

# Using Regional Outcomes Data to Modify Practice



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# Nothing to Disclose

Sample Data Examples provided by  
CPQCC



# Goals of the Presentation

- To be able to operationally define “Quality of Health” and its dimensions.
- To assess the desirability of a proposed quality measure
- To understand the potential limitations of generic data with respect to informing your Quality Improvement activity

# Quality of Health

“..the degree to which health services for **individuals and populations** increase the likelihood of **desired health outcomes** and are consistent with **current professional knowledge**” IOM 1990

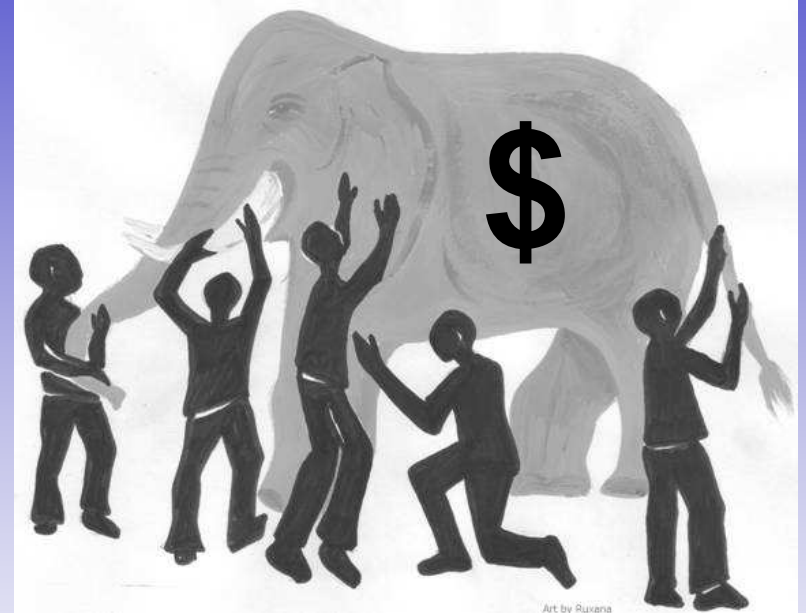
Individual ~clinical /// Population ~access, prevention

Desired ...role of the patient, purchasers, providers

Current knowledge....CME, Research advancement

# What is desired will differ among those who demand quality.

- Families
- Health Advocates (IOM, MCH )
- Payers ( PBGH, Leapfrog, Insurers, CMS )
- Hospital Accreditation
- American Board of Pediatrics



# Quality Marching Plans

- Clinical
  - DO THE RIGHT THING
  - AT THE RIGHT TIME
  - IN THE RIGHT WAY
- Health services
  - DECREASE OVERUSE
  - INCREASE UNDERUSE
  - AVOID MISUSE

# Overuse

- Postnatal Steroids for CLD
  - Dexamethasone Rx and compromised neurodevelopmental outcomes (Yeh et al. 1998)
  - AAP Statement 2002
  - Wide variation in use

Same CCS	N	Median	Q1	Q3
2007	22	11.2%	4.3%	16.7%
2008	22	10.1%	0.0%	28.0%

# Underuse

- Breast Feeding in Preterm Infants
  - Shorter hospital stays
  - Lower incidence of NEC and infection
  - Increased IQ at age 3 and 8

Fewer than 50% leave the NICU on breast milk

Pediatric Annals May 2003, Jane Morton MD Guest Editor

# Misuse

## NICU Acquired Infections

- Failure to achieve universal hand washing
- Failure of sterile catheter insertion and access
- Excessive Catheter use ( too many ...to long )

CPQCC	N	Median	Q1	Q3
2007	117	9.1%	1.5%	16.0%
2008	118	10.7%	2.7%	19.0%

# What exactly is Quality Assessment ?

- Quality assessment is the comparison of observation to expectation with respect to:
  - Structure
  - Process
  - Outcome

**The driver said it was a fabulous restaurant.**



# Quality Assessment always compares Observation to Expectation

$Q = \text{Observation} / \text{Expectation}$

$Q_{\text{index}} = 15 \text{ observed deaths} / 10 \text{ expected death}$   
– Mortality ratio = 1.5 or 50% excess deaths

$Q_{\text{index}} = 15 \text{ observed deaths} / 7-12 \text{ expected deaths}$   
(**all quality assessments must consider chance**, esp  
when small numbers are involved)

# Dimensions of Expectation

- Structural
- Process
- Outcome

# Structural and Process Quality Indicators

..there must be evidence that **structural** and **process** quality indicators exert a clinically significant influence on outcome.

– **Structure**

- VLBW Birth in a Non NICU Hospital

– **Process**

- Antenatal steroids in preterm delivery

# Antenatal Steroids at 24-33weeks Reduces Neonatal Mortality in Ca

CPQCC Data

	<u>RR</u>	<u>95% C.I.</u>	
2001	<b>0.47</b>	0.31	0.7
2002	<b>0.55</b>	0.39	0.78
2003	<b>0.68</b>	0.47	0.98
2004	<b>0.48</b>	0.36	0.65
2005	<b>0.58</b>	0.42	0.79

Outcome Expectations must be appropriate to  
case mix severity

Hospital A	NMR=2.3	Hospital B	NMR= 5.8
SMR = 2.3 obs/1.7exp		SMR = 5.8 0bs/6.2 exp	
SMR = 1.35 (35% higher)		SMR = .94 (6% lower)	

Outcome = Observed/Expected  
(taking into account case mix)

$$Q = \text{Obs} / \text{Exp}$$

- Quality assessment is the comparison of observation to expectation.
- The disparity between expectation and observation can serve to motivate change (Quality Improvement).

# Risk Adjusted Nosocomial Infection Rate

Year	Center Infants	Observed Events	Observed %	Expected %	OE Ratio	95% Confidence Limits for OE Ratio		Unadj Rate
						Lower	Upper	
2005	41	13	31.7	17.2	1.84	0.98	3.15	14.4
2006	46	17	37.0	20.3	1.82	1.06	2.91	12.0
2007	35	16	45.7	16.0	2.86	1.64	4.65	11.4
2008	48	13	27.1	17.5	1.54	0.82	2.64	14.0
2005 to 2007 Aggregate	122	46	37.7	18.0	2.09	1.53	2.79	12.5

**46 – 22 ( 18% x 122) = 24 Excess Infections**

# Key Points

- **Quality** is the extent to which what is desired has been met.
- **Quality Measurement** provides an estimate of the extent to which what is desired has been met.
- **Quality Measures** must efficiently provide an accurate and reproducible reflection of the extent to which what is desired has been met.

