 344	1	0.0	1	0	0	1
≥37	6 227	16	0.3	17	2	7	8
Total included	**15 044**	**76**	**0.5**	**78**	**30**	**16**	**32**
Missing	1						
Total # of neonates	**15 045**						

COMMENTS: Early onset sepsis is indicated by positive bacterial, viral or fungal culture in blood and/or cerebrospinal fluid, in the first two days after birth. Two neonates had two organisms isolated. In other category, top five organisms were: Streptococci (n=11), Haemophilus influenza (n=4), Listeria (n=3), Enterococci (n=2), Staphylococci (n=2). In contrast to previous CNN reports, CONS were *not* included as an organism causing early onset sepsis in this report based on consultation with microbiologists.

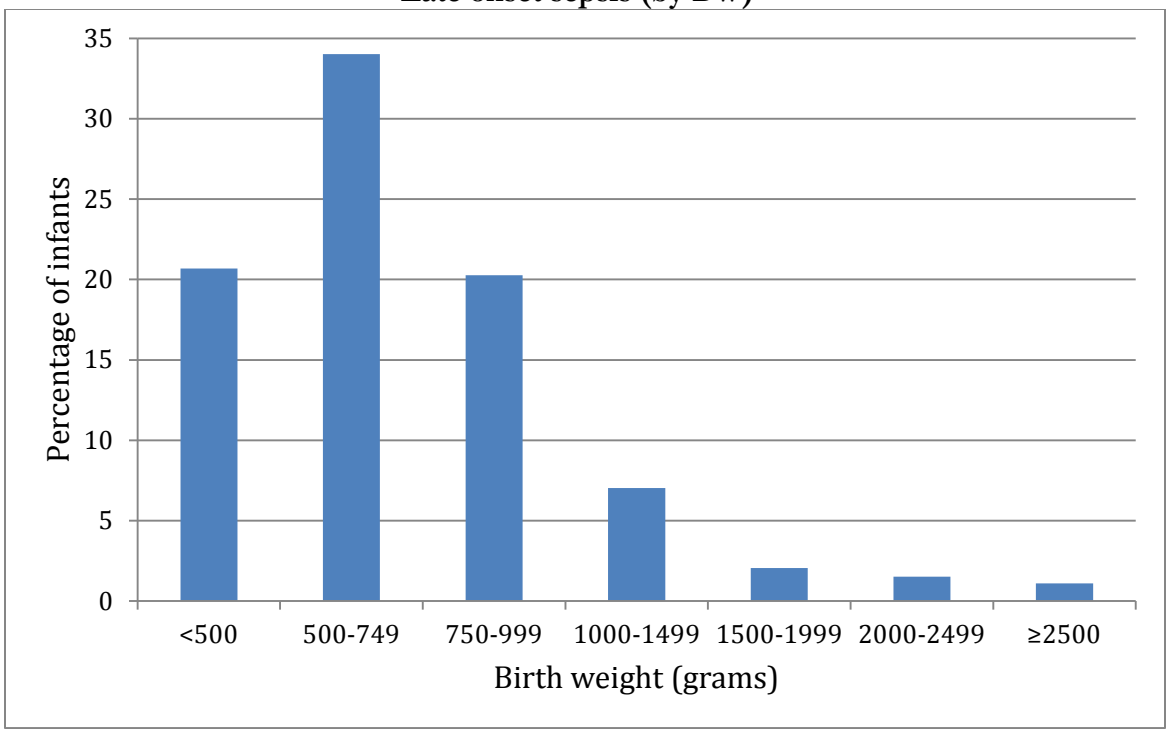
Presentation #10
Late onset sepsis (by GA)



GA at birth (completed weeks)	Total number	Number of deaths in the first 2 days after birth	Number of neonates survived beyond day 2 after birth	Number of neonates with at least one infection	Number of infants with more than one infection	Among infants who survived day 2, percentage with at least one infection	Total number of organisms	Organisms				
								CONS	E. Coli	Coag + Staph	Fungal	Other
<25	315	27	288	103	27	35	141	61	14	15	8	43
25-26	582	12	570	140	32	28	184	93	34	10	4	43
27-28	774	8	766	109	15	18	133	70	10	15	0	38
29-30	1 102	3	1 099	71	7	7	83	50	3	3	3	24
31-32	1 614	4	1 610	50	8	3	60	37	5	4	0	14
33-34	2 087	7	2 080	30	3	1	35	15	4	0	1	15
35-36	2 344	6	2 338	23	2	1	27	13	1	1	0	12
≥37	6 227	26	6 201	64	6	1	77	31	10	9	0	27
Total included	**15 045**	**93**	**14 952**	**590**	**100**	**4**	**740**	**370**	**81**	**57**	**16**	**216**
Missing	0											
Total # of neonates	**15 045**											

COMMENTS: Late onset sepsis is defined as any positive blood and/or cerebrospinal fluid culture for bacteria, viral or fungi after 2 days of age (analysis is neonate-based). The numbers are adjusted for readmission. Among other category, top 5 organisms were: Staphylococci (n=39), Enterococci (n=38), Klebsiella (n=37), GBS (n=28), Enterobacter (n=19).

Presentation #11
Late onset sepsis (by BW)



BW (grams)	Total number	Number of deaths in the first 2 days after birth	Number of neonates survived beyond day 2 after birth	Number of neonates with at least one infection	Number of infants with more than one infection	Among infants who survived day 2, percentage with at least one infection	Total number of organisms	Organisms				
								CONS	E. Coli	Coag + Staph	Fungal	Other
<500	36	7	29	6	4	21	10	4	2	1	1	2
500-749	458	26	432	147	36	34	202	92	24	18	5	63
750-999	760	10	750	152	33	20	202	106	25	17	7	47
1000-1499	1 726	6	1 720	121	14	7	138	80	9	9	3	37
1500-1999	2 256	9	2 247	46	3	2	49	32	5	1	0	11
2000-2499	2 588	6	2 582	39	1	2	43	21	6	3	0	13
≥2500	7 220	29	7 191	79	9	1	96	35	10	8	0	43
Total included	**15 044**	**93**	**14 951**	**590**	**100**	**4**	**740**	**370**	**81**	**57**	**16**	**216**
Missing (BW)	1											
Total # of neonates	**15 045**											

COMMENTS: Late onset sepsis is defined as any positive blood and/or cerebrospinal fluid culture for bacteria, viral or fungi after 2 days of age (analysis is neonate-based). The numbers are adjusted for readmission and transfer. Among other category, top 5 organisms were: Staphylococci (n=39), Enterococci (n=38), Klebsiella (n=37), GBS (n=28), Enterobacter (n=19).

Presentation #12
Other diagnoses / interventions / procedures by GA groups

Characteristics				**GA at birth (completed weeks)**						
				≤25	**26 - 28**	**29 - 30**	**31 - 32**	**33 - 36**	**≥37**	**Total**
Total				565	1106	1102	1614	4431	6227	15045
		Missing								
Prophylactic	Indomethacin	7	N	143	53	12	3	0	3	214
			%	25.4	4.8	1.1	0.2	0.0	0.1	1.4
	HFV	7	N	25	26	6	4	3	7	71
			%	4.4	2.4	0.6	0.3	0.1	0.1	0.5
	Probiotics	7	N	61	111	107	106	27	4	416
			%	10.8	10.1	9.7	6.6	0.6	0.1	2.8
	Phototherapy	7	N	89	158	123	144	255	160	929
			%	15.8	14.3	11.2	8.9	5.8	2.6	6.2
	L-Arginine	7	N	0	0	0	0	0	0	0
			%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RDS	Unknown	33	N	5	1	0	2	2	1	11
			%	0.9	0.1	0.0	0.1	0.1	0.0	0.1
	Uncertain		N	4	28	18	21	56	28	155
			%	0.7	2.5	1.7	1.3	1.3	0.5	1.0
	None		N	47	223	439	994	3860	6022	11585
			%	8.3	20.2	40.4	62.1	87.1	96.7	77.2
	Definite		N	508	853	631	583	512	174	3261
			%	90.1	77.2	58.0	36.4	11.6	2.8	21.7
Surfactant in first 30 min			N	109	114	28	21	8	3	283
			%	19.3	10.3	2.5	1.3	0.2	0.1	1.9
Surfactant at any time			N	470	677	381	315	298	153	2294
			%	83.2	61.2	34.6	19.5	6.7	2.5	15.2
Pneumothorax diagnosis		7	N	52	51	44	43	131	423	744
			%	9.2	4.6	4.0	2.7	3.0	6.8	4.9
Pneumothorax treatment**	Observation	7	N	7	16	8	12	63	291	397
			%	1.2	1.5	0.7	0.7	1.4	4.7	2.6
	Needle drainage	7	N	16	13	15	12	20	40	116
			%	2.8	1.2	1.4	0.7	0.5	0.6	0.8
	Chest tube	7	N	40	37	30	25	54	97	283
			%	7.1	3.4	2.7	1.6	1.2	1.6	1.9
	100% O_2	7	N	4	6	4	2	12	37	65
			%	0.7	0.5	0.4	0.1	0.3	0.6	0.4
Seizures	Definite /suspected	33	N	45	27	21	19	75	409	596
			%	8.0	2.4	1.9	1.2	1.7	6.6	4.0

** One infant can have multiple treatments

Presentation #12 (continued)
Other diagnoses / interventions / procedures by GA groups

Characteristics				**GA at birth (completed weeks)**						
				≤25	**26 - 28**	**29 - 30**	**31 - 32**	**33 - 36**	**≥37**	**Total**
Total				565	1106	1102	1614	4431	6227	15045
		Missing								
Operations	Laparotomy	7	N	49	48	29	39	128	217	510
			%	8.7	4.3	2.6	2.4	2.9	3.5	3.4
	Thoracotomy	7	N	12	9	3	4	33	111	172
			%	2.1	0.8	0.3	0.3	0.7	1.8	1.1
	VP shunt	7	N	11	11	3	3	10	19	57
			%	2.0	1.0	0.3	0.2	0.2	0.3	0.4
Gastro-intestinal perforation	Spontaneous	153	N	21	16	9	5	13	13	77
			%	3.7	1.5	0.8	0.3	0.3	0.2	0.5
	NEC related		N	34	14	8	7	9	2	74
			%	6.1	1.3	0.7	0.4	0.2	0.0	0.5
Acquired stricture		7	N	10	8	3	3	6	2	32
			%	1.8	0.7	0.3	0.2	0.1	0.0	0.2
Acute bilirubin encephalopathy		7	N	0	0	1	1	0	2	4
			%	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Exchange transfusion		7	N	0	0	0	1	7	19	27
			%	0.0	0.0	0.0	0.1	0.2	0.3	0.2
Congenital anomaly*	None		N	416	846	933	1388	3687	4627	11897
			%	73.6	76.5	84.7	86.0	83.2	74.3	79.1
	Minor		N	100	207	128	151	383	752	1721
			%	17.7	18.7	11.6	9.4	8.6	12.1	11.4
	Major		N	49	53	41	75	361	848	1427
			%	8.7	4.8	3.7	4.7	8.2	13.6	9.5

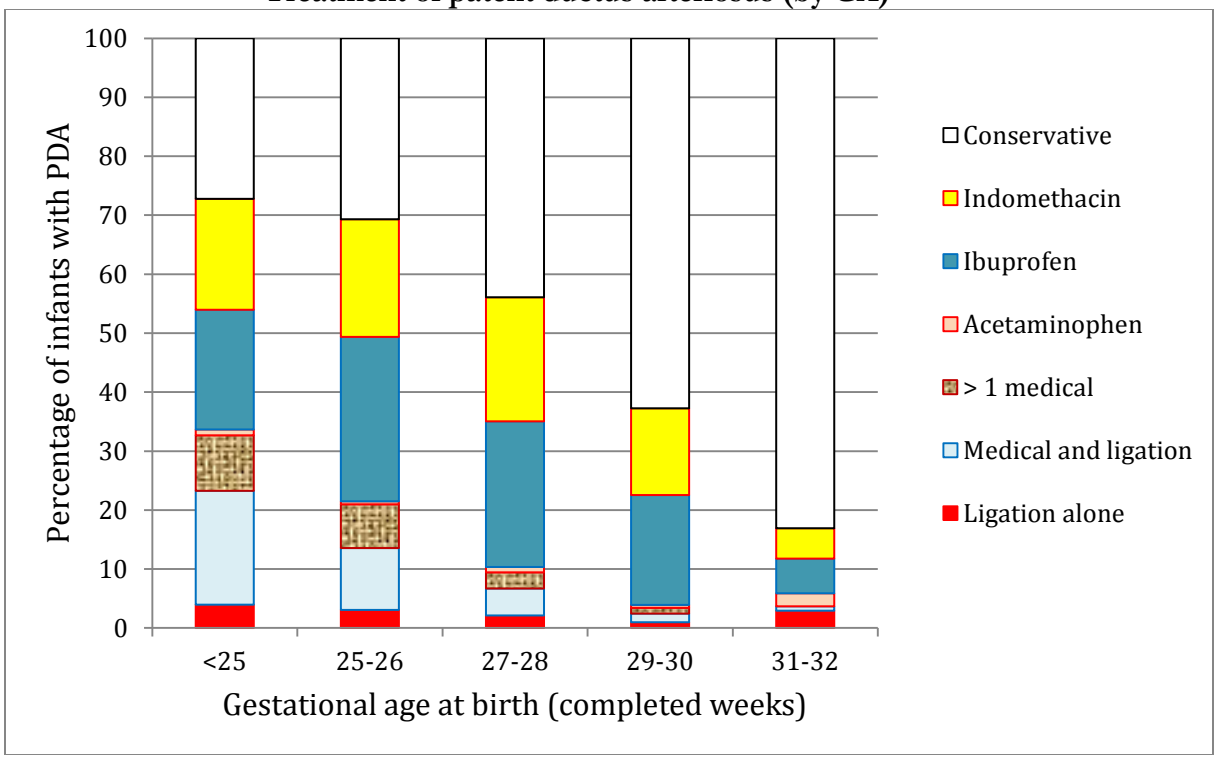
*A list of major anomalies can be found in the 2013 annual report, pages 124-127. It is available via the following link: http://www.canadianneonatalnetwork.org/Portal/LinkClick.aspx?fileticket=lreR0871sjA%3d&tabid=39

Section D.3

Analyses based on number of eligible very preterm (< 33 weeks GA) or very low BW neonates (<1 500g BW) neonates

These include data from 4 387 eligible very preterm neonates and 2 980 eligible VLBW neonates.

Presentation #13
Treatment of patent ductus arteriosus (by GA)

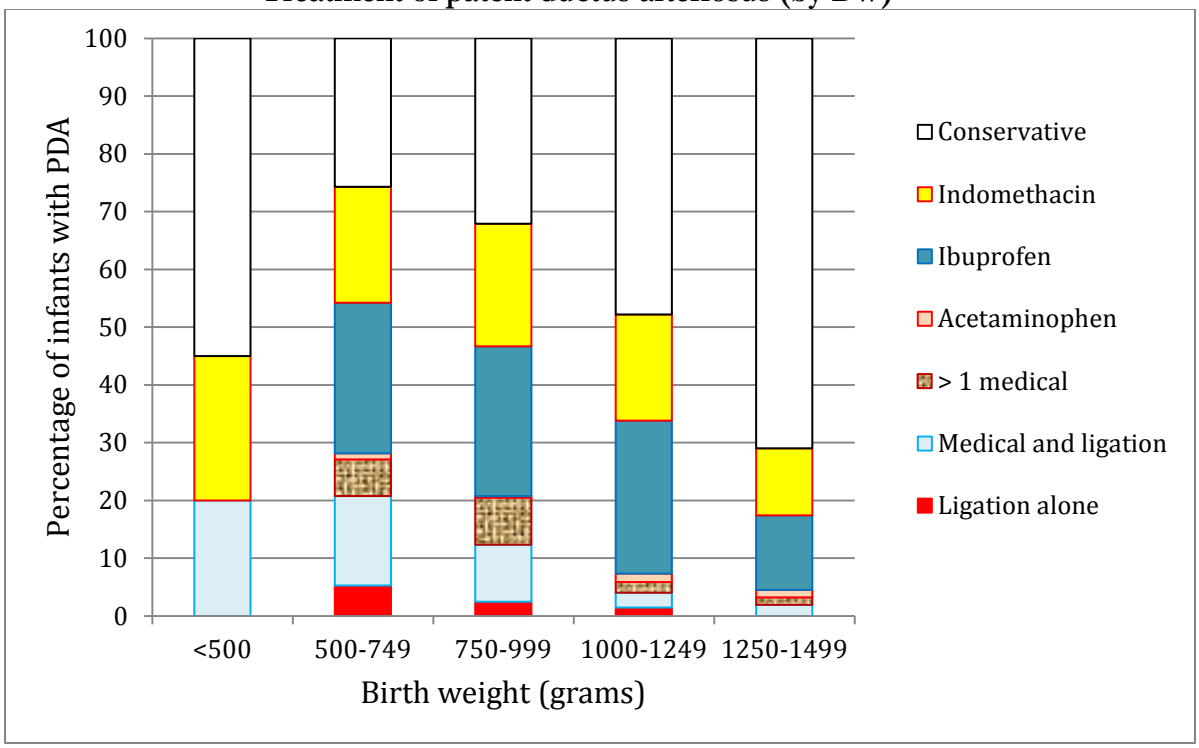


Birth GA (completed weeks)		Total	Missing data on PDA	PDA information unknown	No PDA	Neonates with PDA	Treatment†						
							Conservative	Indo	Ibu	Acetaminophen	> 1 medical*	Medical and ligation#	Ligation alone
<25	**N**	315	1	13	99	202	55	38	41	2	19	39	8
	%						27%	19%	20%	1%	9%	19%	4%
25-26	**N**	582	1	6	184	391	120	78	109	2	29	41	12
	%						31%	20%	28%	1%	7%	10%	3%
27-28	**N**	774	0	8	438	328	144	69	81	3	9	15	7
	%						44%	21%	25%	1%	3%	5%	2%
29-30	**N**	1102	3	4	891	204	128	30	38	1	2	3	2
	%						63%	15%	19%	0%	1%	1%	1%
31-32	**N**	1614	1	4	1473	136	113	7	8	3	0	1	4
	%						83%	5%	6%	2%	0%	1%	3%
Total included	**N**	4387	6	35	3085	1261	560	222	277	11	59	99	33
	%						44%	18%	22%	1%	5%	8%	3%

†The percentages of treatment of patent ductus arteriosus are calculated out of number of neonates diagnosed with PDA.
*>1 medical = 2 or 3 of (Indomethacin or Ibuprofen or Acetaminophen)
#Medical and ligation = Ligation + at least one of (Indomethacin or Ibuprofen or Acetaminophen)

COMMENTS: Specific reasons for treatment with indomethacin and frequency of repeat course of indomethacin were not recorded. Excludes indomethacin prophylaxis started on the first day of age. Neonates were identified as without PDA if there was no clinical suspicion of PDA.

Presentation #14
Treatment of patent ductus arteriosus (by BW)

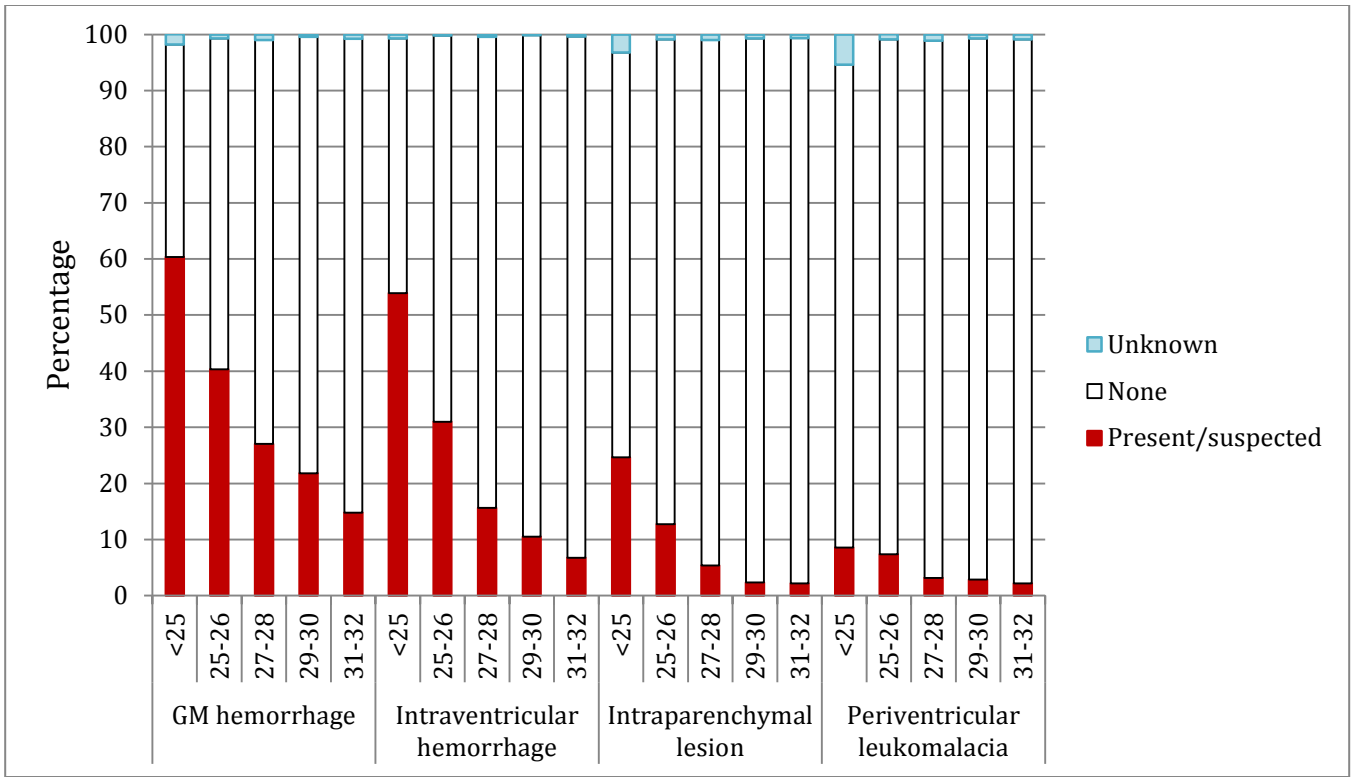


BW (grams)		Total	Missing data on PDA	PDA information unknown	No PDA	Neonates with PDA	Treatment†						
							Conservative	Indo	Ibu	Acetaminophen	> 1 medical*	Medical and ligation#	Ligation alone
<500	**N**	36	0	2	14	20	11	5	0	0	0	4	0
	%						55%	25%	0%	0%	0%	20%	0%
500-749	**N**	458	2	14	158	284	73	57	74	3	18	44	15
	%						26%	20%	26%	1%	6%	15%	5%
750-999	**N**	760	0	12	343	405	130	86	105	1	33	40	10
	%						32%	21%	26%	0%	8%	10%	2%
1000-1249	**N**	804	0	3	529	272	130	50	72	4	5	7	4
	%						48%	18%	26%	1%	2%	3%	1%
1250-1499	**N**	922	2	1	764	155	110	18	20	2	2	3	0
	%						71%	12%	13%	1%	1%	2%	0%
Total included	**N**	2980	4	32	1808	1136	454	216	271	10	58	98	29
	%						40%	19%	24%	1%	5%	9%	3%

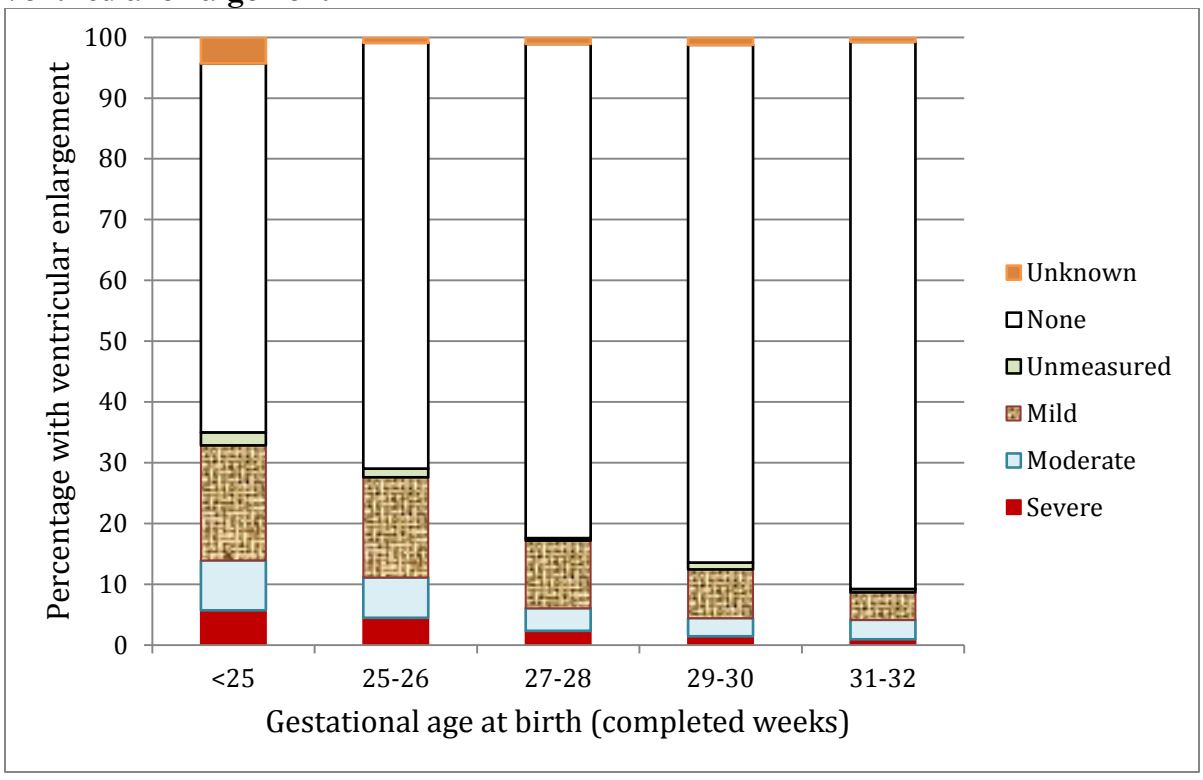
†The percentages of treatment of patent ductus arteriosus are calculated out of number of neonates diagnosed with PDA.
*>1 medical = 2 or 3 of (Indomethacin or Ibuprofen or Acetaminophen)
#Medical and ligation = Ligation + at least one of (Indomethacin or Ibuprofen or Acetaminophen)

COMMENTS: Specific reasons for treatment with indomethacin and frequency of a repeat course of indomethacin were not recorded. Excludes indomethacin prophylaxis started on the first day of age. Neonates were identified as without PDA if there was no clinical suspicion of PDA.

Presentation #15
Neuroimaging findings (by GA)



Ventricular enlargement

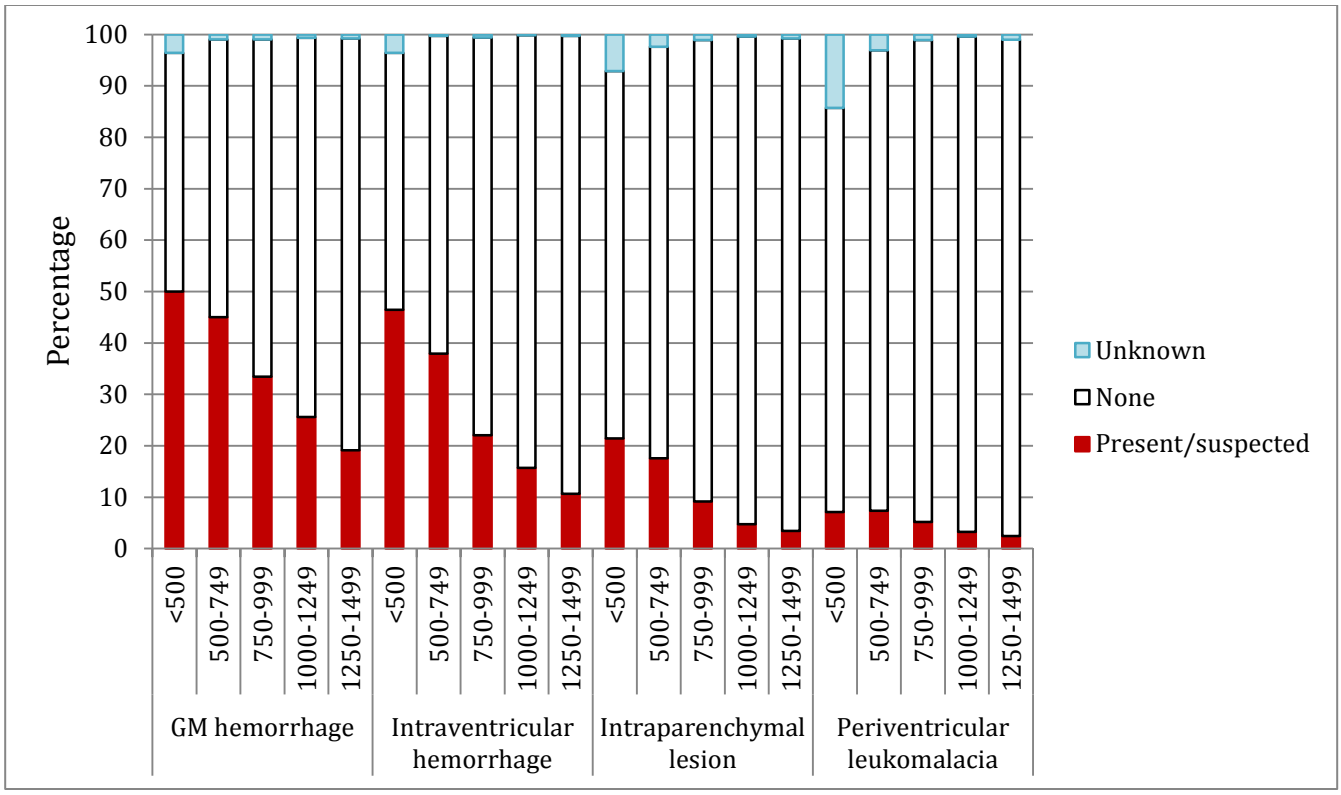


Presentation #15 (continued)
Neuroimaging findings (by GA)

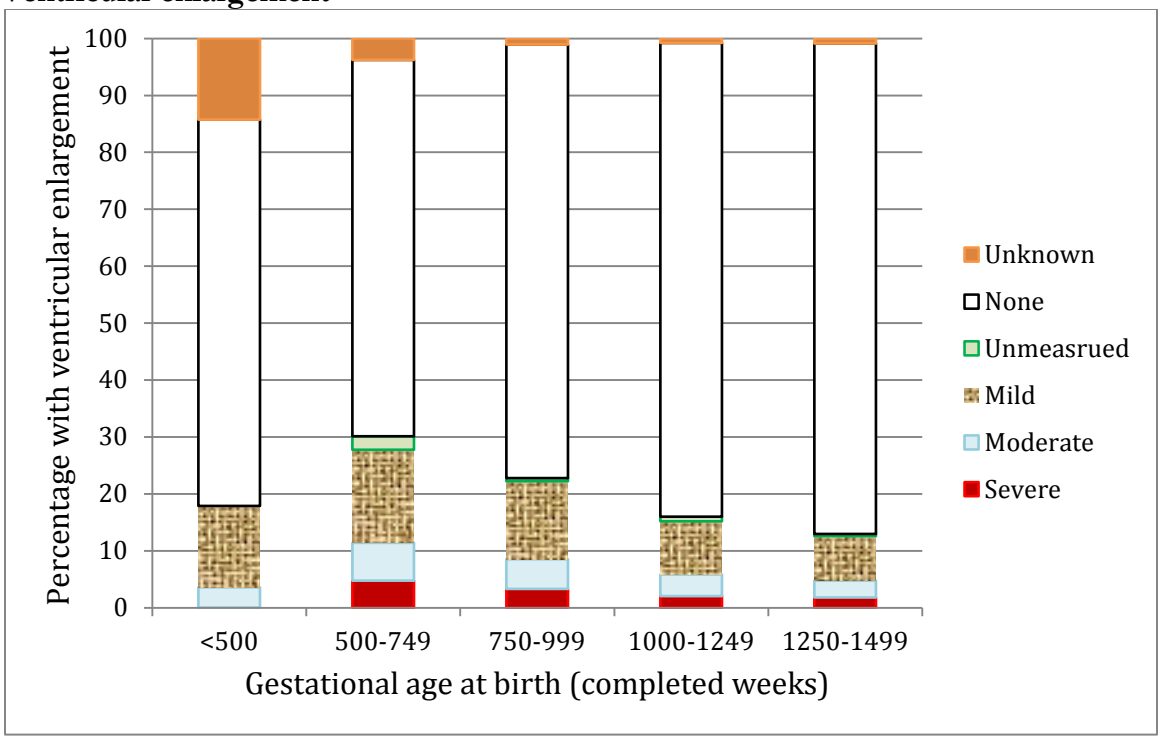
GA at birth (completed weeks)		Total number	Neuro-imaging available	Neuroimaging findings																	
				GM hemorrhage			Intraventricular hemorrhage			Ventricular enlargement						Intraparenchymal lesion			Periventricular leukomalacia		
				Present/suspected	None	Unknown	Present/suspected	None	Unknown	Mild	Moderate	Severe	Unmeasured	None	Unknown	Present/suspected	None	Unknown	Present/suspected	None	Unknown
<25	N	315	280	169	106	5	151	127	2	53	23	16	6	170	12	69	202	9	24	241	15
	%			60%	38%	2%	54%	45%	1%	19%	8%	6%	2%	61%	4%	25%	72%	3%	9%	86%	5%
25-26	N	582	558	225	329	4	173	384	1	92	37	25	8	391	5	71	482	5	41	512	5
	%			40%	59%	1%	31%	69%	0%	16%	7%	4%	1%	70%	1%	13%	86%	1%	7%	92%	1%
27-28	N	774	728	197	524	7	114	611	3	81	27	17	3	592	8	39	682	7	23	697	8
	%			27%	72%	1%	16%	84%	0%	11%	4%	2%	0%	81%	1%	5%	94%	1%	3%	96%	1%
29-30	N	1102	972	212	756	4	102	869	1	78	29	14	11	828	12	23	942	7	28	937	7
	%			22%	78%	0%	10%	89%	0%	8%	3%	1%	1%	85%	1%	2%	97%	1%	3%	96%	1%
31-32	N	1614	1063	157	898	8	72	987	4	48	34	10	6	957	8	23	1033	7	23	1031	9
	%			15%	84%	1%	7%	93%	0%	5%	3%	1%	1%	90%	1%	2%	97%	1%	2%	97%	1%
Total included	N	4387	3601	960	2613	28	612	2978	11	352	150	82	34	2938	45	225	3341	35	139	3418	44
	%			27%	73%	1%	17%	83%	0%	10%	4%	2%	1%	82%	1%	6%	93%	1%	4%	95%	1%

Note: The neuroimaging findings are not mutually exclusive, i.e. one infant may have more than one finding.

Presentation #16
Neuroimaging findings (by BW)



Ventricular enlargement



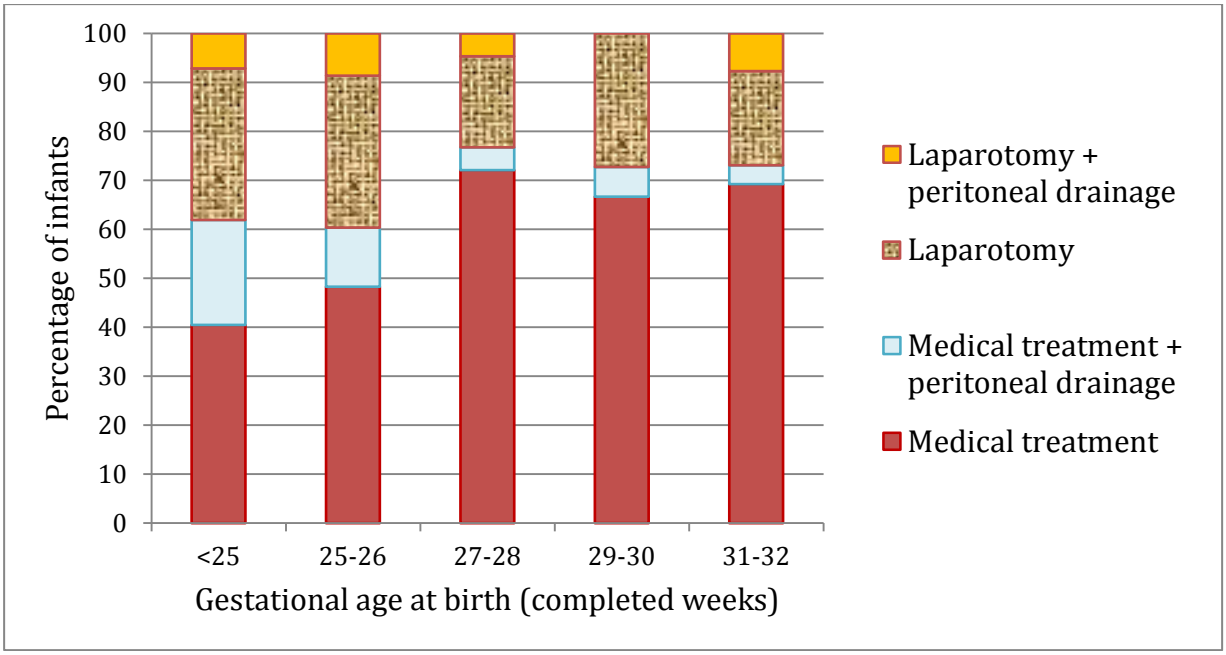
Presentation #16 (continued)
Neuroimaging findings (by BW)

BW (grams)		Total number	Neuro-imaging available	Neuroimaging findings																	
				GM hemorrhage			Intraventricular hemorrhage			Ventricular enlargement						Intraparenchymal lesion			Periventricular leukomalacia		
				Present/suspected	None	Unknown	Present/suspected	None	Unknown	Mild	Moderate	Severe	Unmeasured	None	Unknown	Present/suspected	None	Unknown	Present/suspected	None	Unknown
<500	N	36	28	14	13	1	13	14	1	4	1	0	0	19	4	6	20	2	2	22	4
	%			50%	46%	4%	46%	50%	4%	14%	4%	0%	0%	68%	14%	21%	71%	7%	7%	79%	14%
500-749	N	458	422	190	228	4	160	261	1	69	28	20	10	279	16	74	338	10	31	378	13
	%			45%	54%	1%	38%	62%	0%	16%	7%	5%	2%	66%	4%	18%	80%	2%	7%	90%	3%
750-999	N	760	730	244	479	7	161	565	4	100	38	24	4	556	8	67	655	8	38	684	8
	%			33%	66%	1%	22%	77%	1%	14%	5%	3%	1%	76%	1%	9%	90%	1%	5%	94%	1%
1000-1249	N	804	739	189	545	5	116	622	1	69	28	15	6	615	6	35	701	3	24	712	3
	%			26%	74%	1%	16%	84%	0%	9%	4%	2%	1%	83%	1%	5%	95%	0%	3%	96%	0%
1250-1499	N	922	780	149	625	6	83	695	2	61	23	14	3	672	7	27	747	6	19	753	8
	%			19%	80%	1%	11%	89%	0%	8%	3%	2%	0%	86%	1%	3%	96%	1%	2%	97%	1%
Total included	N	2980	2699	786	1890	23	533	2157	9	303	118	73	23	2141	41	209	2461	29	114	2549	36
	%			29%	70%	1%	20%	80%	0%	11%	4%	3%	1%	79%	2%	8%	91%	1%	4%	94%	1%

Note: The neuroimaging findings are not mutually exclusive, i.e. one infant may have more than one findings.

