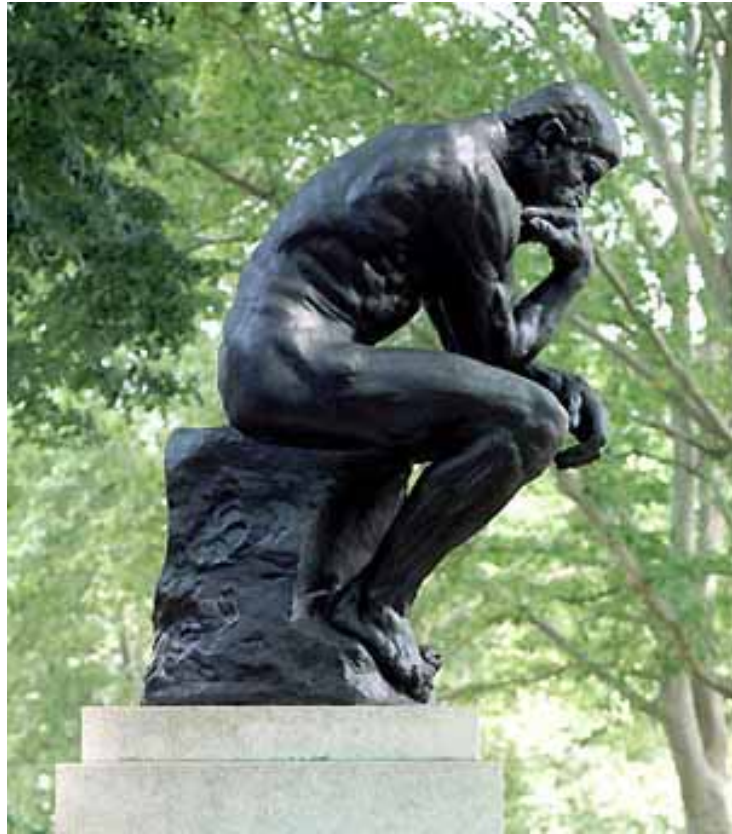


# 2012 National Women's Annual Report



**Commentary – Brian Darlow**  
**University of Otago**  
**Christchurch**



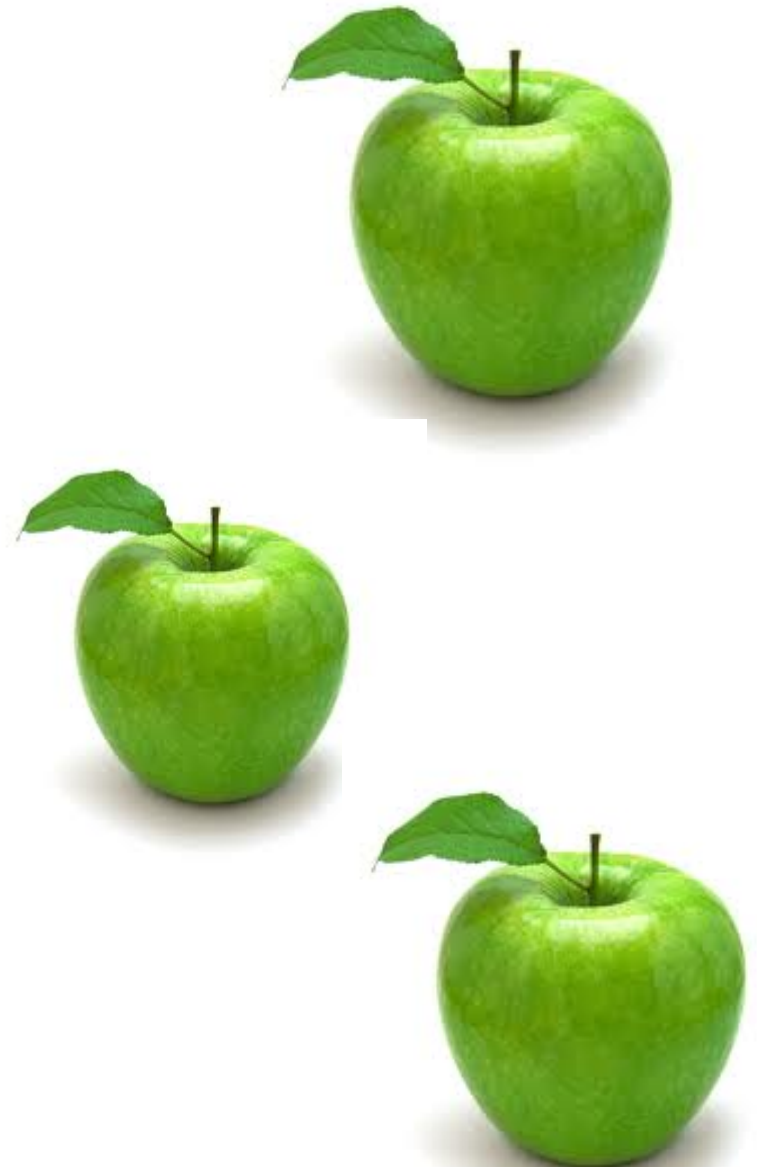




## 2012 NW Annual Report



## 2012 CWH Annual report



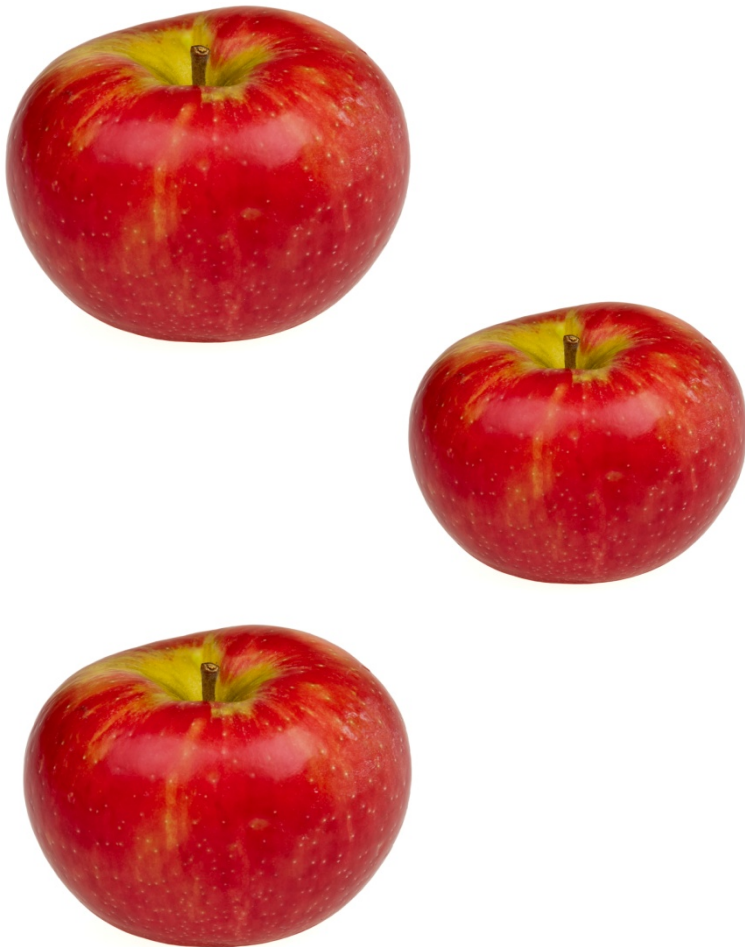


**2012 CWH Report**

(Last report 2008)