# Two Types of Quality Measurement

- Period Measurement
  - Yearly rates and time trends
  - Submit data by the end of the period (quarter-year)
  - Presented as Table or Figure
  - Used to assess **Level of Quality**
- Dynamic Measurement
  - Rate of events per short time interval
  - Time intervals between adverse events
  - Submit data weekly, bi-weekly, monthly
  - Presented as a control chart
  - Used to assess **Changing Levels of Quality** in response to quality improvement activities

# What is the Role of Data in Quality Improvement ?

We use data to “diagnose” and “treat” quality

# The Practice of Neonatology

1. Make a specific set of focused observations
  - Collection of data
2. Assess these observations against a standard
  - Comparative analysis of data (observation vs. expectation)
3. Initiate therapeutic interventions as indicated by our assessments
  - Action motivated by data
4. Assess the effectiveness of the intervention
  - Analysis of change in the data

# The Traditional Database

- Whom do we care for ?
  - Key Demographics that effect outcomes
- What do we do for them ?
  - Major conditions requiring therapy
- How successful was our care?
  - Death, short term morbidity, long term morbidity
- How efficient were we?
  - Resource utilization

# Traditional Database as a tool for Quality Assessment

1. Select a quality indicator ..... *Correct definition ?*
2. Identify subpopulation....  
..... *Subset available ??*
3. Adjust for differences in case mix  
..... *Adequate ?*
4. View status relative to others  
... *Comparable ?*

# How are we doing??

## What do we Measure??

- VLBW Volume
- Average Daily Census
- Nurse Infant ratio
- % ANS
- Time to first surfac
- % Low Admission
- % Meconium Asp.
- Median Weight Ga
- % Cranial imaging
- % Severe IVH , %
- % PVL
- Time to cooling
- % NEC..% Surger
- % CLD
- % Steroids for CLD
- % accidental extub
- % ROP exam on s
- % Severe ROP
- % Hep. B Immunization
- % RSV Immunization



- % Hospital Acquired Infections
- % Catheter Related Blood Stream Infections with Neg Cult
- ations
- nfections
- ygen
- eding
- lk
- scharges
- Satisfaction
- Mortality
- Formal Quality Improvement Project Inventory

# Selection Considerations

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- **Importance**
- Validity
- Reliability
- Malleability
- Feasibility
- Interpretability

# Traditional Database as a tool for Quality Assessment

Given a specific area of improvement can you find what you need ?

Outcomes / Processes of Interest

Target population

Appropriate risk adjustment

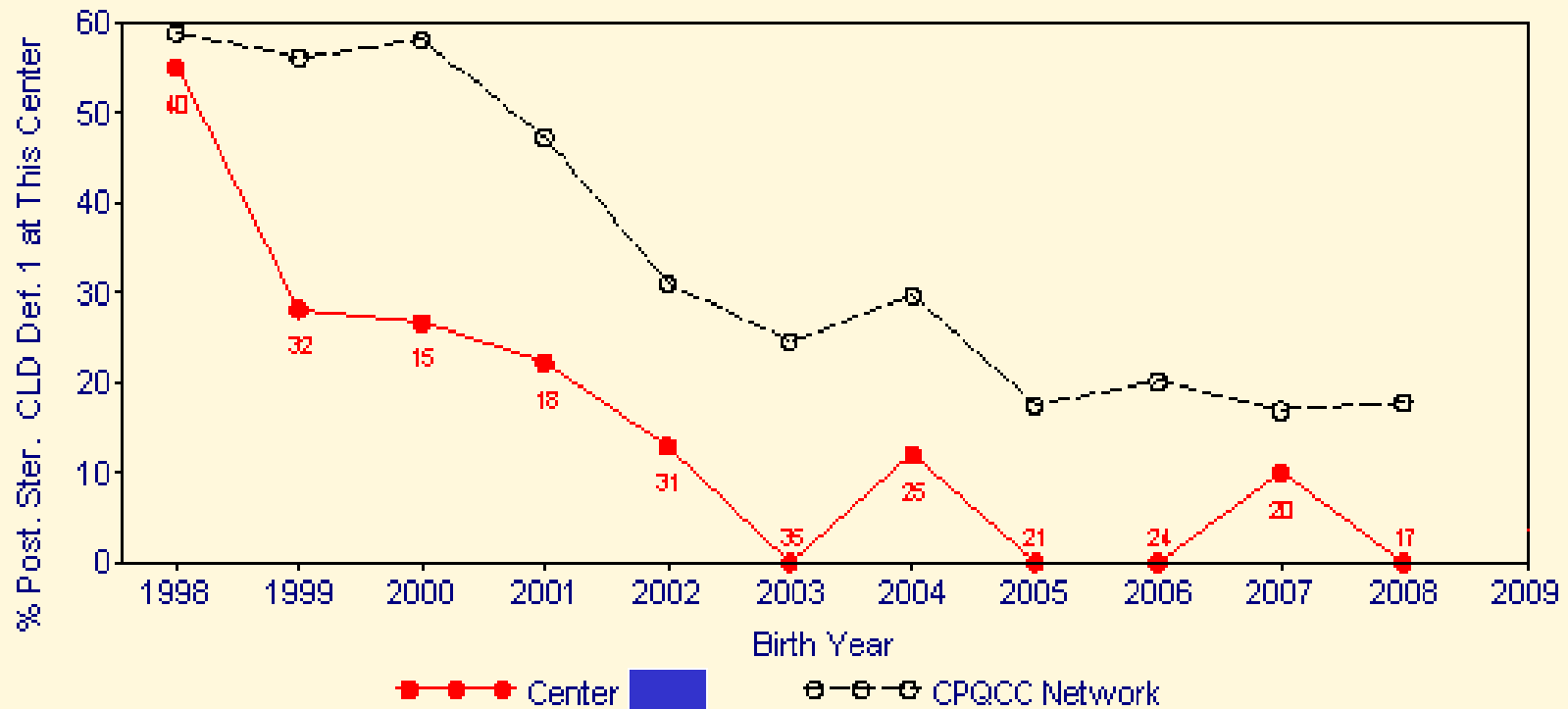
Peer Comparisons

# Overuse ?

## Is this definition correct ?

Percent Postnatal Steroids for Infants with CLD VON Def. 1 Administered at This Center, 1998 to 2008  
Infants 401 to 1500 grams or 22 to 29 weeks gestation  
Center [redacted] compared to all CPQCC Centers

The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.



The number displayed next to each data point for Center [redacted] is the total number of infants on which the percentage is based.