Presentation #17

Necrotizing enterocolitis and treatment modalities received (by GA)



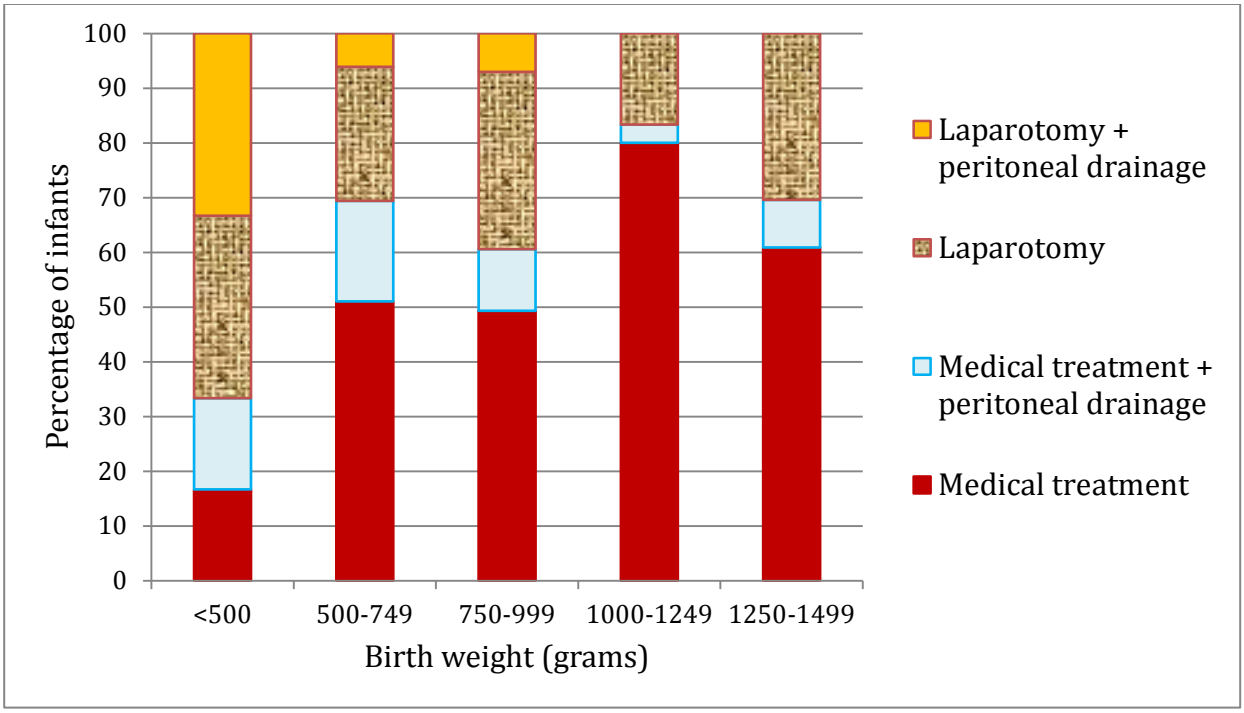
GA at birth (completed weeks)		Total number of neonates	Missing data on NEC	No NEC	NEC*	Neonates with necrotizing enterocolitis**			
						Medical treatment only	Medical + peritoneal drainage	Laparotomy	Laparotomy + peritoneal drainage
<25	N	315	1	272	42	17	9	13	3
	%			87%	13%	40%	21%	31%	7%
25-26	N	582	1	523	58	28	7	18	5
	%			90%	10%	48%	12%	31%	9%
27-28	N	774	0	731	43	31	2	8	2
	%			94%	6%	72%	5%	19%	5%
29-30	N	1102	2	1067	33	22	2	9	0
	%			97%	3%	67%	6%	27%	0%
31-32	N	1614	1	1587	26	18	1	5	2
	%			98%	2%	69%	4%	19%	8%
Total	N	4387	5	4180	202	116	21	53	12
	%			95%	5%	57%	10%	26%	6%

***The percentages of necrotizing enterocolitis are calculated out of number of neonates with data available on NEC.**
****Percentages for various forms of treatment are calculated out of those with NEC**

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

Number (%) of infants with NEC for GA ≥ 33:
GA 33-36: 50 (1.1%), GA ≥ 37: 27 (0.4%)

Presentation #18
Necrotizing enterocolitis and treatment modalities received (by BW)



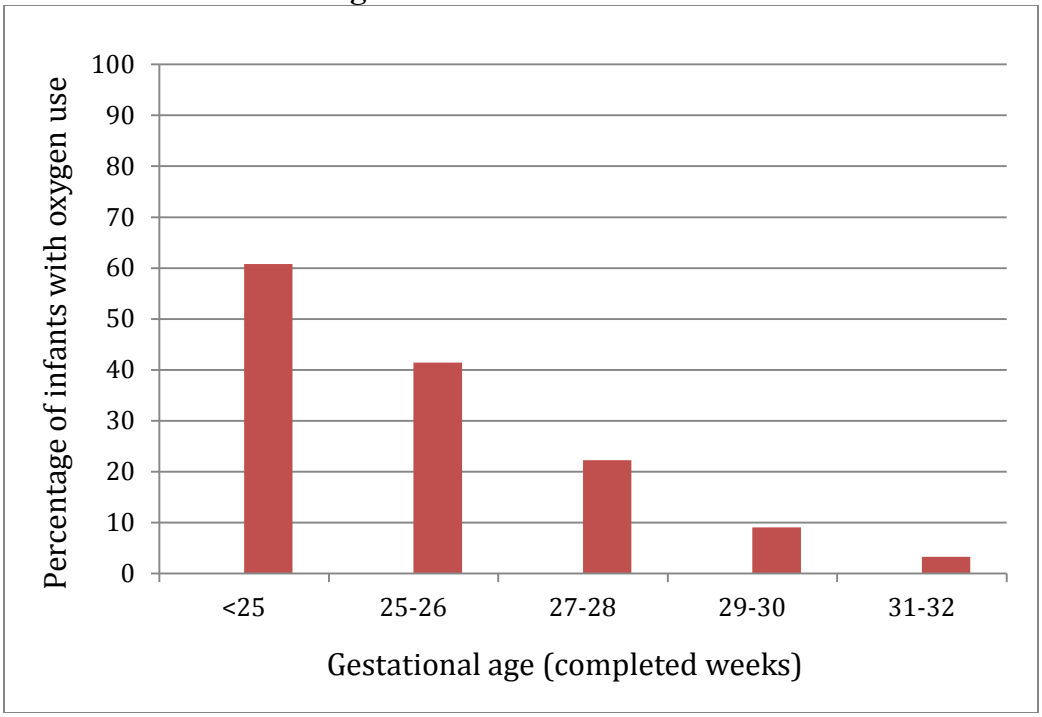
Birth weight (grams)		Total number of neonates	Missing data on NEC	No NEC	NEC*	Neonates with necrotizing enterocolitis**			
						Medical treatment only	Medical + peritoneal drainage	Laparotomy	laparotomy + peritoneal drainage
<500	N	36	0	30	6	1	1	2	2
	%			83%	17%	17%	17%	33%	33%
500-749	N	458	2	407	49	25	9	12	3
	%			89%	11%	51%	18%	24%	6%
750-999	N	760	0	689	71	35	8	23	5
	%			91%	9%	49%	11%	32%	7%
1000-1249	N	804	0	774	30	24	1	5	0
	%			96%	4%	80%	3%	17%	0%
1250-1499	N	922	2	897	23	14	2	7	0
	%			98%	3%	61%	9%	30%	0%
Total	N	2980	4	2797	179	99	21	49	10
	%			94%	6%	55%	12%	27%	6%

***The percentages of necrotizing enterocolitis are calculated out of number of neonates with data available on NEC.**
****Percentages for various forms of treatment are calculated out of those with NEC**

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

Number (%) of infants with NEC and with BW $\geq$ 1500 is as follows:
BW 1500-2499g - 56 neonates (1.2%)
BW $\geq$ 2500g - 44 neonates (0.6%)

Presentation #19a
Oxygen use (by GA) at 36 weeks or at discharge among neonates with GA <33 weeks

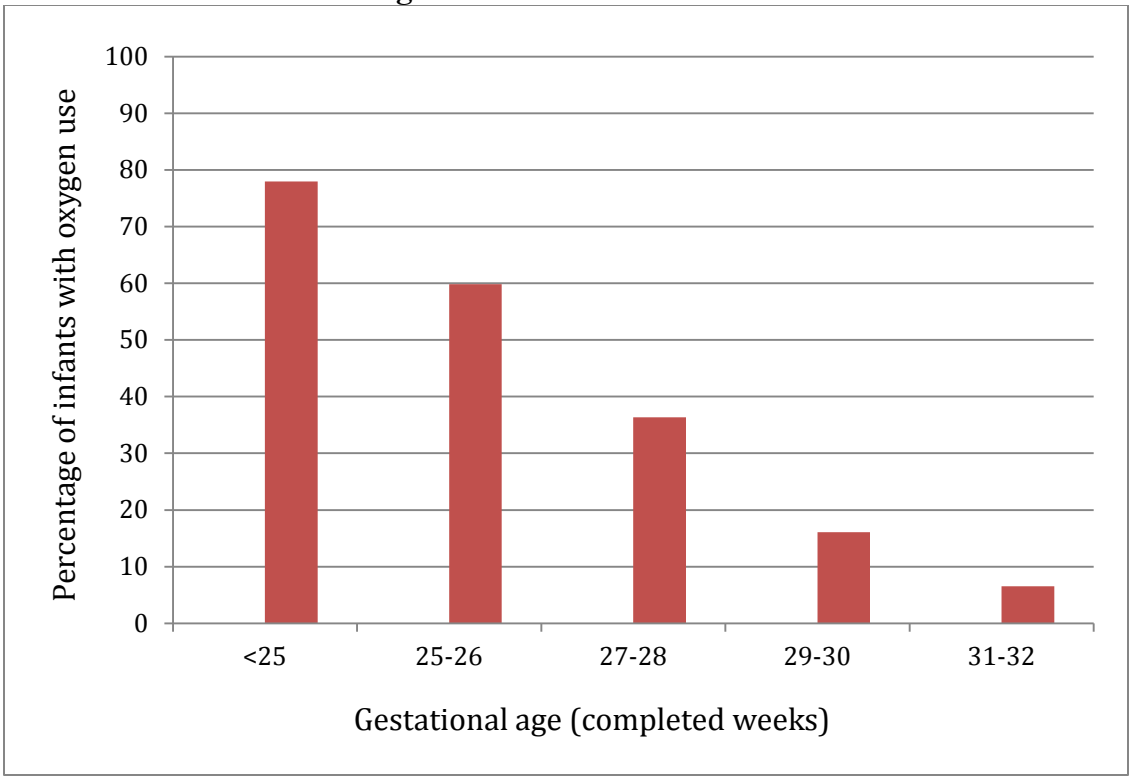


GA	Total number of neonates	Number of neonates whose oxygen use is unknown*	Number of neonates with known results	Number of neonates with oxygen use at 36 weeks or discharge	% of neonates with oxygen use at 36 weeks or discharge among neonates with known results
<25	315	111	204	124	61
25-26	582	104	478	198	41
27-28	774	50	724	161	22
29-30	1 102	51	1 051	95	9
31-32	1 614	70	1 544	51	3
Total	**4 387**	**386**	**4 001**	**629**	**16**

COMMENTS: This presentation includes neonates who received supplemental oxygen at week 36 postmenstrual age (PMA), and neonates who were discharged prior to week 36 PMA and receiving **supplemental oxygen at discharge from a CNN hospital**. There were no requirements for chest radiographs at the time of diagnosis.

*unknown = death before week 36 or first admission after week 36

Presentation #19b
Any respiratory support (by GA) at 36 weeks or at discharge if prior to 36 weeks among neonates with GA <33 weeks

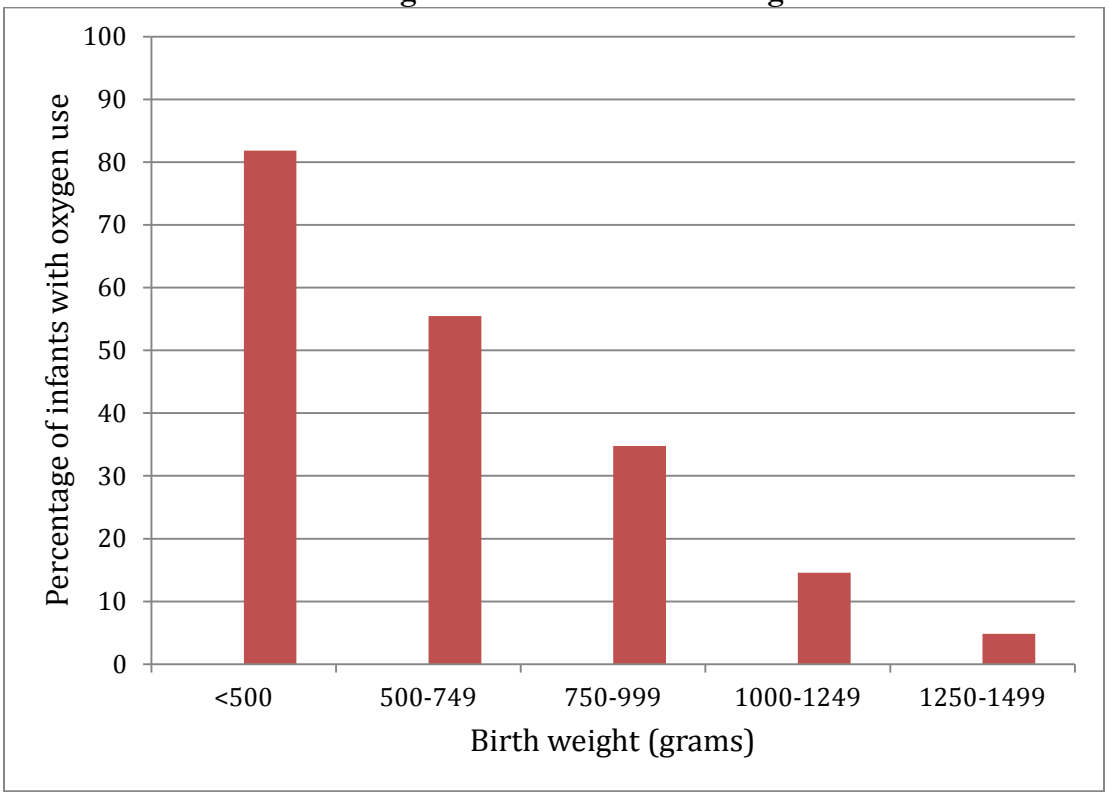


GA	Total number of neonates	Number of neonates whose oxygen use or respiratory support is unknown*	Number of neonates with known results	Number of neonates with respiratory support at 36 weeks or at discharge	% of neonates with respiratory support at 36 weeks or at discharge, among neonates with known results
<25	315	111	204	159	78
25-26	582	104	478	286	60
27-28	774	50	724	263	36
29-30	1 102	51	1 051	169	16
31-32	1 614	70	1 544	101	7
Total	**4 387**	**386**	**4 001**	**978**	**24**

COMMENTS: This presentation includes neonates who received supplemental oxygen or any respiratory support at week 36 postmenstrual age (PMA), and neonates who were discharged prior to week 36 PMA and receiving supplemental oxygen or any respiratory support at discharge from CNN centre. There were no requirements for chest radiographs at the time of diagnosis.

*unknown = death before week 36 or first admission after week 36

Presentation #20a
Oxygen use (by BW) at 36 weeks or at discharge if prior to 36 weeks among neonates with BW < 1500g

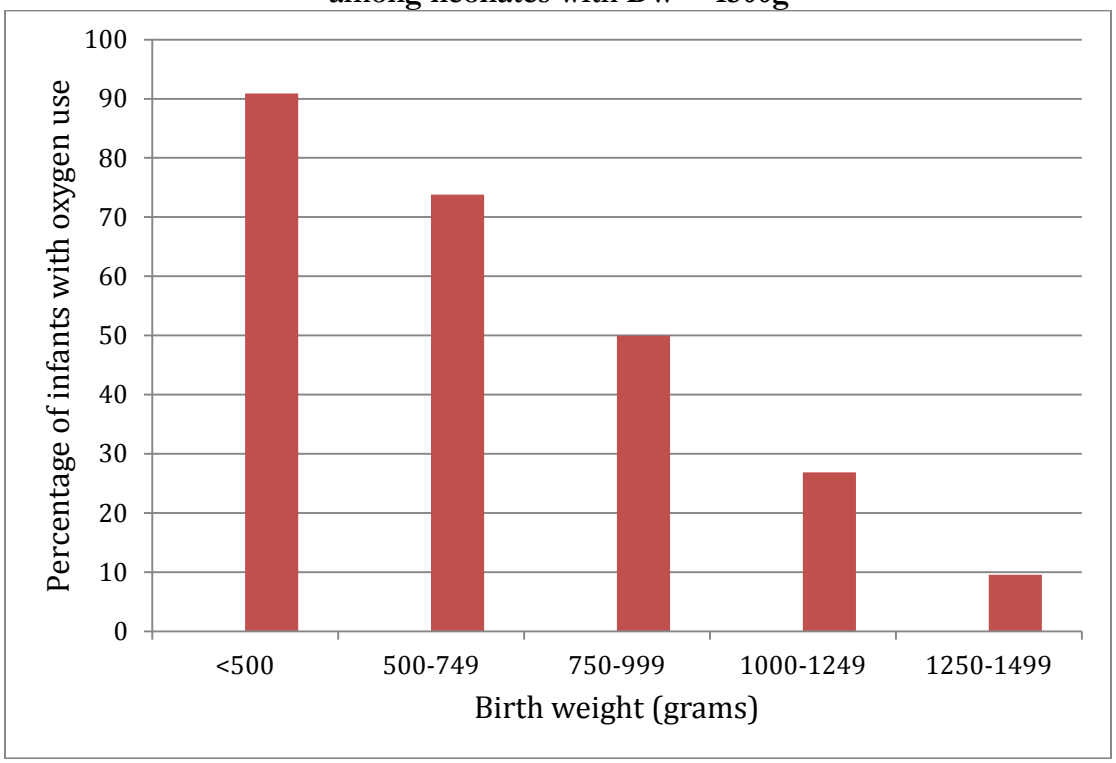


BW (grams)	Total number of neonates	Number of neonates whose oxygen use is unknown*	Number of neonates with known results	Number of neonates with oxygen use at 36 weeks or at discharge	% of neonates with oxygen use at 36 weeks or at discharge among neonates with known results
<500	36	25	11	9	82
500-749	458	130	328	182	55
750-999	760	87	673	234	35
1000-1249	804	41	763	111	15
1250-1499	922	33	889	43	5
Total	**2 980**	**316**	**2 664**	**579**	**22**

COMMENTS: This presentation includes neonates who received supplemental oxygen at week 36 postmenstrual age (PMA), and neonates who were discharged prior to week 36 PMA and receiving **supplemental oxygen at discharge from CNN centre**. There were no requirements for chest radiographs at the time of diagnosis.

*unknown = death before week 36 or first admission after week 36

Presentation #20b
Any respiratory support (by BW) at 36 weeks or at discharge prior to 36 weeks among neonates with BW < 1500g

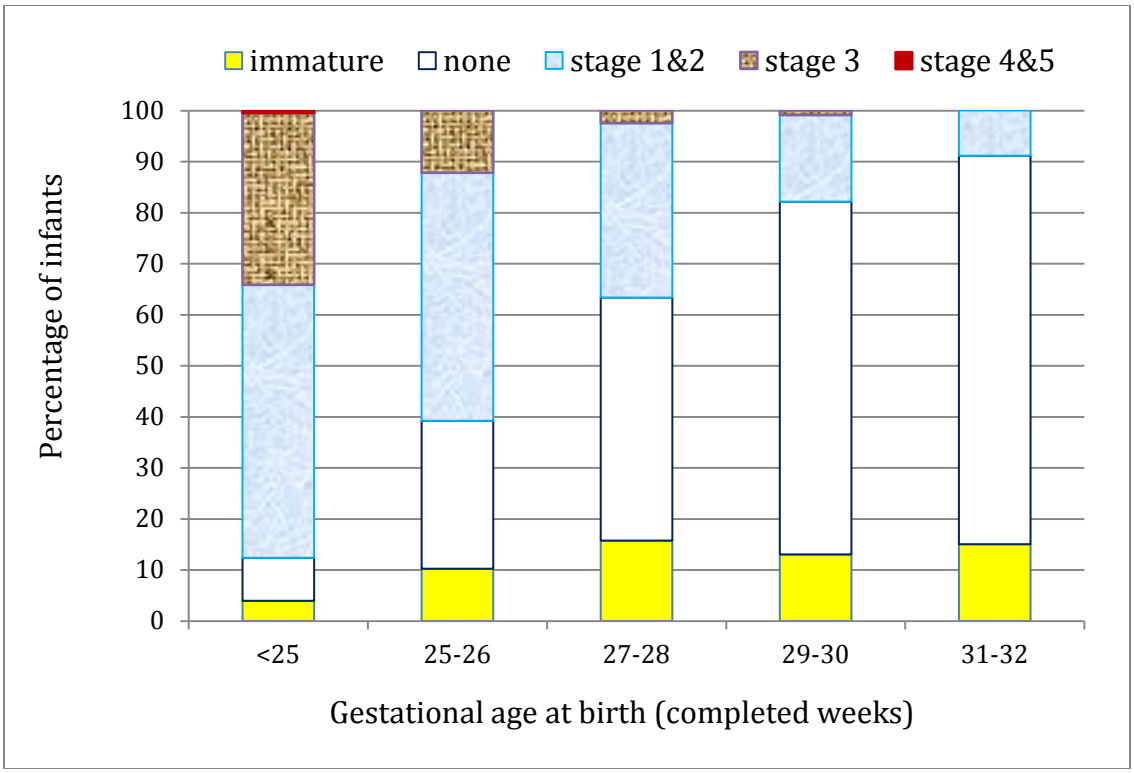


BW (grams)	Total number of neonates	Number of neonates whose oxygen use is unknown*	Number of neonates with known results	Number of neonates with respiratory support at 36 weeks or at discharge	% of neonates with respiratory support at 36 weeks or at discharge among neonates with known results
<500	36	25	11	10	91
500-749	458	130	328	242	74
750-999	760	87	673	336	50
1000-1249	804	41	763	205	27
1250-1499	922	33	889	85	10
Total	**2 980**	**316**	**2 664**	**878**	**33**

COMMENTS: This presentation includes neonates who received supplemental oxygen or any respiratory support at week 36 postmenstrual age (PMA), and neonates who were discharged prior to week 36 PMA and receiving supplemental oxygen or any respiratory support at discharge from CNN centre. There were no requirements for chest radiographs at the time of diagnosis.

*unknown = death before week 36 or first admission after week 36

Presentation #21
Retinopathy of prematurity (by GA)

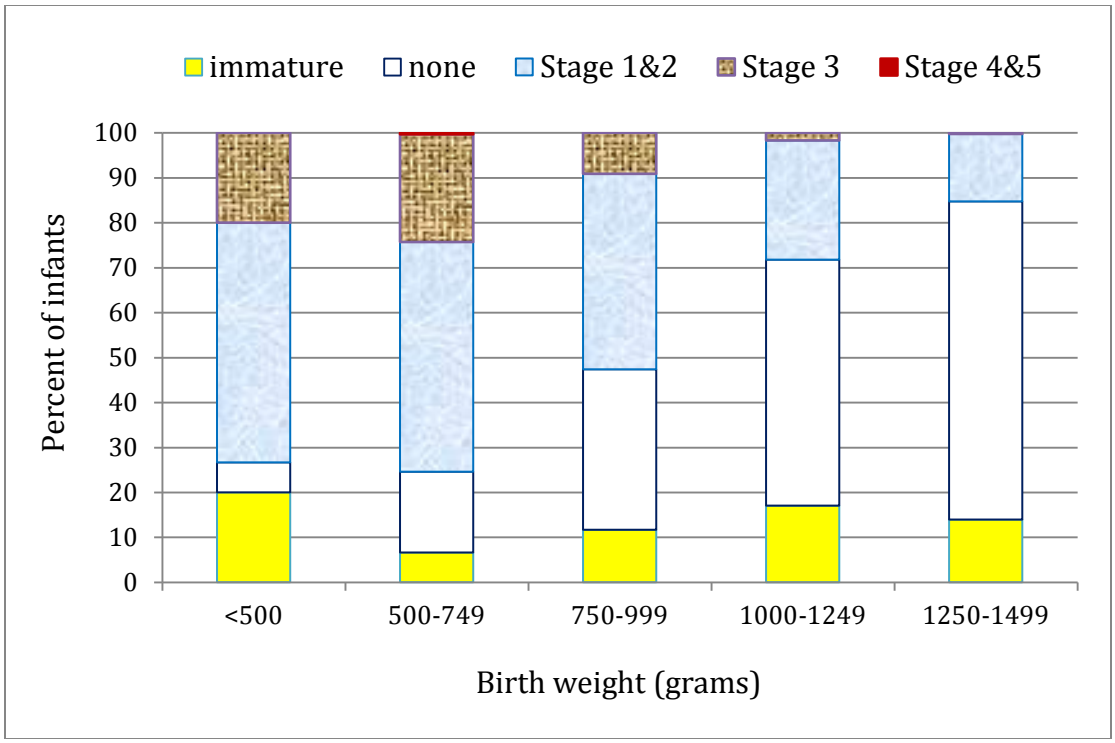


GA (completed weeks)		Total number of neonates	Number of neonates alive at 6 weeks	Number of neonates with known eye examination results	Retinopathy of prematurity*				
					Immature	None	Stages 1 & 2	Stage 3	Stage 4 & 5
<25	N	315	218	202	8	17	108	68	1
	%				4%	8%	53%	34%	0.5%
25-26	N	582	497	459	47	133	223	56	0
	%				10%	29%	49%	12%	0%
27-28	N	774	744	565	89	269	193	14	0
	%				16%	48%	34%	2%	0%
29-30	N	1102	1079	560	73	387	95	5	0
	%				13%	69%	17%	1%	0%
31-32	N	1614	1596	226	34	172	20	0	0
	%				15%	76%	9%	0%	0%
Total included	N	4387	4134	2012	251	978	639	143	1
	%				12%	49%	32%	7%	0%

***The percentages of various stages of retinopathy of prematurity are calculated out of number of neonates with known eye examination results.**

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). More advanced stages may have been detected in neonates transferred from network sites to level II sites or units. **Caution should be used in interpreting these data.**

Presentation #22
Retinopathy of prematurity (by BW)



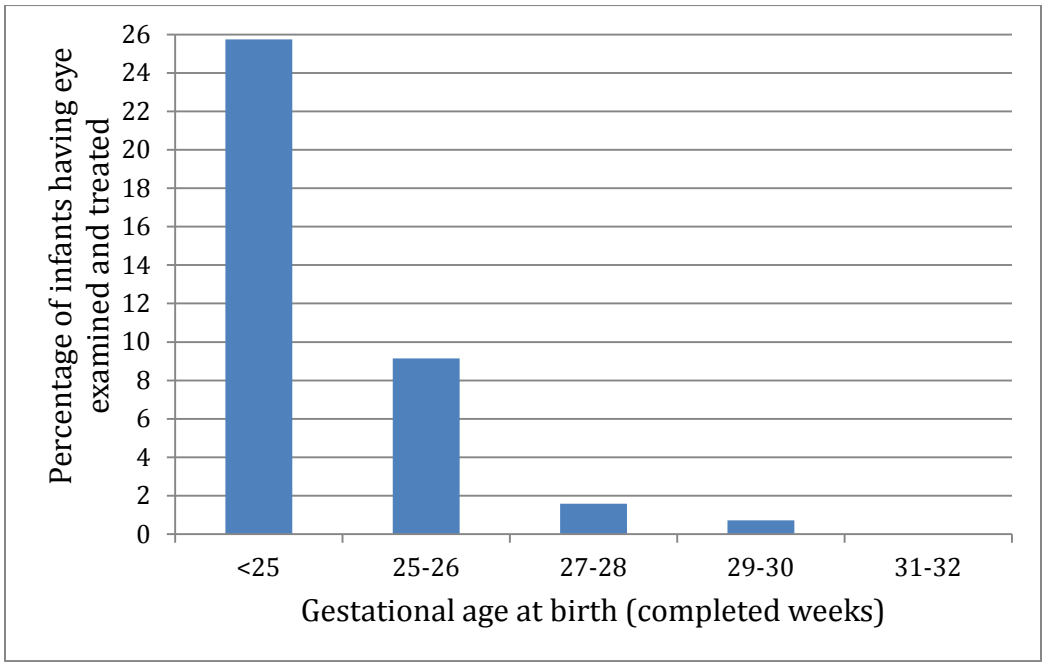
BW (grams)		Total number of neonates	Number of neonates alive at 6 weeks	Number of neonates with known eye examination results	Retinopathy of prematurity*				
					Immature	None	Stages 1 & 2	Stage 3	Stage 4 & 5
<500	N	36	17	15	3	1	8	3	0
	%				20%	7%	53%	20%	0%
500-749	N	458	341	317	21	57	162	76	1
	%				7%	18%	51%	24%	0.3%
750-999	N	760	699	591	69	211	257	54	0
	%				12%	36%	43%	9%	0%
1000-1249	N	804	783	528	90	289	140	9	0
	%				17%	55%	27%	2%	0%
1250-1499	N	922	905	380	53	269	57	1	0
	%				14%	71%	15%	0%	0%
Total included	N	2980	2745	1831	236	827	624	143	1
	%				13%	45%	34%	8%	0.1%

***The percentages of various stages of retinopathy of prematurity are calculated out of number of neonates with known eye examination results.**

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). More advanced stages may have been detected in neonates transferred from network sites to level II sites or units. **Caution should be used in interpreting these data.**

Presentation #23

Laser/Anti-VEGF therapy for neonates with retinopathy of prematurity (by GA)

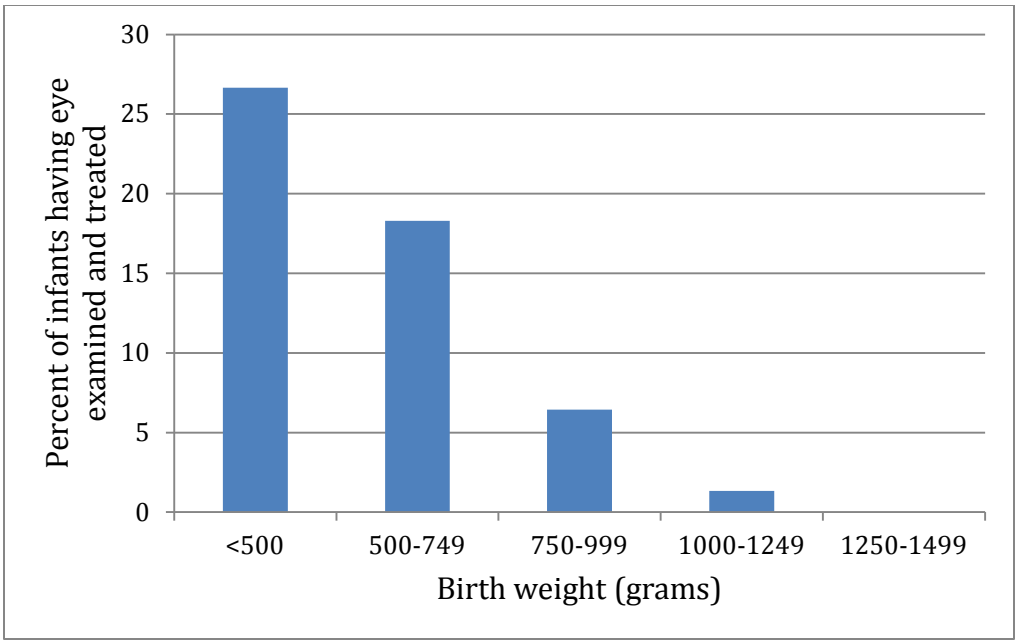


Birth GA (completed weeks)		Total number of neonates	Number of neonates with known eye examination results	Therapy for retinopathy of prematurity *	Therapy for retinopathy of prematurity			
					Laser	Anti-VEGF	Both Laser and Anti-VEGF	Other surgery
<25	**N**	315	202	52	13	35	4	0
	%			26%				
25-26	**N**	582	459	42	23	17	2	0
	%			9%				
27-28	**N**	774	565	9	6	2	1	0
	%			2%				
29-30	**N**	1102	560	4	1	2	1	0
	%			1%				
31-32	**N**	1614	226	0	0	0	0	0
	%			0%				
Total included	**N**	4387	2012	107	43	56	8	0
	%			5%				

***The percentages of patient who received therapy are calculated out of number of neonates with known eye examination results.**

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). More advanced stages may have been detected in neonates transferred from network sites to level II sites or units. **Caution should be used in interpreting these data as some neonates did not have eye examination data.**

Presentation #24
Laser/Anti-VEGF therapy for neonates with retinopathy of prematurity (by BW)



BW (grams)		Total number of neonates	Number of neonates with known eye examination results	Therapy for retinopathy of prematurity *	Therapy for retinopathy of prematurity			
					Laser	Anti-VEGF	Both Laser and Anti-VEGF	Other surgery
<500	N	36	15	4	1	2	1	0
	%			27%				
500-749	N	458	317	58	19	34	5	0
	%			18%				
750-999	N	760	591	38	22	15	1	0
	%			6%				
1000-1249	N	804	528	7	1	5	1	0
	%			1%				
1250-1499	N	922	380	0	0	0	0	0
	%			0%				
Total included	N	2980	1831	107	43	56	8	0
	%			6%				

***The percentages of patient who received therapy are calculated out of number of neonates with known eye examination results.**

COMMENTS: Retinopathy of prematurity is defined according to the International Classification of Retinopathy of Prematurity (ICROP). More advanced stages may have been detected in neonates transferred from network sites to level II sites or units. **Caution should be used in interpreting these data as some neonates did not have eye examination data.**

Presentation #25a
Gestational age specific mortality or significant morbidity (six morbidities)

GA	Number of neonates	Number survived (%)	Number of neonates discharged home directly from network sites	Number (%) without any of the six morbidities	Number (%) with any one morbidity prior to discharge	Number (%) with any two morbidities prior to discharge	Number (%) with any three morbidities prior to discharge	Number (%) with any four morbidities prior to discharge	Number (%) with any five morbidities prior to discharge	Number (%) with all six morbidities prior to discharge
<24	89	33 (37)	13	2 (15)	2 (15)	2 (15)	4 (31)	2 (15)	1 (8)	0
24	226	174 (77)	81	16 (20)	22 (27)	20 (25)	14 (17)	8 (10)	1 (1)	0
25	250	195 (78)	96	25 (26)	27 (28)	25 (26)	13 (14)	4 (4)	2 (2)	0
26	332	288 (87)	136	45 (33)	58 (43)	28 (21)	2 (1)	2 (1)	1 (1)	0
27	362	337 (93)	132	65 (49)	40 (30)	26 (20)	0	0	1 (1)	0
28	412	404 (98)	155	100 (65)	42 (27)	11 (7)	2 (1)	0	0	0
29	517	507 (98)	196	139 (71)	49 (25)	7 (4)	1 (1)	0	0	0
30	585	569 (97)	224	183 (82)	32 (14)	8 (4)	1 (0)	0	0	0
31	743	733 (98)	284	252 (89)	23 (8)	8 (3)	1 (0)	0	0	0
32	871	863 (99)	369	337 (91)	32 (9)	0	0	0	0	0
Total	**4387**	**4103 (94)**	**1686**	**1164 (69)**	**327 (19)**	**135 (8)**	**38 (2)**	**16 (1)**	**6 (0)**	**0**

Inclusion criteria for these analyses:

1. Neonate born at <33 weeks GA
2. Neonate discharged home from participating network sites

COMMENTS:

Morbidities were counted as score of one for each of the following

i. Ventricular enlargement or PEC
ii. Stage 3 or higher ROP
iii. Oxygen use at 36 weeks or at discharge if earlier
iv. Culture proven early onset or late onset sepsis
v. Stage 2 or 3 NEC
vi. PDA requiring surgical ligation

Presentation #25b
Gestational age specific mortality or significant morbidity (three morbidities)

GA	Number of neonates	Number survived (%)	Number of neonates discharged home directly from network sites	Number (%) without any of the three morbidities	Number (%) with any one morbidity prior to discharge	Number (%) with any two morbidities prior to discharge	Number (%) with all three morbidities prior to discharge
<24	89	33 (37)	13	2 (15)	4 (31)	6 (46)	1 (8)
24	226	174 (77)	81	26 (32)	29 (36)	16 (20)	10 (12)
25	250	195 (78)	96	37 (39)	34 (35)	21 (22)	4 (4)
26	332	288 (87)	136	67 (49)	56 (41)	12 (8)	1 (1)
27	362	337 (93)	132	89 (67)	38 (29)	5 (4)	0
28	412	404 (98)	155	119 (76)	30 (19)	6 (4)	0
29	517	507 (98)	196	163 (83)	30 (15)	3 (2)	0
30	585	569 (97)	224	198 (88)	24 (11)	2 (1)	0
31	743	733 (98)	284	271 (95)	12 (4)	1 (0)	0
32	871	863 (99)	369	348 (94)	21 (6)	0	0
Total	**4387**	**4103 (94)**	**1686**	**1320 (78)**	**278 (16)**	**72 (4)**	**16 (1)**

Inclusion criteria for these analyses:

1. Neonate born at <33 weeks GA
2. Neonate discharged home from participating network sites

COMMENTS:

Morbidities were counted as score of one for each of the following

i. Ventricular enlargement or PEC
ii. Stage 3 or higher ROP
iii. Oxygen use at 36 weeks or at discharge if earlier

E. Site Comparisons

E.1. Site Comparisons – Survival / Mortality

Presentation #26
Site-specific survival rates by GA for infants admitted to the NICU

Site	Percentage survival for each GA (completed weeks)								
	<25	25-26	27-28	29-30	31-32	33-34	35-36	≥37	Overall survival rate for sites*
A	58.8	94.7	93.9	98.0	97.0	100.0	97.8	99.1	96.8
B	50.0	50.0	100.0	100.0	100.0	100.0	100.0	100.0	98.0
C	100.0	50.0	50.0	50.0	100.0	95.2	97.7	97.1	95.8
D	0.0	90.0	100.0	100.0	100.0	100.0	99.0	99.5	98.9
E	60.0	92.3	100.0	96.6	100.0	100.0	100.0	98.0	98.4
F	73.1	85.2	100.0	97.3	100.0	95.9	99.5	99.2	98.0
G	50.0	77.8	92.9	100.0	100.0	100.0	100.0	99.1	98.2
H$^{\phi}$	46.2	68.4	96.8	100.0	100.0	100.0	91.2	96.2	92.9
I	100.0	80.0	100.0	100.0	100.0	96.3	96.0	92.7	95.5
J	85.7	75.0	91.3	96.9	100.0	98.8	97.5	100.0	97.8
K	100.0	75.0	100.0	100.0	100.0	100.0	100.0	99.6	99.4
L	40.0	50.0	100.0	100.0	100.0	100.0	100.0	98.9	98.1
M	77.5	87.8	98.8	99.0	98.5	99.1	100.0	100.0	97.0
N$^{\phi}$	66.7	100.0	100.0	92.9	100.0	100.0	100.0	NA	97.0
O	100.0	100.0	NA	100.0	100.0	100.0	98.4	100.0	99.6
P	66.7	67.9	93.0	94.4	97.6	98.4	98.1	98.1	95.6
Q$^{\phi}$	50.0	77.8	100.0	96.2	100.0	100.0	100.0	98.4	98.1
R$^{\phi}$	66.7	86.7	100.0	95.5	100.0	100.0	NA	NA	95.9
S	0.0	82.4	100.0	96.6	100.0	100.0	100.0	97.7	97.2
T	73.1	84.4	95.6	97.0	99.0	98.9	98.3	96.2	96.1
U$^{\phi}$	70.0	72.0	93.9	98.0	100.0	100.0	100.0	71.4	92.1
V	60.0	73.3	88.2	100.0	100.0	97.1	98.6	99.2	97.9
W$^{\phi}$	63.3	88.1	93.4	98.0	99.2	96.6	96.3	97.4	95.0
X	NA	100.0	100.0	100.0	100.0	100.0	100.0	98.4	99.1
Y	100.0	85.7	92.9	100.0	100.0	94.7	96.2	98.2	97.0
Z	75.0	91.7	95.0	97.3	97.0	93.6	98.9	95.6	95.9
AA	77.8	92.1	100.0	94.8	94.3	95.8	98.5	95.3	95.1
AB	50.0	88.2	100.0	97.4	98.3	99.0	100.0	100.0	98.6
AC	0.0	100.0	80.0	100.0	95.8	100.0	100.0	99.2	98.5
AD	33.3	72.7	89.2	97.8	98.8	97.5	98.8	99.1	96.6
AE	80.0	81.5	95.2	100.0	98.5	100.0	98.0	98.4	97.1
Overall survival rate for GA**	65.7	83.0	95.7	97.6	98.9	98.7	98.8	98.2	97.0

These analyses include 15 045 neonates from 31 sites.