**CDHB & WCDHB Maternity Quality  
& Safety Programme 2012-2013**  
Annual Report

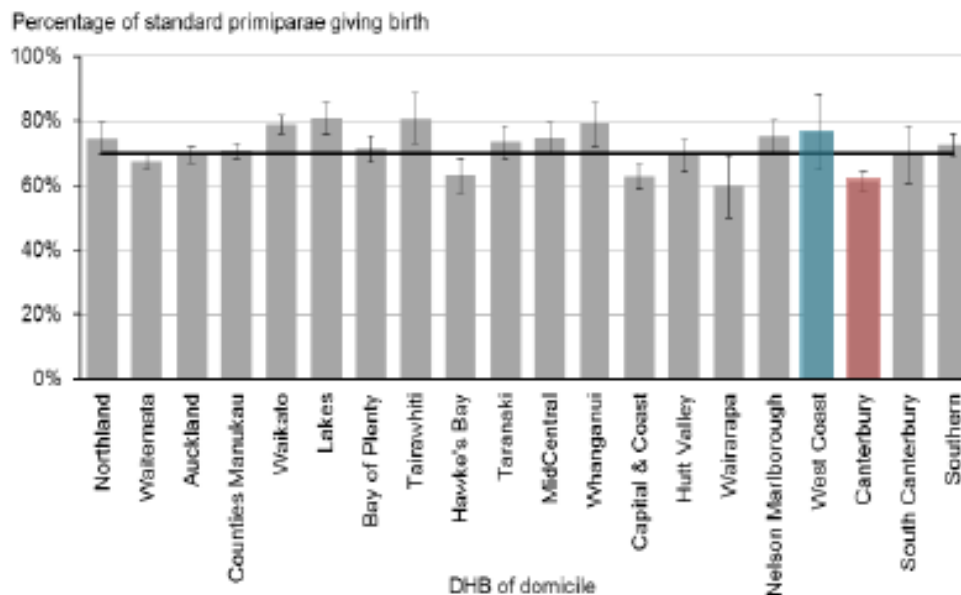
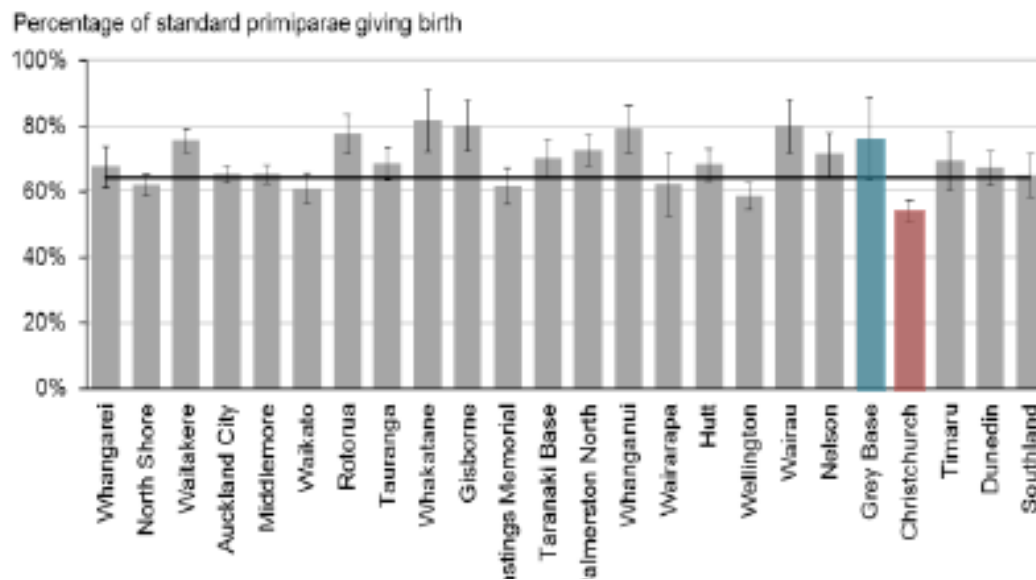
**ANZNN / WHA / PMMR Committee  
Reports**



**2010 Report – Commentary by David  
Knight, **Mater Mothers' Hosp, Brisbane****

**2011 Report – commentary by Lindsay  
Mildenhall, **Middlemore Hospital****

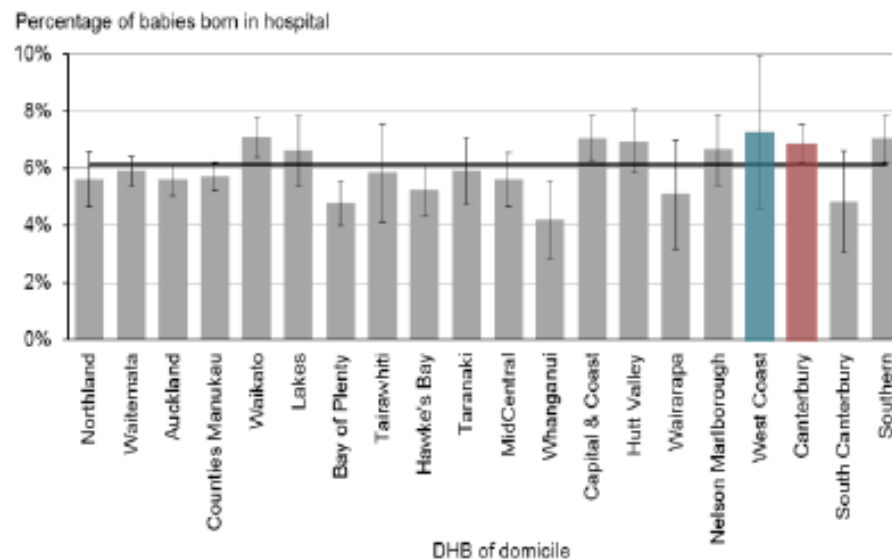
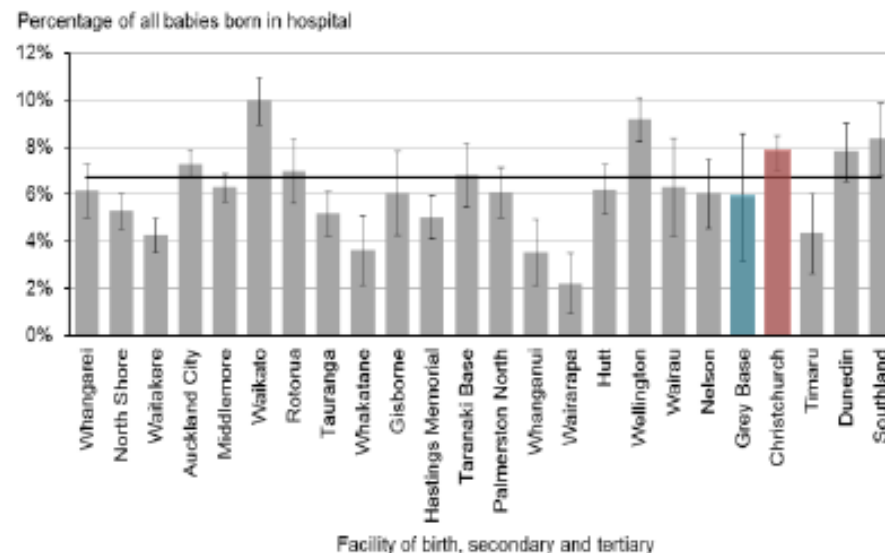
# Spontaneous vaginal births in standard primiparae 2011