For years prior to 2008 the event location was not collected. The above chart's percentage for prior years is based on the subpopulation of infants for whom the location of the event can be determined.

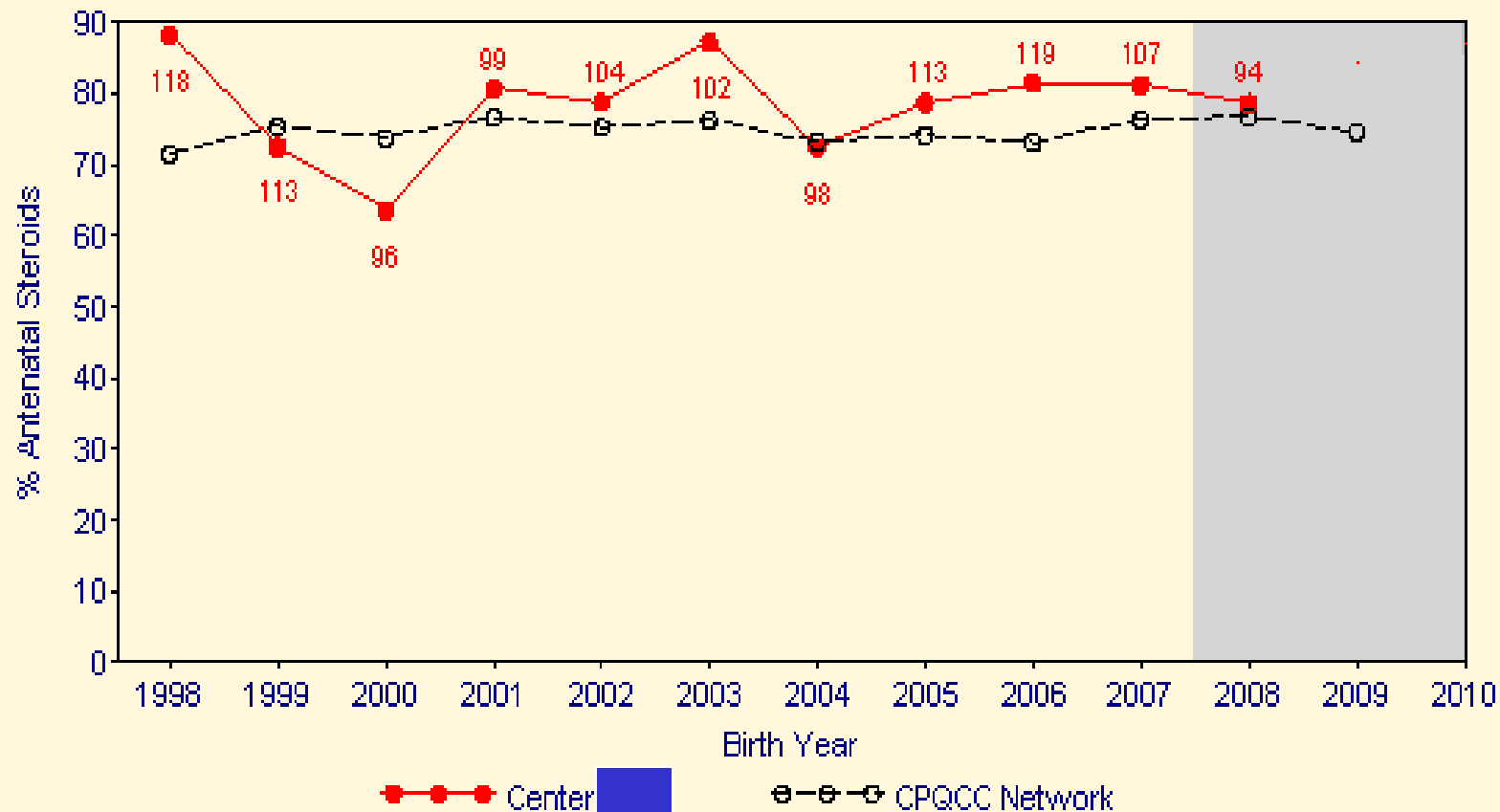
## Underuse ?

### Percent Antenatal Steroids, 1998 to 2009

Inborn Infants 401 to 1500 grams or 22 to 29 weeks gestation

Center [redacted] compared to all CPGCC Centers

The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.



The number displayed next to each data point for Center [redacted] is the total number of infants on which the percentage is based.

# Underuse ?

Is this the correct target population ?

## Percent Retinal Exam Performed (Eligible Infants Only), 1998 to 2009

Infants 401 to 1500 grams or 22 to 29 weeks gestation

Center [redacted] compared to all CPQCC Centers

The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.