Twenty-five sites collected data on all eligible admissions whereas six sites (marked by$^{\phi}$) collected data on selected eligible admissions only.

$^{\phi}$ Please note that the criteria for entering neonates in the CNN dataset are not the same for these five sites and thus, the rates may not be comparable with other sites.

Overall* = (number of neonates survived by site / total number of neonates for that site)*100

Overall** = (number of neonates survived for GA category / total number of neonates in GA category)*100

NA = no data available, 0 = no neonates survived

Delivery room deaths are not included

Presentation #27
Site-specific survival rates by BW for infants admitted to the NICU

Site	Percentage survival for each BW (g) category							
	<500	**500-749**	**750-999**	**1000-1249**	**1250-1499**	**1500-2499**	**≥2500**	**Overall survival rate for sites***
A	25.0	70.3	91.5	100.0	94.4	98.8	98.8	96.8
B	NA	50.0	73.3	90.0	100.0	100.0	100.0	98.0
C	NA	75.0	50.0	50.0	NA	93.3	97.9	95.8
D	NA	40.0	100.0	100.0	100.0	100.0	99.2	98.9
E	NA	81.8	93.3	100.0	100.0	99.1	98.4	98.4
F	60.0	85.4	93.8	97.0	100.0	99.2	98.7	98.0
G	0.0	40.0	100.0	100.0	100.0	100.0	99.4	98.2
H$^{\phi}$	0.0	55.6	81.5	100.0	100.0	100.0	94.8	92.9
I	NA	66.7	100.0	100.0	100.0	97.9	93.0	95.5
J	0.0	77.8	92.9	95.5	96.9	98.9	99.5	97.8
K	50.0	100.0	90.9	100.0	100.0	100.0	99.6	99.4
L	NA	20.0	87.5	100.0	100.0	100.0	99.1	98.1
M	0.0	85.4	91.5	98.7	98.5	99.1	100.0	97.0
N$^{\phi}$	NA	75.0	100.0	100.0	100.0	96.7	100.0	97.0
O	NA	NA	100.0	100.0	100.0	98.4	100.0	99.6
P	0.0	71.0	77.8	93.3	98.2	98.0	98.2	95.6
Q$^{\phi}$	NA	83.3	84.6	100.0	94.4	100.0	98.5	98.1
R$^{\phi}$	NA	66.7	94.1	95.7	100.0	100.0	NA	95.9
S	NA	50.0	77.8	93.3	100.0	99.5	98.6	97.2
T	100.0	71.4	86.8	100.0	98.7	98.1	97.1	96.1
U$^{\phi}$	100.0	52.9	86.2	100.0	97.7	100.0	75.0	92.1
V	NA	50.0	92.9	100.0	92.9	98.0	99.3	97.9
W$^{\phi}$	100.0	66.7	92.2	97.1	98.7	97.3	97.6	95.0
X	NA	100.0	100.0	100.0	100.0	100.0	98.6	99.1
Y	75.0	88.9	100.0	100.0	100.0	95.6	98.3	97.0
Z	100.0	100.0	83.3	96.0	93.5	96.8	96.5	95.9
AA	25.0	89.3	100.0	95.0	98.2	94.5	95.7	95.1
AB	NA	70.0	95.0	100.0	100.0	98.4	100.0	98.6
AC	NA	66.7	100.0	75.0	100.0	98.6	99.4	98.5
AD	33.3	48.0	95.7	91.2	94.7	99.1	98.5	96.6
AE	NA	84.0	92.0	94.3	97.4	98.3	99.3	97.1
Overall survival rate for BW**	44.4	71.8	89.9	97.3	98.0	98.6	98.4	97.0

These analyses include 15 044 neonates from 31 sites (1 neonate had missing BW data).

Twenty-five sites collected data on all eligible admissions whereas six sites (marked by $^{\phi}$) collected data on selected eligible admissions only.

$^{\phi}$ Please note that the criteria for entering neonates in the CNN dataset are not the same for these five sites and thus, the rates may not be comparable with other sites.

Overall* = (number of neonates survived by site / total number of neonates for site)*100

Overall** = (number of neonates survived for BW category / total number of neonates in BW category)*100.

NA = no data available, 0 = no neonates survived

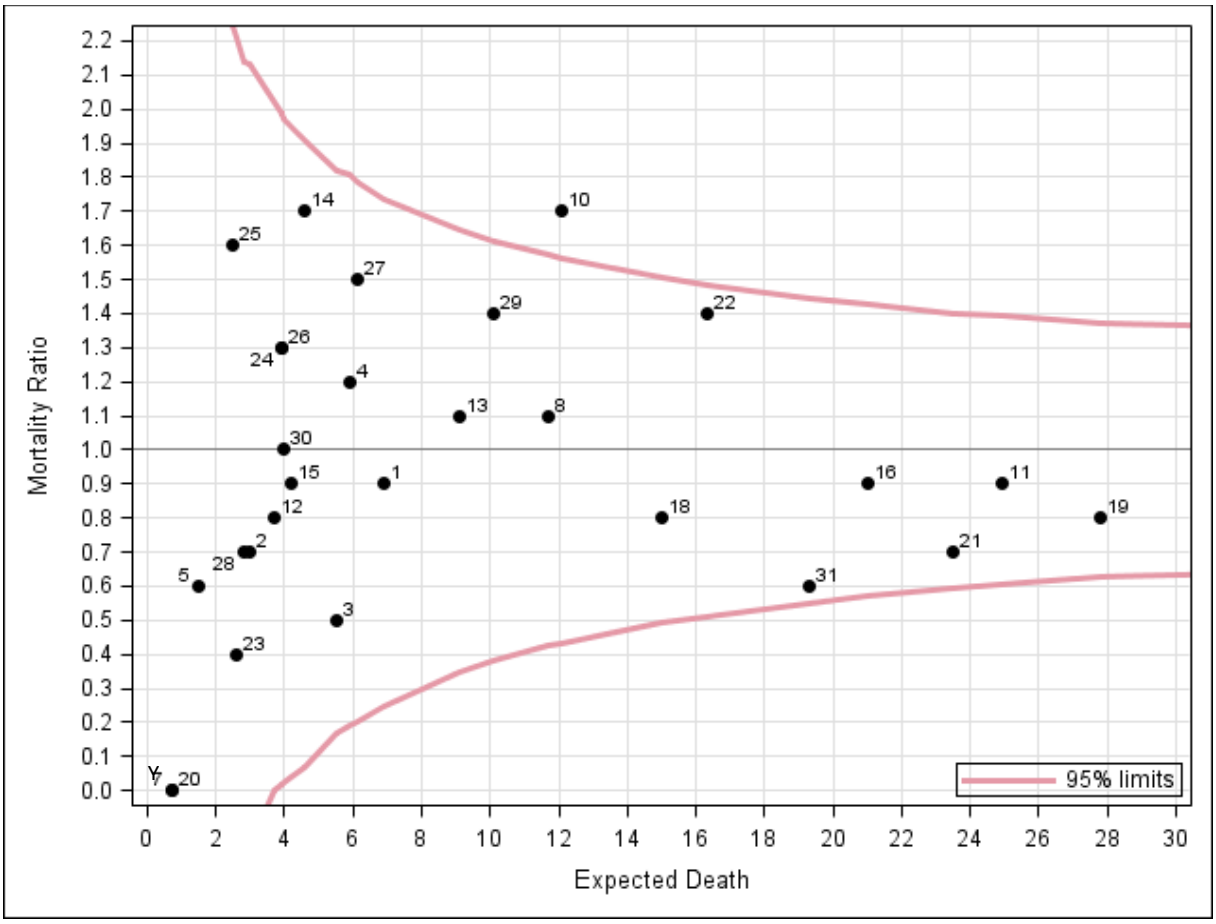
Delivery room deaths are not included

Presentation # 28a
Mortality among neonates with GA<33 weeks
Adjusted standardized ratios by site

Site	Number of infants	Number of deaths	Adjusted# Expected number of deaths	Adjusted# Standardized ratio	95% confidence interval for adjusted standardized ratio	
1	136	6	6.9	0.9	0.3	1.9
2	36	2	3.0	0.7	0.1	2.4
3	127	3	5.5	0.5	0.1	1.6
4	119	7	5.9	1.2	0.5	2.4
5	41	1	1.5	0.6	0.0	3.6
6	37	3	1.1	2.8	0.6	8.2
7	8	0	0.7	0.0	.	5.2
8	177	13	11.7	1.1	0.6	1.9
9	68	6	2.3	2.6	0.9	5.6
10	189	21	12.1	1.7	1.1	2.7
11	347	22	24.9	0.9	0.6	1.3
12	69	3	3.7	0.8	0.2	2.4
13	176	10	9.1	1.1	0.5	2.0
14	116	8	4.6	1.7	0.7	3.4
15	87	4	4.2	0.9	0.3	2.4
16	258	19	21.0	0.9	0.5	1.4
17	15	4	1.4	2.9	0.8	7.3
18	216	12	15.0	0.8	0.4	1.4
19	363	21	27.8	0.8	0.5	1.2
20	21	0	0.7	0.0	.	5.4
21	325	17	23.5	0.7	0.4	1.2
22	225	22	16.3	1.4	0.8	2.0
23	85	1	2.6	0.4	0.0	2.2
24	75	5	3.9	1.3	0.4	3.0
25	105	4	2.5	1.6	0.4	4.1
26	64	5	3.9	1.3	0.4	3.0
27	105	9	6.1	1.5	0.7	2.8
28	59	2	2.8	0.7	0.1	2.5
29*	121	14	10.1	1.4	0.8	2.3
30	97	4	4.0	1.0	0.3	2.5
31	302	11	19.3	0.6	0.3	1.0

Please note that site codes for Presentations 28a and 28b are different from other presentations in this report.
Neonates with major congenital anomalies are excluded.
Variables adjusted for in the prediction model: GA, SGA, Sex, SNAPII > 20
* Site 29 has different criteria for entering neonates in the CNN dataset, and may not be comparable with other sites. (See next page for full explanation)

Presentations # 28b
Mortality among neonates with GA<33 weeks
Adjusted standardized ratios – site comparisons



Explanation for Presentation 28a
Column 1: Different site code than other presentations in the report
Column 2: Number of eligible neonates at each site (<33 weeks and no major anomaly)
Column 3: Number of neonates with outcome of interest among those eligible neonates
Column 4: Expected number of neonates with outcome of interest after adjustment for GA, SGA, Sex, SNAPII > 20
Column 5: Adjusted standardized ratio calculated based on observed deaths/expected deaths
Columns 6 and 7: 95% CI around the adjusted standardized ratio for the outcome

Explanation for Presentation 28b
X-axis: Expected number of neonates with outcome (value from Column 4 of previous presentation)
Y-axis: Adjusted standardized ratio (value from Column 5 of previous presentation)
Dark points with numerical notation: Site and its location matching x and y axis values
Red funnel shaped lines: 95% confidence limits based on entire network information.
Sites outside of red lines represent higher or lower (depending upon position in graph) adjusted standardized ratio. However, for determining whether site is statistically different from others, one should also assess 95% CI and check whether both upper and lower boundaries are also outside of the funnel area or not.

E2. Site Comparisons –

Morbidities
and
Risks Adjusted Analyses

Presentation #29
Site-specific mortality/morbidities rates among neonates with GA<33 weeks

Site	Number range	Mortality	Severe neurological injury	Severe ROP	Oxygen use at 36 weeks or discharge	NEC stage 2 or 3	Late onset sepsis	Mortality or severe morbidity
	N	%	%	%	%	%	%	%
Y	<60	4.2	28.1	5.0	39.3	10.6	6.3	43.8
X		0.0	20.0	0.0	37.5	0.0	12.5	37.5
O		0.0	0.0	7.7	0.0	0.0	0.0	4.8
AC		7.9	2.9	3.9	3.0	2.6	0.0	10.5
C		26.7	36.4	0.0	37.5	6.7	13.3	66.7
I		2.4	5.1	15.4	2.5	2.4	19.5	26.8
N	61-100	3.3	5.3	0.0	3.5	4.9	26.2	37.7
L		7.6	11.1	0.0	11.7	6.1	3.0	24.2
B		8.8	11.5	11.5	6.6	8.8	8.8	35.3
D		4.2	11.6	11.9	13.2	4.2	5.6	26.8
G		6.4	8.3	1.9	12.3	0.0	7.7	29.5
K		2.2	4.1	8.3	8.1	1.1	3.3	15.6
R		4.3	11.5	6.7	13.6	3.2	9.6	28.7
S	101-200	8.5	9.4	15.7	6.2	2.8	8.5	25.5
V		6.5	9.2	2.8	7.6	1.7	6.5	22.0
J		5.7	9.9	5.4	7.7	4.0	14.5	27.4
H		10.9	8.1	4.5	24.3	8.5	18.8	48.1
E		3.0	16.1	11.8	20.8	3.8	8.3	35.3
Z		4.7	18.2	11.1	19.1	8.5	12.3	42.5
Q		3.6	12.0	4.8	1.1	1.8	8.2	17.3
AB		4.3	4.0	0.0	7.9	0.7	9.4	19.4
AE		5.6	4.3	1.0	12.5	3.9	19.7	33.2
U		7.3	13.6	3.8	22.6	6.7	13.4	41.3
P	>200	10.8	6.7	6.4	26.3	6.1	17.7	41.8
AA		6.3	7.7	19.4	15.8	2.1	11.3	28.9
A		8.5	9.5	13.4	18.8	5.2	13.2	39.0
F		4.0	18.3	9.8	16.4	5.5	7.4	28.8
M		5.4	21.7	12.4	10.8	3.3	9.3	29.0
AD		11.0	12.9	10.6	20.3	4.0	6.5	37.8
T		6.6	14.4	8.3	17.3	6.3	10.5	35.8
W		6.9	19.5	18.9	23.3	6.1	9.9	37.9
Total CNN		6.5	12.3	8.2	15.7	4.6	10.8	32.7

Mortality or severe morbidity = Mortality prior to discharge or any of the five morbidities

*Site H does not have complete data for infants with GA < 33 and may not be comparable with other sites.

These are unadjusted rates.

Presentation #30
Site-specific mortality/morbidities rates among neonates with GA<29 weeks

Site	Number range	Mortality	Severe neurological injury	Severe ROP	Oxygen use at 36 weeks or discharge	NEC stage 2 or 3	Late onset sepsis	Mortality or severe morbidity
	N	%	%	%	%	%	%	%
X	<20	0.0	25.0	0.0	75.0	0.0	25.0	75.0
K		14.3	16.7	20.0	30.0	0.0	14.3	50.0
AC		28.6	16.7	20.0	20.0	14.3	0.0	42.9
C		37.5	40.0	0.0	100.0	0.0	25.0	75.0
I		7.7	0.0	33.3	0.0	0.0	46.2	53.9
D		21.4	42.9	36.4	54.6	14.3	7.1	78.6
L		31.3	31.3	0.0	36.4	25.0	12.5	68.8
O		0.0	0.0	20.0	0.0	0.0	0.0	20.0
N		5.9	0.0	0.0	6.3	5.9	41.2	52.9
Y	20-40	7.1	34.8	5.3	52.9	17.9	10.7	64.3
R		9.7	19.4	11.1	35.7	3.2	22.6	61.3
B		28.6	20.0	23.1	13.3	14.3	14.3	66.7
G		18.5	12.0	4.8	18.2	0.0	11.1	55.6
S		22.9	18.2	29.6	18.5	5.7	22.9	60.0
Q		12.0	19.1	11.1	4.8	4.0	24.0	48.0
Z		8.3	24.1	16.7	44.4	11.1	19.4	61.1
V		21.6	20.0	3.7	20.7	2.9	10.8	48.7
AB	41-100	9.8	10.3	0.0	27.8	2.4	17.1	46.3
AE		14.3	4.9	1.9	35.2	11.1	31.8	63.5
U		17.7	22.1	6.1	48.2	11.8	20.6	69.1
AD		27.0	18.6	17.0	50.9	6.8	10.8	71.6
J		14.3	16.7	9.1	16.7	7.1	28.6	57.1
E		6.7	24.4	20.0	44.2	8.9	20.0	71.1
H		22.2	13.3	8.1	46.0	12.7	25.4	81.0
AA		7.5	10.6	25.9	33.3	3.2	22.6	51.6
P		21.1	9.8	11.3	50.0	12.6	35.8	71.6
A	> 100	15.7	15.8	16.0	39.8	7.4	26.5	68.6
T		12.7	22.4	10.2	30.2	8.9	21.5	57.6
M		9.3	26.4	15.0	18.0	6.4	16.2	45.7
F		8.9	28.6	11.3	37.7	10.5	16.9	58.9
W		13.9	31.1	22.6	43.8	11.6	19.7	63.6
Total CNN		14.4	20.2	12.9	34.4	8.6	21.1	70.7

Mortality or severe morbidity = Mortality prior to discharge or any of the five morbidities

These are unadjusted rates.

E.2.1. Site Comparisons – Late Onset Sepsis

Presentations #31 to #34

In presentations #31 and #32, late onset sepsis was attributed to the hospital where the first episode of sepsis was acquired. Each neonate was counted only once even if there were multiple episodes of infections.

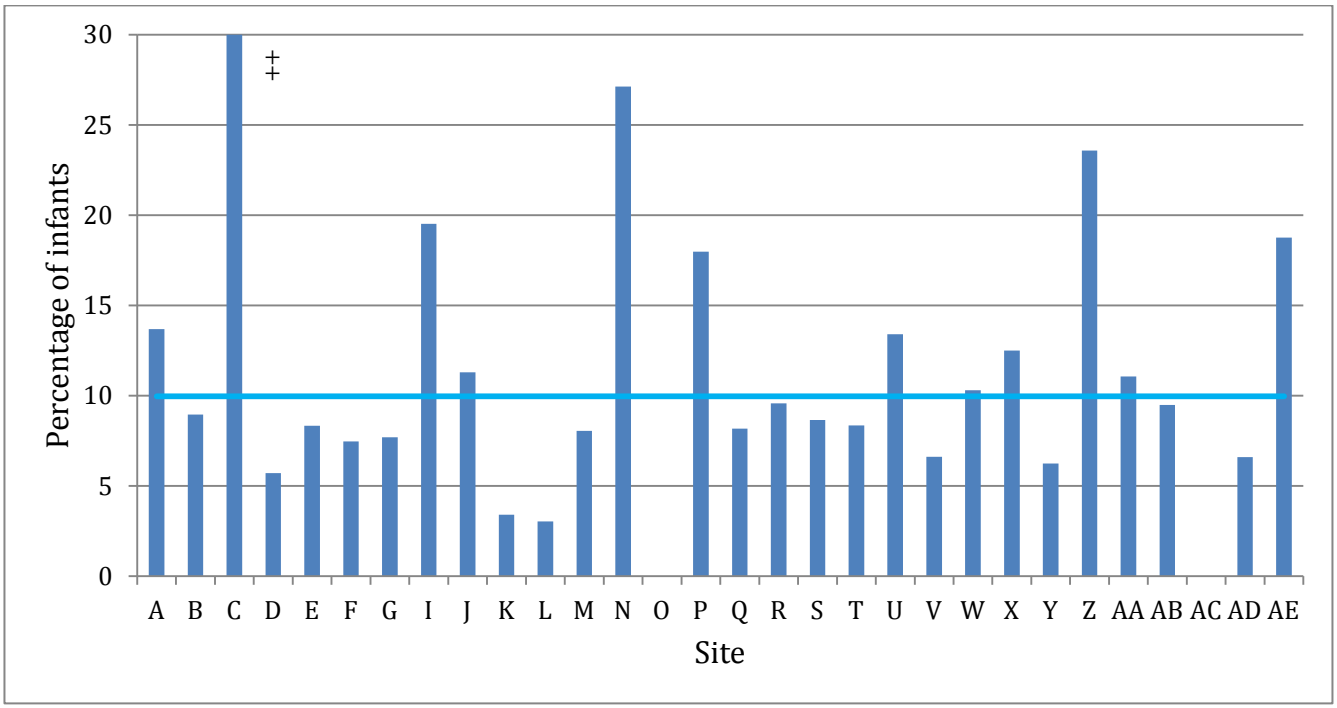
In presentations #33 and #34, assignment of infection was based on location where the infection happened, and not assigned to the hospital where the first episode of sepsis was acquired. Each episode of infection was counted (the total number of episodes exceeds the total number of neonates).

In all other presentations of this report, all morbidities including late onset sepsis were attributed to the hospital where the infant was first admitted.

Presentation #31

Late onset sepsis* among neonates with GA<33 weeks – site rates

Sites that contributed data on all eligible admissions for neonates with GA < 33
(n=30 sites, 4 505 neonates, 53 excluded due to death before 3 days of age)



‡ Site C has a late onset sepsis rate of 57% but not shown completely in the graph. Please refer to the table for the actual percentage for site C.

Site	A	B	C	D	E	F	G	I	J	K	L
%	13.7	9.0	57.1	5.7	8.3	7.5	7.7	19.5	11.3	3.4	3.0
Site	**M**	**N**	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**
%	8.1	27.1	0.0	18.0	8.2	9.6	8.7	8.4	13.4	6.6	10.3
Site	**X**	**Y**	**Z**	**AA**	**AB**	**AC**	**AD**	**AE**	**Whole network**		
%	12.5	6.3	23.6	11.1	9.5	0.0	6.6	18.8	10.0		

**COMMENTS: ***Late onset sepsis is defined as any positive blood and/or cerebrospinal fluid culture after 2 days of age (analysis is neonate-based and deaths before 3 days of age are excluded).

In presentations #31 and #32, late onset sepsis was attributed to the hospital where the first episode of sepsis was acquired. Each neonate was counted only once even if there were multiple episodes of infections.

Presentation #32a
Late onset sepsis among neonates with GA<33 weeks
Adjusted standardized ratios by site

Site	Number of infants	Number of NI	Adjusted# Expected number of NI	Adjusted# Standardized ratio	95% confidence interval for adjusted standardized ratio	
1	137	13	12.3	1.1	0.6	1.8
2	48	3	7.5	0.4	0.1	1.2
3	132	11	12.1	0.9	0.5	1.6
4	120	14	11.5	1.2	0.7	2.1
5	41	8	3.4	2.4	1.0	4.7
6	36	0	2.4	0.0	.	1.5
7	8	1	1.2	0.8	0.0	4.7
8	179	24	19.8	1.2	0.8	1.8
9	67	6	5.7	1.1	0.4	2.3
10	197	13	20.6	0.6	0.3	1.1
11	351	30	42.1	0.7	0.5	1.0
12	70	4	5.7	0.7	0.2	1.8
13	174	33	18.4	1.8	1.2	2.5
14	121	8	10.2	0.8	0.3	1.5
15	94	9	9.2	1.0	0.4	1.9
16	263	36	31.7	1.1	0.8	1.6
17	20	8	3.5	2.3	1.0	4.5
18	234	26	26.5	1.0	0.6	1.4
19	389	40	47.2	0.8	0.6	1.2
20	21	0	1.8	0.0	.	2.0
21	331	27	44.3	0.6	0.4	0.9
22	228	41	27.4	1.5	1.1	2.0
23	88	3	6.0	0.5	0.1	1.5
24	78	6	7.9	0.8	0.3	1.7
25	110	9	8.1	1.1	0.5	2.1
26	66	2	6.1	0.3	0.0	1.2
27	104	9	9.8	0.9	0.4	1.8
28	59	16	4.5	3.5	2.0	5.8
29*	127	24	16.7	1.4	0.9	2.1
30	118	25	13.9	1.8	1.2	2.6
31	321	24	34.7	0.7	0.4	1.0

Please note that site codes for Presentations 32a and 32b are different from other presentations in this report.

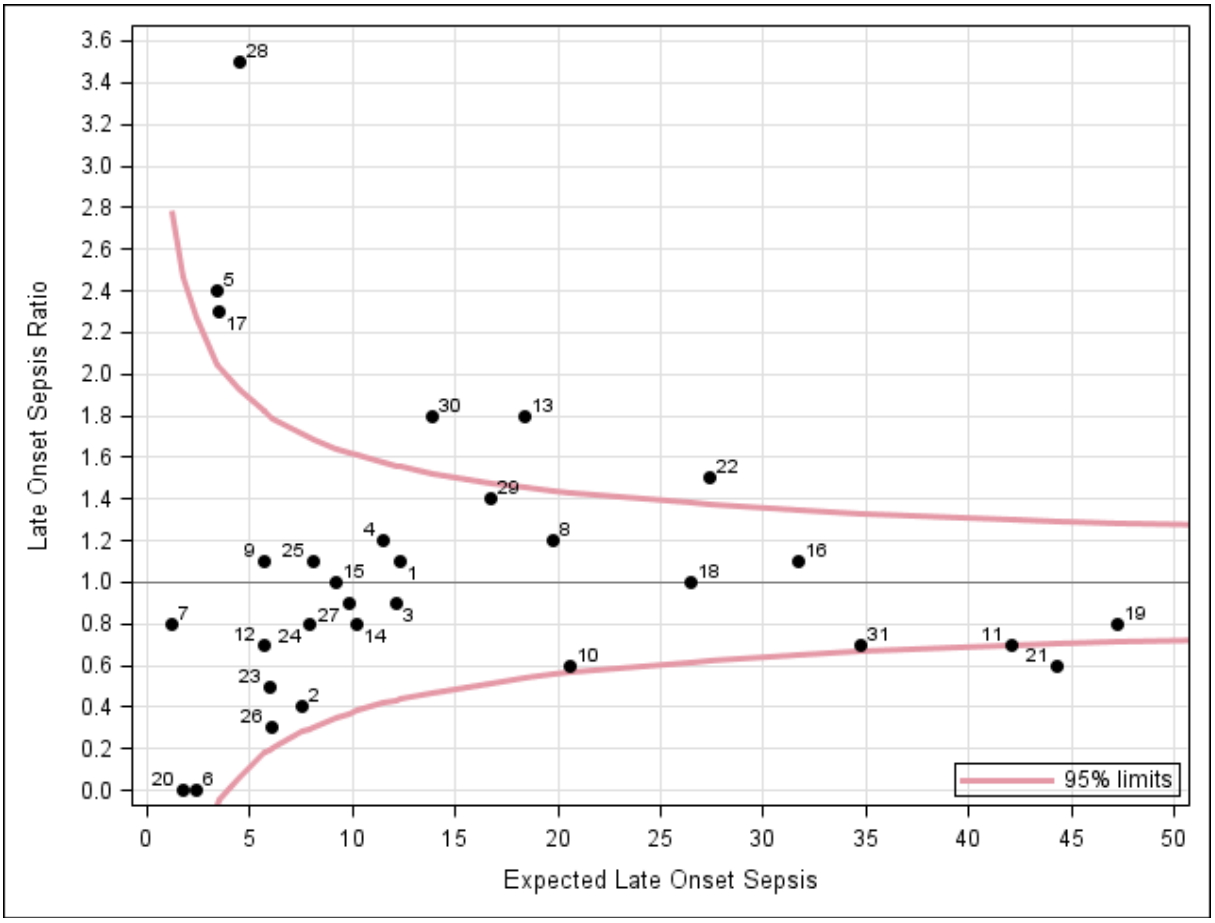
*Late onset sepsis was attributed to the hospital where the first episode of sepsis was acquired.

*Neonates who died before 3 days of age are excluded.

Variables adjusted for in the prediction model: GA, SGA, Sex, SNAPII > 20

* Site 29 has different criteria for entering neonates in the CNN dataset, and may not be comparable with other sites. (See next page for full explanation)

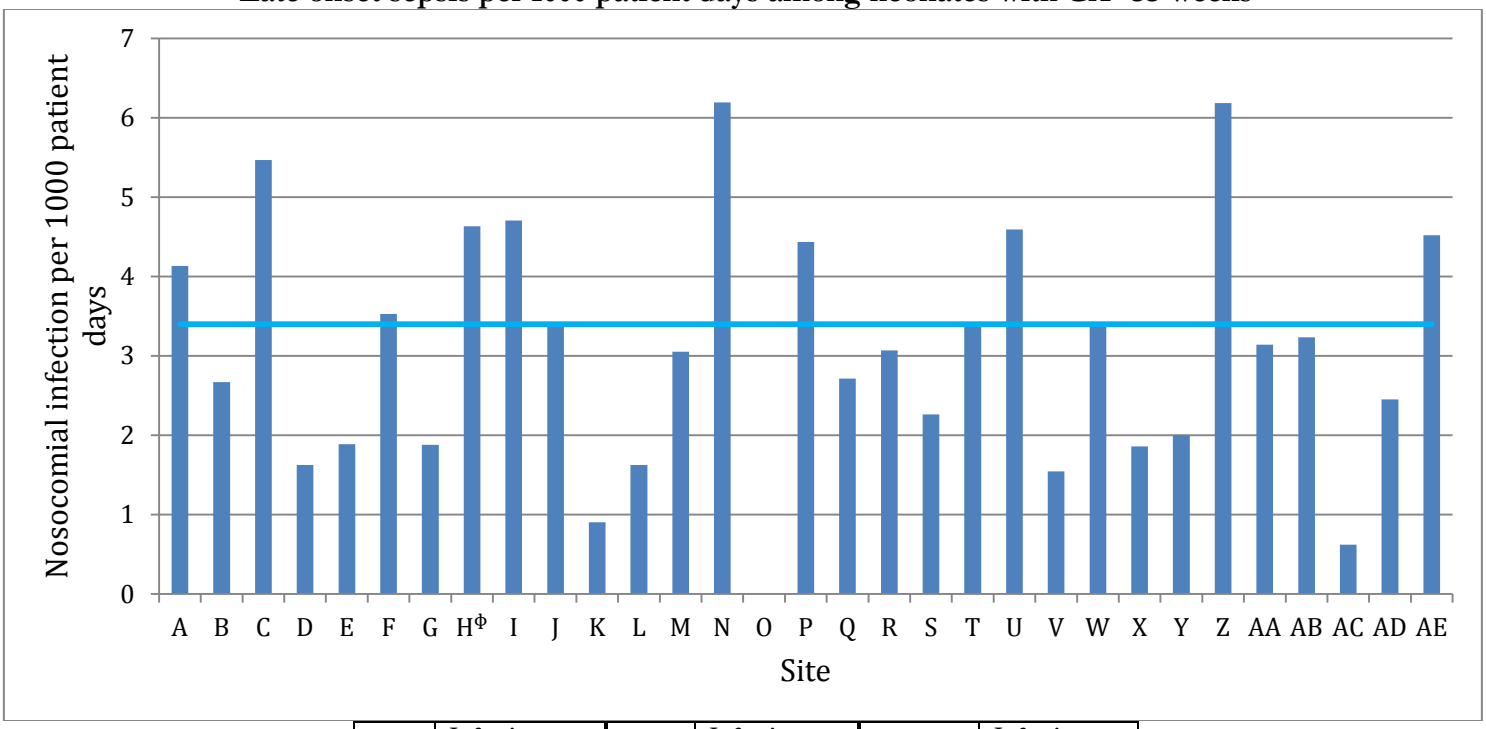
Presentation # 32b
Late onset sepsis among neonates with GA<33 weeks
Adjusted standardized ratios – site comparisons



Explanation for Presentation 32a
Column 1: Different site code than other presentations in the report
Column 2: Number of eligible neonates at your sites (<33 weeks and no major anomaly)
Column 3: Number of neonates with outcome of interest among those eligible neonates
Column 4: Expected number of neonates with outcome of interest after adjustment for GA, SGA, Sex, SNAPII > 20
Column 5: Adjusted standardized ratio calculated based on observed LOS/expected LOS
Columns 6 and 7: 95% CI around the adjusted standardized ratio for the outcome

Explanation for Presentation 32b
X-axis: Expected number of neonates with outcome (value from Column 4 of previous presentation)
Y-axis: Adjusted standardized ratio (value from Column 5 of previous presentation)
Dark points with numerical notation: Site and its location matching x and y axis values
Red funnel shaped lines: 95% confidence limits based on entire network information.
Sites outside of red lines represent higher or lower (depending upon position in graph) adjusted standardized ratio. However, for determining whether site is statistically different from others, one should also assess 95% CI and check whether both upper and lower boundaries are also outside of the funnel area or not.