**CDHB &  
WCDHB  
Maternity  
Quality  
& Safety  
Programme  
2012-2013  
Annual Report**



## Premature birth at 32-36 weeks gestation 2011



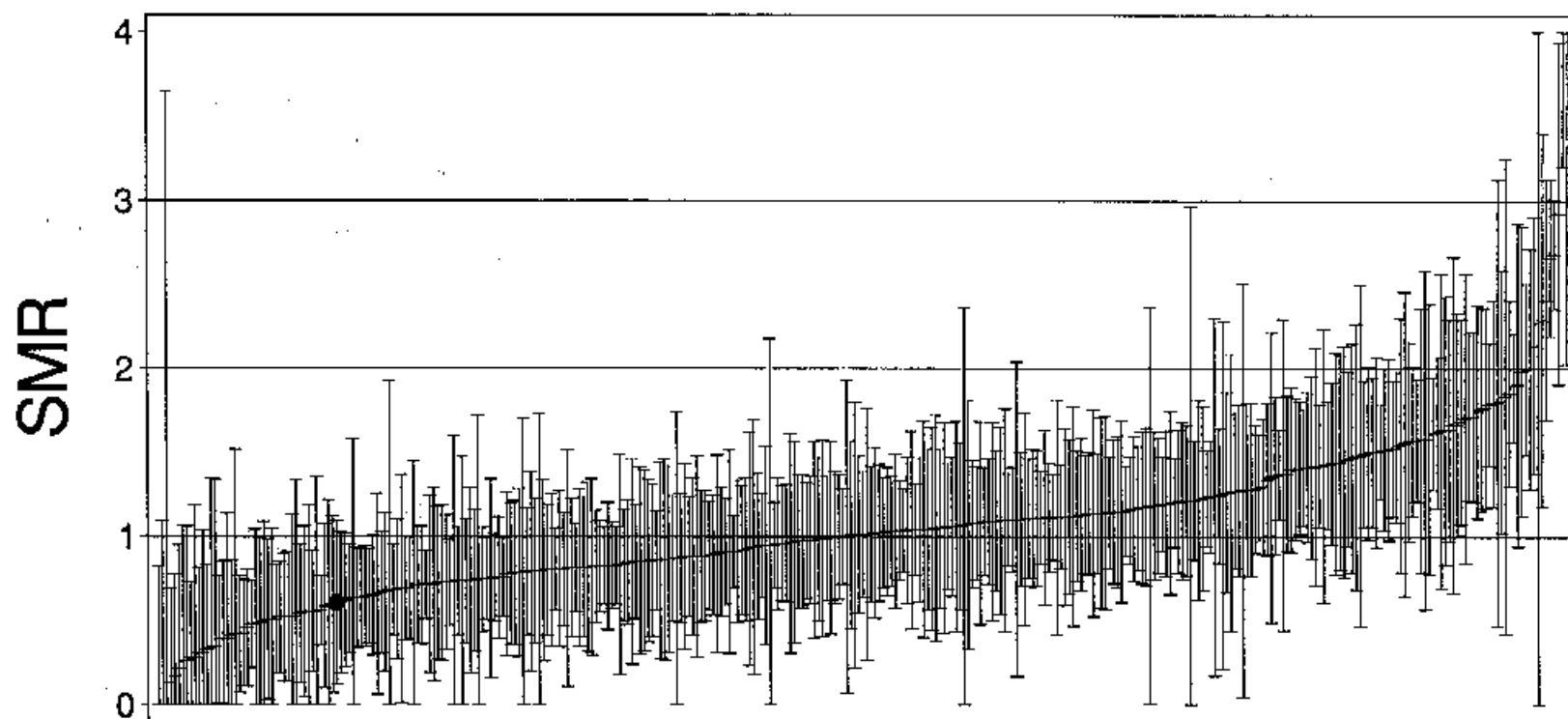
**CDHB &  
WCDHB  
Maternity  
Quality  
& Safety  
Programme  
2012-2013  
Annual Report**



# Plan of comments

- No direct comparison with “another NICU”
- A pot pourri of issues
- Early / late onset infection      IVH
- CPAP usage      Follow-up data
- What is the denominator?
- What is the difference?
- NZ versus the world