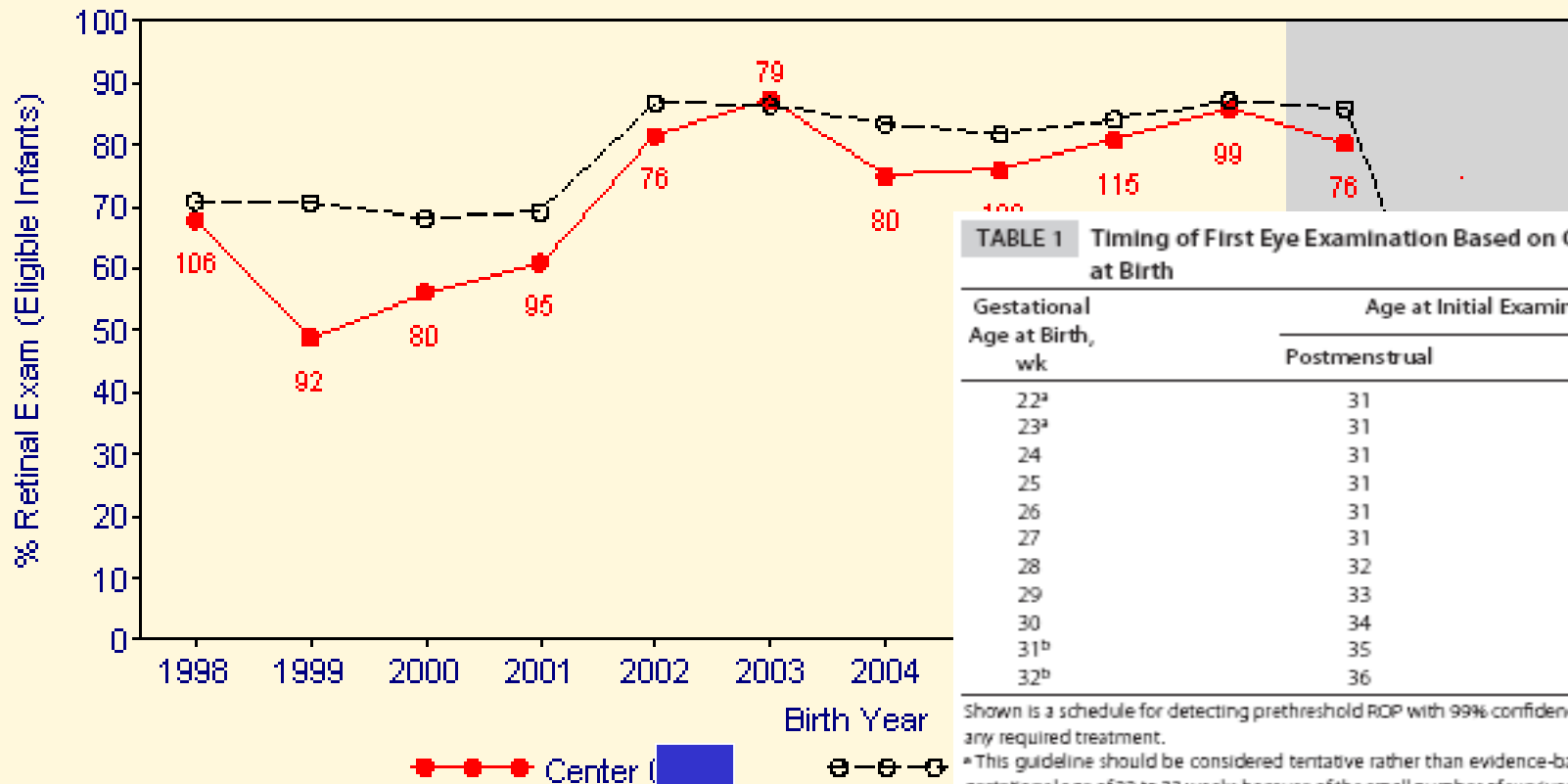


TABLE 1 Timing of First Eye Examination Based on Gestational Age at Birth

Gestational Age at Birth, wk	Age at Initial Examination, wk	
	Postmenstrual	Chronologic
22 <sup>a</sup>	31	9
23 <sup>a</sup>	31	8
24	31	7
25	31	6
26	31	5
27	31	4
28	32	4
29	33	4
30	34	4
31 <sup>b</sup>	35	4
32 <sup>b</sup>	36	4

Shown is a schedule for detecting prethreshold ROP with 99% confidence, usually well before any required treatment.

<sup>a</sup>This guideline should be considered tentative rather than evidence-based for infants with a gestational age of 22 to 23 weeks because of the small number of survivors in these gestational-age categories.

<sup>b</sup>if necessary.

The number displayed next to each data point for Center [redacted] is the percentage is based.

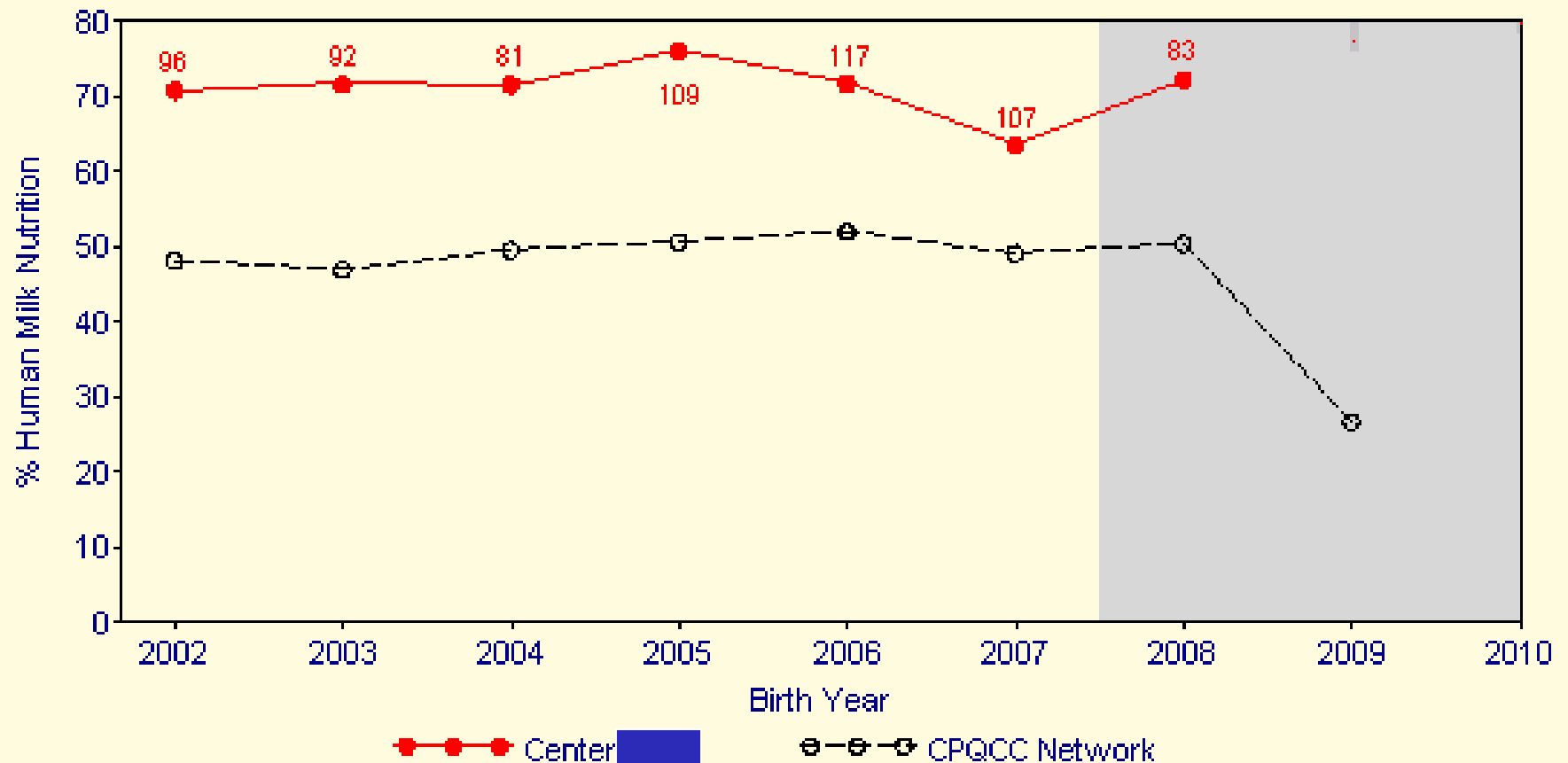
## Value ? .....Individual vs. Regional Perspective

### Percent Human Milk Nutrition, 1998 to 2009

Inborn Infants 401 to 1500 grams or 22 to 29 weeks gestation

Center [redacted] compared to all CPQCC Centers

The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.