Presentation #33
Late onset sepsis per 1000 patient days among neonates with GA<33 weeks



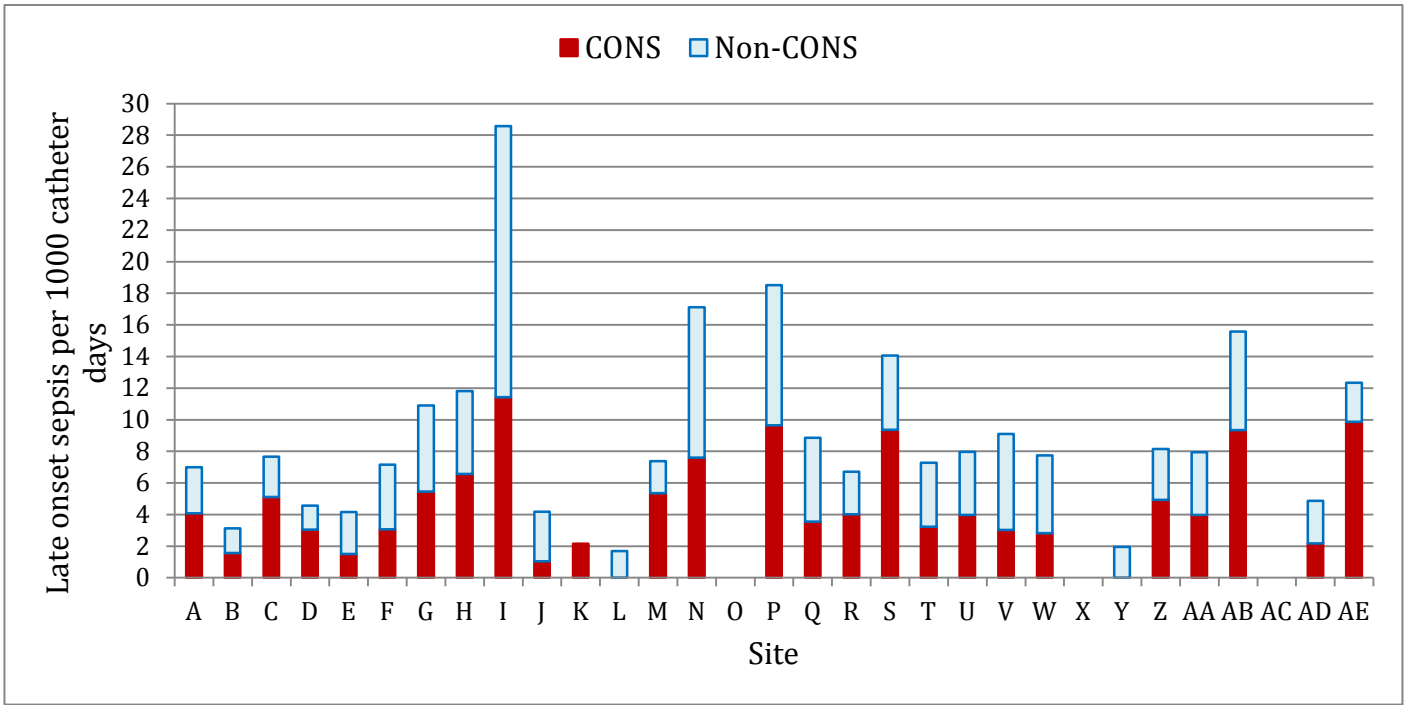
Site	Infections per 1000 patient days	Site	Infections per 1000 patient days	Site	Infections per 1000 patient days
A	4.1	**L**	1.6	**W**	3.4
B	2.7	**M**	3.1	**X**	1.9
C	5.5	**N**	6.2	**Y**	2.0
D	1.6	**O**	0.0	**Z**	6.2
E	1.9	**P**	4.4	**AA**	3.1
F	3.5	**Q**	2.7	**AB**	3.2
G	1.9	**R**	3.1	**AC**	0.6
H$^{\phi}$	4.6	**S**	2.3	**AD**	2.4
I	4.7	**T**	3.4	**AE**	4.5
J	3.4	**U**	4.6	**Whole network**	3.4
K	0.9	**V**	1.5		

Total number of neonates = 4 387

***Note that the criteria for entering neonates with GA <33 in the CNN dataset are not the same for site H, thus, the rates may not be comparable with other sites.**

COMMENTS: Late onset sepsis is defined as positive blood and/or cerebrospinal fluid culture after 2 days of age (includes all admissions). Considerable variation exists when late onset sepsis is analyzed as infections per 1000 patient days. Note that it is possible that certain sites with high retro transfer rates may report a high incidence per 1000 patient days since neonates who are transferred out are those with lower acuity. If a neonate had >1 distinct episodes of infections, they will be counted as separate episodes of infections in the numerator.
In presentations #33 and #34, assignment of infection was based on location where the infection happened, and not assigned to the hospital where the first episode of sepsis was acquired.

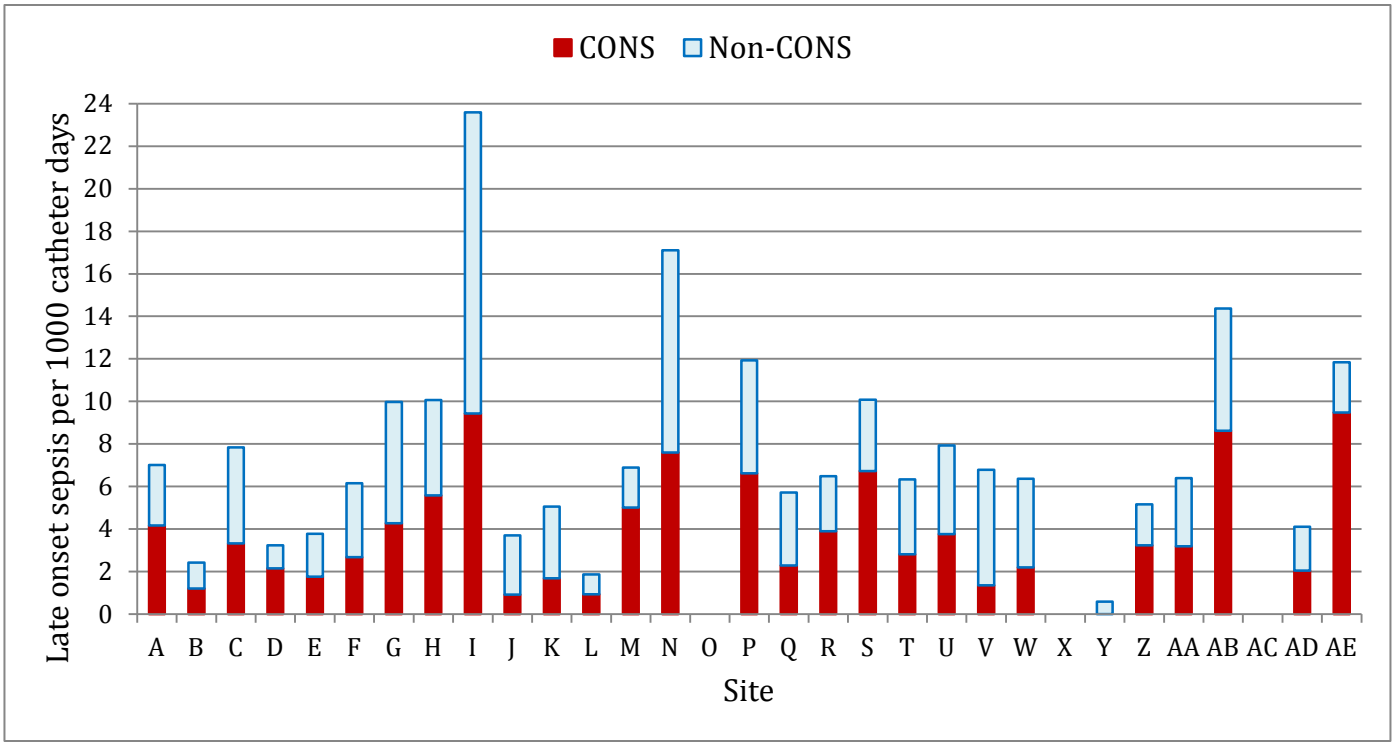
Presentation #34a
Central Line-Associated Bloodstream Infections (CLABSI) per 1000 central line* days among neonates with GA < 33 weeks



Site	CLABSI**		Central line days	CLABSI per 1000 central line days		Site	CLABSI**		Central line days	CLABSI per 1000 central line days	
	CONS	Non-CONS		CONS	Non-CONS		CONS	Non-CONS		CONS	Non-CONS
A	14	10	3429	4.1	2.9	**Q**	2	3	564	3.5	5.3
B	1	1	640	1.6	1.6	**R**	6	4	1492	4.0	2.7
C	8	4	1566	5.1	2.6	**S**	4	2	427	9.4	4.7
D	2	1	657	3.0	1.5	**T**	12	15	3710	3.2	4.0
E	4	7	2644	1.5	2.6	**U**	8	8	2007	4.0	4.0
F	9	12	2938	3.1	4.1	**V**	2	4	659	3.0	6.1
G	3	3	550	5.5	5.5	**W**	16	28	5678	2.8	4.9
H	10	8	1524	6.6	5.2	**X**	0	0	27	0.0	0.0
I	2	3	175	11.4	17.1	**Y**	0	1	513	0.0	1.9
J	2	6	1917	1.0	3.1	**Z**	23	15	4661	4.9	3.2
K	1	0	466	2.1	0.0	**AA**	15	15	3779	4.0	4.0
L	0	1	590	0.0	1.7	**AB**	3	2	321	9.3	6.2
M	16	6	2985	5.4	2.0	**AC**	0	0	36	0.0	0.0
N	4	5	526	7.6	9.5	**AD**	4	5	1847	2.2	2.7
O	0	0	125	0.0	0.0	**AE**	20	5	2027	9.9	2.5
P	14	10	2594	9.6	8.9						
						Total	**216**	**197**	**46521**	**4.2**	**3.9**

*Central line = Any of UV, surgical CVL, or PICC
** CLABSI was defined as a primary bloodstream infection in a patient who developed infection while a central line was in situ or within 2 days of removal of the central line.

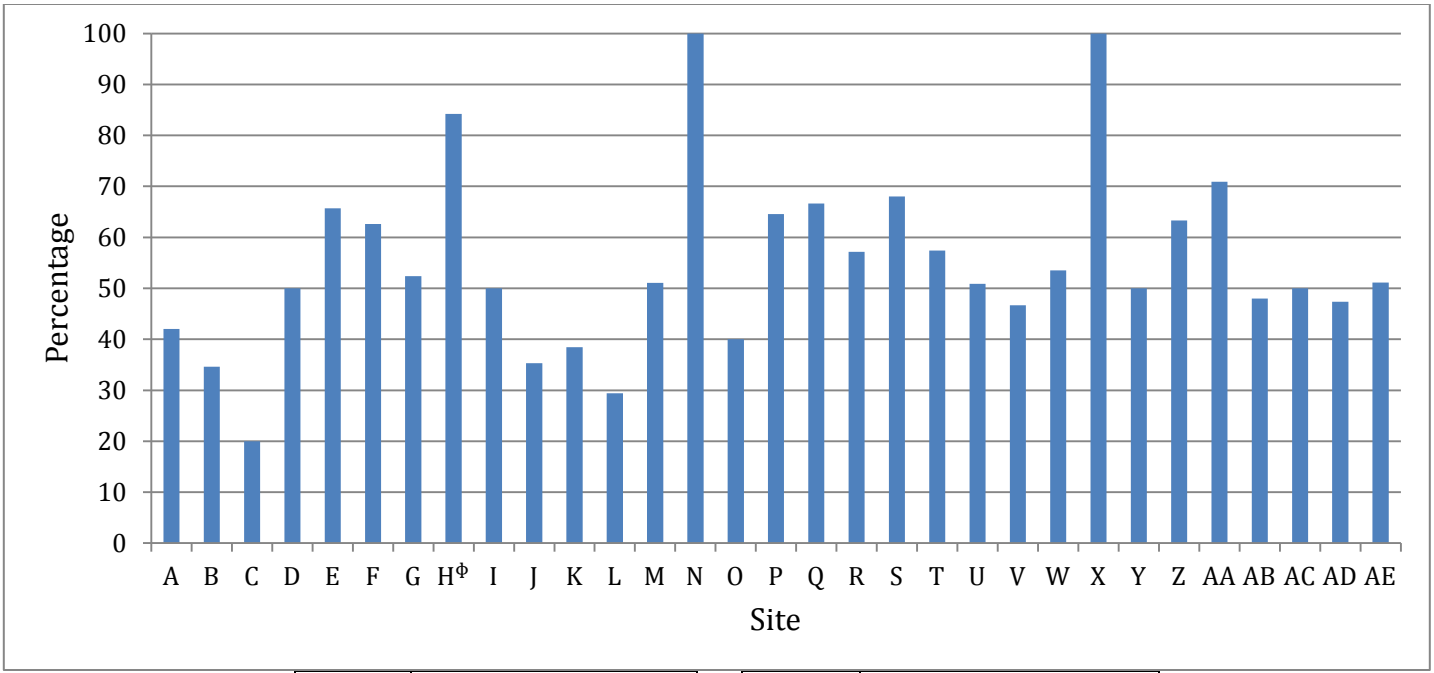
Presentation #34b
Central Line-Associated Bloodstream Infections (CLABSI) per 1000 central line* days among all neonates



Site	CLABSI**		Central line days	CLABSI per 1000 central line days		Site	CLABSI**		Catheter days	CLABSI per 1000 central line days	
	CONS	Non-CONS		CONS	Non-CONS		CONS	Non-CONS		CONS	Non-CONS
A	22	15	5272	4.2	2.8	**Q**	2	3	875	2.3	3.4
B	1	1	824	1.2	1.2	**R**	6	4	1540	3.9	2.6
C	14	19	4212	3.3	4.5	**S**	4	2	595	6.7	3.4
D	2	1	926	2.2	1.1	**T**	12	15	4257	2.8	3.5
E	7	8	3967	1.8	2.0	**U**	9	10	2396	3.8	4.2
F	10	13	3736	2.7	3.5	**V**	2	8	1473	1.4	5.4
G	3	4	702	4.3	5.7	**W**	19	36	8650	2.2	4.2
H	10	8	1789	5.6	4.5	**X**	0	0	69	0.0	0.0
I	2	3	212	9.4	14.2	**Y**	0	1	1677	0.0	0.6
J	2	6	2159	0.9	2.8	**Z**	30	18	9285	3.2	1.9
K	1	2	593	1.7	3.4	**AA**	18	18	5634	3.2	3.2
L	1	1	1074	0.9	0.9	**AB**	3	2	348	8.6	5.7
M	16	6	3192	5.0	1.9	**AC**	0	0	45	0.0	0.0
N	4	5	526	7.6	9.5	**AD**	6	6	2921	2.1	2.1
O	0	0	214	0.0	0.0	**AE**	20	5	2110	9.5	2.4
P	30	24	4526	6.6	5.3						
						Total	**256**	**244**	**75799**	**3.4**	**3.2**

*Central line = Any of UV, surgical CVL, or PICC
** CLABSI was defined as a primary bloodstream infection in a patient who developed infection while a central line was in situ or within 2 days of removal of the central line.

Presentation #35
Treatment[#] for PDA among neonates with GA<33 weeks and who had PDA



Site	Treatment[#] for PDA among neonates who had PDA (%)
A	42.0
B	34.6
C	20.0
D	50.0
E	65.7
F	62.7
G	52.4
H[ϕ]	84.2
I	50.0
J	35.3
K	38.5
L	29.4
M	51.1
N	100.0
O	40.0
P	64.6

Site	Treatment[#] for PDA among neonates who had PDA (%)
Q	66.7
R	57.1
S	68.0
T	57.4
U	50.9
V	46.7
W	53.5
X	100.0
Y	50.0
Z	63.3
AA	70.9
AB	48.0
AC	50.0
AD	47.4
AE	51.2
Total	55.6

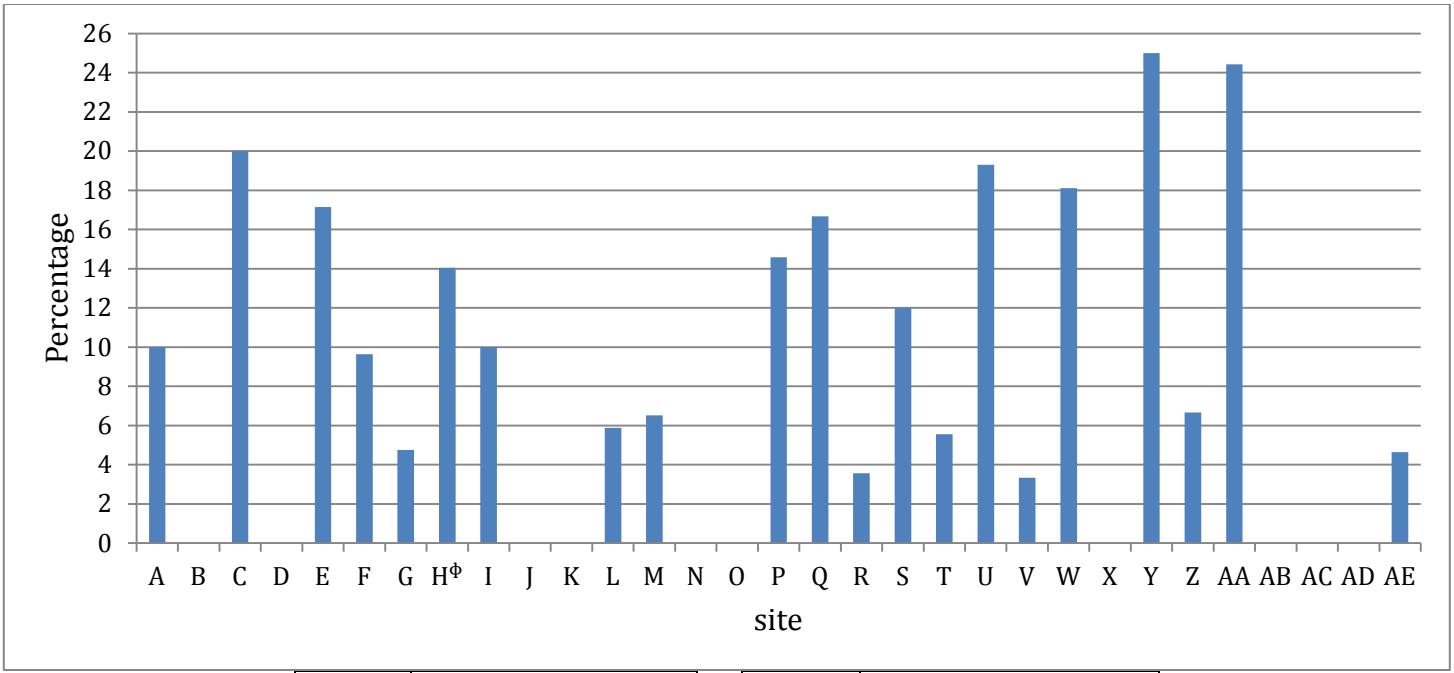
Total number of neonates who had PDA = 701

[#]Treatment of PDA includes any of indomethacin, ibuprofen, acetaminophen, or ligation

†Percentage of neonates to each network site and results are attributed to the site of first admission.

[ϕ]Note that the criteria for entering neonates with GA <33 in the CNN dataset are not the same for site H and thus, the rates may not be comparable with other sites.

Presentation #36
Surgical ligation for PDA among neonates with GA<33 weeks and who had PDA

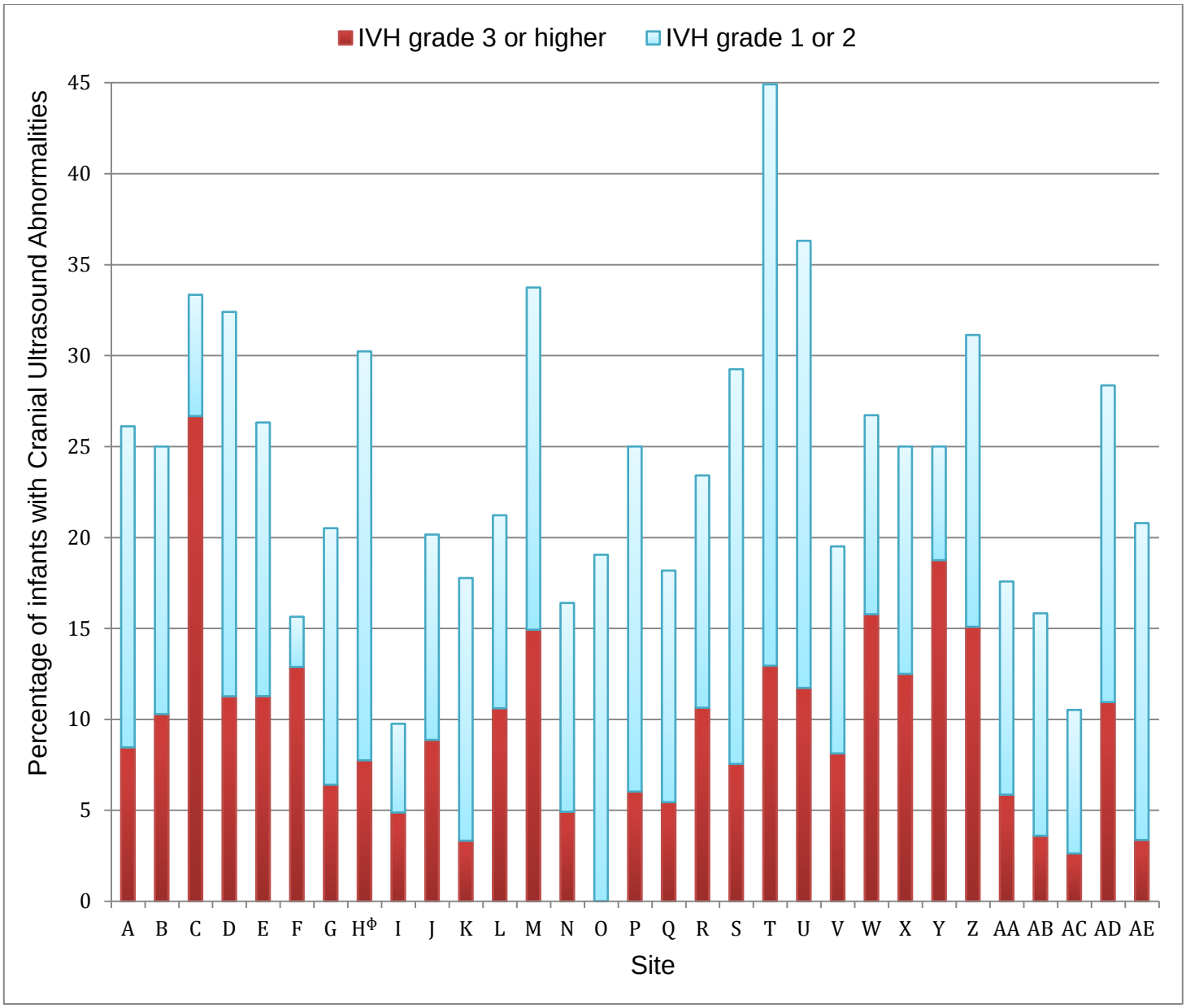


Site	Surgical ligation for PDA among neonates who had PDA (%)
A	10.0
B	0.0
C	20.0
D	0.0
E	17.1
F	9.6
G	4.8
Hϕ	14.0
I	10.0
J	0.0
K	0.0
L	5.9
M	6.5
N	0.0
O	0.0
P	14.6

Site	Surgical ligation for PDA among neonates who had PDA (%)
Q	16.7
R	3.6
S	12.0
T	5.6
U	19.3
V	3.3
W	18.1
X	0.0
Y	25.0
Z	6.7
AA	24.4
AB	0.0
AC	0.0
AD	0.0
AE	4.7
Total	10.5

Total number of neonates who had PDA = 701
† Percentage of neonates to each network site and results are attributed to the site of first admission.
ϕNote that the criteria for entering neonates with GA <33 in the CNN dataset are not the same for site H and thus, the rates may not be comparable with other sites.

Presentation #37
Neuroimaging abnormalities among neonates with GA<33 weeks



IVH grade 1 or 2 = Germinal matrix hemorrhage or intraventricular hemorrhage without ventricular enlargement

IVH grade 3 or 4 = Intraventricular hemorrhage with ventricular enlargement or persistent parenchymal echogenicity or periventricular leukomalacia

Presentation #37 (continued)
Neuroimaging abnormalities among neonates with GA<33 weeks – site rates

Site	<25	25-26	27-28	29-30	31-32	Overall rate* per sites %
A	23.5	21.1	4.1	6.0	2.0	8.5
B	0.0	30.0	11.1	5.3	7.1	10.3
C	0.0	0.0	50.0	50.0	20.0	26.7
D	50.0	50.0	0.0	4.8	2.8	11.3
E	80.0	23.1	14.8	6.9	3.4	11.3
F	61.5	29.6	14.1	6.7	2.4	12.9
G	0.0	22.2	7.1	5.3	3.1	6.4
Hϕ	15.4	15.8	9.7	2.7	3.5	7.8
I	0.0	0.0	0.0	11.1	5.3	4.9
J	28.6	16.7	13.0	3.1	6.0	8.9
K	100.0	0.0	20.0	4.2	0.0	3.3
L	60.0	25.0	14.3	0.0	5.3	10.6
M	42.5	30.6	8.3	9.3	3.1	14.9
N	0.0	0.0	0.0	7.1	6.7	4.9
O	0.0	0.0	NA	0.0	0.0	0.0
P	8.3	17.9	4.7	1.9	4.8	6.0
Q	50.0	22.2	7.1	3.9	1.7	5.5
R	100.0	13.3	7.7	9.1	4.9	10.6
S	40.0	23.5	0.0	3.5	2.4	7.6
T	19.2	21.9	23.5	9.0	2.9	13.0
U	50.0	24.0	12.1	10.0	1.6	11.7
V	40.0	13.3	17.7	2.9	3.9	8.1
W	63.3	32.8	11.8	7.1	4.1	15.8
X	NA	33.3	0.0	0.0	0.0	12.5
Y	28.6	28.6	28.6	0.0	7.7	18.8
Z	50.0	25.0	10.0	8.1	18.2	15.1
AA	11.1	15.8	2.7	3.5	3.4	5.9
AB	0.0	17.7	5.0	0.0	1.7	3.6
AC	100.0	0.0	0.0	0.0	0.0	2.6
AD	33.3	27.3	5.4	15.6	2.4	11.0
AE	6.7	3.7	4.8	4.0	1.5	3.4
Overall rate per GA group %**	33.7	22.2	10.6	6.3	3.5	10.1

Total number of neonates = 4 387
VE=ventricular enlargement, PEC=parenchymal echogenicity
ϕ Note that the criteria for entering neonates with GA <33 in the CNN dataset are not same for site H and thus, the rates may not be comparable with other sites.

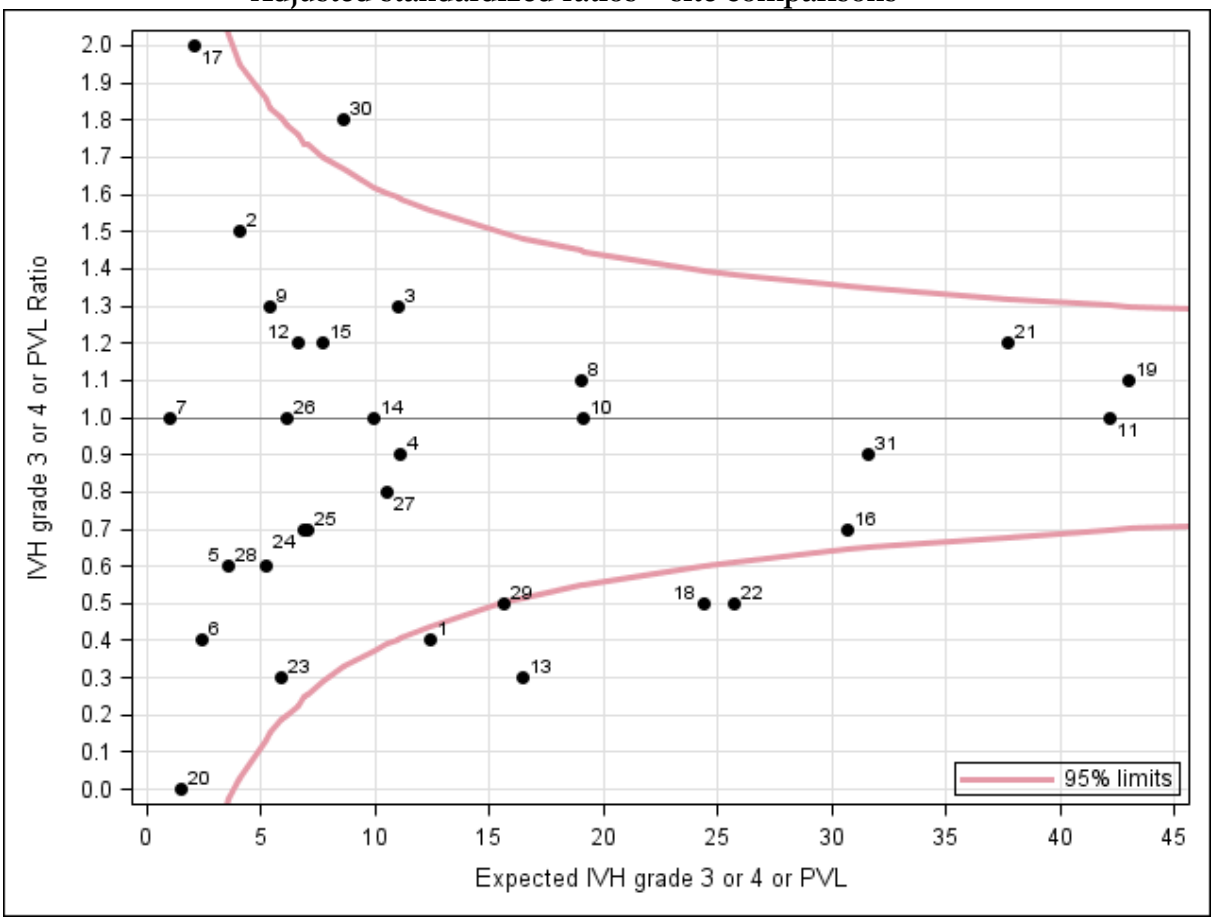
*Overall % = (number of neonates with cranial ultrasound abnormalities for site / total number of neonates for site)*100
**Overall % = (number of neonates with cranial ultrasound abnormalities for GA category / total number of neonates in gestational category)*100
NA = no data available

Presentation# 38a
IVH grade 3 or 4 or PVL among neonates with GA<33 weeks
Adjusted standardized ratios by site

Site	Number of infants	Number with IVH G3/4 or PVL	Adjusted# Expected number with IVH G3/4 or PVL	Adjusted# Standardized ratio	95% confidence interval for adjusted standardized ratio	
1	122	5	12.4	0.4	0.1	0.9
2	22	6	4.1	1.5	0.5	3.2
3	89	14	11.0	1.3	0.7	2.1
4	106	10	11.1	0.9	0.4	1.7
5	39	2	3.6	0.6	0.1	2.0
6	34	1	2.4	0.4	0.0	2.3
7	5	1	1.0	1.0	0.0	5.5
8	153	21	19.0	1.1	0.7	1.7
9	61	7	5.4	1.3	0.5	2.6
10	162	19	19.1	1.0	0.6	1.6
11	311	42	42.2	1.0	0.7	1.3
12	67	8	6.6	1.2	0.5	2.4
13	137	5	16.5	0.3	0.1	0.7
14	102	10	9.9	1.0	0.5	1.9
15	81	9	7.7	1.2	0.5	2.2
16	232	20	30.7	0.7	0.4	1.0
17	11	4	2.1	2.0	0.5	5.0
18	163	13	24.4	0.5	0.3	0.9
19	290	49	43.0	1.1	0.8	1.5
20	19	0	1.5	0.0	.	2.4
21	221	47	37.7	1.2	0.9	1.7
22	203	12	25.7	0.5	0.2	0.8
23	68	2	5.9	0.3	0.0	1.2
24	58	5	6.9	0.7	0.2	1.7
25	46	5	7.0	0.7	0.2	1.7
26	61	6	6.1	1.0	0.4	2.1
27	84	8	10.5	0.8	0.3	1.5
28	55	3	5.2	0.6	0.1	1.7
29*	116	8	15.6	0.5	0.2	1.0
30	79	15	8.6	1.8	1.0	2.9
31	211	29	31.6	0.9	0.6	1.3

Please note that site codes for Presentations 38a and 38b are different from other presentations in this report.
Neonates with major congenital anomalies are excluded.
Variables adjusted for in the prediction model: GA, SGA, Sex, SNAPII > 20
* Site 29 has different criteria for entering neonates in the CNN dataset, and may not be comparable with other sites. (See next page for full explanation)

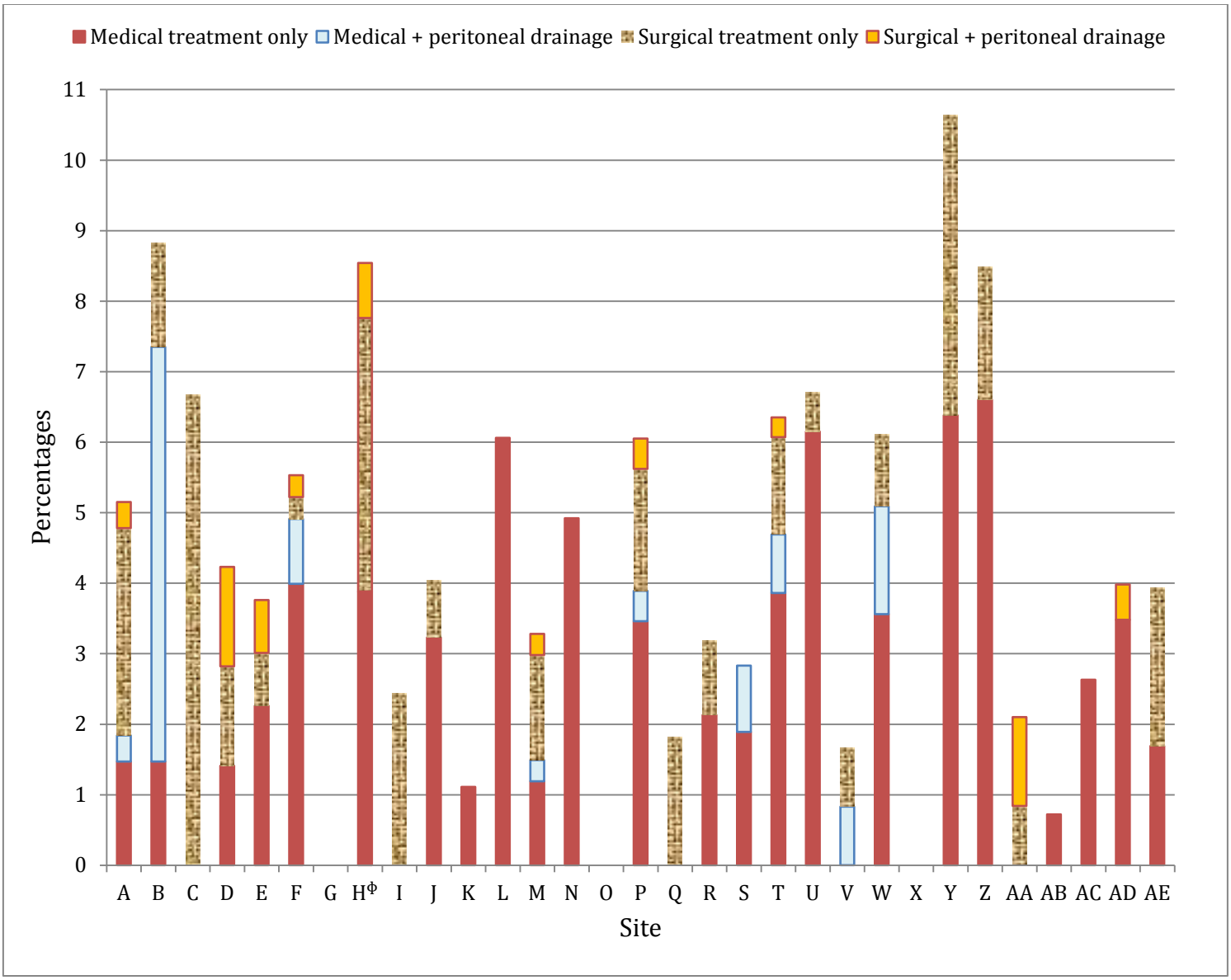
Presentation #38b
IVH grade 3 or 4 or PVL among neonates with GA<33 weeks
Adjusted standardized ratios – site comparisons



Explanation for Presentation 38a
Column 1: Different site code than other presentations in the report
Column 2: Number of eligible neonates at your sites (<33 weeks and no major anomaly)
Column 3: Number of neonates with outcome of interest among those eligible neonates
Column 4: Expected number of neonates with outcome of interest after adjustment for GA, SGA, Sex, SNAPII > 20
Column 5: Adjusted standardized ratio calculated based on observed IVH or PVL/expected IVH or PVL
Columns 6 and 7: 95% CI around the adjusted standardized ratio for the outcome

Explanation for Presentation 38b
X-axis: Expected number of neonates with outcome (value from Column 4 of previous presentation)
Y-axis: Adjusted standardized ratio (value from Column 5 of previous presentation)
Dark points with numerical notation: Site and its location matching x and y axis values
Red funnel shaped lines: 95% confidence limits based on entire network information.
Sites outside of red lines represent higher or lower (depending upon position in graph) adjusted standardized ratio. However, for determining whether site is statistically different from others, one should also assess 95% CI and check whether both upper and lower boundaries are also outside of the funnel area or not.