# STANDARDIZED MORTALITY RATIOS (SMR) VERMONT OXFORD NETWORK 2000



349 NETWORK CENTERS

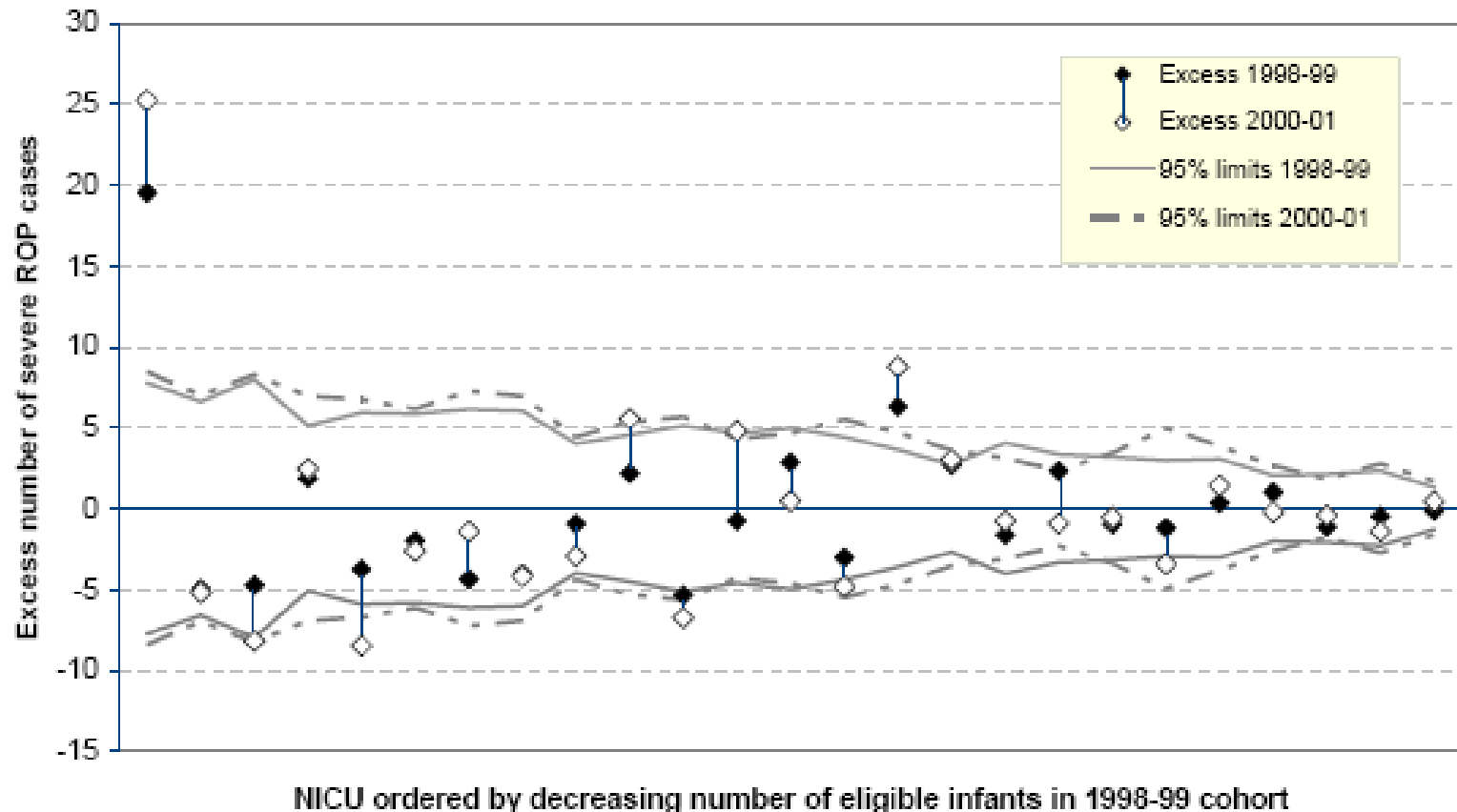
● CENTER 196

VERTICAL BAR REPRESENTS 95% CONFIDENCE INTERVAL



FIGURE 6.3

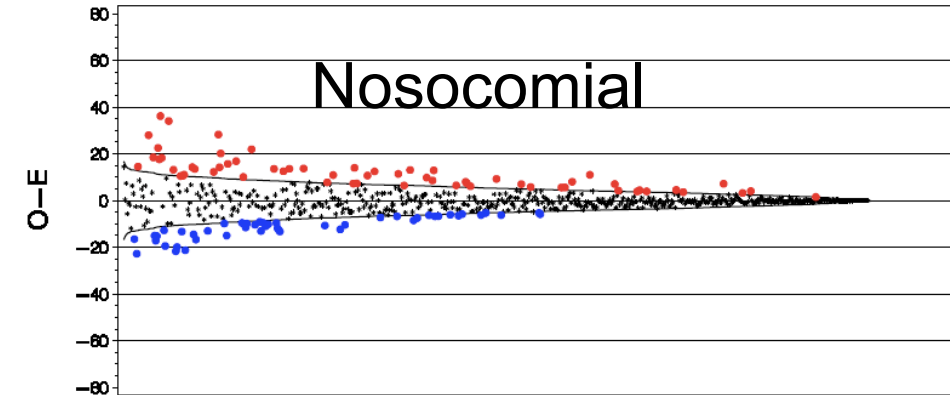
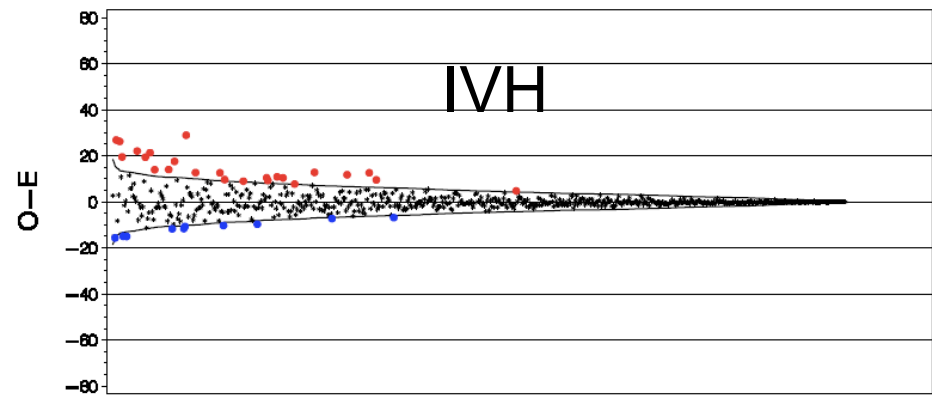
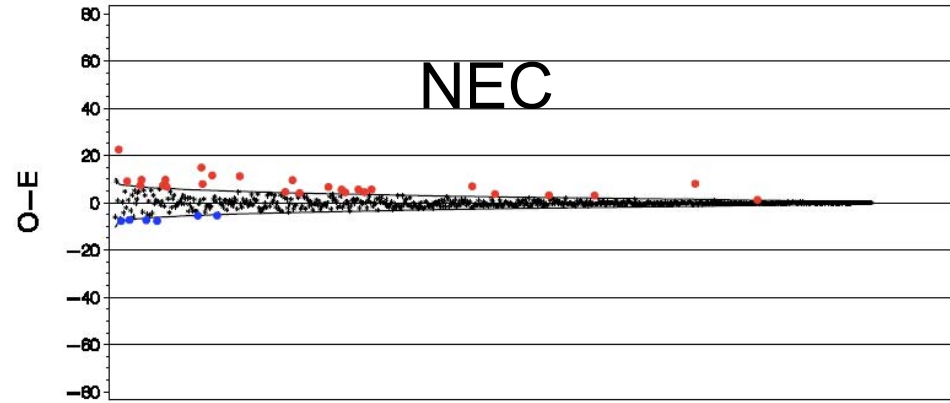
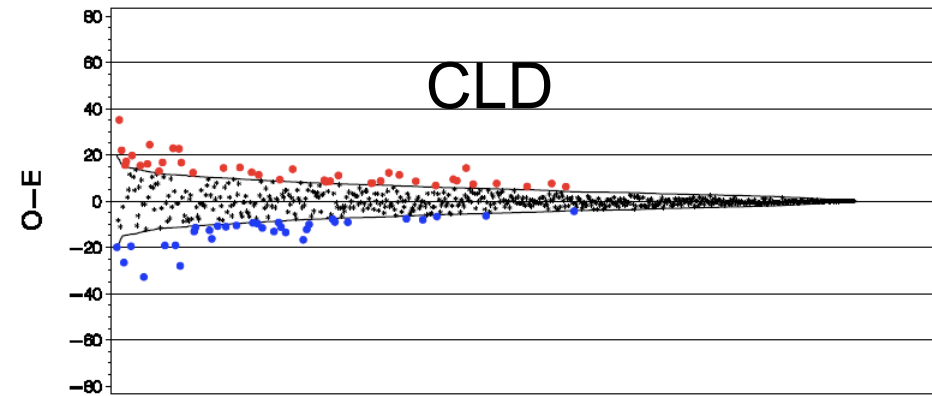
## Excess (O-E) cases of severe ROP by NICU, adjusted for case mix and sampling variability – ANZNN data



<29 weeks, survived to 36 wks PMA

*Brit J Ophthalmol* 2005;89:1592

# Shrunken O-E



After adjusting for *Risk* and *Chance*



Figure 7: % women giving birth by caesarean section (2010-11)