The number displayed next to each data point for Center [redacted] is the total number of infants on which the percentage is based.

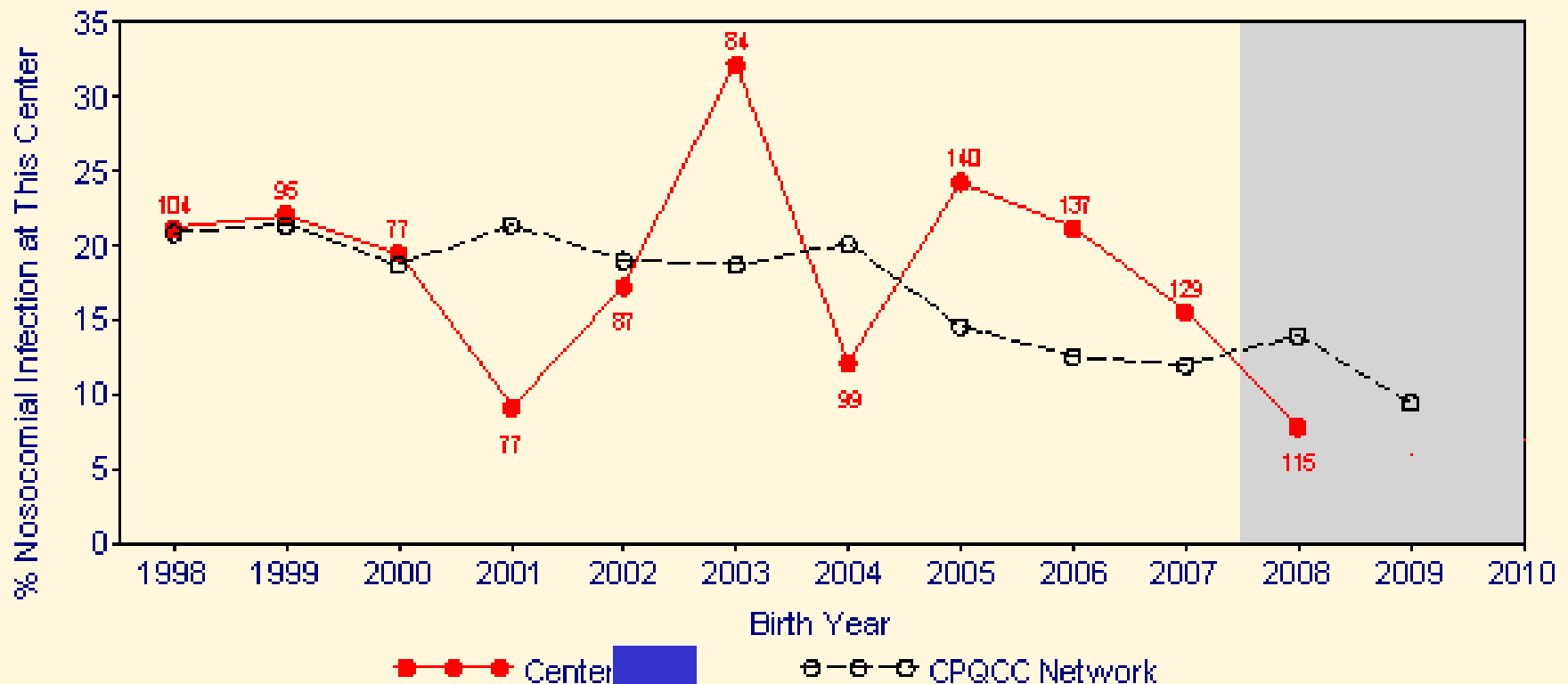
## Misuse

### Percent Nosocomial Infection at This Center, 1998 to 2009

Infants 401 to 1500 grams or 22 to 29 weeks gestation

Center [redacted] compared to all CPQCC Centers

The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.



The number displayed next to each data point for Center [redacted] is the total number of infants on which the percentage is based.

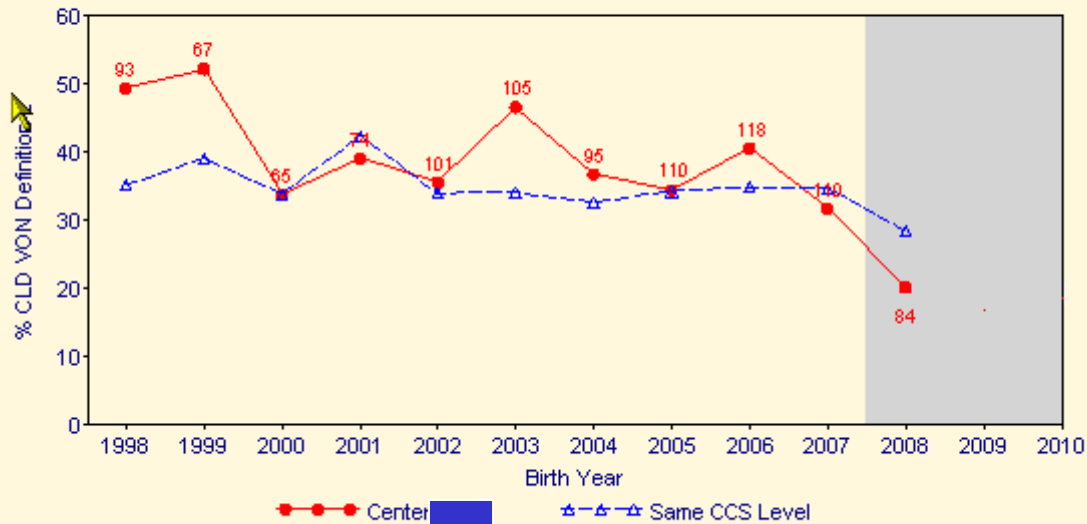
For years prior to 2008 the event location was not collected. The above chart's percentage for prior years is based on the subpopulation of infants for whom the location of the event can be determined.

### Percent Chronic Lung Disease (CLD) VON Definition 2, 1998 to 2009

Infants 401 to 1500 grams or 22 to 29 weeks gestation

Center [redacted] compared to same CCS Level Centers

The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.