Presentation #39
Necrotizing enterocolitis (≥stage 2) among neonates with GA<33 weeks



Presentation #39 (continued)

Necrotizing enterocolitis (≥stage 2) among neonates with GA<33 weeks – site rates

Site	Treatment (%)				
	Medical treatment only	Medical + peritoneal drainage	Surgical treatment only	Surgical + peritoneal drainage	Any
A	1.5	0.4	2.9	0.4	5.2
B	1.5	5.9	1.5	0.0	8.8
C	0.0	0.0	6.7	0.0	6.7
D	1.4	0.0	1.4	1.4	4.2
E	2.3	0.0	0.8	0.8	3.8
F	4.0	0.9	0.3	0.3	5.5
G	0.0	0.0	0.0	0.0	0.0
Hϕ	3.9	0.0	3.9	0.8	8.5
I	0.0	0.0	2.4	0.0	2.4
J	3.2	0.0	0.8	0.0	4.0
K	1.1	0.0	0.0	0.0	1.1
L	6.1	0.0	0.0	0.0	6.1
M	1.2	0.3	1.5	0.3	3.3
N	4.9	0.0	0.0	0.0	4.9
O	0.0	0.0	0.0	0.0	0.0
P	3.5	0.4	1.7	0.4	6.1
Q	0.0	0.0	1.8	0.0	1.8
R	2.1	0.0	1.1	0.0	3.2
S	1.9	0.9	0.0	0.0	2.8
T	3.9	0.8	1.4	0.3	6.4
U	6.2	0.0	0.6	0.0	6.7
V	0.0	0.8	0.8	0.0	1.7
W	3.6	1.5	1.0	0.0	6.1
X	0.0	0.0	0.0	0.0	0.0
Y	6.4	0.0	4.3	0.0	10.6
Z	6.6	0.0	1.9	0.0	8.5
AA	0.0	0.0	0.8	1.3	2.1
AB	0.7	0.0	0.0	0.0	0.7
AC	2.6	0.0	0.0	0.0	2.6
AD	3.5	0.0	0.0	0.5	4.0
AE	1.7	0.0	2.3	0.0	3.9
Total	2.6	0.5	1.2	0.3	4.6

COMMENTS: These analyses include 4 382 neonates from 31 sites. **Thirty sites collected data on all eligible admissions for neonates with GA < 33 weeks whereas one site (marked by ϕ) collected data on selected eligible admissions only.**

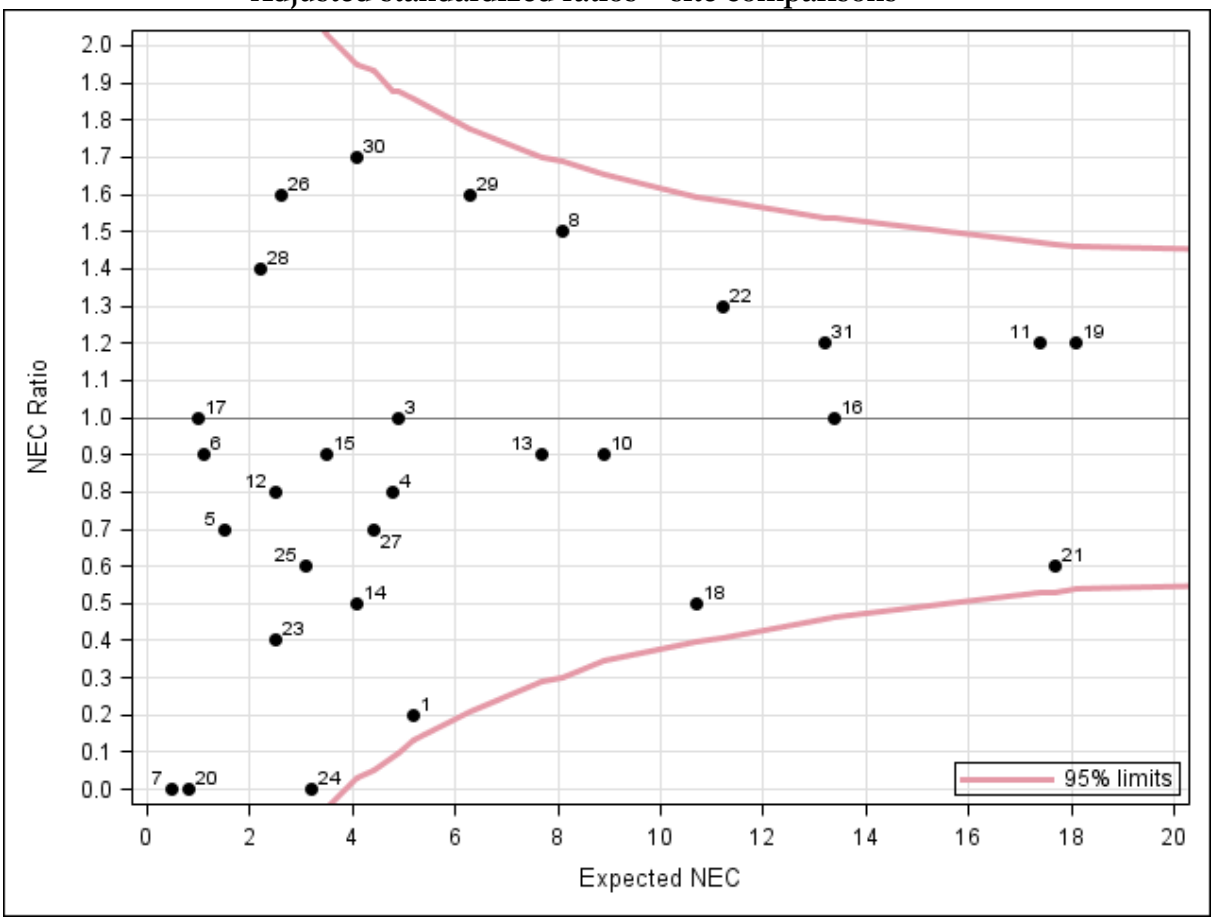
ϕNote that the criteria for entering neonates with GA **<33 weeks** in the CNN dataset are not same for site H and thus, the rates may not be comparable with other sites.

Presentation #40a
Necrotizing enterocolitis (≥ stage 2) among neonates with GA<33 weeks
Adjusted standardized ratios by site

Site	Number of infants	Number of NEC	Adjusted# Expected number of NEC	Adjusted# Standardized ratio	95% confidence interval for adjusted standardized ratio	
1	136	1	5.2	0.2	0.0	1.1
2	35	5	2.3	2.2	0.7	5.1
3	127	5	4.9	1.0	0.3	2.4
4	119	4	4.8	0.8	0.2	2.1
5	41	1	1.5	0.7	0.0	3.8
6	37	1	1.1	0.9	0.0	5.2
7	8	0	0.5	0.0	.	7.5
8	177	12	8.1	1.5	0.8	2.6
9	68	6	2.4	2.5	0.9	5.3
10	189	8	8.9	0.9	0.4	1.8
11	347	21	17.4	1.2	0.7	1.8
12	69	2	2.5	0.8	0.1	2.9
13	176	7	7.7	0.9	0.4	1.9
14	114	2	4.1	0.5	0.1	1.8
15	87	3	3.5	0.9	0.2	2.5
16	258	14	13.4	1.0	0.6	1.8
17	15	1	1.0	1.0	0.0	5.7
18	215	5	10.7	0.5	0.2	1.1
19	363	22	18.1	1.2	0.8	1.8
20	21	0	0.8	0.0	.	4.8
21	325	10	17.7	0.6	0.3	1.0
22	224	14	11.2	1.3	0.7	2.1
23	85	1	2.5	0.4	0.0	2.2
24	75	0	3.2	0.0	.	1.1
25	105	2	3.1	0.6	0.1	2.3
26	64	4	2.6	1.6	0.4	4.0
27	105	3	4.4	0.7	0.1	2.0
28	59	3	2.2	1.4	0.3	4.0
29*	121	10	6.3	1.6	0.8	2.9
30	97	7	4.1	1.7	0.7	3.5
31	302	16	13.2	1.2	0.7	2.0

Please note that site codes for Presentations 40a and 40b are different from other presentations in this report.
Neonates with major congenital anomalies are excluded.
Variables adjusted for in the prediction model: GA, SGA, Sex, SNAPII > 20
* Site 29 has different criteria for entering neonates in the CNN dataset, and may not be comparable with other sites. (See next page for full explanation)

Presentation #40b
Necrotizing enterocolitis (≥ stage 2) among neonates with GA<33 weeks
Adjusted standardized ratios – site comparisons



Explanation for Presentation 40a
Column 1: Different site code than other presentations in the report
Column 2: Number of eligible neonates at your sites (<33 weeks and no major anomaly)
Column 3: Number of neonates with outcome of interest among those eligible neonates
Column 4: Expected number of neonates with outcome of interest after adjustment for GA, SGA, Sex, SNAPII > 20
Column 5: Adjusted standardized ratio calculated based on observed NEC/expected NEC
Columns 6 and 7: 95% CI around the adjusted standardized ratio for the outcome

Explanation for Presentation 40b
X-axis: Expected number of neonates with outcome (value from Column 4 of previous presentation)
Y-axis: Adjusted standardized ratio (value from Column 5 of previous presentation)
Dark points with numerical notation: Site and its location matching x and y axis values
Red funnel shaped lines: 95% confidence limits based on entire network information.
Sites outside of red lines represent higher or lower (depending upon position in graph) adjusted standardized ratio. However, for determining whether site is statistically different from others, one should also assess 95% CI and check whether both upper and lower boundaries are also outside of the funnel area or not.

Presentation #41
Oxygen use at 36 weeks or at discharge (if earlier) or death among neonates with GA <33 weeks at birth – site rates

GA at birth						
Site	**<25**	**25-26**	**27-28**	**29-30**	**31-32**	**Overall rate for sites**
A	76.5	47.4	30.6	10.0	5.0	25.4
B	50.0	70.0	0.0	10.5	0.0	14.9
C	100.0	100.0	100.0	50.0	20.0	58.3
D	100.0	70.0	0.0	4.8	5.6	16.9
E	100.0	46.2	37.0	24.1	3.4	22.6
F	84.6	48.2	25.4	9.3	2.4	19.4
G	50.0	44.4	21.4	10.5	9.4	18.0
H$^{\phi}$	84.6	89.5	25.8	8.8	3.7	32.3
I	0.0	20.0	0.0	11.1	0.0	4.9
J	28.6	33.3	26.1	9.4	2.0	12.9
K	100.0	50.0	20.0	8.3	3.9	10.2
L	80.0	100.0	14.3	16.7	2.7	18.5
M	60.0	22.5	10.8	7.2	1.5	15.6
N	66.7	0.0	0.0	7.1	3.5	6.7
O	0.0	0.0	NA	0.0	0.0	0.0
P	86.4	67.9	39.5	18.9	11.4	32.9
Q	50.0	22.2	7.7	4.4	0.0	5.1
R	100.0	40.0	30.8	10.5	0.0	17.7
S	100.0	47.1	0.0	6.9	0.0	14.2
T	69.2	45.3	19.4	11.2	8.8	22.4
U	88.9	75.0	34.4	14.0	8.2	27.8
V	40.0	60.0	17.7	3.0	2.3	14.0
W	82.8	60.6	30.1	14.4	6.9	28.4
X	NA	66.7	100.0	0.0	0.0	37.5
Y	60.0	66.7	54.6	66.7	0.0	43.3
Z	100.0	60.0	31.3	15.2	6.5	23.4
AA	58.8	37.8	27.8	14.3	5.8	20.2
AB	75.0	47.1	15.8	2.6	1.8	12.0
AC	100.0	0.0	40.0	0.0	4.4	11.1
AD	93.3	81.8	41.7	20.0	2.5	29.2
AE	60.0	48.2	28.6	4.0	1.5	17.4
Overall rate for GA group	73.9	50.9	25.5	11.1	4.3	21.0

Total number of neonates = 4 268. 119 neonates were excluded due to first admission after week 36. NA = no data available.

$^{\phi}$Note that the criteria for entering neonates with GA <33 weeks in the CNN dataset are not the same for site H and thus, the rates may not be comparable with other sites. Outcomes are attributed to the site of first admission.

Comments: Neonates were classified as having oxygen use at 36 weeks as follows: a) receiving supplemental oxygen at week 36 postmenstrual age (PMA) or b) discharged prior to week 36 PMA and receiving supplemental oxygen at discharge. Neonates were excluded from analysis if the first admission was after week 36. There were no requirements for chest radiographs at the time of diagnosis. Deaths prior to week 36 PMA are included.

Presentation #42
Oxygen use at 36 weeks or at discharge (if earlier) among neonates with GA<33 weeks – site rates

GA at birth						
Site	**<25**	**25-26**	**27-28**	**29-30**	**31-32**	**Overall rate for sites**
A	61.9	44.4	26.1	8.2	2.0	18.8
B	0.0	40.0	0.0	10.5	0.0	6.6
C	100.0	NA	100.0	0.0	20.0	37.5
D	NA	66.7	0.0	4.8	5.6	13.2
E	100.0	41.7	37.0	21.4	3.4	20.8
F	79.0	41.7	25.4	6.9	2.4	16.4
G	0.0	28.6	15.4	10.5	9.4	12.3
H$^{\phi}$	66.7	85.7	23.3	8.8	3.7	24.3
I	0.0	0.0	0.0	11.1	0.0	2.5
J	16.7	11.1	19.1	6.5	2.0	7.7
K	100.0	25.0	20.0	8.3	3.9	8.1
L	50.0	100.0	14.3	16.7	2.7	11.7
M	48.4	11.6	9.8	6.3	0.0	10.8
N	50.0	0.0	0.0	0.0	3.5	3.5
O	0.0	0.0	NA	0.0	0.0	0.0
P	81.3	55.0	35.0	17.3	9.1	26.3
Q	0.0	0.0	7.7	0.0	0.0	1.1
R	100.0	30.8	30.8	5.6	0.0	13.6
S	NA	35.7	0.0	3.6	0.0	6.2
T	57.9	37.5	15.6	8.4	7.9	17.3
U	83.3	66.7	30.0	12.2	8.2	22.6
V	0.0	45.5	6.7	3.0	2.3	7.6
W	72.2	55.9	26.1	12.6	6.1	23.3
X	NA	66.7	100.0	0.0	0.0	37.5
Y	60.0	50.0	50.0	66.7	0.0	39.3
Z	100.0	55.6	26.7	12.5	3.3	19.1
AA	50.0	32.4	27.8	9.4	2.4	15.8
AB	50.0	40.0	15.8	0.0	0.0	7.9
AC	NA	0.0	25.0	0.0	0.0	3.0
AD	80.0	75.0	34.4	18.2	1.3	20.3
AE	50.0	36.4	25.0	4.0	0.0	12.5
Overall rate for GA group	60.8	41.4	22.2	9.0	3.3	15.7

Total number of neonates = 4 001. 386 neonates were excluded due to death prior to week 36 or first admission after week 36. NA = no data available.

$^{\phi}$Note that the criteria for entering neonates with GA <33 weeks in the CNN dataset are not the same for site H and thus, the rates may not be comparable with other sites. Outcomes are attributed to the site of first admission.

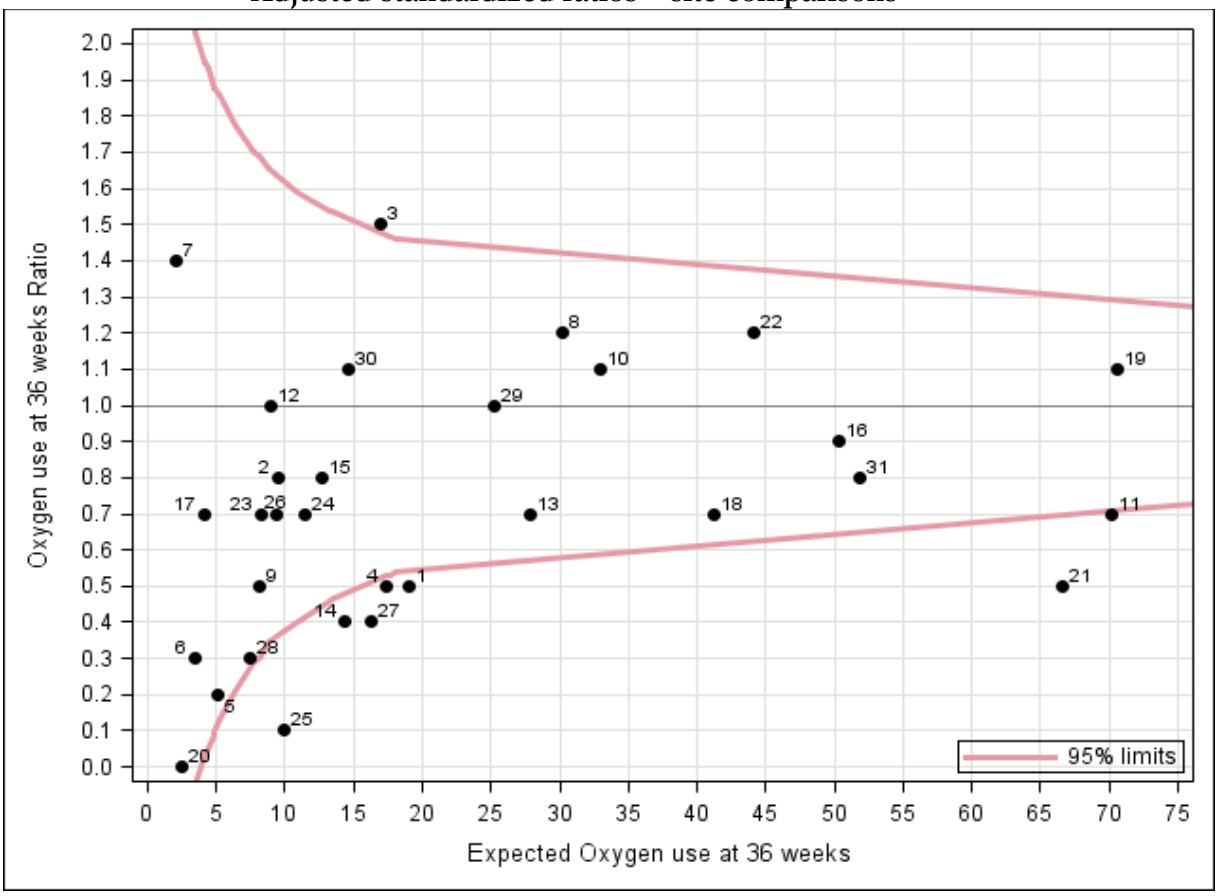
Comments: Neonates were classified as having oxygen use at 36 weeks as follows: a) receiving supplemental oxygen at week 36 postmenstrual age (PMA) or b) discharged prior to week 36 PMA and receiving supplemental oxygen at discharge. Neonates were excluded from analysis if they died prior to week 36 or the first admission was after week 36. There were no requirements for chest radiographs at the time of diagnosis.

Presentation #43a
Oxygen use at 36 weeks or at discharge (if earlier) among neonates with GA <33 weeks
Adjusted standardized ratios by site

Site	Number of infants	Number with oxygen use at 36w or discharge	Adjusted# Expected number of oxygen use at 36w or discharge	Adjusted# Standardized ratio	95% confidence interval for adjusted standardized ratio	
1	124	10	19.1	0.5	0.3	1.0
2	19	8	9.5	0.8	0.4	1.7
3	125	25	16.9	1.5	1.0	2.2
4	112	8	17.4	0.5	0.2	0.9
5	40	1	5.1	0.2	0.0	1.1
6	32	1	3.5	0.3	0.0	1.6
7	8	3	2.1	1.4	0.3	4.1
8	163	37	30.2	1.2	0.9	1.7
9	61	4	8.1	0.5	0.1	1.3
10	167	35	33.0	1.1	0.7	1.5
11	322	49	70.2	0.7	0.5	0.9
12	66	9	9.0	1.0	0.5	1.9
13	166	19	27.9	0.7	0.4	1.1
14	99	6	14.4	0.4	0.2	0.9
15	74	10	12.7	0.8	0.4	1.4
16	240	45	50.3	0.9	0.7	1.2
17	8	3	4.2	0.7	0.1	2.1
18	200	27	41.2	0.7	0.4	1.0
19	332	75	70.6	1.1	0.8	1.3
20	21	0	2.5	0.0	.	1.5
21	307	32	66.6	0.5	0.3	0.7
22	200	51	44.1	1.2	0.9	1.5
23	82	6	8.3	0.7	0.3	1.6
24	70	8	11.4	0.7	0.3	1.4
25	92	1	9.9	0.1	0.0	0.6
26	58	7	9.4	0.7	0.3	1.5
27	96	6	16.3	0.4	0.1	0.8
28	56	2	7.5	0.3	0.0	1.0
29*	103	24	25.3	1.0	0.6	1.4
30	82	16	14.6	1.1	0.6	1.8
31	291	41	51.8	0.8	0.6	1.1

Please note that site codes for Presentations 43a and 43b are different from other presentations in this report.
Neonates with major congenital anomalies and death before 36 weeks were excluded.
Variables adjusted for in the prediction model: GA, SGA, Sex, SNAPII > 20
* Site 29 has different criteria for entering neonates in the CNN dataset, and may not be comparable with other sites. (See next page for full explanation)

Presentation #43b
Oxygen use at 36 weeks or at discharge (if earlier) among neonates with GA<33 weeks
Adjusted standardized ratios – site comparisons

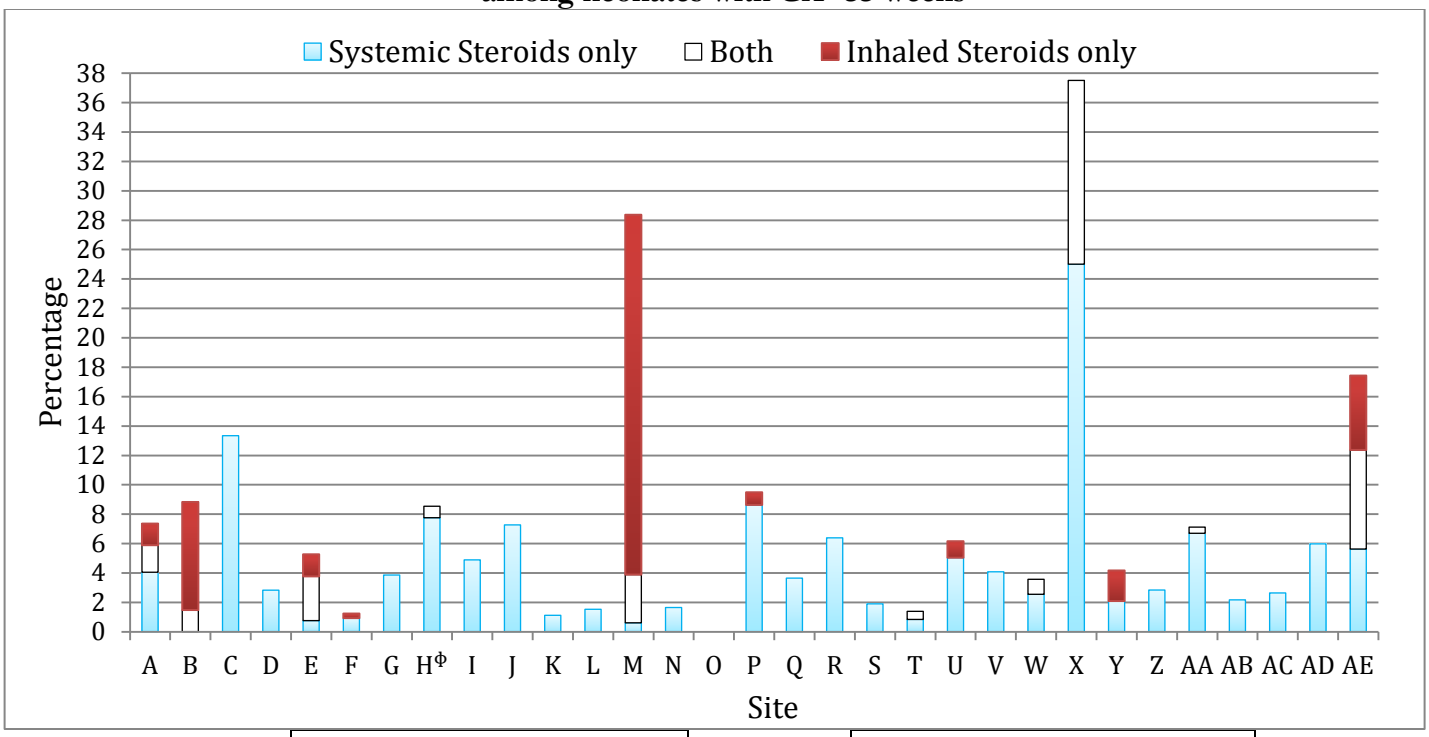


Explanation for Presentation 43a
Column 1: Different site code than other presentations in the report
Column 2: Number of eligible neonates at your sites (<33 weeks and no major anomaly)
Column 3: Number of neonates with outcome of interest among those eligible neonates
Column 4: Expected number of neonates with outcome of interest after adjustment for GA, SGA, Sex, SNAPII > 20
Column 5: Adjusted standardized ratio calculated based on observed oxygen use/expected oxygen use
Columns 6 and 7: 95% CI around the adjusted standardized ratio for the outcome

Explanation for Presentation 43b
X-axis: Expected number of neonates with outcome (value from Column 4 of previous presentation)
Y-axis: Adjusted standardized ratio (value from Column 5 of previous presentation)
Dark points with numerical notation: Site and its location matching x and y axis values
Red funnel shaped lines: 95% confidence limits based on entire network information.
Sites outside of red lines represent higher or lower (depending upon position in graph) adjusted standardized ratio. However, for determining whether site is statistically different from others, one should also assess 95% CI and check whether both upper and lower boundaries are also outside of the funnel area or not.

Note: Deaths before 36 weeks were not included in the denominator.

Presentation #44a
Postnatal use of steroids for treatment of Bronchopulmonary dysplasia (BPD) among neonates with GA<33 weeks†



Site	Postnatal steroid use (%)		
	Systemic Steroids only	Both	Inhaled Steroids only
A	4.0	1.8	1.5
B	0.0	1.5	7.4
C	13.3	0.0	0.0
D	2.8	0.0	0.0
E	0.8	3.0	1.5
F	0.9	0.0	0.3
G	3.9	0.0	0.0
HΦ	7.8	0.8	0.0
I	4.9	0.0	0.0
J	7.3	0.0	0.0
K	1.1	0.0	0.0
L	1.5	0.0	0.0
M	0.6	3.3	24.5
N	1.6	0.0	0.0
O	0.0	0.0	0.0
P	8.6	0.0	0.9

Site	Postnatal steroid use (%)		
	Systemic Steroids only	Both	Inhaled Steroids only
Q	3.6	0.0	0.0
R	6.4	0.0	0.0
S	1.9	0.0	0.0
T	0.8	0.6	0.0
U	5.0	0.0	1.1
V	4.1	0.0	0.0
W	2.5	1.0	0.0
X	25.0	12.5	0.0
Y	2.1	0.0	2.1
Z	2.8	0.0	0.0
AA	6.7	0.4	0.0
AB	2.2	0.0	0.0
AC	2.6	0.0	0.0
AD	6.0	0.0	0.0
AE	5.6	6.7	5.1
Total	3.5	1.0	2.5

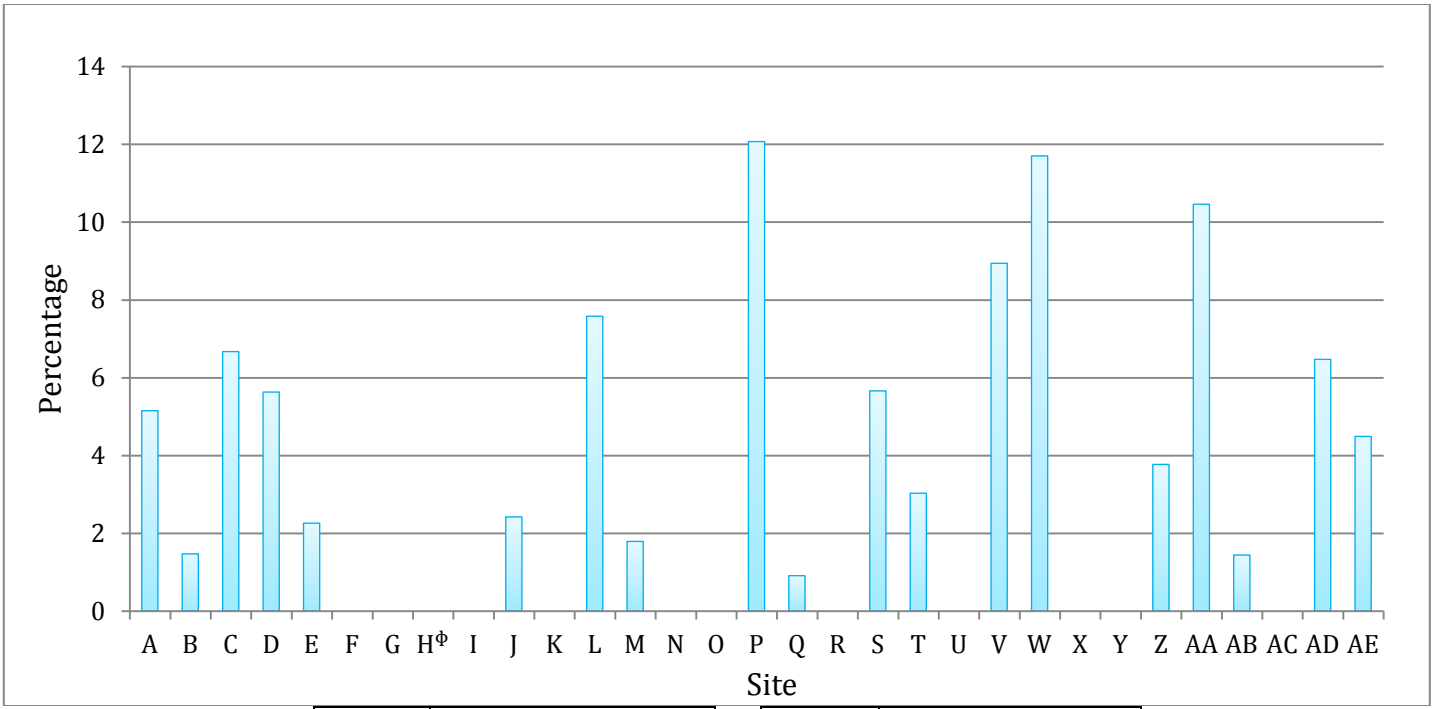
Total number of neonates = 4 387

† Percentage of neonates to each network site and results are attributed to the site of first admission.

ΦNote that the criteria for entering neonates with GA <33 in the CNN dataset are not the same for site H and thus, the rates may not be comparable with other sites.

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

Presentation #44b
Postnatal use of systemic steroids for hypotension among neonates with GA<33 weeks†



Site	Postnatal systemic steroids use for hypotension (%)
A	5.2
B	1.5
C	6.7
D	5.6
E	2.3
F	0.0
G	0.0
Hᶲ	0.0
I	0.0
J	2.4
K	0.0
L	7.6
M	1.8
N	0.0
O	0.0
P	12.1

Site	Postnatal systemic steroids use for hypotension (%)
Q	0.9
R	0.0
S	5.7
T	3.0
U	0.0
V	8.9
W	11.7
X	0.0
Y	0.0
Z	3.8
AA	10.5
AB	1.4
AC	0.0
AD	6.5
AE	4.5
Total	4.4

Total number of neonates = 4 387

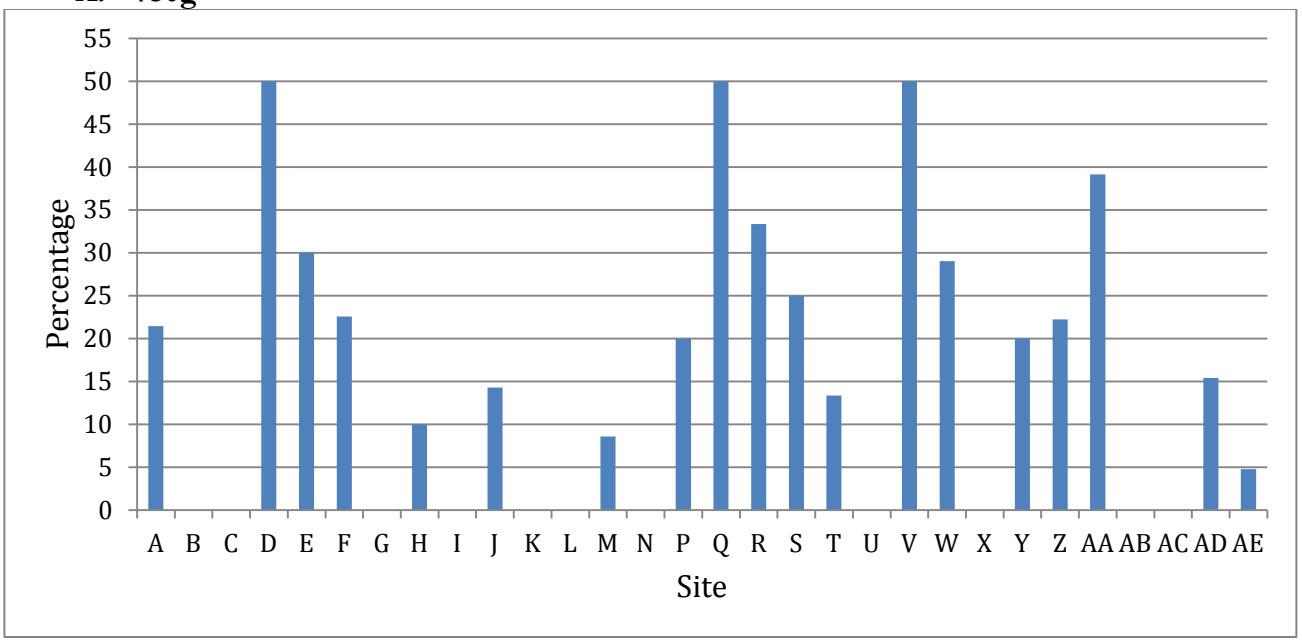
† Percentage of neonates to each network site and results are attributed to the site of first admission.

ᶲNote that the criteria for entering neonates with GA <33 in the CNN dataset are not the same for site H and thus, the rates may not be comparable with other sites.

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

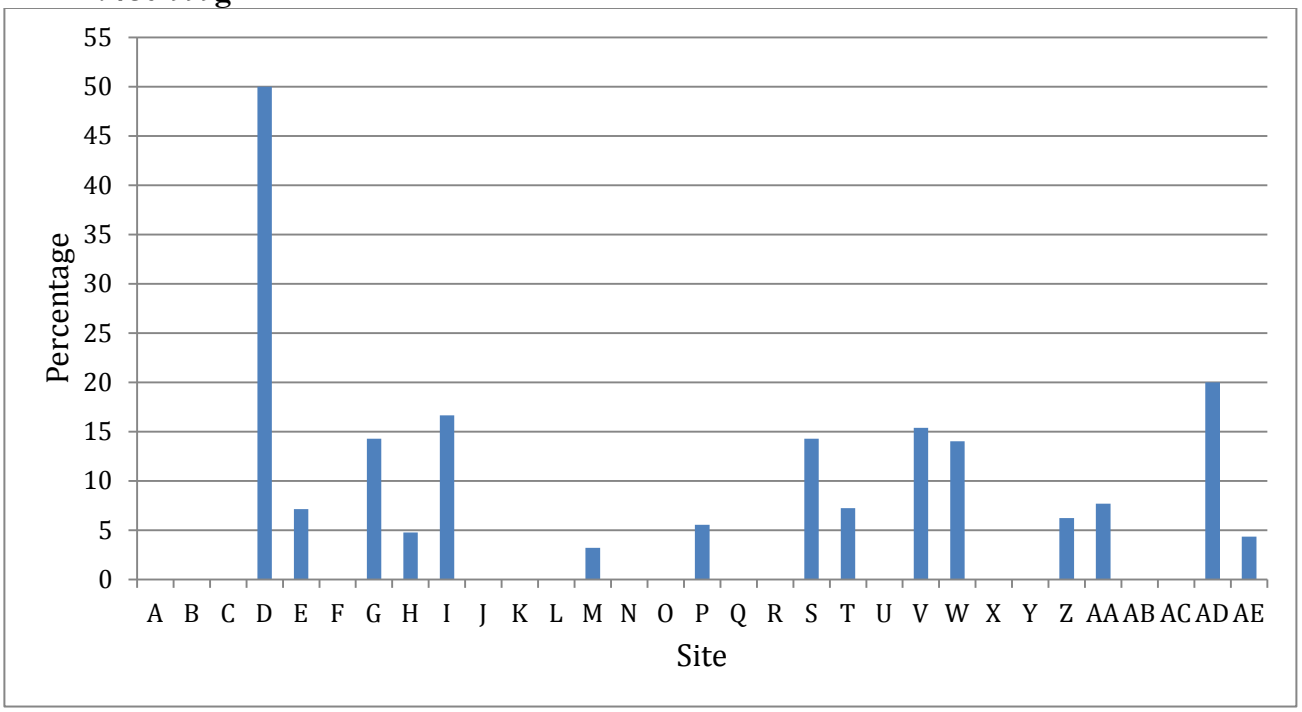
Presentation #45
Treatment for retinopathy of prematurity among neonates with BW <1000g and who had eye exams

A. <750g



There were no neonates in site O in this BW category.

B. 750-999g



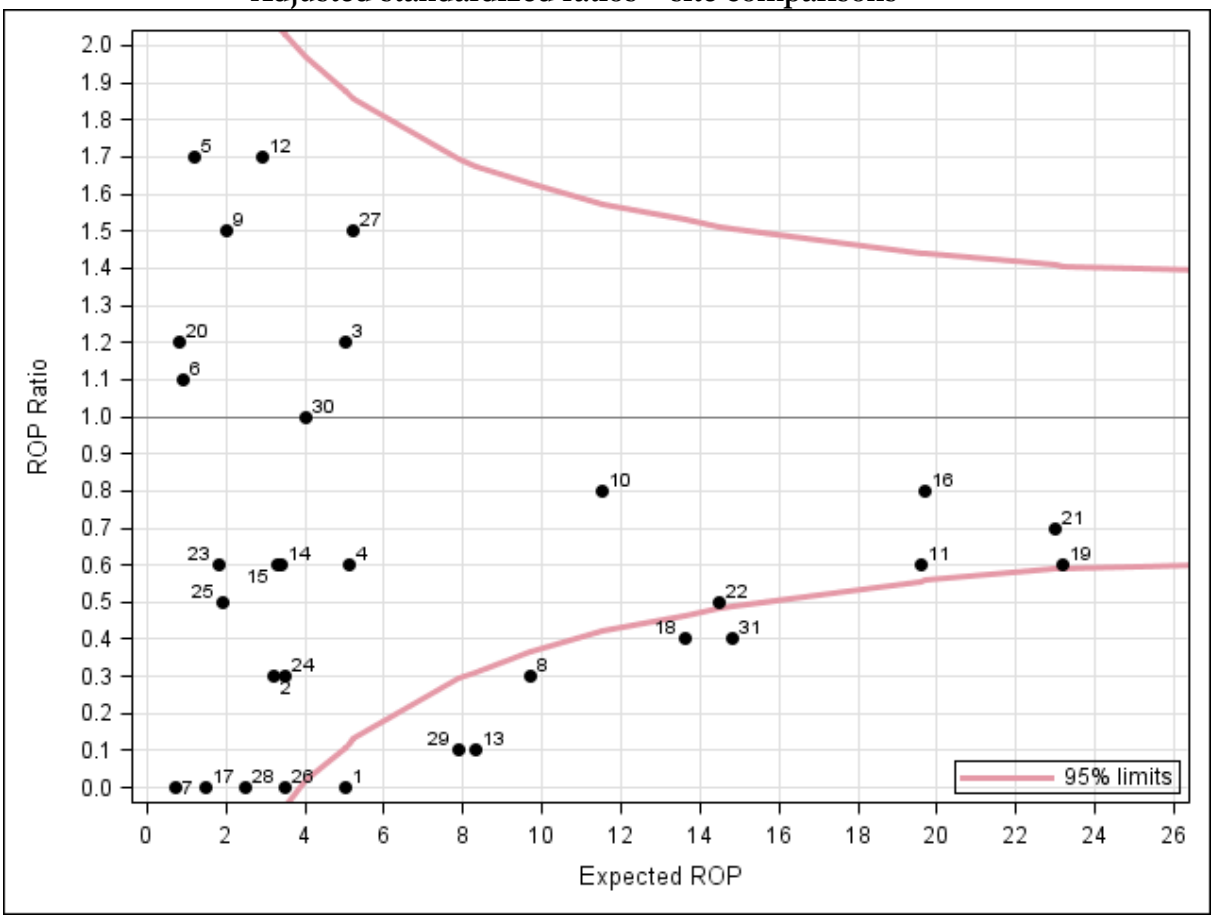
COMMENTS: Not all centers have data on neonates in each BW category. Treatment includes Anti-VEGF therapy, surgery or both.