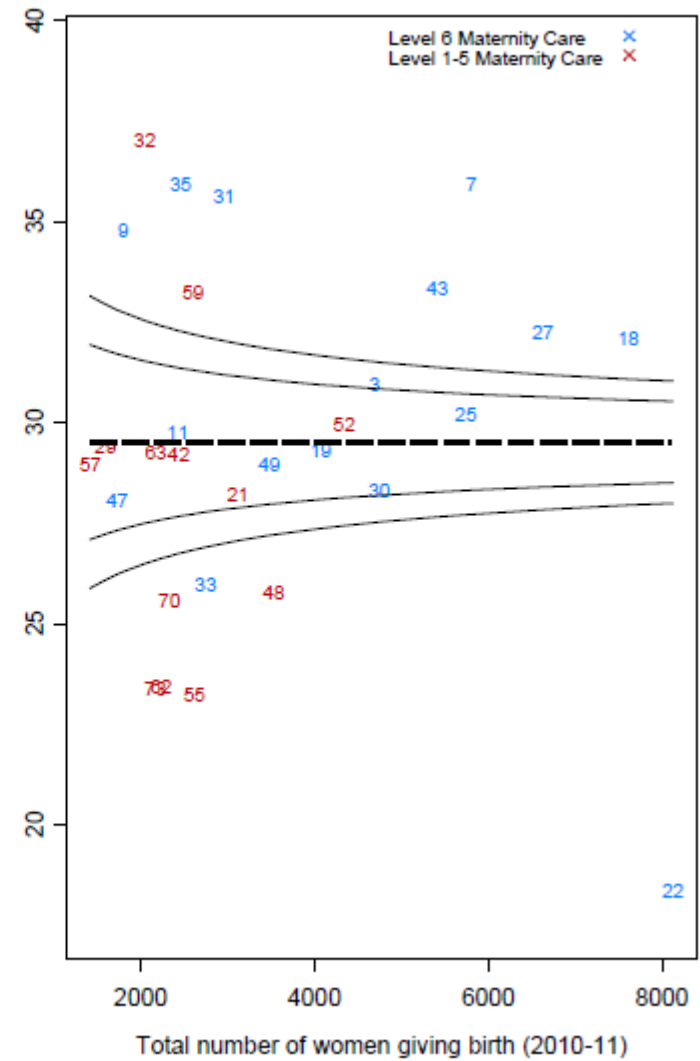
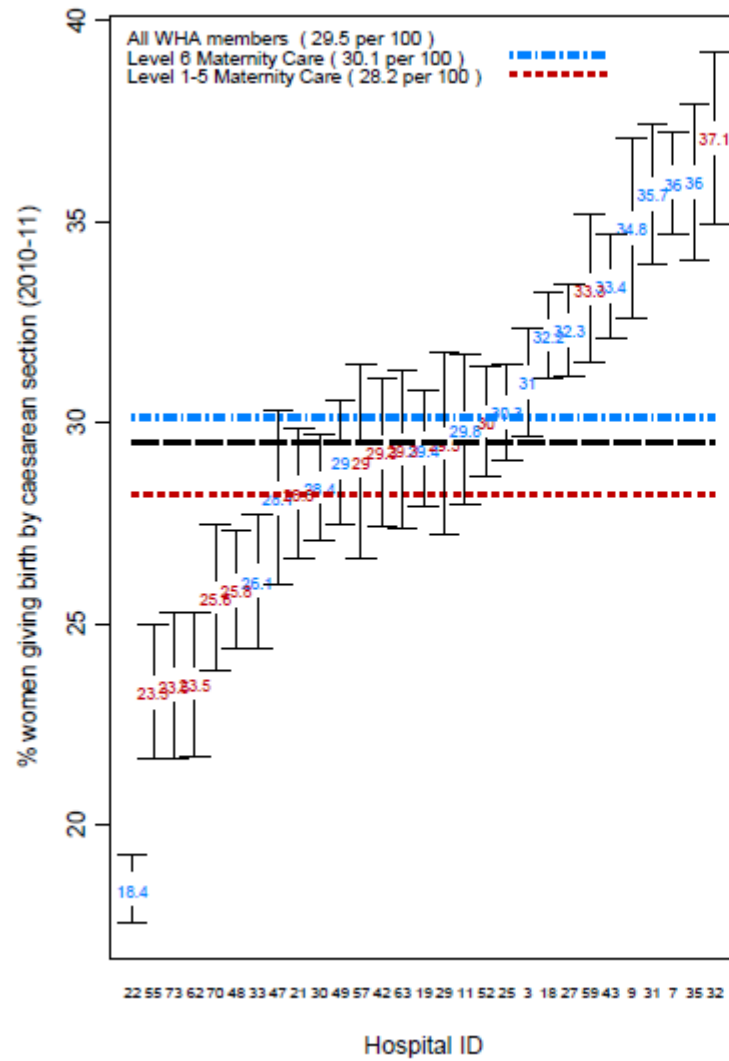
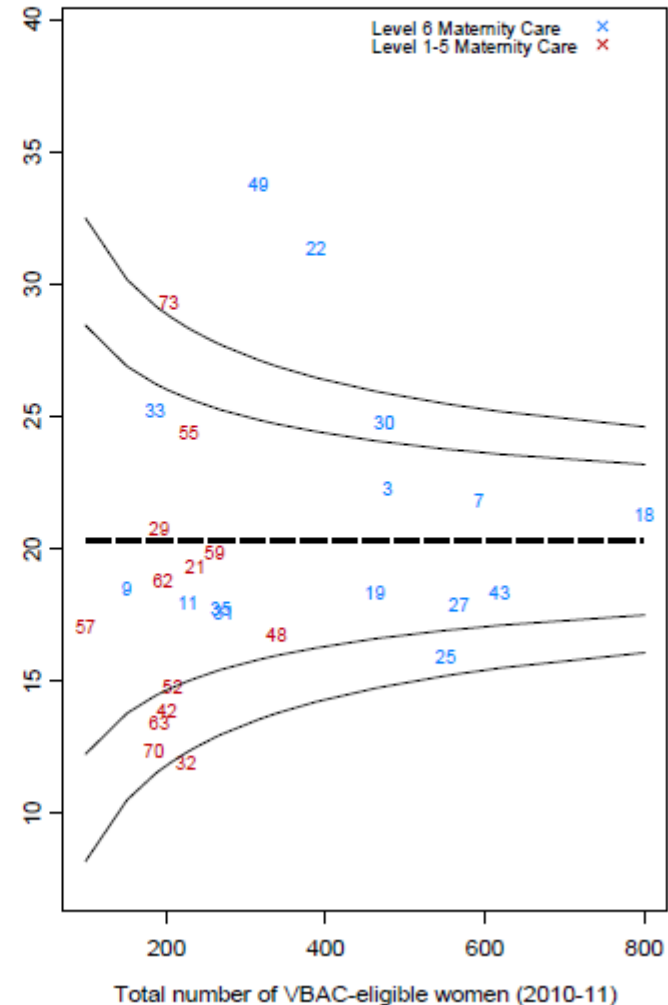
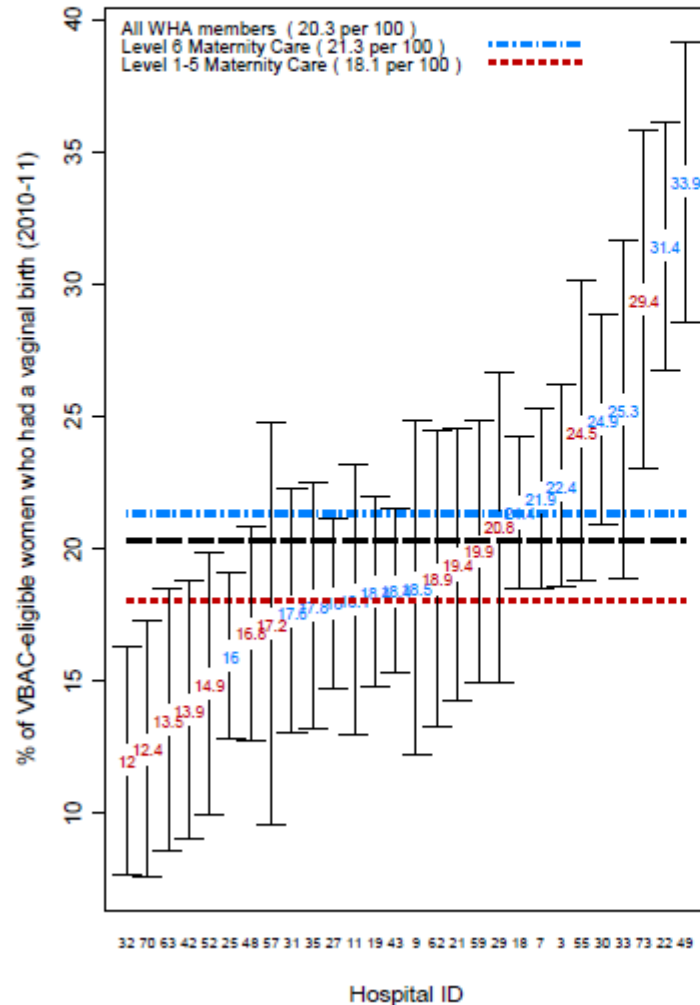
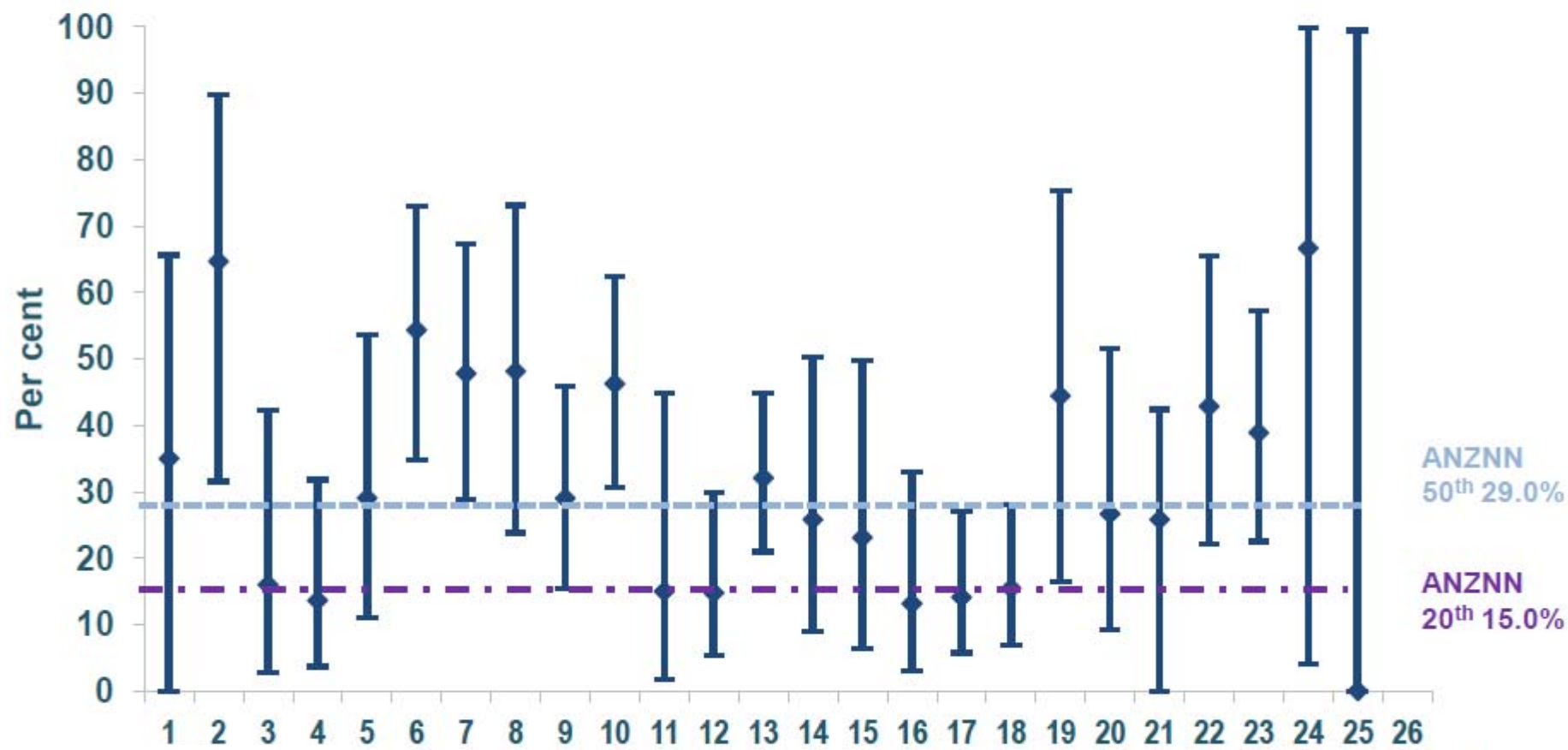