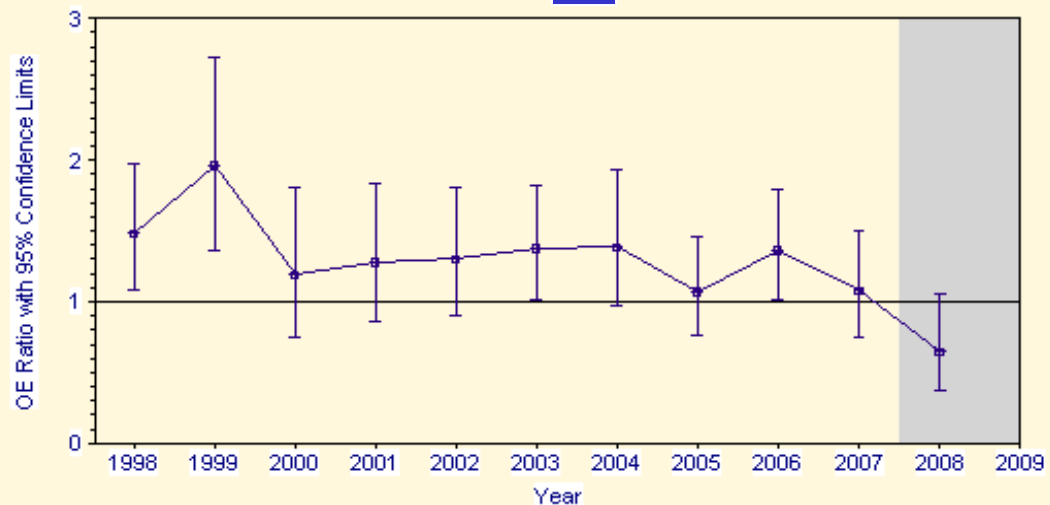
The number displayed next to each data point for Center [redacted] is the total number of infants on which the percentage is based.

Misuse ?

### O/E Ratios for Chronic Lung Disease (CLD) VON Definition 2

Infants 401 to 1,500 grams or 22 to 29 weeks of Gestation born between 01/01/1998 and 31/12/2008

Center ID: [redacted]



The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.

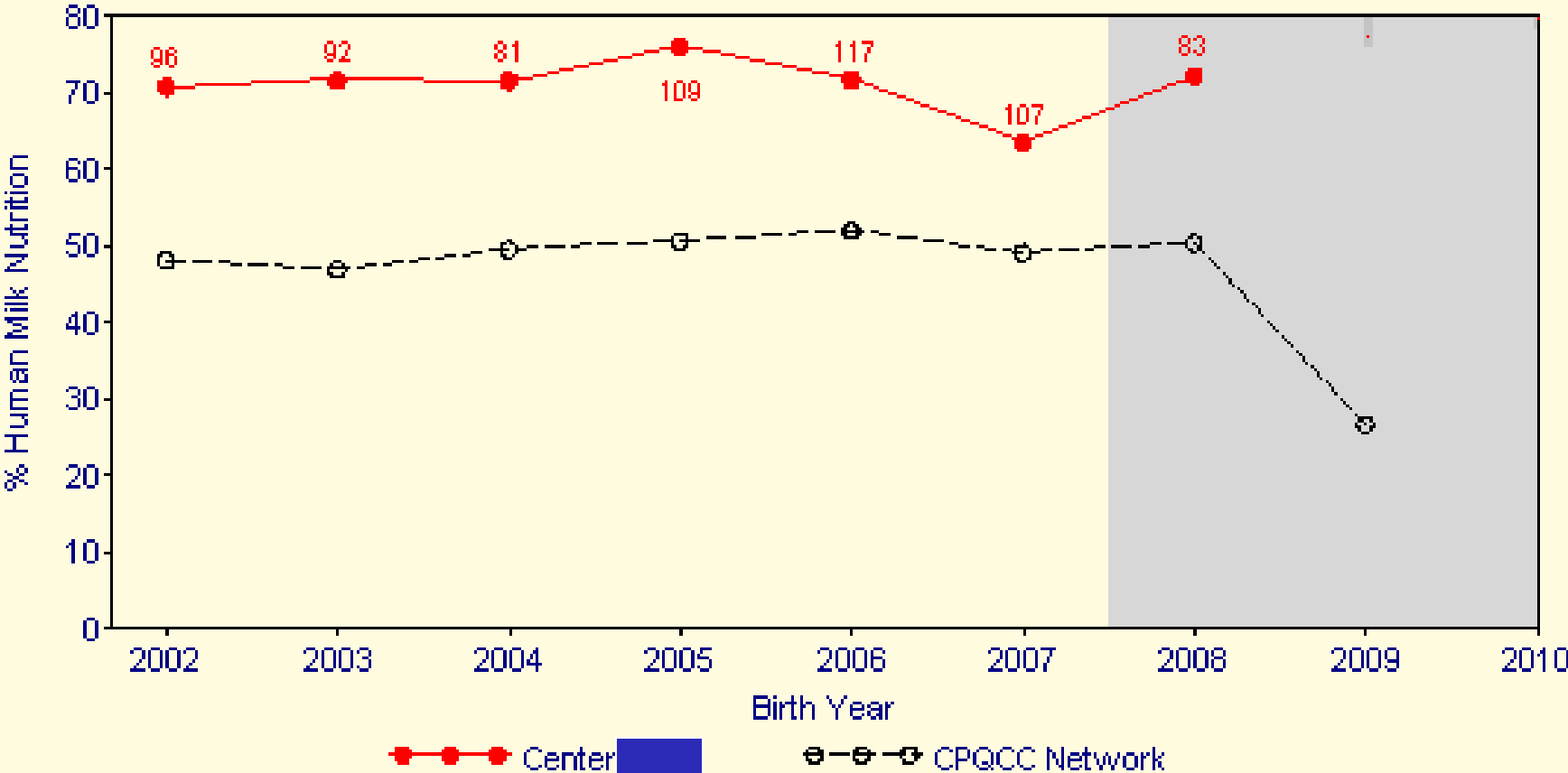
# CPQCC Q.I. Objective for 2009 -2010

## Percent Human Milk Nutrition, 1998 to 2009

Inborn Infants 401 to 1500 grams or 22 to 29 weeks gestation

Center [redacted] compared to all CPQCC Centers

The shaded area in the chart corresponds to years for which the data collection is on-going/incomplete.



The number displayed next to each data point for Center [redacted] is the total number of infants on which the percentage is based.