Presentation #46a
Retinopathy of prematurity stage 3 and higher among neonates with GA<33weeks
Adjusted standardized ratios by site

Site	Number of infants	Number with ROP ≥Stage 3	Adjusted# Expected number with ROP ≥ Stage 3	Adjusted# Standardized ratio	95% confidence interval for adjusted standardized ratio	
1	26	0	5.0	0.0	.	0.7
2	14	1	3.2	0.3	0.0	1.7
3	49	6	5.0	1.2	0.4	2.6
4	53	3	5.1	0.6	0.1	1.7
5	13	2	1.2	1.7	0.2	6.1
6	25	1	0.9	1.1	0.0	6.3
7	5	0	0.7	0.0	.	5.2
8	77	3	9.7	0.3	0.1	0.9
9	26	3	2.0	1.5	0.3	4.3
10	80	9	11.5	0.8	0.4	1.5
11	170	12	19.6	0.6	0.3	1.1
12	40	5	2.9	1.7	0.5	4.0
13	103	1	8.3	0.1	0.0	0.7
14	65	2	3.4	0.6	0.1	2.1
15	28	2	3.3	0.6	0.1	2.2
16	104	15	19.7	0.8	0.4	1.3
17	3	0	1.5	0.0	.	2.5
18	32	6	13.6	0.4	0.2	1.0
19	66	13	23.2	0.6	0.3	1.0
20	13	1	0.8	1.2	0.0	6.7
21	136	17	23.0	0.7	0.4	1.2
22	137	7	14.5	0.5	0.2	1.0
23	11	1	1.8	0.6	0.0	3.1
24	51	1	3.5	0.3	0.0	1.6
25	40	1	1.9	0.5	0.0	2.9
26	21	0	3.5	0.0	.	1.0
27	51	8	5.2	1.5	0.7	3.0
28	53	0	2.5	0.0	.	1.4
29*	60	1	7.9	0.1	0.0	0.7
30	31	4	4.0	1.0	0.3	2.6
31	70	6	14.8	0.4	0.1	0.9

Please note that site codes for Presentations 46a and 46b are different from other presentations in this report.
Neonates with major congenital anomalies are excluded.
Variables adjusted for in the prediction model: GA, SGA, Sex, SNAPII > 20
* Site 29 has different criteria for entering neonates in the CNN dataset, and may not be comparable with other sites. (See next page for full explanation)

Presentation #46b
Retinopathy of prematurity stage 3 and higher among neonates with GA<33weeks
Adjusted standardized ratios – site comparisons



Explanation for Presentation 46a
Column 1: Different site code than other presentations in the report
Column 2: Number of eligible neonates at your sites (<33 weeks and no major anomaly)
Column 3: Number of neonates with outcome of interest among those eligible neonates
Column 4: Expected number of neonates with outcome of interest after adjustment for GA, SGA, Sex, SNAPII > 20
Column 5: Adjusted standardized ratio calculated based on observed ROP/expected ROP
Columns 6 and 7: 95% CI around the adjusted standardized ratio for the outcome

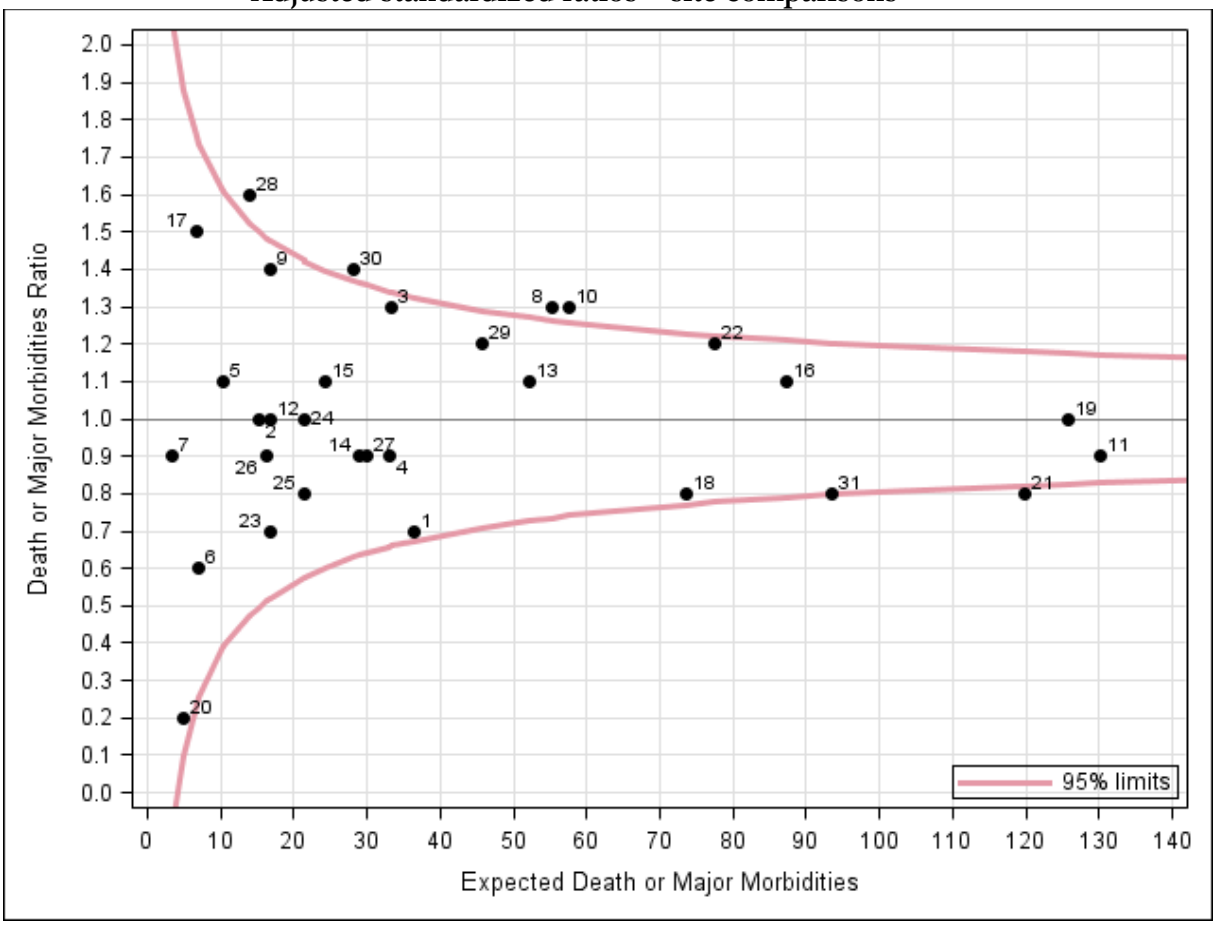
Explanation for Presentation 46b
X-axis: Expected number of neonates with outcome (value from Column 4 of previous presentation)
Y-axis: Adjusted standardized ratio (value from Column 5 of previous presentation)
Dark points with numerical notation: Site and its location matching x and y axis values
Red funnel shaped lines: 95% confidence limits based on entire network information.
Sites outside of red lines represent higher or lower (depending upon position in graph) adjusted standardized ratio. However, for determining whether site is statistically different from others, one should also assess 95% CI and check whether both upper and lower boundaries are also outside of the funnel area or not.

Presentation #47a
Mortality or major morbidity among neonates with GA<33 weeks
Adjusted standardized ratios by site

Site	Number of infants	Number with mortality or major morbidities	Adjusted# Expected number of mortality or major morbidities	Adjusted# Standardized ratio	95% confidence interval for adjusted standardized ratio	
1	136	26	36.5	0.7	0.5	1.0
2	36	15	15.2	1.0	0.6	1.6
3	127	43	33.3	1.3	0.9	1.7
4	119	31	33.0	0.9	0.6	1.3
5	41	11	10.3	1.1	0.5	1.9
6	37	4	7.0	0.6	0.2	1.5
7	8	3	3.3	0.9	0.2	2.6
8	177	73	55.2	1.3	1.0	1.7
9	68	24	16.9	1.4	0.9	2.1
10	189	73	57.7	1.3	1.0	1.6
11	347	117	130.2	0.9	0.7	1.1
12	69	17	16.9	1.0	0.6	1.6
13	176	57	52.2	1.1	0.8	1.4
14	116	25	29.0	0.9	0.6	1.3
15	87	26	24.3	1.1	0.7	1.6
16	258	98	87.2	1.1	0.9	1.4
17	15	10	6.7	1.5	0.7	2.8
18	216	56	73.5	0.8	0.6	1.0
19	363	130	125.7	1.0	0.9	1.2
20	21	1	4.9	0.2	0.0	1.1
21	325	91	119.9	0.8	0.6	0.9
22	225	91	77.6	1.2	0.9	1.4
23	85	11	16.9	0.7	0.3	1.2
24	75	22	21.5	1.0	0.6	1.6
25	105	17	21.4	0.8	0.5	1.3
26	64	15	16.4	0.9	0.5	1.5
27	105	27	29.9	0.9	0.6	1.3
28	59	23	14.0	1.6	1.0	2.5
29*	121	56	45.8	1.2	0.9	1.6
30	97	39	28.3	1.4	1.0	1.9
31	302	76	93.5	0.8	0.6	1.0

Major morbidity = IVH 3 or 4 or PVL or BPD or ROP >stage 2 or NEC or Nosocomial sepsis
Please note that site codes for Presentations 47a & 47b are different from other presentations in this report.
Neonates with major congenital anomalies are excluded.
Variables adjusted for in the prediction model: GA, SGA, Sex, SNAPII > 20
* Site 29 has different criteria for entering neonates in the CNN dataset, and may not be comparable with other sites. (See next page for full explanation)

Presentation #47b
Mortality or major morbidity among neonates with GA<33 weeks
Adjusted standardized ratios – site comparisons



Explanation for Presentation 47a
Column 1: Different site code than other presentations in the report
Column 2: Number of eligible neonates at your sites (<33 weeks and no major anomaly)
Column 3: Number of neonates with outcome of interest among those eligible neonates
Column 4: Expected number of neonates with outcome of interest after adjustment for GA, SGA, Sex, SNAPII > 20
Column 5: Adjusted standardized ratio calculated based on observed death or morbidities/expected deaths or morbidities
Columns 6 and 7: 95% CI around the adjusted standardized ratio for the outcome

Explanation for Presentation 47b
X-axis: Expected number of neonates with outcome (value from Column 4 of previous presentation)
Y-axis: Adjusted standardized ratio (value from Column 5 of previous presentation)
Dark points with numerical notation: Site and its location matching x and y axis values
Red funnel shaped lines: 95% confidence limits based on entire network information.
Sites outside of red lines represent higher or lower (depending upon position in graph) adjusted standardized ratio. However, for determining whether site is statistically different from others, one should also assess 95% CI and check whether both upper and lower boundaries are also outside of the funnel area or not.

Presentation #48a
Benchmarking

Benchmarking among all neonates for sites which contributed all eligible admissions with GA<33 weeks

Among all neonates															
Grouping according to number of neonates	< 250 neonates						250 – 450 neonates								
Parameter ↓ / Site rank →	**Top → Bottom**						**Top → Bottom**								
Mortality (adjusted standardized ratio)*	7	15	28	8	2	5	12	20	24	26	13	25	6	9	17
Early onset sepsis rate (%)	28	7	2	5	15	8	17	24	26	20	25	9	12	13	6
Late onset sepsis rate (SNAP-II-PE adjusted) (%)	7	2	5	15	8	28	6	20	12	26	24	9	17	25	13
Late onset sepsis /1000 patient days	7	2	15	5	8	28	20	6	26	12	24	9	25	13	17
Death or at least one of major morbidities (adjusted standardized ratio)*	7	15	5	8	28	2	20	6	25	12	26	24	9	13	17

Benchmarking among <1500 g for sites which contributed all eligible admissions with GA<33 weeks

Among neonates < 1500g															
Grouping according to number of neonates	< 30 neonates						30 – 69 neonates								
Parameter ↓ / Site rank →	**Top → Bottom**						**Top → Bottom**								
Non-receipt of antenatal steroid (%)	7	20	26	6	17	5	28	27	12	15	24	2	9	25	23
Surgical ligation of PDA (%)	6	20	7	26	5	17	9	12	24	23	28	15	27	25	2
Stage 2 or 3 NEC (adjusted standardized ratio)*	20	7	5	17	6	26	24	23	12	27	25	15	28	2	9
Stage 3-5 ROP (adjusted standardized ratio)*	17	26	7	6	20	5	28	24	2	25	23	15	9	27	12
Oxygen use at 36 wks (adjusted standardized ratio)*	20	5	6	17	26	7	25	28	27	9	24	23	15	2	12
Grade 3 or 4 IVH (adjusted standardized ratio)*	20	5	6	7	26	17	28	23	24	27	25	15	12	9	2
Use of systemic steroids (%)	20	6	5	26	7	17	28	23	24	9	15	12	27	2	25
Mortality (adjusted standardized ratio)*	20	7	5	26	6	17	28	23	2	12	15	24	27	25	9
Death or at least one of major morbidities (adjusted standardized ratio)	20	6	26	7	5	17	23	24	27	25	2	12	15	28	9

*Standardized ratio calculated based on observed events/expected events adjusted for GA, SGA, Sex, SNAPII > 20

Presentation #48a (continued)
Benchmarking

Benchmarking among all neonates for sites which contributed all eligible admissions with GA<33 weeks

Among all neonates															
451 – 700 neonates								**> 700 neonates**							Grouping according to number of neonates
Top → **Bottom**								**Top** → **Bottom**							**← Site rank / ↓ Parameter**
23	1	3	21	4	18	27	30	31	11	19	16	14	22	10	Mortality (adjusted standardized ratio)*
27	30	3	18	23	1	21	4	16	22	10	14	31	11	19	Early onset sepsis rate (%)
23	27	3	18	1	30	21	4	31	14	10	11	19	16	22	Late onset sepsis rate (SNAP-II-PE adjusted) (%)
23	3	27	1	18	4	21	30	14	10	11	31	22	19	16	Late onset sepsis /1000 patient days
23	1	27	21	4	18	3	30	14	31	11	22	16	19	10	Death or at least one of major morbidities (adjusted standardized ratio)*

Benchmarking among neonates <1500g for sites which contributed all eligible admissions with GA<33 weeks

Among neonates < 1500g															
70 – 150 neonates								**> 150 neonates**							Grouping according to number of neonates
Top → **Bottom**								**Top** → **Bottom**							**← Site rank / ↓ Parameter**
30	14	3	10	13	8	1	4	21	22	16	18	19	31	11	Non-receipt of antenatal steroid (%)
1	10	4	14	30	13	3	8	11	21	31	16	22	19	18	Surgical ligation of PDA (%)
1	14	4	10	3	13	8	30	18	21	16	22	19	31	11	Stage 2 or 3 NEC (adjusted standardized ratio)*
1	13	8	4	14	10	30	3	31	18	22	19	11	21	16	Stage 3-5 ROP (adjusted standardized ratio)*
14	4	1	13	30	10	8	3	21	18	11	31	16	19	22	Oxygen use at 36 wks (adjusted standardized ratio)*
13	1	4	14	10	8	3	30	22	18	16	11	31	21	19	VE or PEC (adjusted standardized ratio)*
1	30	3	8	4	14	10	13	21	11	31	16	18	22	19	Use of systemic steroids (%)
3	1	13	30	4	8	10	14	18	31	21	19	16	11	22	Mortality (adjusted standardized ratio)*
1	14	4	13	8	10	3	30	18	21	31	11	19	22	16	Death or at least one of major morbidities (adjusted standardized ratio)

*Standardized ratio calculated based on observed events/expected events adjusted for GA, SGA, Sex, SNAPII > 20

Presentation #48b
Benchmarking

Benchmarking for sites which contributed all eligible admissions with GA<33 weeks

Among neonates <33 weeks															
Grouping according to number of neonates	< 50 neonates						50 – 109 neonates								
Parameter ↓ / Site rank →	**Top → Bottom**						**Top → Bottom**								
Non-receipt of antenatal steroid (%)	7	17	20	2	6	5	30	26	28	24	27	12	9	23	15
Surgical ligation of PDA (%)	6	20	7	5	17	2	9	12	23	28	15	24	26	30	27
Late onset sepsis (adjusted standardized ratio)*	6	20	2	7	17	5	26	23	12	24	27	15	9	30	28
Stage 2 or 3 NEC (adjusted standardized ratio)*	20	7	5	6	17	2	24	23	27	12	15	28	26	30	9
Stage 3-5 ROP (adjusted standardized ratio)*	17	7	2	6	20	5	26	28	24	23	15	30	9	27	12
Oxygen use at 36 wks (adjusted standardized ratio)*	20	5	6	17	2	7	28	27	9	24	23	26	15	12	30
VE or PEC (adjusted standardized ratio)*	20	6	5	7	2	17	23	28	24	27	26	15	12	9	30
Use of systemic steroids (%)	20	6	5	2	17	7	28	23	24	9	15	12	26	27	30
Mortality (adjusted standardized ratio)*	20	7	5	2	6	17	23	28	12	15	30	26	24	27	9
Death or at least one of major morbidities (adjusted standardized ratio)	20	6	7	2	5	17	23	27	26	12	24	15	30	9	28

Benchmarking for sites which contributed all eligible admissions with GA<29 weeks

Among neonates <29 weeks															
Grouping according to number of neonates	< 15 neonates							15 – 30 neonates							
Parameter ↓ / Site rank →	**Top → Bottom**							**Top → Bottom**							
Non-receipt of antenatal steroid (%)	7	12	17	23	6	5	20	27	9	28	15	26	24	25	2
Surgical ligation of PDA (%)	6	12	23	20	7	5	17	9	24	28	15	26	27	25	2
Stage 2 or 3 NEC (adjusted standardized ratio)*	17	5	23	20	7	12	6	24	15	25	27	28	9	26	2
Stage 3-5 ROP (adjusted standardized ratio)*	17	7	23	6	20	12	5	26	28	24	2	25	15	27	9
Oxygen use at 36 wks (adjusted standardized ratio)*	5	20	6	23	17	12	7	25	28	9	27	24	26	2	15
VE or PEC (adjusted standardized ratio)*	5	20	23	6	17	7	12	28	24	27	25	15	26	9	2
Use of systemic steroids (%)	20	6	23	5	12	17	7	28	24	9	15	2	27	26	25
Mortality (adjusted standardized ratio)*	20	7	23	5	12	17	6	28	2	15	26	24	27	25	9
Death or at least one of major morbidities (adjusted standardized ratio)	20	23	6	7	12	17	5	25	27	24	26	28	2	15	9

*Standardized ratio calculated based on observed events/expected events adjusted for GA, SGA, Sex, SNAPII > 20

Presentation #48b (continued)
Benchmarking

Benchmarking for sites which contributed all eligible admissions with GA<33 weeks

Among neonates <33 weeks															
110 – 210 neonates								**> 210 neonates**							Grouping according to number of neonates
Top → Bottom								**Top → Bottom**							**← Site rank / ↓ Parameter**
25	14	3	8	10	13	4	1	21	19	18	22	16	31	11	Non-receipt of antenatal steroid (%)
1	10	4	14	13	25	3	8	11	21	31	16	22	19	18	Surgical ligation of PDA (%)
10	14	3	1	25	8	4	13	21	31	11	19	18	16	22	Late onset sepsis (adjusted standardized ratio)*
1	14	25	4	10	13	3	8	18	21	16	11	31	19	22	Stage 2 or 3 NEC (adjusted standardized ratio)*
1	13	8	25	14	4	10	3	31	18	22	19	11	21	16	Stage 3-5 ROP (adjusted standardized ratio)*
25	14	4	1	13	10	8	3	21	18	11	31	16	19	22	Oxygen use at 36 wks (adjusted standardized ratio)*
13	1	25	4	10	14	8	3	22	18	16	31	11	19	21	VE or PEC (adjusted standardized ratio)*
1	3	8	4	14	10	25	13	21	11	31	16	18	19	22	Use of systemic steroids (%)
3	1	13	8	4	25	14	10	31	21	19	18	11	16	22	Mortality (adjusted standardized ratio)*
1	25	14	4	13	10	3	8	21	18	31	11	19	16	22	Death or at least one of major morbidities (adjusted standardized ratio)

Benchmarking for sites which contributed all eligible admissions with GA<29 weeks

Among neonates <29 weeks															
36 – 70 neonates								**> 70 neonates**							Grouping according to number of neonates
Top → Bottom								**Top → Bottom**							**← Site rank / ↓ Parameter**
30	3	14	13	8	4	29	1	10	21	19	22	18	16	31	11	Non-receipt of antenatal steroid (%)
1	4	13	14	3	30	29	8	10	21	11	31	16	22	19	18	Surgical ligation of PDA (%)
1	14	4	3	13	8	30	29	18	21	10	16	11	31	19	22	Stage 2 or 3 NEC (adjusted standardized ratio)*
1	13	29	14	8	4	30	3	31	18	22	19	11	10	16	21	Stage 3-5 ROP (adjusted standardized ratio)*
14	4	1	13	29	30	8	3	21	11	18	31	16	10	22	19	Oxygen use at 36 wks (adjusted standardized ratio)*
13	1	29	4	8	14	30	3	22	18	16	10	11	31	19	21	VE or PEC (adjusted standardized ratio)*
1	3	30	29	8	4	14	13	21	11	31	16	10	19	18	22	Use of systemic steroids (%)
3	1	30	13	8	4	29	14	18	31	21	16	19	11	22	10	Mortality (adjusted standardized ratio)*
1	14	4	13	30	8	29	3	18	21	31	11	19	16	22	10	Death or at least one of major morbidities (adjusted standardized ratio)

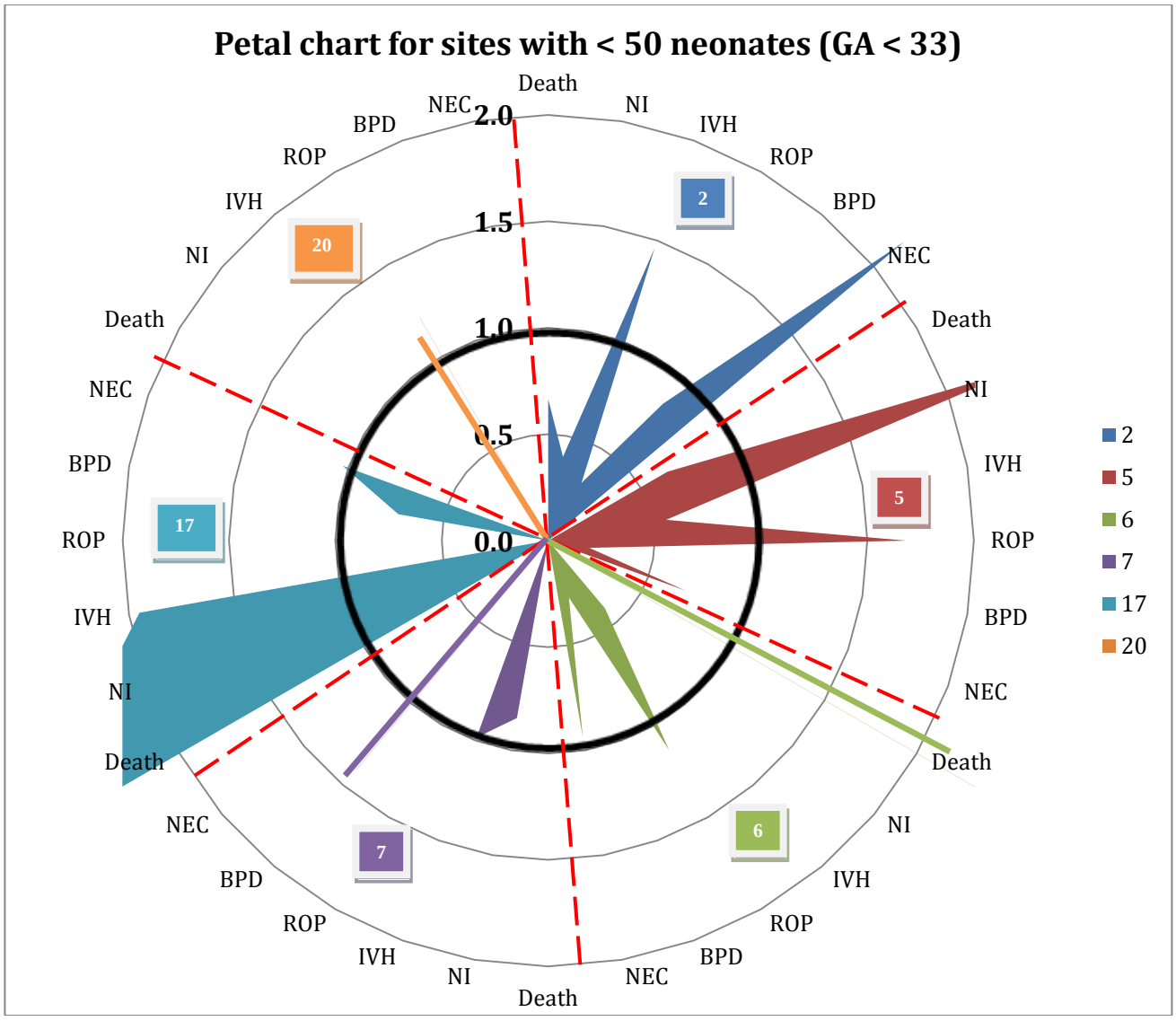
*Standardized ratio calculated based on observed events/expected events adjusted for GA, SGA, Sex, SNAPII > 20

Presentation 49 (a to d)
Benchmarking sites by adjusted standardized ratios (SR)
for mortality and different morbidities

Explanations for the charts in presentation 49 (a to d)

1. These charts are called Petal charts which portray the picture of all units in the group in one presentation.
2. There are four charts based on the size of the unit and they are divided according to the number of neonates <33 weeks gestation during the year.
3. The scale is in standardized ratios starting from 0 at center.
4. Units are separated by broken lines.
5. Numeric site code is shown in each segment – please refer to the appropriate code sent to your CNN site investigator.
6. Mortality and five morbidities are reported for each unit.
7. SR of 1 is highlighted with darker circle which should be used as a reference point for each morbidity. Anything less than 1 indicates that the adjusted SR is lower than average (observed lower than expected) and more than 1 means the adjusted SR is higher than average (observed higher than expected) for that particular morbidity.
8. SRs for each outcome are reported below the charts in a table.
9. The unit which has higher area of petal colored indicates that the SR in that particular unit is higher.

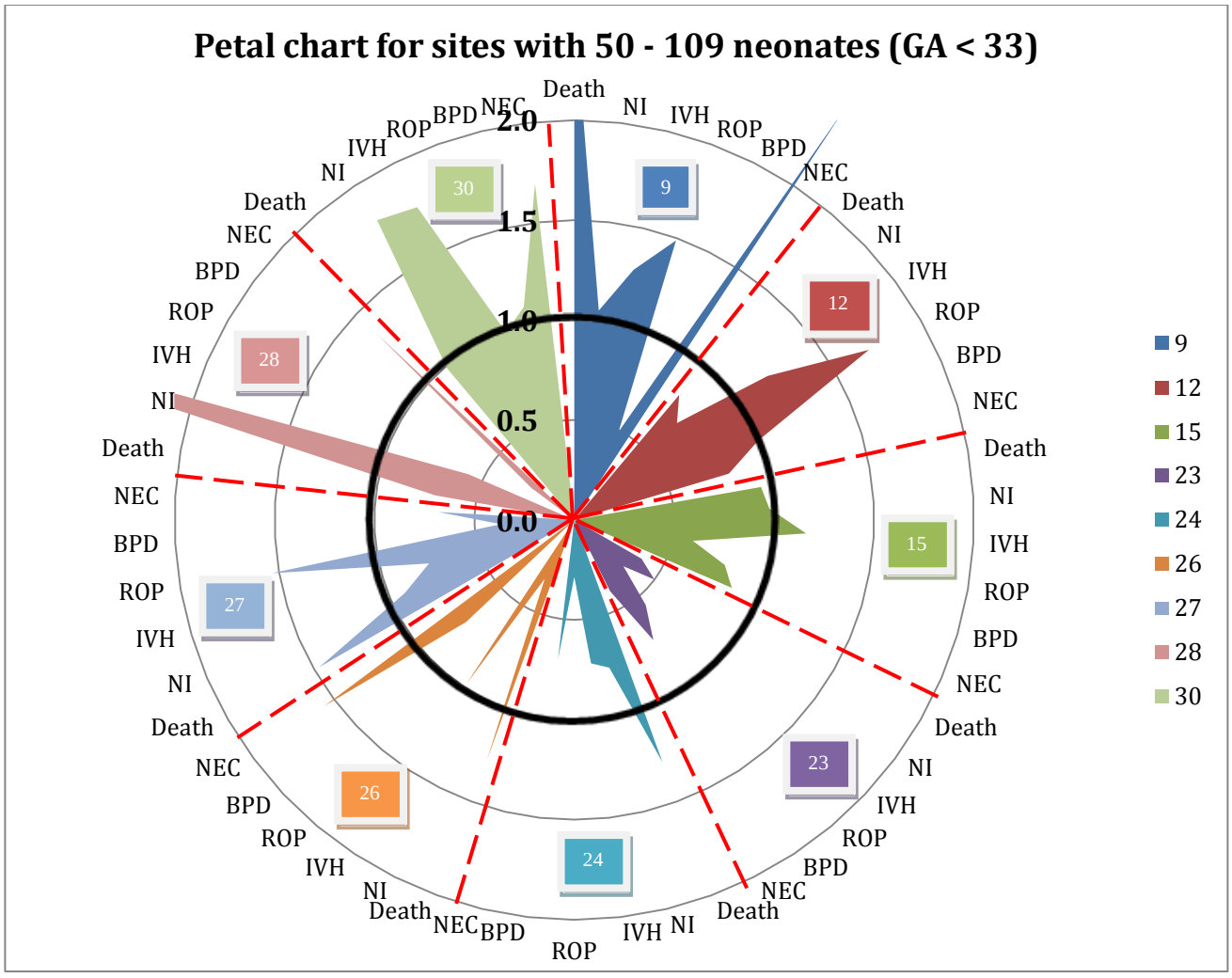
Presentation #49a
Petal chart with adjusted SR for mortality and morbidities (Sites with < 50 neonates)



Adjusted standardized ratios for mortality and morbidities

Site	Adjusted standardized ratio					
	Death	NI	IVH	ROP	BPD	NEC
2	0.7	0.4	1.5	0.3	0.8	2.2
5	0.6	2.4	0.6	1.7	0.2	0.7
6	2.8	0.0	0.4	1.1	0.3	0.9
7	0.0	0.8	1.0	0.0	1.4	0.0
17	2.9	2.3	2.0	0.0	0.7	1.0
20	0.0	0.0	0.0	1.2	0.0	0.0

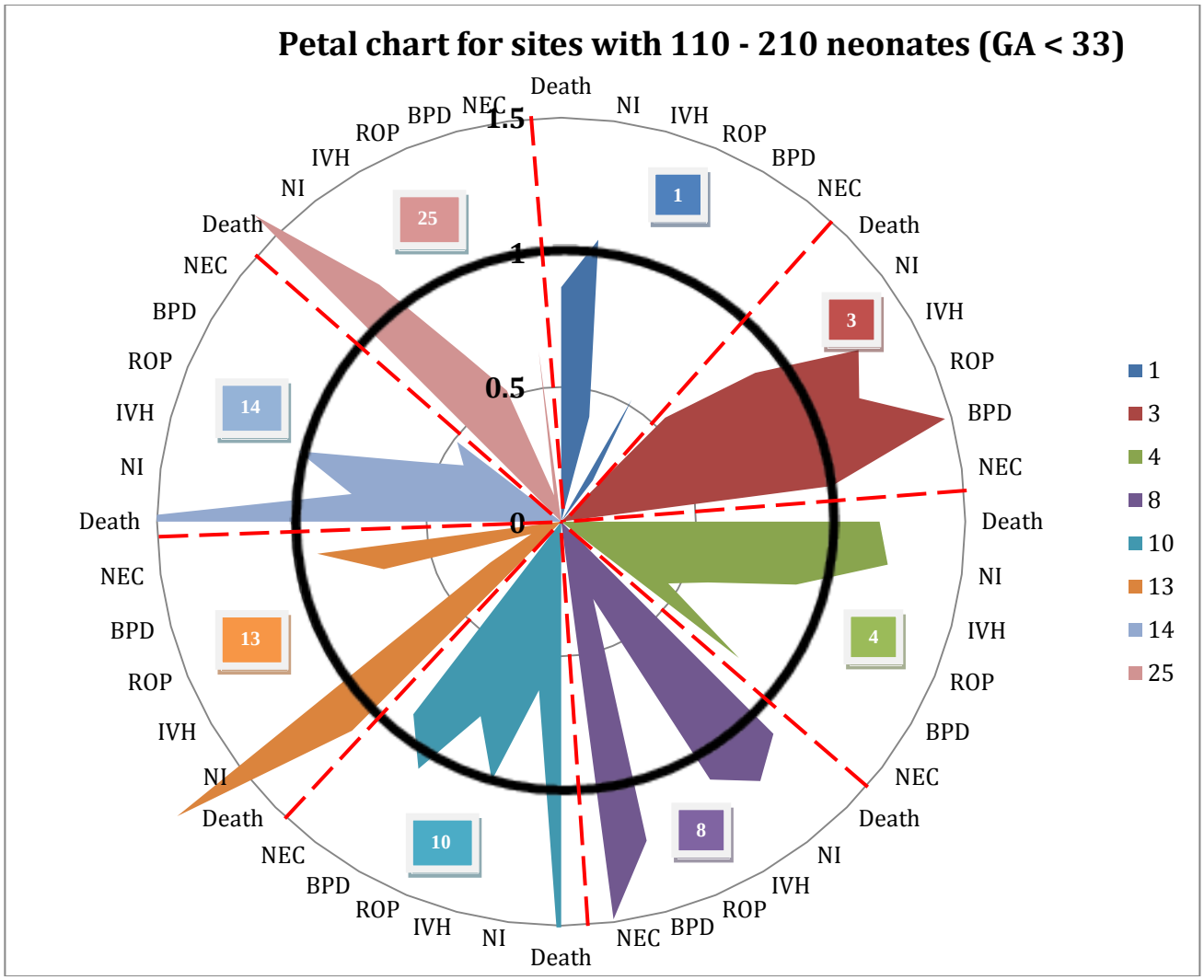
Presentation #49b
Petal chart with adjusted standardized ratios for mortality and morbidities
(Sites with 50 – 109 neonates)



Adjusted standardized ratios for mortality and morbidities

Site	Adjusted standardized ratio					
	Death	NI	IVH	ROP	BPD	NEC
9	2.6	1.1	1.3	1.5	0.5	2.5
12	0.8	0.7	1.2	1.7	1.0	0.8
15	0.9	1.0	1.2	0.6	0.8	0.9
23	0.4	0.5	0.3	0.6	0.7	0.4
24	1.3	0.8	0.7	0.3	0.7	0.0
26	1.3	0.3	1.0	0.0	0.7	1.6
27	1.5	0.9	0.8	1.5	0.4	0.7
28	0.7	3.5	0.6	0.0	0.3	1.4
30	1.0	1.8	1.8	1.0	1.1	1.7

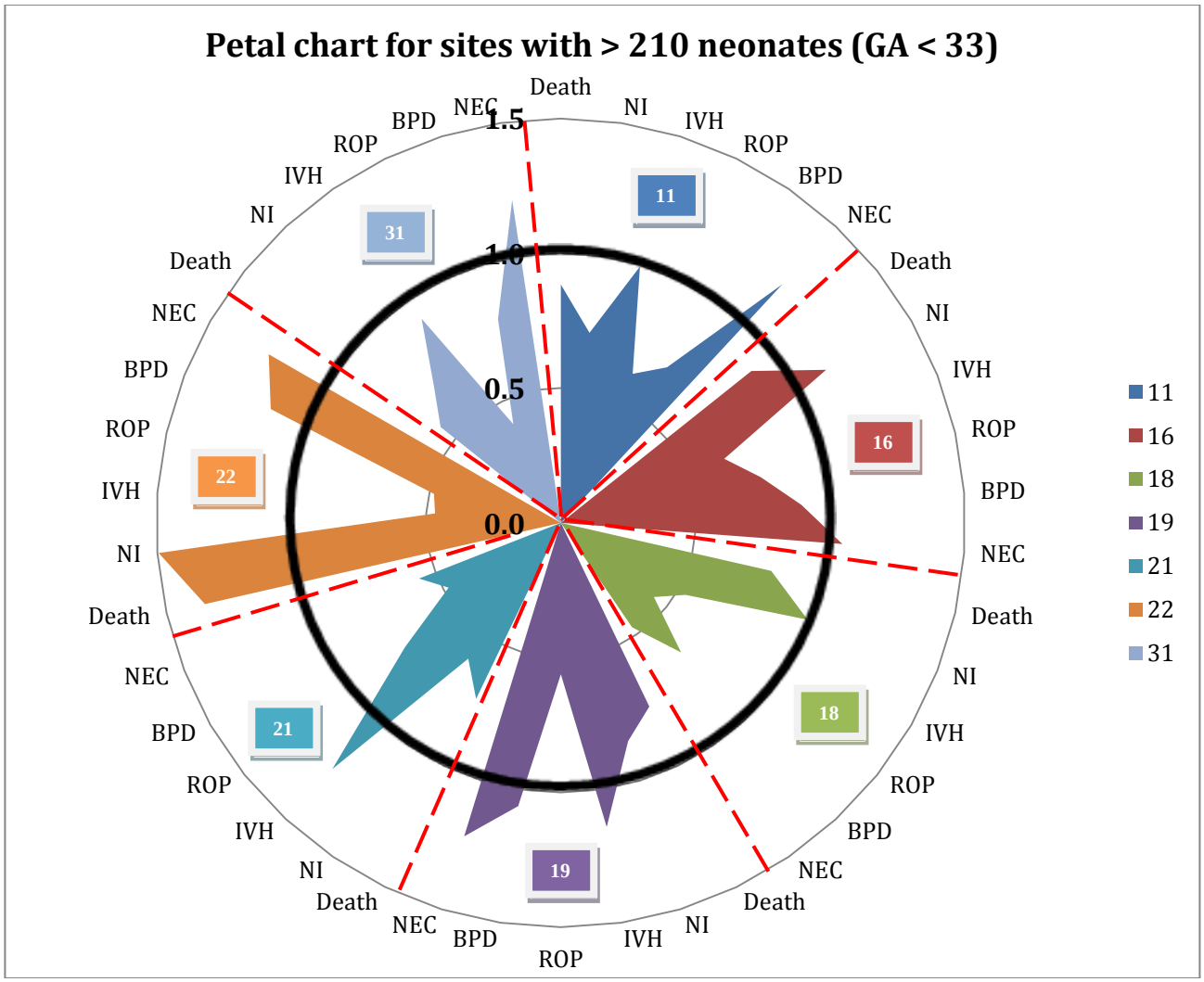
Presentation #49c
Petal chart with adjusted standardized ratios for mortality and morbidities
(Sites with 100 – 210 neonates)