Figure 21: % VBAC-eligible women giving birth vaginally (VBAC rate per 100) (2010-11)



# Late-onset sepsis

Babies born <28 weeks GA and survived >2 days



# Excess cases of severe ROP by NICU

If concentrate on improving outcome of the 2 outlying NICUs, there would be 13 fewer cases.

The ANZNN focuses on reducing the outcome rate to that of the best 20% of NICUs – in this case 5.9% or less

If Network rate of stage 3-4 ROP reduced to 5.9%, there would be 40 fewer cases of ROP p.a.

By 2005 Using the estimates of final logistic regression model for NOVA 1998-2001, adjusting for Gestation, B.wt., Gender, Unit size  
Observed – Expected resulted in 53 fewer cases

2005 CLD in infants <32 weeks gestation  
Observed – Expected resulted in 74 fewer cases



# Inborn admissions to NICU

## 3.3 Table 7

Admissions to NICU	Preterm 479
	Term 413
	892

---

11.5% of 7786 inborn live births (incl BBA)

*(NB in Table 26 – Appendix 8 – Preterm/Term are 476 and 396 = 11.2%)*

Assuming this is Level III and Level II admissions, it is quite impressive.

Generally c. 15% inborn babies and 10% of regional births need some form of neonatal intensive/special care. Often difficult to keep admissions down.

592 births (7.5% inborn) were 32-36 weeks gestation

334 of these admitted to NICU (?others needing special care transferred) -

- accounted for 32.4% baby-days

# Admissions to NICU

## Admissions to NICU

Inborn	Admissions (% total)	Baby days (% total)	Ass vent d
32-36 weeks	334 (38.3%)	4752 (32.4%)	
Term	396 (45.4%)	2462 (16.8%)	

## CWH (2001)

33-36 weeks	40%	31%	7%
Term	41%	20%	3%

**Table 83:**

**Occupancy (baby-days) for NICU by gestational age (1999-2012)**

Gestation (weeks)	2011	2012
Total	15122	14661
<28	4312	2363
28-31	3344	1732
32-36	4659	4752
≥37	2507	2462

These figures can not be correct. Gives total 11309 infants

# Infection

**Table 99: Organisms causing serious infection in NICU (2012)**

Organism	Early Infection	Late Infection
Staph epidermidis + Ecoli	0	0
E Coli	1	4
Staph aureus	0	2
Staph epidermidis	0	6
Coagulase negative staphylococcus	1	6
Enterococcus	0	1
Enetrobacter	0	1
Candida	0	1
Citrobacter	0	0
Group B Strep	5	1
Listeria monocytogenes	0	0
Klebsiella	0	3
Pseudomonas	1	1
Other / Unknown	1	2



## Infection

**Table 99: Organisms causing serious infection in NICU (2012)**

Organism	Early Infection	Late Infection
Staph epidermidis + Ecoli	0	0
E Coli	1	4
Staph aureus	0	2
Staph epidermidis	0	6
Coagulase negative staphylococcus	1	6
Enterococcus	0	1
Enetrobacter	0	1
Candida	0	1
Citrobacter	0	0
<b>Group B Strep</b>	5	1
Listeria monocytogenes	0	0
Klebsiella	0	3
Pseudomonas	1	1
Other / Unknown	1	2

# Early-onset GBS sepsis

- 5/9 cases “Early infection” due to GBS

*(Uncertain if 1<sup>st</sup> 48 hrs, first 5 days, first week)*

*(Seems no inborn babies died from EOS, but a Waitakere baby [41 weeks] died on day 0 from “sepsis” - ?GBS)*