## Do we have the correct definition ?

	Center (N = 159)			CPQCC (N Centers = 125)			Center-Network Comparison
	N	%	Last Year %	% Median	% Lower Quartile	% Upper Quartile	
All CPQCC Centers							
All Infants							
2007							
<b>Enteral Feeding at Discharge</b>							
	28	18.4	12.7	22	15	35	←
None	21	13.8	19.9	4	1	10	→
Human Milk Only	36	23.7	21.7	26	12	36	←
Formula Only	67	44.1	45.8	37	25	50	→
Human Milk with Fortifier or Formula	152	100.0	100.0				
Total							

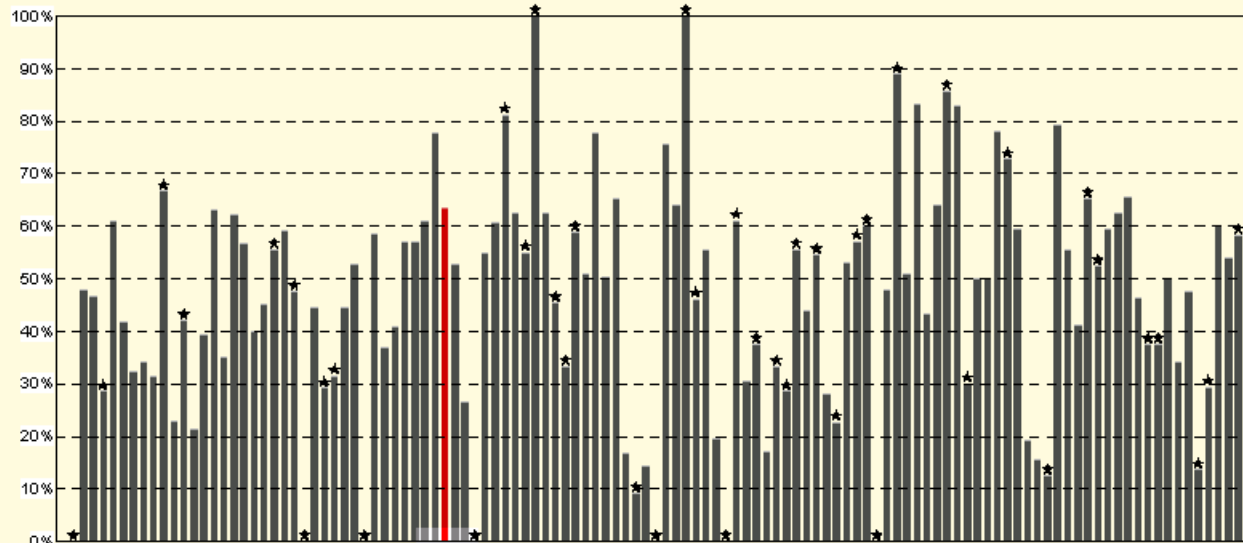
## Do we have the appropriate target population ?

	Center (N = 159)			CPQCC (N Centers = 125)			Center-Network Comparison
	N	%	Last Year %	% Median	% Lower Quartile	% Upper Quartile	
All CPQCC Centers							
Inborn Infants							
2007							
<b>Enteral Feeding at Discharge</b>							
	15	14.0	9.4	21	13	36	←
None	14	13.1	16.2	4	0	11	→
Human Milk Only	24	22.4	18.8	25	9	37	←
Formula Only	54	50.5	55.6	38	26	53	→
Human Milk with Fortifier or Formula	107	100.0	100.0				
Total							

### Human Milk Nutrition

This chart is final.

Inborn Infants 401 to 1,500 grams or 22 to 29 weeks of gestation  
01/01/2007 to 12/31/2007



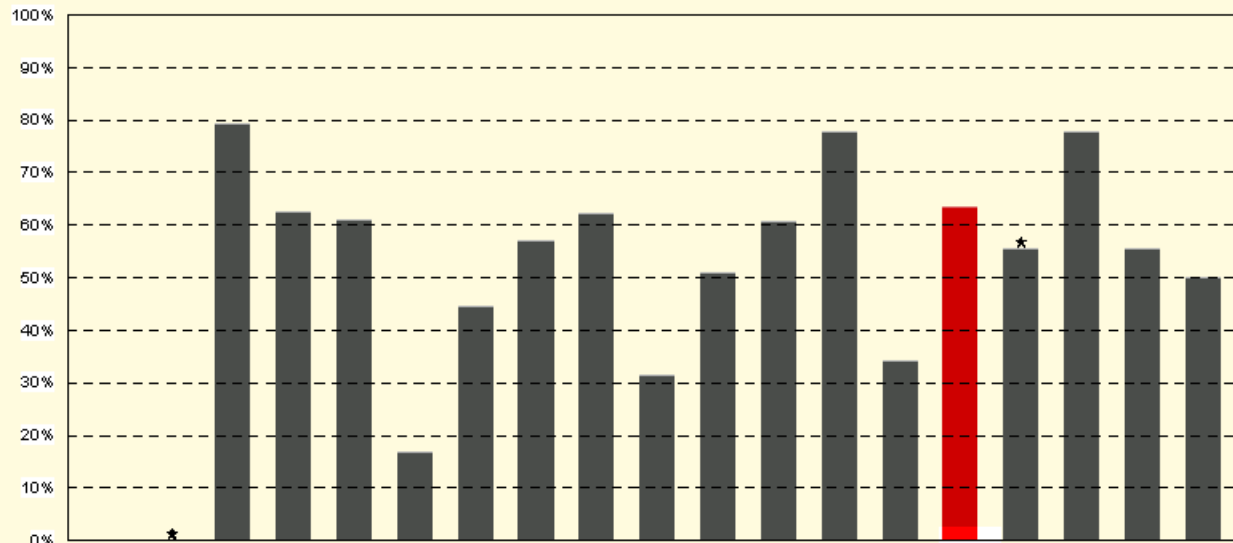
How do we compare ?

Who do I want to be compared with  
??????????

### Human Milk Nutrition

This chart is final.