Adjusted standardized ratios for mortality and morbidities

Site	Adjusted standardized ratio					
	Death	NI	IVH	ROP	BPD	NEC
1	0.9	1.1	0.4	0.0	0.5	0.2
3	0.5	0.9	1.3	1.2	1.5	1.0
4	1.2	1.2	0.9	0.6	0.5	0.8
8	1.1	1.2	1.1	0.3	1.2	1.5
10	1.7	0.6	1.0	0.8	1.1	0.9
13	1.1	1.8	0.3	0.1	0.7	0.9
14	1.7	0.8	1.0	0.6	0.4	0.5
25	1.6	1.1	0.7	0.5	0.1	0.6

Presentation #49d
Petal chart with adjusted standardized ratios for mortality and morbidities
(Sites with > 210 neonates)



Adjusted standardized ratios for mortality and morbidities

Site	Adjusted standardized ratio					
	Death	**NI**	**IVH**	**ROP**	**BPD**	**NEC**
11	0.9	0.7	1.0	0.6	0.7	1.2
16	0.9	1.1	0.7	0.8	0.9	1.0
18	0.8	1.0	0.5	0.4	0.7	0.5
19	0.8	0.8	1.1	0.6	1.1	1.2
21	0.7	0.6	1.2	0.7	0.5	0.6
22	1.4	1.5	0.5	0.5	1.2	1.3
31	0.6	0.7	0.9	0.4	0.8	1.2

F. Discharge Disposition and Status

Presentation #50

Discharge destination

		GA (completed weeks)								
		< 25	**25-26**	**27-28**	**29-30**	**31-32**	**33-34**	**35-36**	**≥37**	**Total**
Home	N	94	232	287	420	653	1065	1179	3198	7128
	%	29.8	39.9	37.1	38.2	40.5	51.1	50.3	51.4	47.4
Community hospital	N	49	171	365	576	808	757	485	600	3811
	%	15.6	29.4	47.2	52.4	50.1	36.3	20.7	9.6	25.3
Tertiary hospital	N	34	32	37	24	34	31	52	248	492
	%	10.8	5.5	4.8	2.2	2.1	1.5	2.2	4.0	3.3
Died	N	108	99	33	26	18	28	28	109	449
	%	34.3	17.0	4.3	2.4	1.1	1.3	1.2	1.8	3.0
Palliative care (home/other institute)	N	0	0	3	0	2	1	4	16	26
	%	0.0	0.0	0.4	0.0	0.1	0.1	0.2	0.3	0.2
Another inpatient area in site	N	30	46	49	53	97	203	596	2054	3128
	%	9.5	7.9	6.3	4.8	6.0	9.7	25.4	33.0	20.8
Out of country discharge	N	0	2	0	1	2	1	0	1	7
	%	0.0	0.3	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Total included	N	315	582	774	1100	1614	2086	2344	6226	15041
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Discharge destination missing	N									4
GA missing	N									0
Total	N									15045

Presentation #51

Support at discharge among neonates who were discharged home

		GA (completed weeks)								
		< 25	**25-26**	**27-28**	**29-30**	**31-32**	**33-34**	**35-36**	**≥37**	**Total**
Total available	N	315	582	774	1102	1614	2087	2344	6227	15045
Number of infants who survived and were discharged home	**N**	**94**	**232**	**287**	**420**	**653**	**1065**	**1179**	**3198**	**7128**
Oxygen	N	35	35	17	5	1	2	6	12	113
	%	37.2	15.1	5.9	1.2	0.2	0.2	0.5	0.4	1.6
Monitor	N	14	11	7	6	4	10	13	50	115
	%	14.9	4.7	2.4	1.4	0.6	0.9	1.1	1.6	1.6
Enterostomy	N	1	3	3	0	2	0	3	8	20
	%	1.1	1.3	1.1	0.0	0.3	0.0	0.3	0.3	0.3
Gavage	N	14	7	5	7	4	10	8	47	102
	%	14.9	3.0	1.7	1.7	0.6	0.9	0.7	1.5	1.4
Tracheostomy	N	3	0	0	1	0	0	0	3	7
	%	3.2	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.1
Gastrostomy	N	2	6	1	1	3	4	4	17	38
	%	2.1	2.6	0.4	0.2	0.5	0.4	0.3	0.5	0.5
Ventilation	N	0	0	1	0	0	0	0	0	1
	%	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
CPAP	N	0	0	0	0	1	3	0	0	4
	%	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.1
Breast milk only	N	28	63	95	119	222	415	407	1171	2520
	%	29.8	27.2	33.1	28.3	34.0	39.0	34.5	36.6	35.4
Formula only	N	38	88	98	150	178	251	284	701	1788
	%	40.4	37.9	34.2	35.7	27.3	23.6	24.1	21.9	25.1
Both breast milk and formula	N	26	77	89	137	239	395	477	1306	2746
	%	27.7	33.2	31.0	32.6	36.6	37.1	40.5	40.8	38.5

Note: **All the percentages in this presentation are calculated out of the number of infants who survived and were discharged home.**

There were 74 neonates who were missing breast milk / formula information.

G. Hypoxic Ischemic Encephalopathy

Presentation #52

Hypoxic Ischemic Encephalopathy

A. Sarnat staging at the time of admission and receipt of hypothermia

		Sarnat's staging of HIE on admission				
		Stage 1	**Stage 2**	**Stage 3**	**Unknown stage**	**Total**
Hypothermia treatment	**Yes**	44	164	67	38	313
	No	84	46	19	24	173
	Unknown	0	4	2	4	10
	Total	**128**	**214**	**88**	**66**	**496**

B. Reason for not receiving hypothermia treatment*

Reason	**Number**
Chromosomal anomalies	0
Major congenital anomalies	5
Weight < 2000g or GA < 35 weeks	25
Extreme condition	11
Head trauma or intracranial hemorrhage	5
Mild HIE	92
Unit policy	20
Health care team preference	7
Delayed transfer	18
Parental request	0
Unknown	19

*One neonate can have more than one reason.

C. Time of admission

Time	**Number**
<6 hours from birth	302
6 – 12 hours from birth	137
>12 hours from birth	54
Total**	493

**3 infants are missing either time of birth or time of admission.

Presentation #52 (continued)

Hypoxic Ischemic Encephalopathy

D. Characteristics of neonates who received hypothermia (N=313)

Characteristics	N		Results
Method	313	Selective head	5 (2%)
		Whole body cooling	308 (98%)
Target temperature	313	< 33^{0}C	6 (2%)
		33-34^{0}C	249 (80%)
		33.5-34.5^{0}C	45 (14%)
		34-35^{0}C	7 (2%)
		34.5-35.5^{0}C	2 (1%)
		Unknown	4 (1%)
Seizures at initiation	313		105 (34%)
Seizures at completion	313		45 (14%)
GA < 33 weeks	313		3 (1%)
Birthweight < 2000g	313		6 (2%)
During hypothermia	290	Hypotension	113 (39%)
	282	Thrombocytopenia	57 (20%)
	286	Coagulopathy	97 (34%)
	274	Persistent metabolic acidosis	45 (16%)
Death	313		45 (14%)

E. Encephalopathy stage in relation to hypothermia treatment

Encephalopathy stage*		**At the end of hypothermia**					
		Stage 1	**Stage 2**	**Stage 3**	**Unknown**	**Normal**	**Total**
At the start of hypothermia	**Stage 1**	15	7	0	3	22	47
	Stage 2	46	44	9	32	44	175
	Stage 3	2	9	35	12	1	59
	Unknown	2	1	2	19	8	32
	Total	65	61	46	66	75	313

*The numbers may be different from table A because this table represents staging at the start and end of hypothermia where as table A presents staging at the time of first assessment

Presentation #52 (continued)
Hypoxic Ischemic Encephalopathy
For neonates* who received hypothermia (N=313)

Characteristics		N	Mean	SD	Min	1st Q	Median	3rd Q	Max	Outside of recommendation	Time taken to achieve target
Timing** of hypothermia (in hours)	**Initiation**	306	4.4	5.1	0.0	1.4	3.5	5.7	55.4	After 6 hours 61 (20%)	
	Target temp achieved	296	6.9	6.4	0.2	3.7	5.5	7.7	57.0	After 10 hours 42 (14%)	After 4 hours of initiation 38 (13%)
	Age at re-warming	311	70.5	18.5	3.2	73.7	76.2	78.1	127.5	After 78 hours 79 (25%)	Re-warming started >72 hours after initiation 49 (17%)
	Age at return of temp to normal	291	85.5	19.9	8.3	82.4	86.3	92.2	155.9	After 86 hours 150 (52%)	Took >8 hours to return temperature to normal after starting re-warming 184 (63%)
Temperature during hypothermia	**Lowest temp during hypothermia**	311	32.7	0.7	29.0	32.5	32.9	33.1	35.5	Lowest temp < 32.5C 76 (24%)	
	Highest temp during hypothermia	311	34.1	0.6	32.4	33.8	33.9	34.3	36.9	Highest temp > 35.5C 19 (6%)	

*Infants with time at initiation > 72 hours were excluded.
**All timing calculated from time of birth in hours of age.

H. Trend Analyses over last 5 years

This section includes trend analyses in the last 5 years (2010-14) for specific outcomes for neonates <33 weeks GA in network sites. The number of neonates included in these analyses is described in the following table for reference. This excludes delivery room deaths.

Number of neonates by admission year and GA

	GA										
Year	**<23**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
2010	9	73	172	270	333	388	371	480	611	678	788
2011	15	86	166	242	318	332	391	467	553	643	828
2012	28	85	184	285	294	348	416	510	610	738	872
2013	16	76	197	247	267	357	434	479	620	733	836
2014	8	81	226	250	332	362	412	517	585	743	871

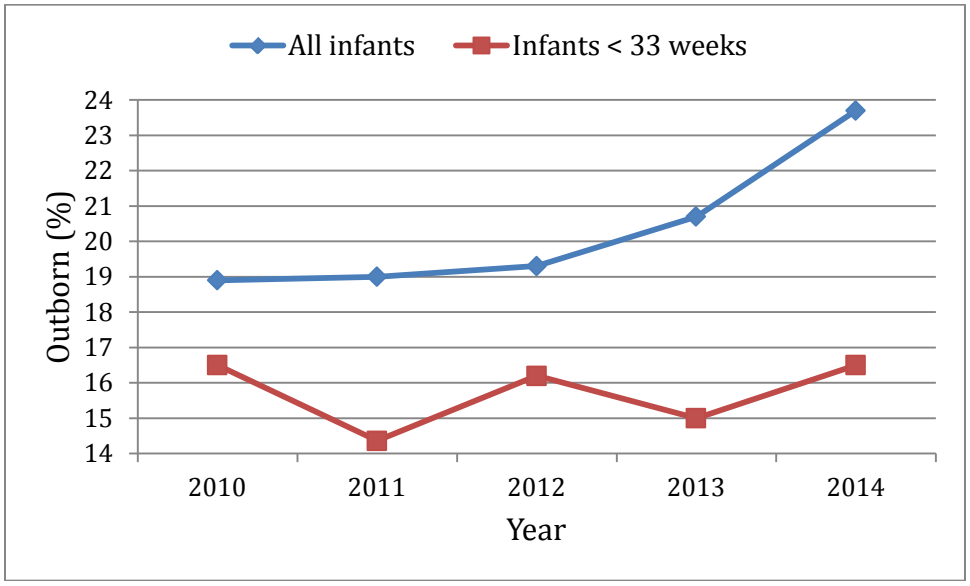
Number of neonates by admission year and birth weight

	Birth weight				
Year	**< 500**	**500 - 749**	**750 - 999**	**1000 - 1249**	**1250 – 1499**
2010	32	436	792	819	879
2011	31	383	660	680	794
2012	48	441	696	815	922
2013	36	428	651	842	919
2014	36	458	760	804	922

1. Neonates in the participating sites: Admission status:

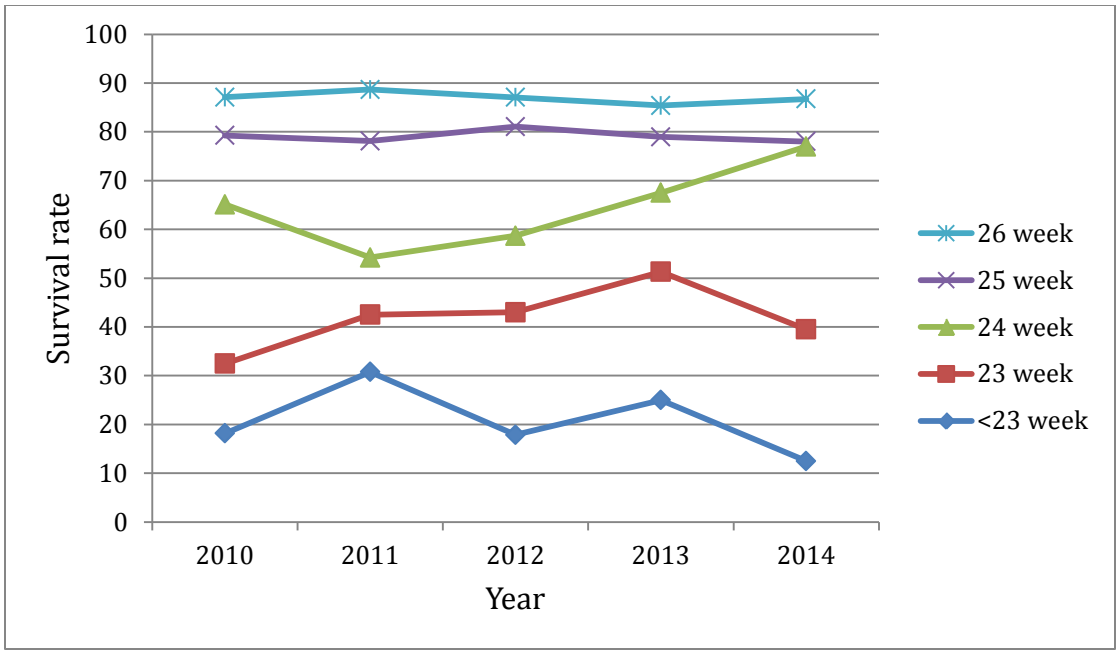
		All infants			Infants with GA<33 weeks		
Year	**Number of Sites**	**Total Number of Neonates***	**Inborn (%)**	**Outborn (%)**	**Number of Neonates* with GA<33**	**Inborn (%)**	**Outborn (%)**
2010	**27**	13 147	10 662 (81.1%)	2 485 (18.9%)	3 383	2 824 (83.5%)	559 (16.5%)
2011	**30**	13 548	10 972 (81.0%)	2 576 (19.0%)	4 040	3 460 (85.6%)	580 (14.4%)
2012	**30**	14 222	11 475 (80.7%)	2 747 (19.3%)	4 370	3 663 (83.8%)	707 (16.2%)
2013	**29**	14 489	11 487 (79.2%)	3 002 (20.7%)	4 262	3 624 (85.0%)	638 (15.0%)
2014	**31**	14 038	11 473 (76.3%)	3 565 (23.7%)	4 383	3658 (83.5%)	725 (16.5%)

*total number of neonates excluding those who are missing admission status

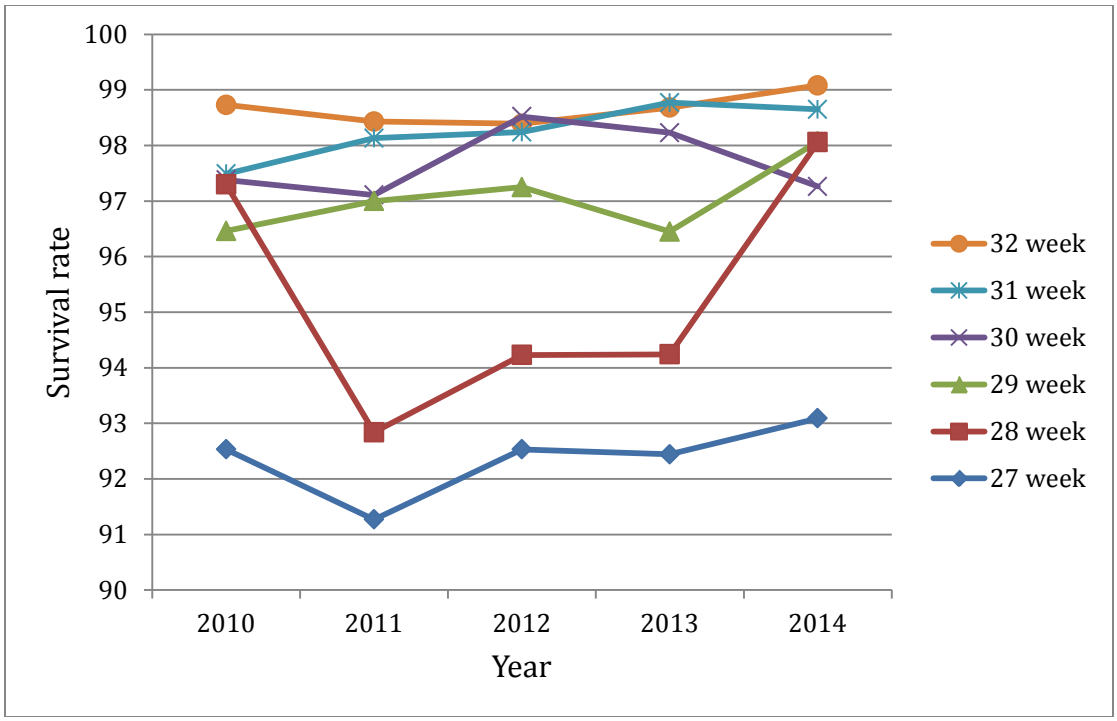


2. Survival rate:

a. 22-26 weeks:

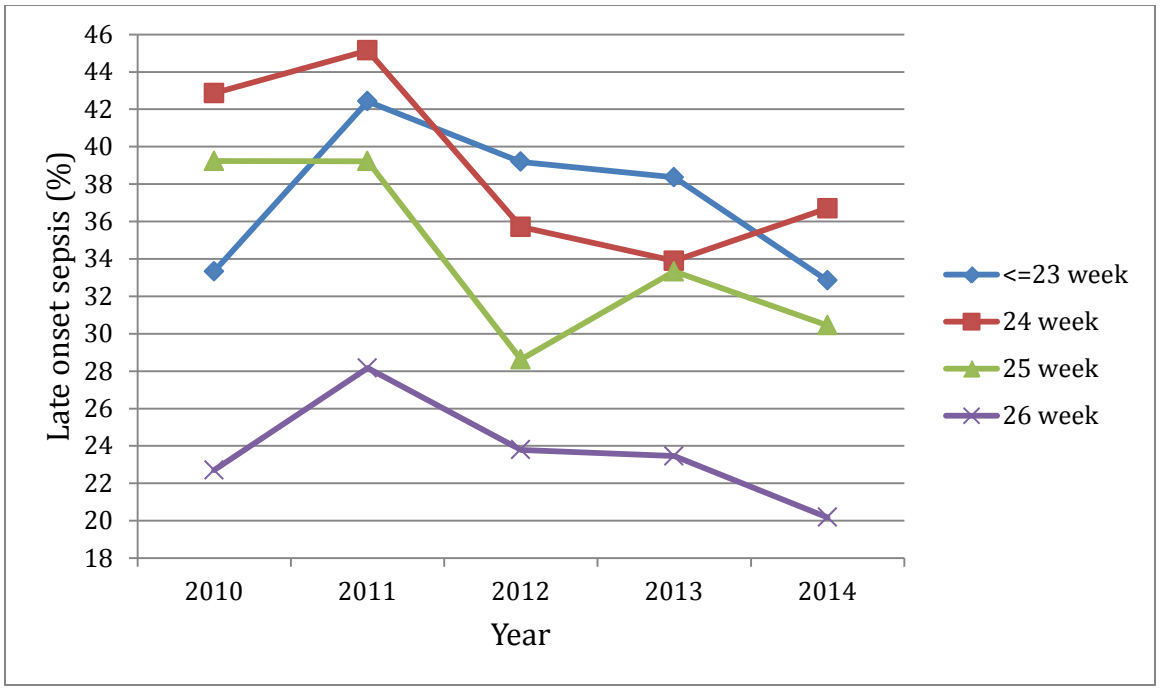


b. 27-32 weeks:

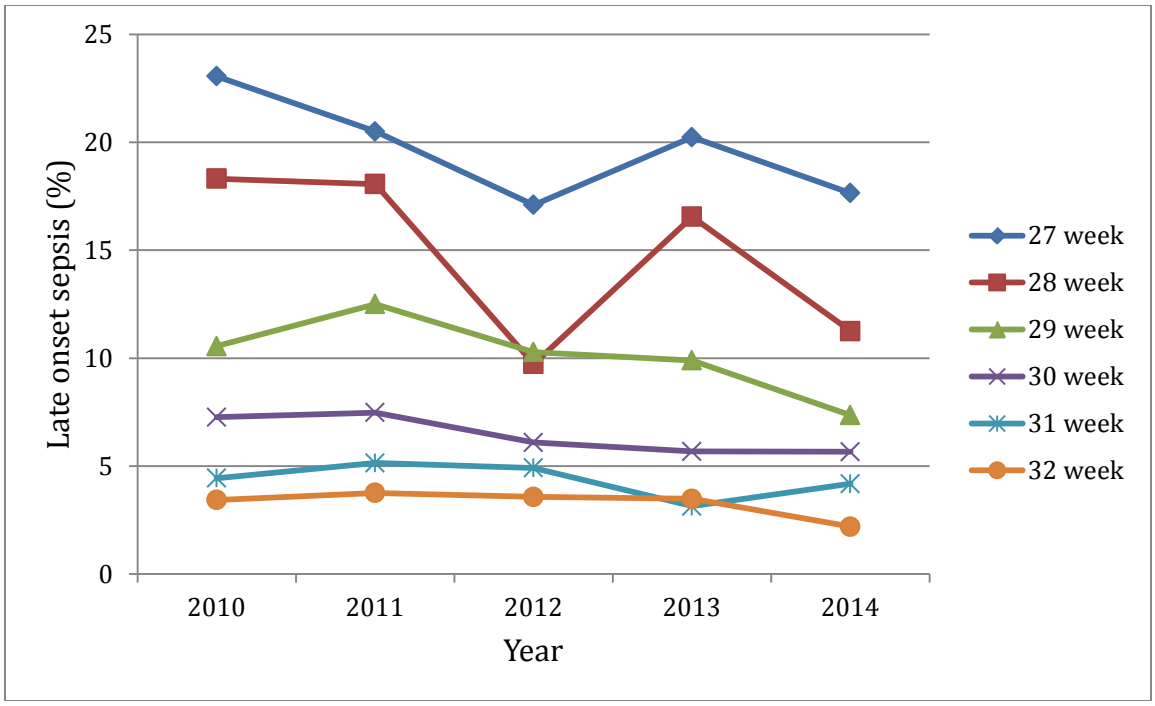


3. Late onset sepsis (with at least one infection) among neonates who survived beyond 2 days after birth

a. 23-26 weeks:

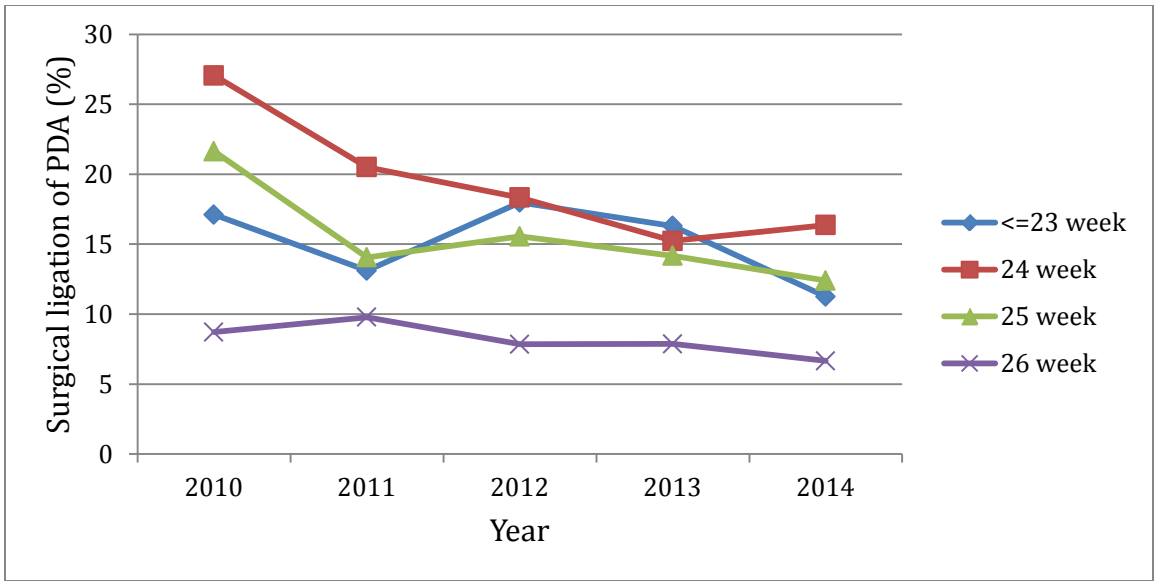


b. 27-32 weeks:

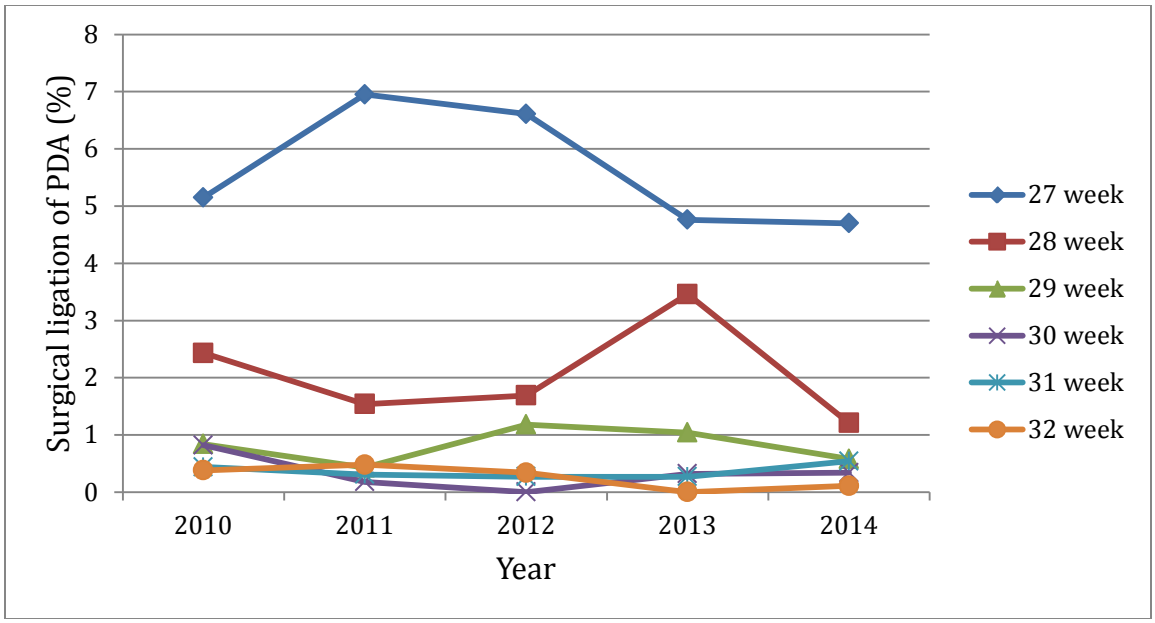


4. Surgical ligation of PDA

a. 23-26 weeks:

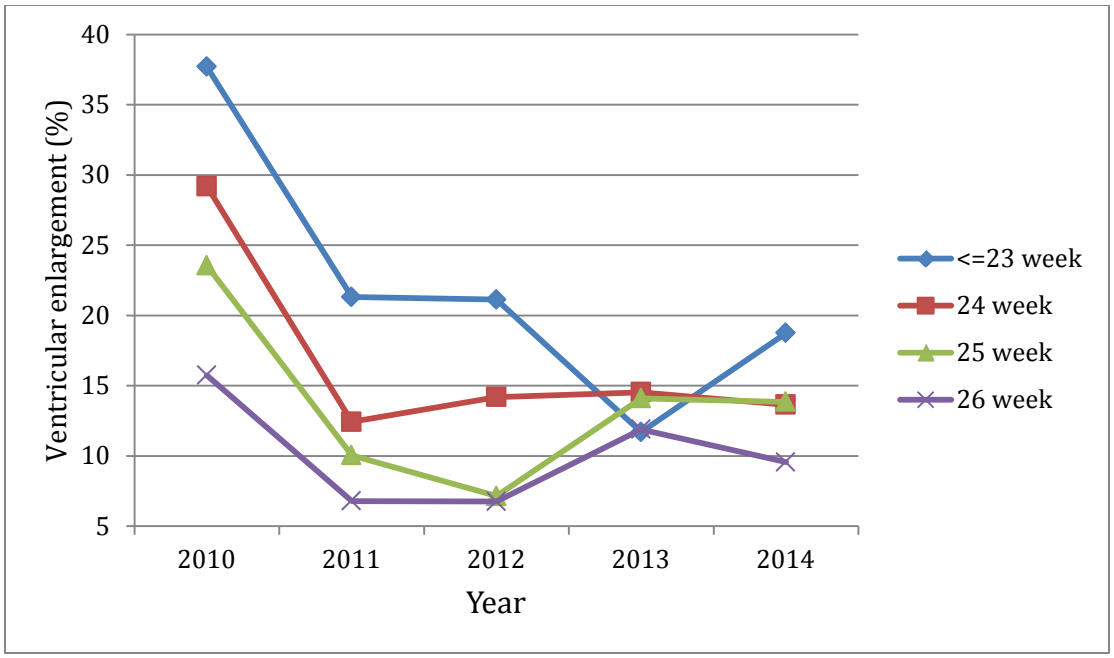


b. 27-32 weeks:

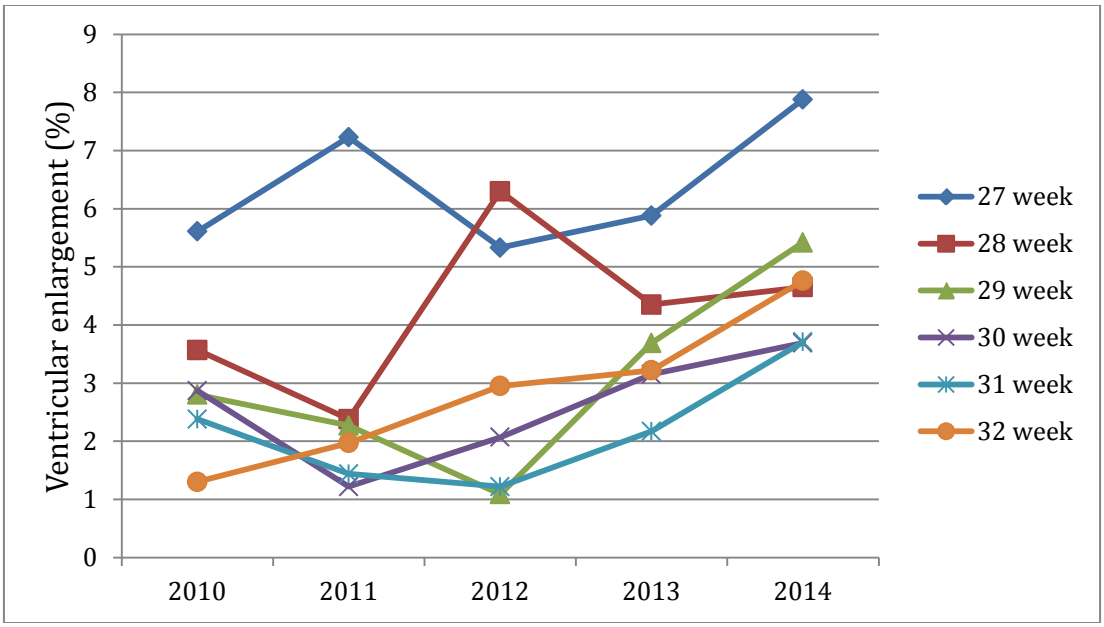


5. Ventricular enlargement: (moderate and severe VE only; among neonates who received ultrasound exams)

a. 23-26 weeks:

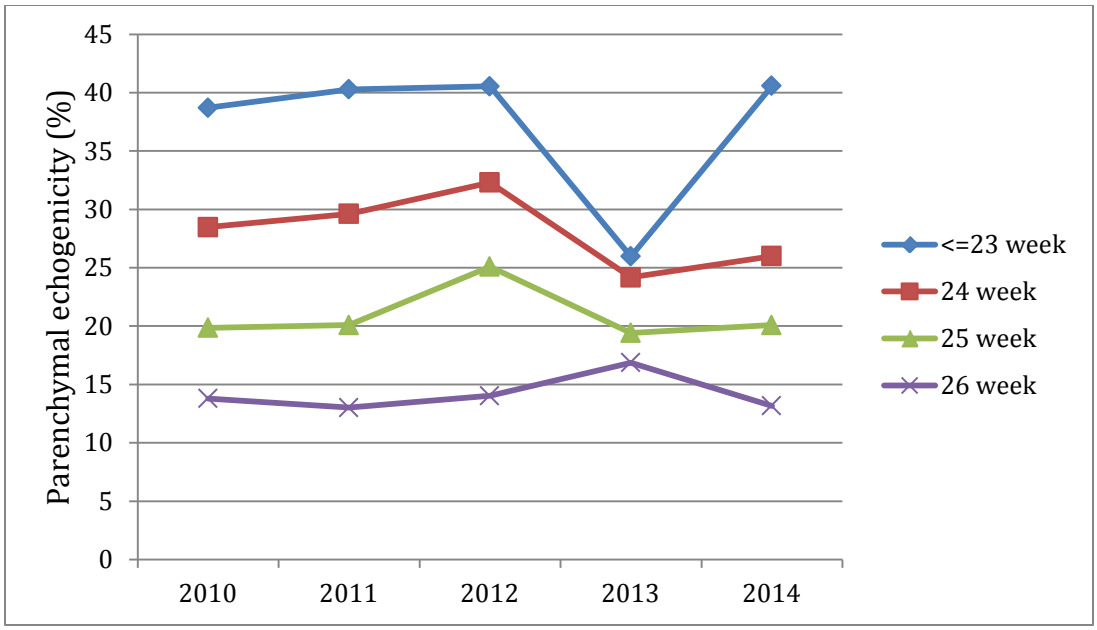


b. 27-32 weeks:

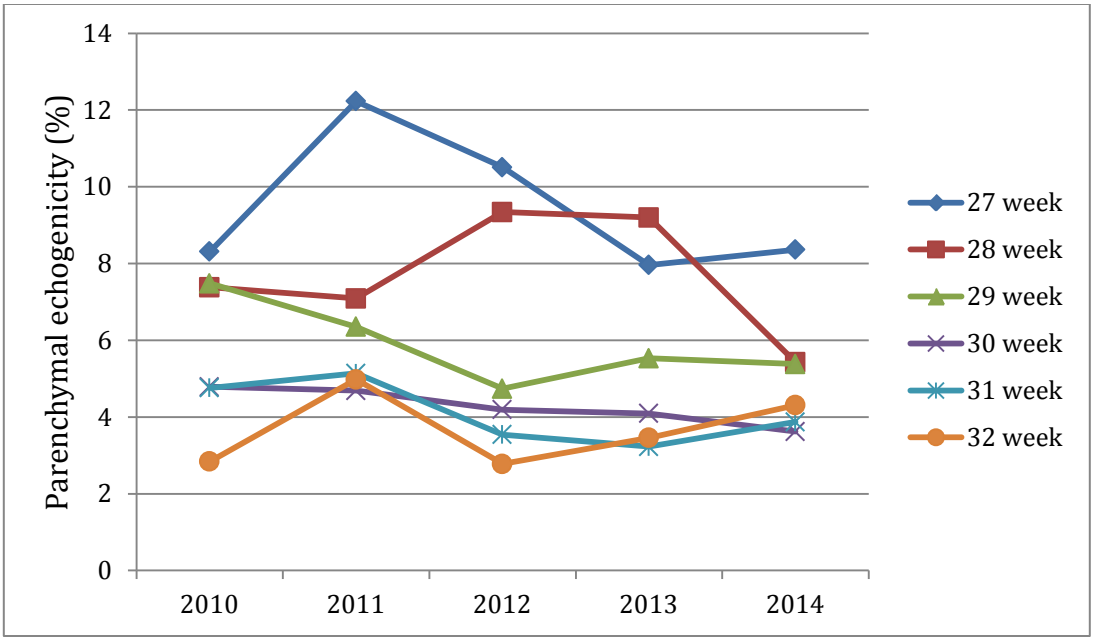


6. Parenchymal echogenicity: (among neonates who received ultrasound exams)

a. 23-26 weeks:

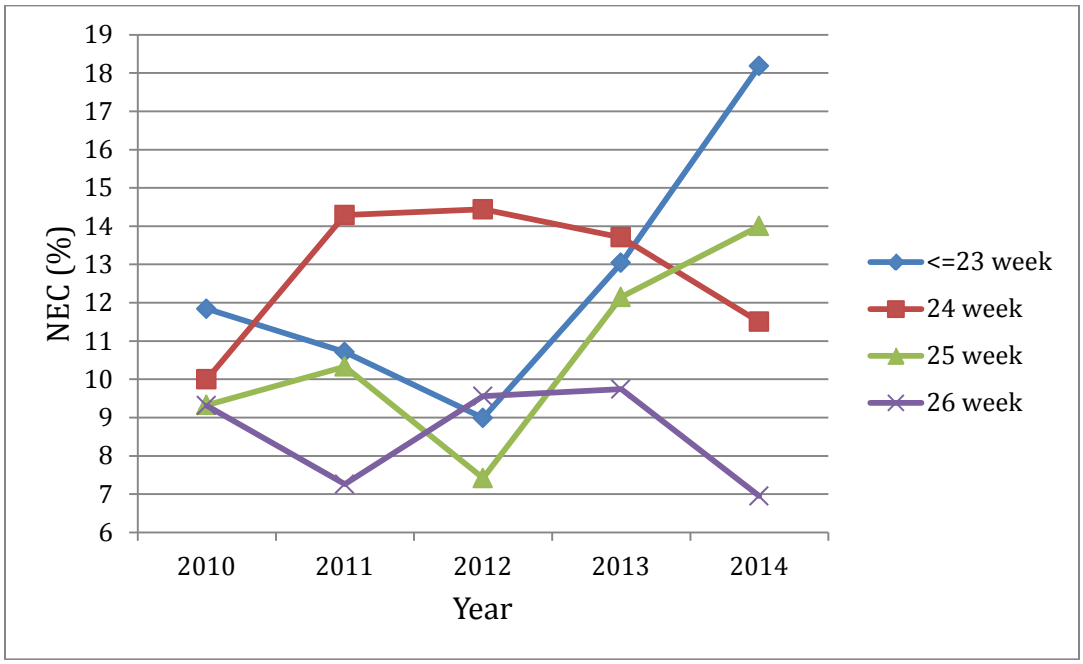


b. 27-32 weeks:

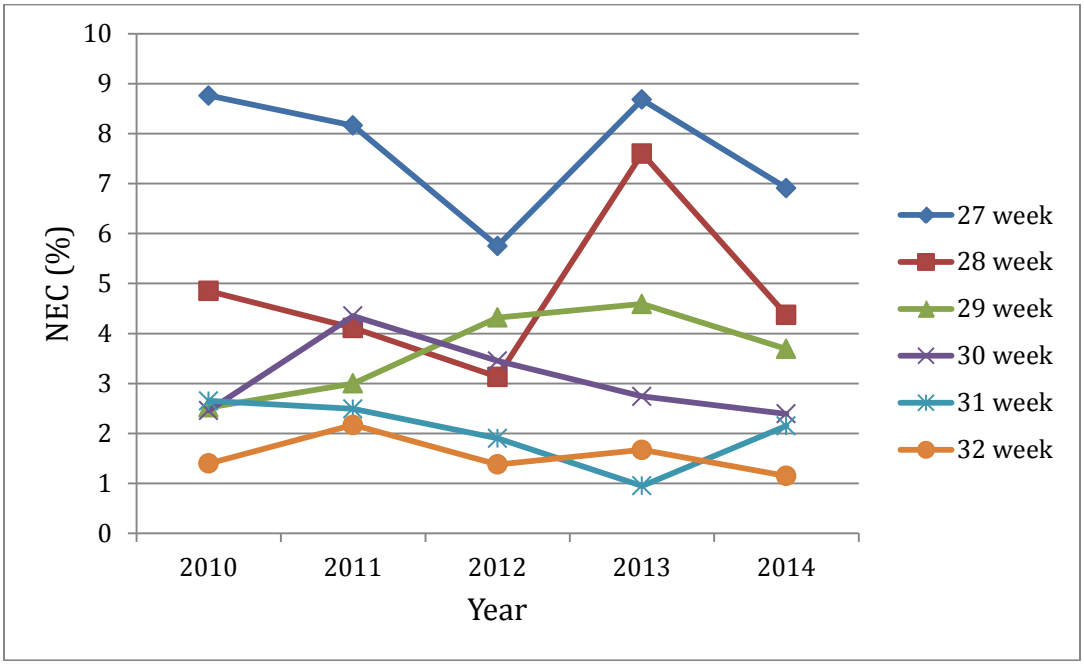


7. NEC:

a. 23-26 weeks:

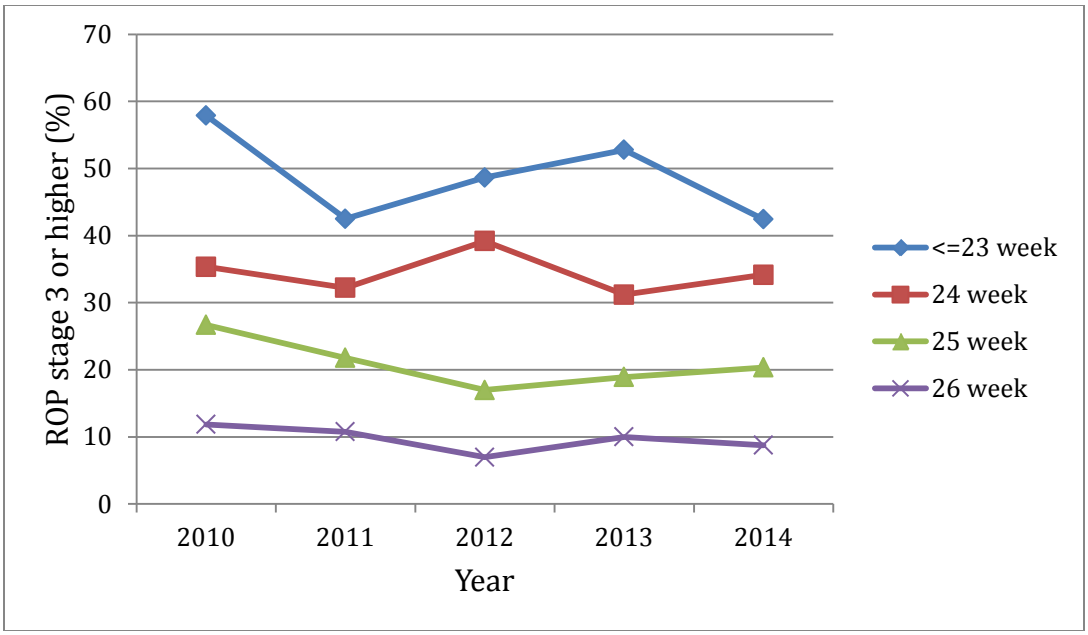


b. 27-32 weeks:

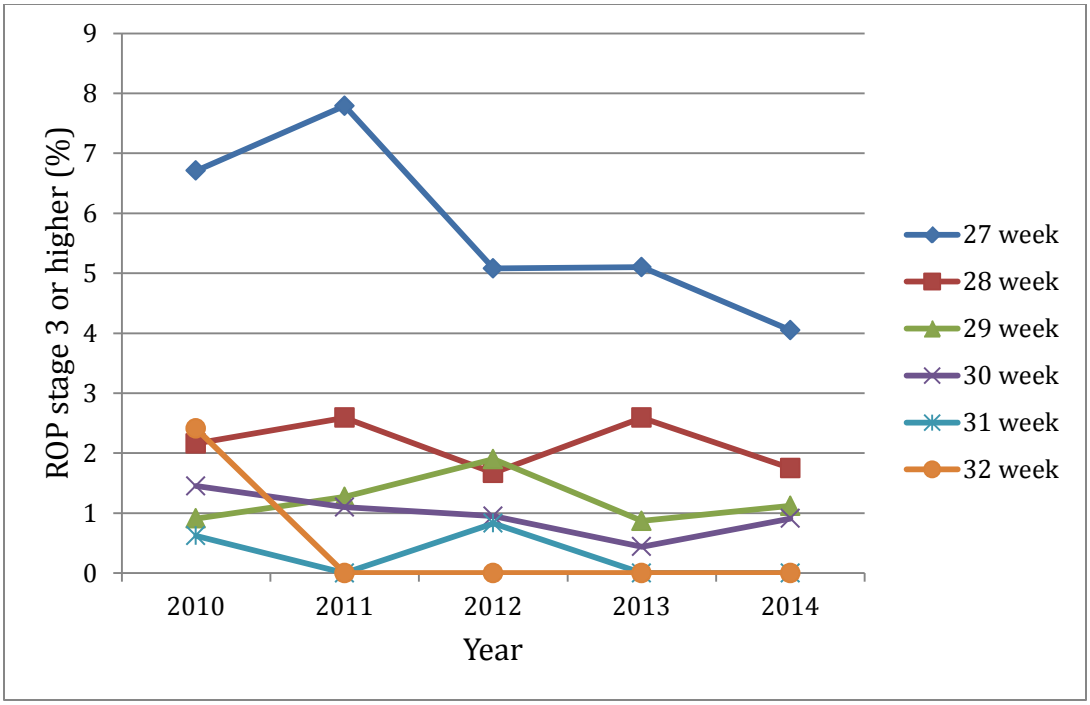


8. Stage 3, 4 and 5 ROP: (among neonates who received eye exams)

a. 23-26 weeks:

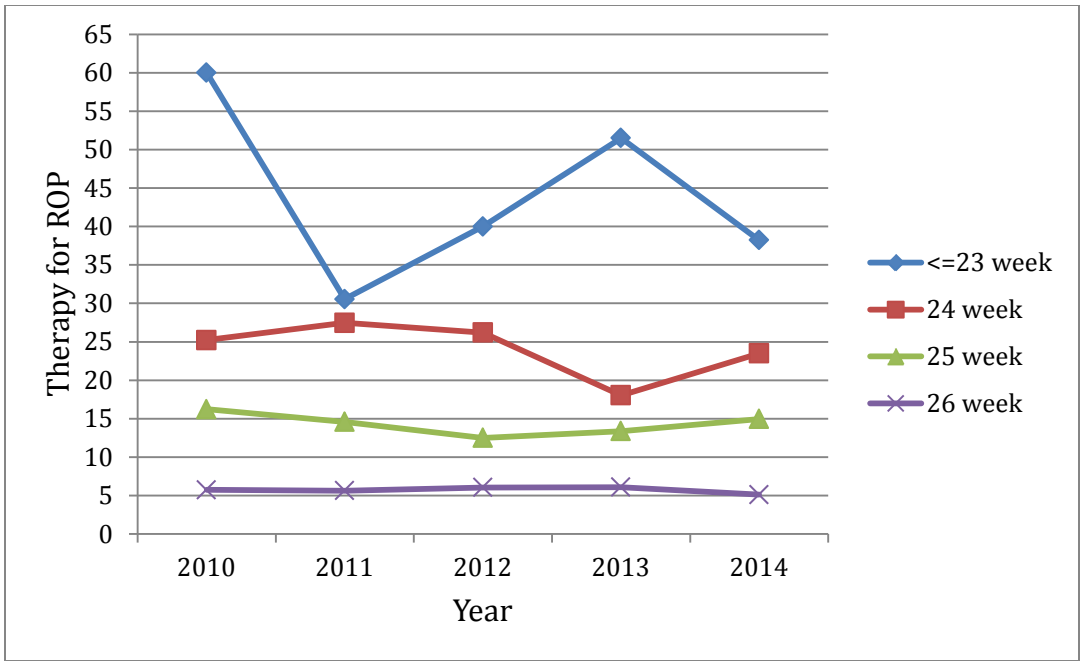


b. 27-32 weeks:

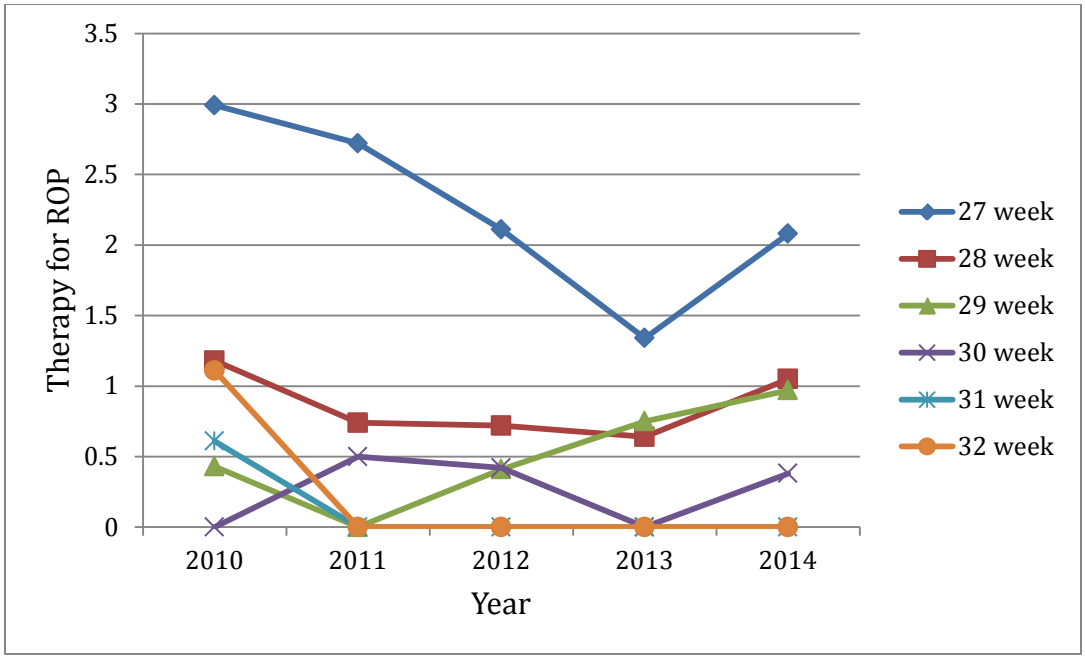


9. Therapy for ROP (among neonates who received eye exams)

a. 23-26 weeks:

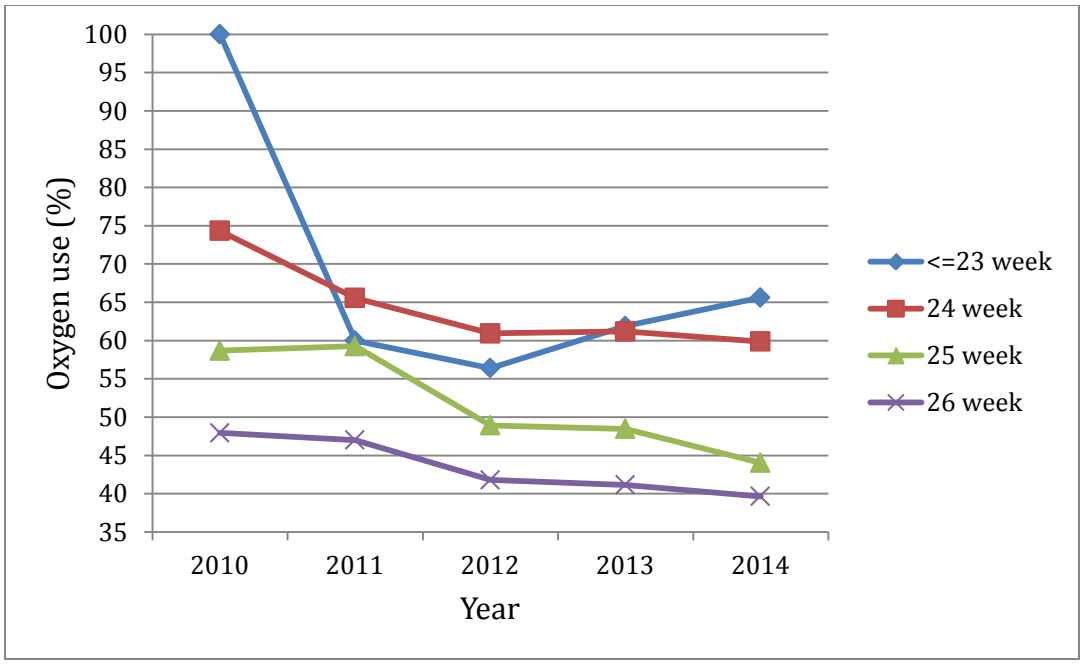


b. 27-32 weeks:

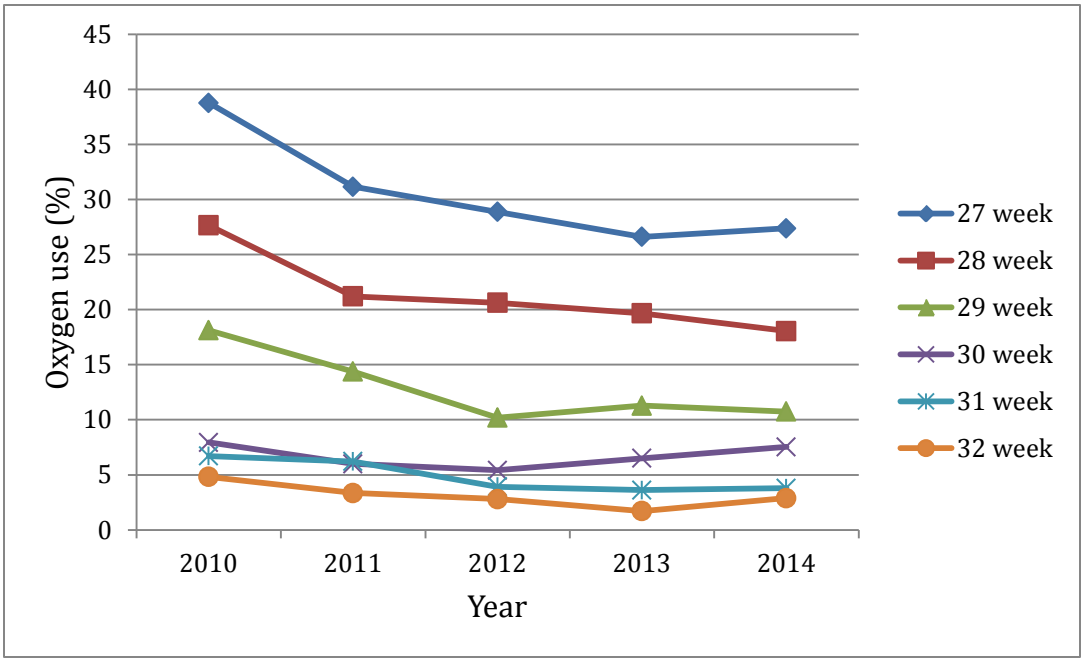


10a. Oxygen use at 36 weeks or at discharge:

a. 23-26 weeks:

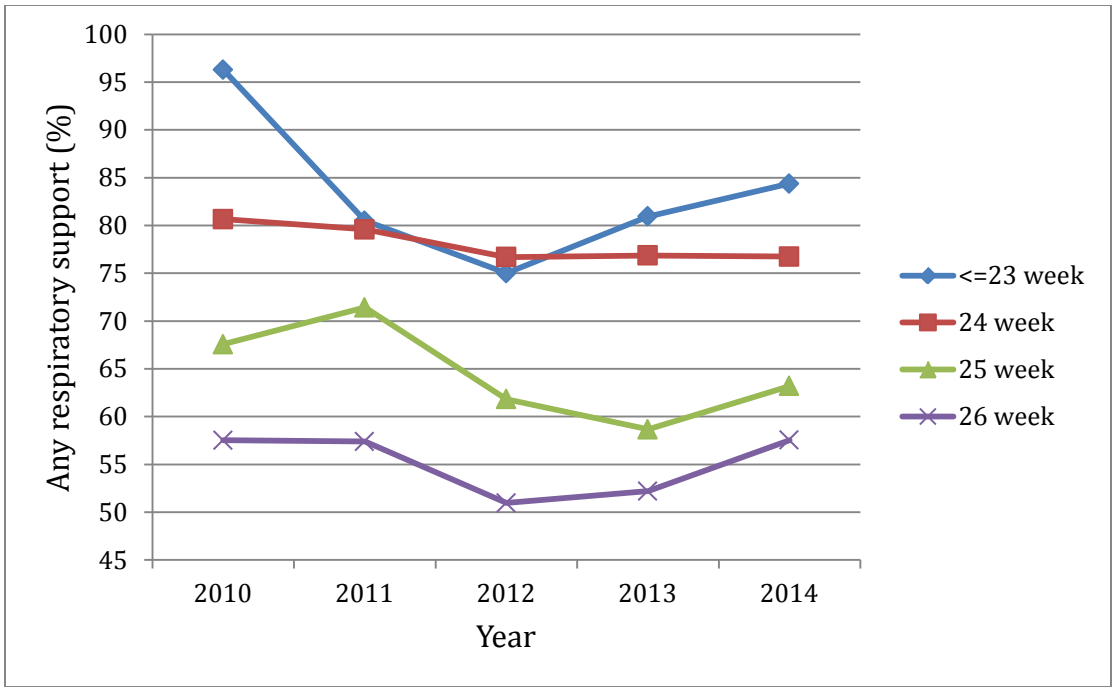


b. 27-32 weeks:

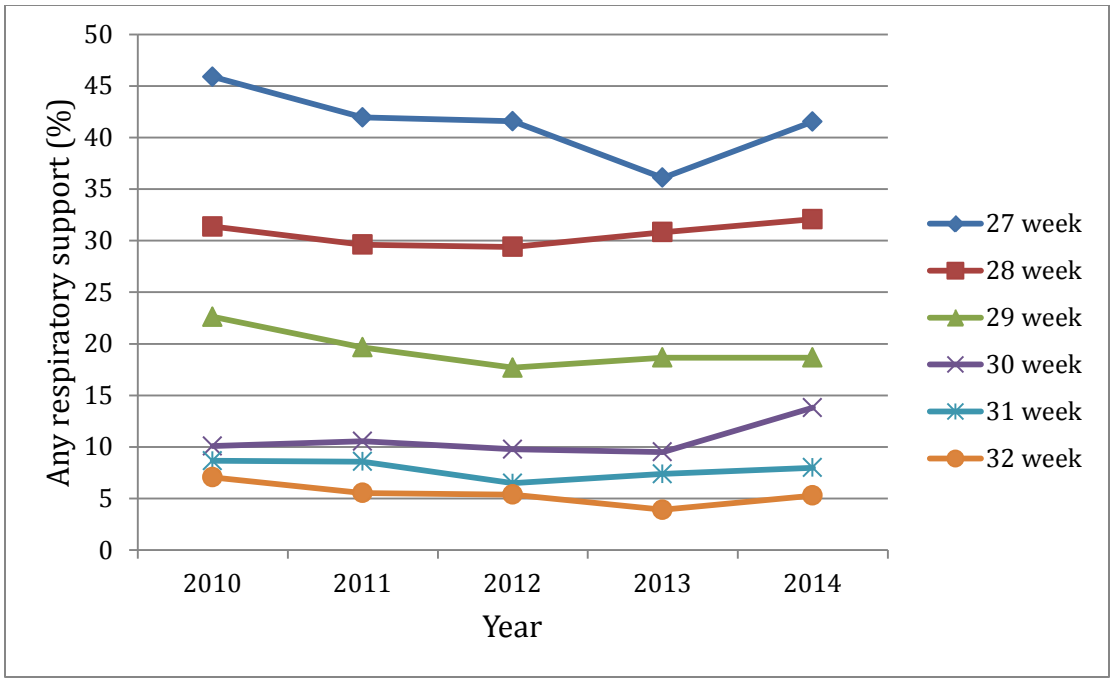


10b. Any respiratory support at 36 weeks or at discharge:

a. 23-26 weeks:

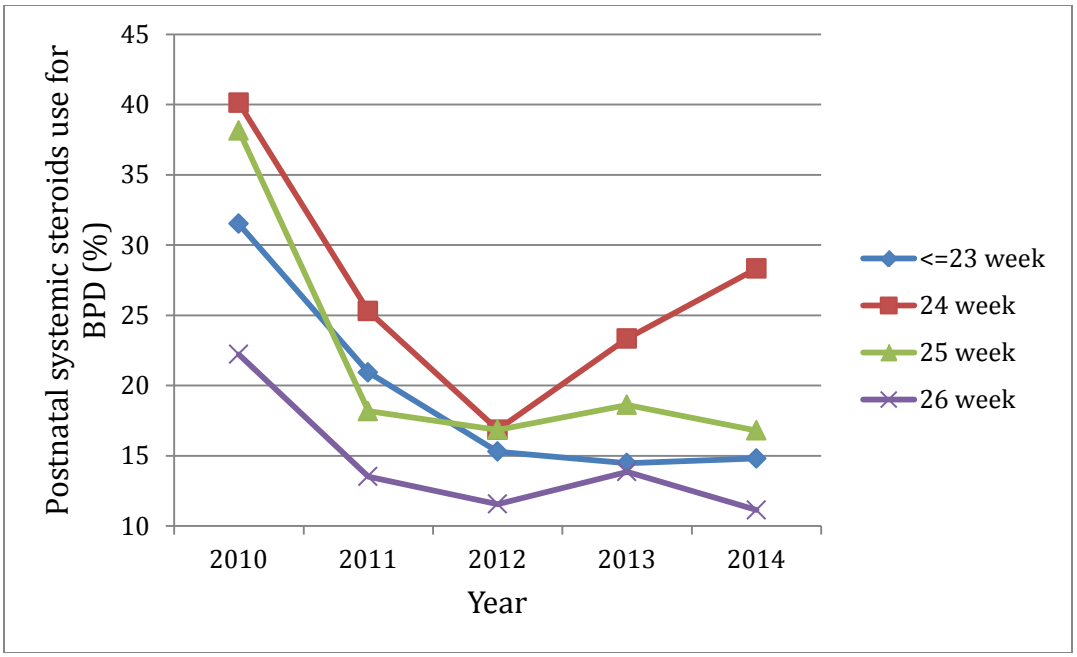


b. 27-32 weeks:

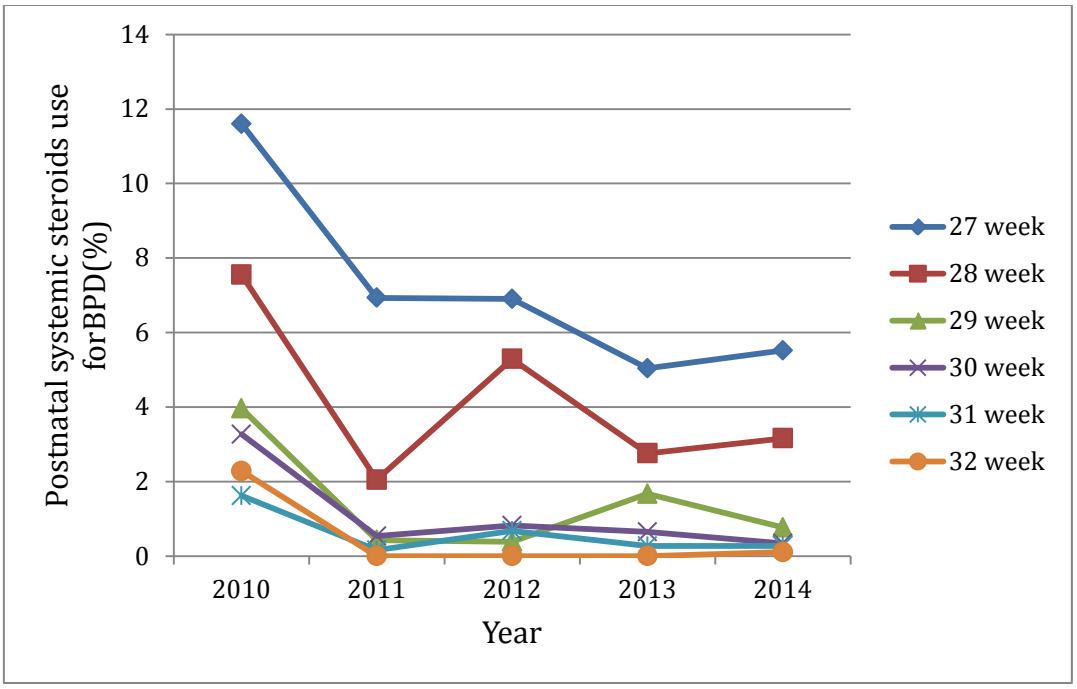


11. Postnatal systemic steroids use for BPD

a. 23-26 weeks:



b. 27-32 weeks:



I. Conclusions

The Canadian Neonatal Network™ was established in 1995. 31 Canadian NICUs participated in data collection in 2014.

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

CNN researchers continue to utilize the database and produce many publications that will have significant impact on neonatal care and policy in Canada and internationally. CNN will continue to produce NICU population-based data on outcomes and practices, and apply quality improvement strategies.

J. 2014 CNN publications

Peer reviewed publications

1) Bassil KL, Shah PS, Shah V, Ye XY, Lee SK, Jefferies AL, Canadian Neonatal Network. Impact of late preterm and early term infants on Canadian neonatal intensive care units. Am J Perinatol 2014; 31(4):269-78.
2) Bassil KL, Yaseen A, Walker M, Sgro MD, Shah PS, Campbell D, Mamdani M, Sprague AE, Lee SK, Maguire JL. The Association between Obstetrical Interventions and Late Preterm Birth. Am J Obstet Gynecol 2014; 210(6):538.e1-9.
3) Duong HH, Mirea L, Shah PS, Yang J, Lee SK, Sankaran K. Pneumothorax in Neonates: Trends, predictors and outcomes. J Pediatr Neonatol Med 2014; 7(1):29-38.
4) Shah PS, Lee SK, Lui K, Sjörs G, Mori R, Reichman B, Håkansson S, Feliciano LS, Modi N, Adams M, Darlow B, Fujimura M, Kusuda S, Haslam R, Mirea L; International Network for Evaluating Outcomes of Neonates (iNeo). The International Network for Evaluating Outcomes of very low birth weight, very preterm neonates (iNeo): a protocol for collaborative comparisons of international health services for quality improvement in neonatal care. BMC Pediatr 2014; 14:110.
5) Soraisham AS, Lodha AK, Singhal N, Aziz K, Yang J, Lee SK, Shah PS and the Canadian Neonatal Network. Neonatal outcomes following extensive cardiopulmonary resuscitation in the delivery room for infants born at less than 33 weeks gestational age. Resuscitation 2014; 85(2):238-43.
6) Lee SK, Shah PS, Singhal N, Aziz K, Synnes A, McMillan D, Seshia M for the Canadian EPIQ Study Group. Association of a quality improvement program with neonatal outcomes in extremely preterm infants: a prospective cohort study. CMAJ 2014; 186:E485-494.

Abstracts

1) Lee SK, Shah PS, Singhal N, Aziz K, Synnes A, McMillan D, Seshia M. Improvement in Neonatal Outcomes of Preterm <29 Weeks GA: Results from a National Prospective Quality Improvement Cohort Study (EPIQ2). E-PAS 2014:2380.2.
2) Shah J, Hunter T, Shah PS, Shivananda S, Synnes A, Murphy K. Neonatal Outcomes of Preterm Twins by Mode and Presentation at Birth. E-PAS 2014:4685.4.
3) Shah J, Jefferies A, Yoon EW, Shah PS. Incidence, risk factors, and outcome of gram negative sepsis in preterm neonates <32 weeks gestational age: national cohort study. E-PAS 2014:1540.644.
4) Shah PS, Mirea L, Weisz D, Barrington K, Lee KS, Sorokan T, Yee W, Lee SK. Trends in Patent Ductus Arteriosus Management and Association with Neonatal Mortality and Morbidities among Very Preterm Infants in Canada. E-PAS 2014:2850.8.
5) Lyu Y, Shah PS, Ye XY, Piedboeuf B, Deshpandey A, Dunn M, Lee SK. Impact of Admission Temperature on Mortality and Major Morbidities in very Preterm Infants. E-PAS 2014:4685.6.
6) Yusuf K, Nair V, Alshaikh B, Hasan SU, Lodha A, da Silva O, Alvaro RE, Lee SK, Shah PS. Neonatal Outcomes in Infants < 29 Weeks GA in relation to Maternal Hypertension and Smoking Status. E-PAS 2014:3846.774.

7) Lodha A, Soraisham Y, Rabi Y, Abou Mehrem A, Shah PS, Singhal N. Delayed cord clamping and neonatal outcomes among preterm infants born≤ 28 weeks of gestational age. E-PAS 2014:1180.3.

8) Keir A, Harrison A, Lee SK, Shah PS. Use of blood products in preterm infants <30 weeks gestation in the Canadian Neonatal Network from 2004-2012. E-PAS 2014:2850.6.

9) Keir A, Aziz K, McMillan D, Ojah C, Monterrosa L, Lee SK, Shah PS. 'Late' RBC transfusions and outcomes of preterm infants <30 weeks gestational age: a nested cohort study. E-PAS 2014:3846.735.

10) Hossain S, Shah PS, Ye XY, Chow SSW, Darlow B, Lee SK, Lui Kei. Comparison of changes in neonatal outcomes of very preterm infants cared in Canadian and Australian-New Zealand neonatal network units between 2006 and 2011. E-PAS 2014:3846.755.

11) Koller-Smith L, Shah PS, Ye XY, Sjors G, Chow SSW, Darlow B, Lee SK. Evaluating outcome reporting validity from national cohorts based on birth weight versus gestational age in high risk infants. E-PAS 2014:3846.763.

12) Derynck MR, Shah PS, Seshia M, Rouvinez-Bouali N, Yoon EW, Lee SK, Dow K. Inhaled and systemic corticosteroid administration to preterm infants across Canadian NICUs. E-PAS 2014:4106.146.

13) Bodani B, Ye XY, Bodani JP, Mirea L, Sankaran K. Morbidity outcomes of premature neonates born at < 30 weeks gestation in Canada over the last decade. E-PAS 2014:3846.713.

14) Jantzen C, Mirea L, Ye XY, Lee SK, Prosser-Loose E, Sankaran K and the Canadian Neonatal Network. Nosocomial Infection (NI) Trends in Canadian Neonatal Intensive Care Units: Association with Mortality and Morbidity. E-PAS 2014:3846.762.

15) Toye J, Mirea L, Yang J, Sankaran K. Trends in narcotics and sedative use during ventilation of preterm infants in Canadian NICUs during 2004-09. E-PAS 2014:2940.548.

16) Toye J, Mirea L, Yang J, Sankaran K. Narcotics and sedatives during ventilation in preterm infants: Associations with mortality/morbidities. E-PAS 2014:2940.549.

17) Aguinaga F, Lodha A, Hoyos A, Baez M, Akierman A, Fajardo C. Comparison of Morbidity and Mortality in Neonates Born ≥ 33 Weeks Gestational Age and Requiring Resuscitation Between SIBEN and CNN Neonatal Networks. E-PAS 2014:2917.218.

K. Future Plans

Database Improvements: Major changes have taken place to improve data collection for the CNN database over last few years. Input from the abstractors and the database review committee are carefully considered. Minor modifications and enhancements to the database are implemented on a half-yearly or yearly basis.

L. Appendices

Major Anomalies

A list of major anomalies can be found in the 2013 annual report, pages 124-127.
It is available via the following link:

http://www.canadianneonatalnetwork.org/Portal/LinkClick.aspx?fileticket=lreR0871sjA%3d&tabid=39

Definitions

CNN definitions can be found in the CNN abstractors' manual. The manual can be accessed on the CNN website (www.canadianneonatalnetwork.org/portal) via the following link:

http://www.canadianneonatalnetwork.org/Portal/LinkClick.aspx?fileticket=krvGeUTtLck%3d&tabid=69

List of Abbreviations

BW	Birth Weight
CONS	Coagulase-Negative Staphylococcus
CPAP	Continuous Positive Airway Pressure
CLABSI	Central Line-Associated Bloodstream Infection
CLD	Chronic Lung Disease
CVL	Central Venous Line
DR	Delivery Room
EPIQ	Evidence-based Practice for Improving Quality
ETT	Endotracheal Tube
GA	Gestational Age
GBS	Group B Streptococcus
GM	Germinal Matrix
HFV	High Frequency Ventilation
HIE	Hypoxic Ischemic Encephalopathy
ICROP	International Classification of Retinopathy of Prematurity
IPPV	Intermittent Positive Pressure Ventilation
IVH	Intra-Ventricular Hemorrhage
NEC	Necrotizing Enterocolitis
NI	Non-Invasive
NICE	Neonatal-Perinatal Interdisciplinary Capacity Enhancement
NICU	Neonatal Intensive Care Units
NTISS	Neonatal Therapeutic Intervention Scoring System
PDA	Patent Ductus Arteriosus
PEC	Parenchymal Echodensities
PICC	Peripherally Inserted Central Catheters
PIV	Peripheral Intravenous
PMA	Postmenstrual Age
PPV	Positive Pressure Ventilation
RDS	Respiratory Distress Syndrome

ROP	Retinopathy of Prematurity
SD	Standard Deviation
SEM	Standard Error of Mean
SGA	Small for Gestational Age
SNAP	Score for Acute Neonatal Physiology
SNAP-IIPE	Score for Acute Neonatal Physiology Version II, Perinatal Extension
SR	Standardized Ratio
TPN	Total Parenteral Nutrition
TRIPS	Transport Risk Index of Physiologic Stability
UV	Umbilical Vein
VE	Ventricular Enlargement
VEGF	Vascular Endothelial Growth Factor
VLBW	Very Low Birth Weight
VP	Ventriculoperitoneal

Canadian Neonatal Network™, Maternal-Infant Care Research Centre
700 University Avenue, Suite 8-500, Toronto ON M5G 1X6