- The incidence of early-onset GBS sepsis is:

**0.64 per 1,000 births**

*(Table 37 “Organisms causing serious infection in NICU”, so assume inborn and outborn. Figure above uses 7786 ACH livebirths as denominator)*

# Early-onset GBS sepsis

- National survey (NZPSU) Apr 2009 – Mar 2011
- The incidence of early-onset GBS sepsis (48 hrs) had halved in the 10 years since the previous survey, to

**0.25 per 1,000 (95%CI 0.17 - 0.33)**

- 31 cases of GBS sepsis

In 14 (45%) cases there were risk factors for GBS

Only 5 of these had IAP (36% RF cases; 16% all GBS)

# Early-onset GBS sepsis

In NZ 60% of all EOS cases had antenatal Risk Factors:

- Only 50% of these have any IAP

Despite a Consensus NZ Guideline (*NZ Med J* 2004; 117: No. 1200) it is clear individual practice varies and different protocols exist – adding to confusion

Both US and UK reports note "poor compliance with IAP guidelines"

- If all GBS cases with risk factors had had IAP, incidence might have been .17 per 1,000

*New Consensus Guidelines under discussion but will still be risk-based.*

## Late-onset neonatal sepsis

Organism	Early Infection	Late Infection
Staph epidermidis + Ecoli	0	0
E Coli	1	4
Staph aureus	0	2
Staph epidermidis	0	6
Coagulase negative staphylococcus	1	6
Enterococcus	0	1
Enetrobacter	0	1
Candida	0	1
Citrobacter	0	0
Group B Strep	5	1
Listeria monocytogenes	0	0
Klebsiella	0	3
Pseudomonas	1	1
Other / Unknown	1	2

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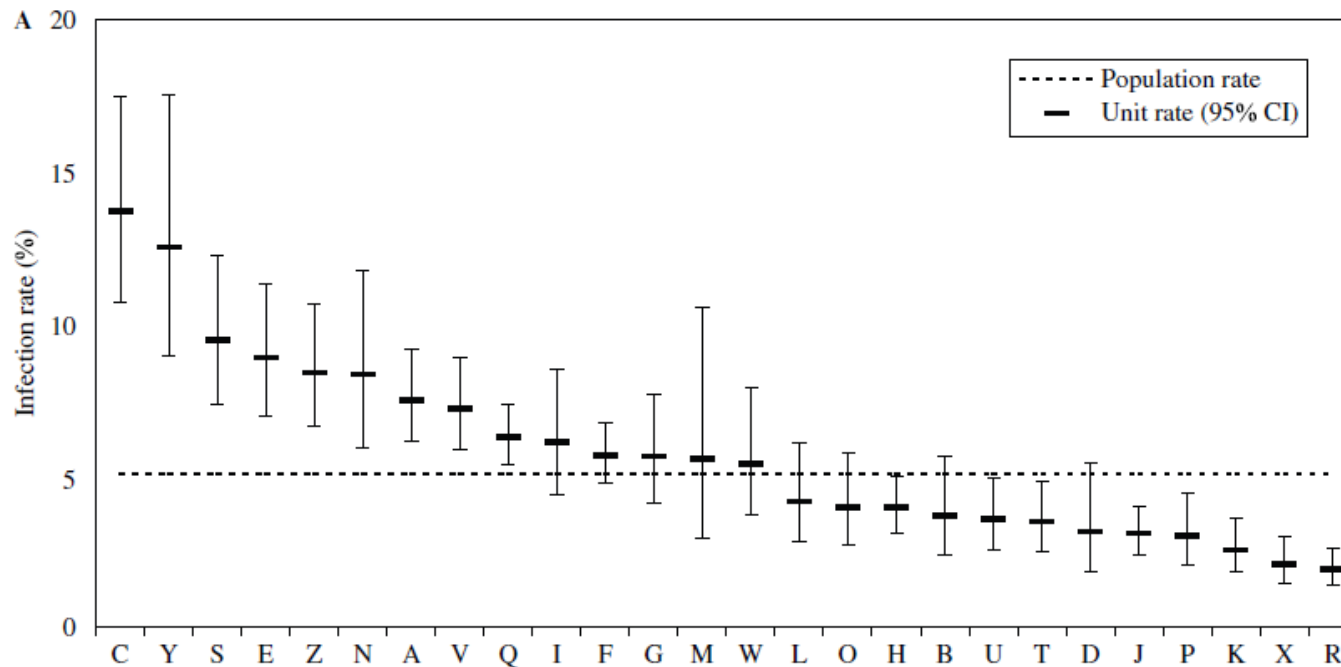
28

Is this babies (rather than episodes)? 28/1000 (2.8%) NICU admissions had LOS  
 If all <32 wks, ie 28/167, 16.8%.



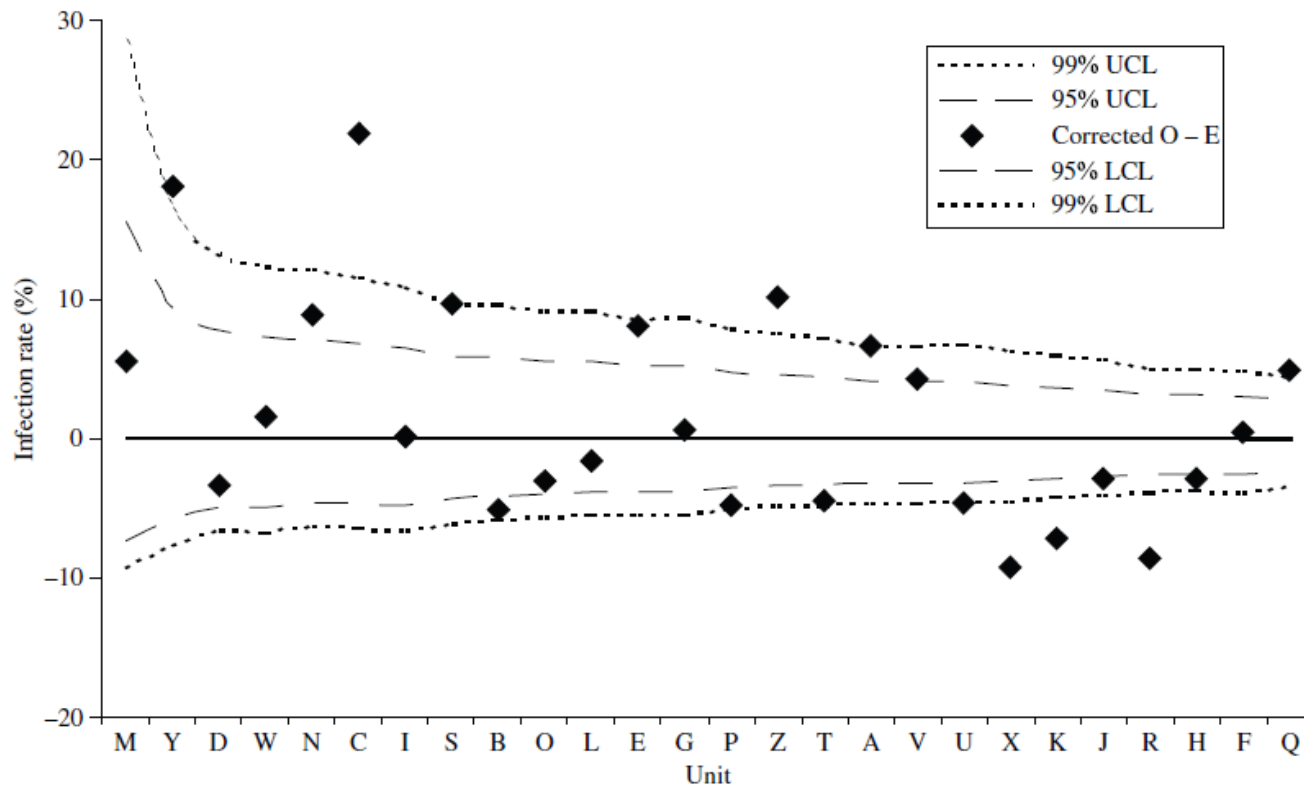
# Late-onset neonatal sepsis

What is most useful for benchmarking is number of episodes/1,000 baby days  
(If all in <32 weeks : 6.8 per 1,000 baby days)