Inborn Infants 401 to 1,500 grams or 22 to 29 weeks of gestation  
Regional NICUs, 01/01/2007 to 12/31/2007



CPQCC Centers

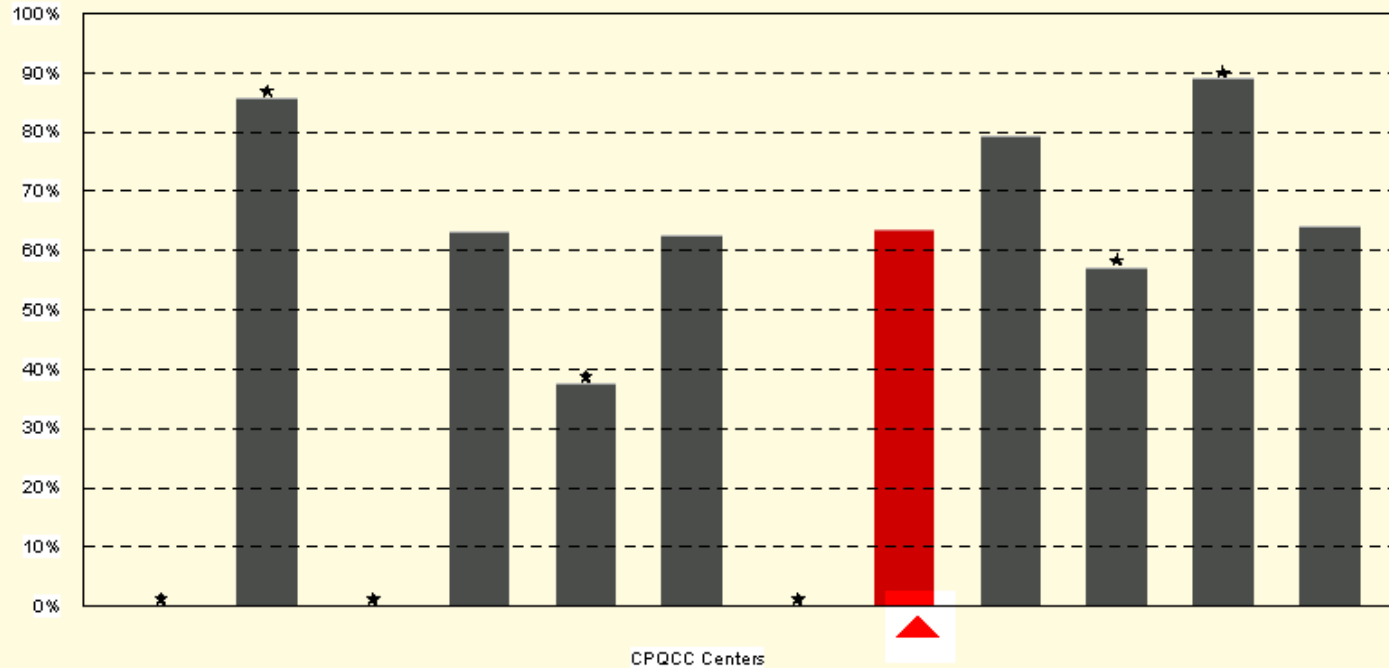
Same CCS	N	Median	Q1	Q3
2006	17	57.4%	51.8%	67.9%
2007	17	56.9%	50.0%	62.7%

### Human Milk Nutrition

This chart is final.

Inborn Infants 401 to 1,500 grams or 22 to 29 weeks of gestation

XXX CA Perinatal Outreach Program, 01/01/2007 to 12/31/2007



**But I thought that we were the best in our Perinatal Region XXX ???**

Same Region	N	Median	Q1	Q3
2006	12	59.4%	27.5%	70.9%
2007	11	63.0%	37.5%	79.4%

## Can you take my case mix into account ?

CENTER ID: XXXXXXXXXX

Year	Center Infants	Observed Events	Observed %	Expected %	OE Ratio	95% Confidence Limits for OE Ratio		Unadjusted % for ...		
						Lower	Upper	CPQCC Network	Regional CCS Level	Region XXX Perinatal Outreach Program
2002	131	81	61.8	49.9	1.24	0.98	1.54	42.6	40.8	56.7
2003	140	86	61.4	49.9	1.23	0.98	1.52	44.0	43.2	60.2
2004	108	73	67.6	50.4	1.34	1.05	1.68	46.5	45.3	57.3
2005	159	108	67.9	48.8	1.39	1.14	1.68	48.4	49.6	57.8
2006	166	109	65.7	49.7	1.32	1.08	1.59	49.7	49.3	60.6
2007	151	87	57.6	49.6	1.16	0.93	1.43	47.1	48.4	62.3
2008	117	87	74.4	50.5	1.47	1.18	1.82	48.8	53.9	66.0
2005 to 2007 Aggregate	476	304	63.9	49.4	1.29	1.15	1.45	48.4	49.1	60.3

Did the risk adjustment account for all major risk factors out of my control ?

## Risk-Adjustment Models Used for Quality Indicators, 2007

### Human Milk Nutrition

Infants 401 to 1,500 grams or 22 to 29 weeks gestation

California Perinatal Quality Care Collaborative (CPQCC)

For the standardized tables the model based on three years of finalized data shown in the last set of columns is used.

Risk Factor		2007 - Model Without CCS Level		2007 - Model With CCS Level		2005 - 2007 - With CCS Level	
		Odds Ratio	p-value	Odds Ratio	p-value	Odds Ratio	p-value
CCS Level	Community	Reference Group					
	Intermediate	Not in Model		0.72	0.001	0.88	0.029
	Regional	Not in Model		1.07	0.245	1.07	0.032
	Non-CCS	Not in Model		1.39	0.006	1.52	0.000
Prenatal Care		3.36	0.000	3.33	0.000	3.51	0.000



# The Final analysis

## Consider the Measure

- Importance
- Validity
- Reliability
- Malleability
- Feasibility
- Interpretability

## Consider the Data

- Correct Definition
- Correct Target
- Adequate Risk Adjust.
- Useful Comparisons

<http://www.cpqcc.org/>



Improving the quality of  
NICU care using state of the  
art collaborative Quality  
Improvement Methods



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<https://www.cpqccreport.org/>



February 28, 2009

J.B. Gould, M.D., Director

### Welcome to the CPQCC Data Reports Home Page

**Update 2008-09-25:** The CPQCC Report website has been updated with many new features and additional selections. After you logon, please review the section **2007 New Features** in the Introduction. Please let us know if there are any variables that are currently not covered through the options available to you, so we may add them to the list of choices.

While we have tried to thoroughly test our on-line report system, we are asking you to alert us to any problems that you might encounter. Please send an e-mail describing your problem(s) to [support@cpqcc.org](mailto:support@cpqcc.org), or call the data center at 510-620-3146.

To logon to the CPQCC on-line reporting functions, enter your center's 4-digit ID (including leading zeroes) and your report password below.

CPQCC Center Number:

Password:

← test

After entering password use the tab key

For questions, please contact J.B. Gould, M.D., Director

# REFERENCES

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