May be useful to censor to 35 days and to report suspected rates also  
*Gill J Hosp Inf 2009 ANZNN data 2002-4; <1000g*

# Late-onset neonatal sepsis



Censored to 35 days. Adjusted for GA and gender  
Gill 2009

# Intraventricular haemorrhage

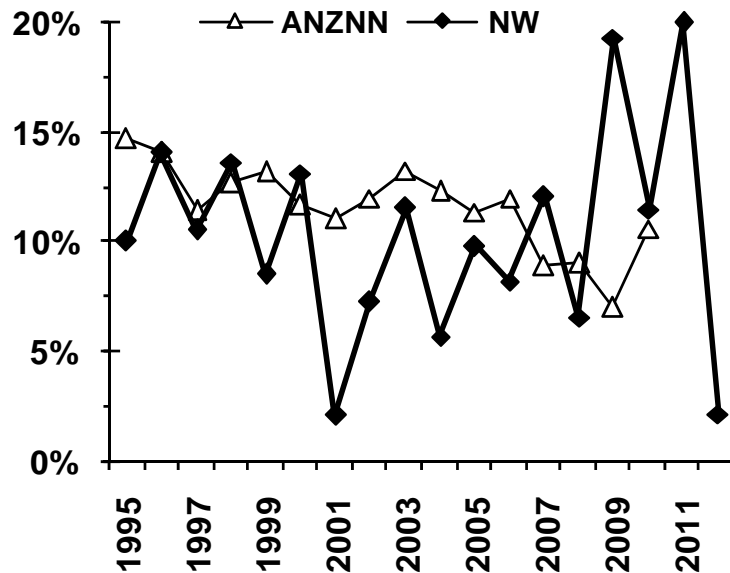


Figure 88: Severe (G3-4) IVH at 24-27 weeks

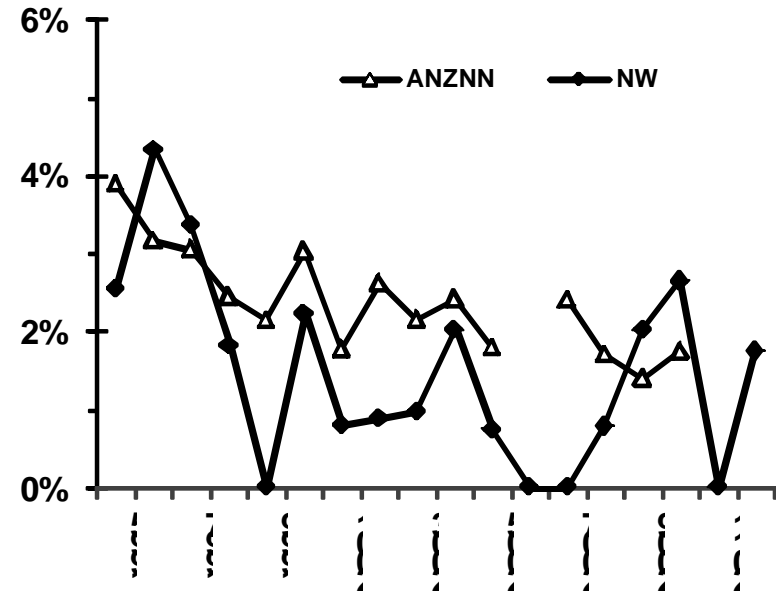
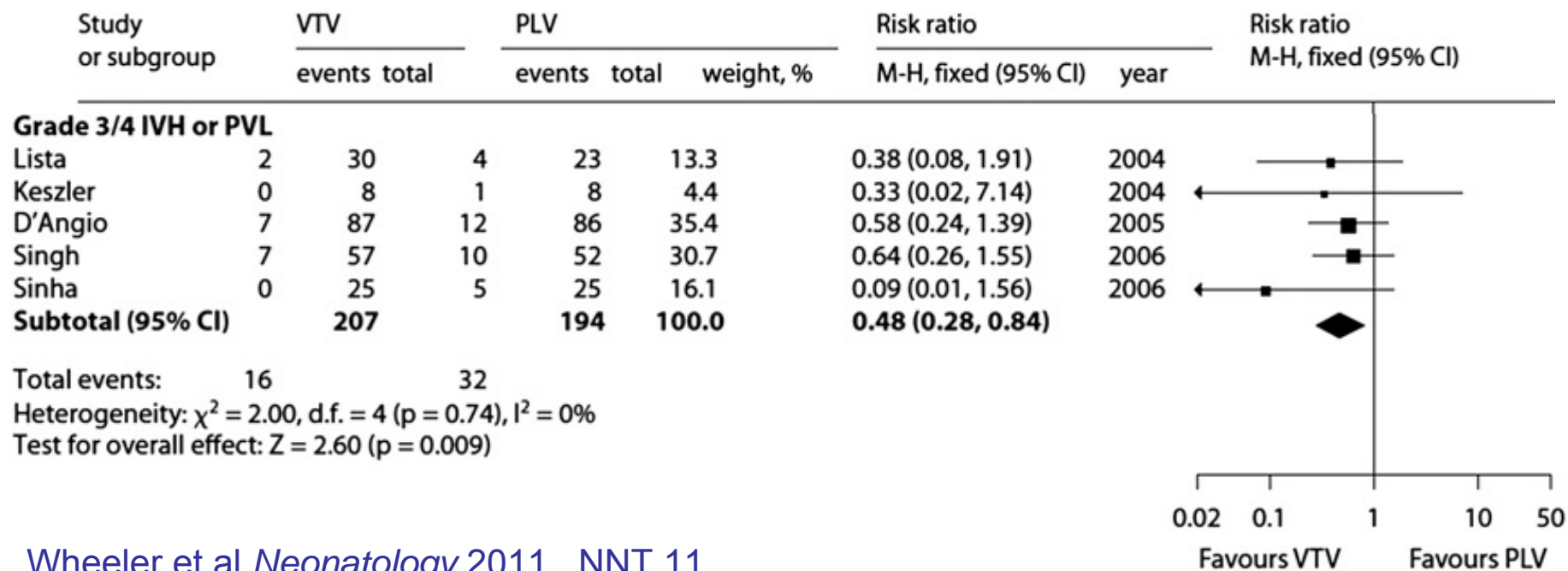


Figure 90: Severe (G3-4) IVH at 28-31 weeks

Apart from 2009-11 for 24-27 wk group it does look as if there has been an overall decline in severe IVH both at NWH and in the ANZNN.

Why?

# Intraventricular haemorrhage



Wheeler et al *Neonatology* 2011   NNT 11

Not all ANZNN NICUs use Volume Targeted Vent as preferred mode of ventilation. Could well be worth exploring further – death, BPD, PTx are other outcomes of interest.

VTV associated with less hypocarbia and may stabilise cerebral perfusion.

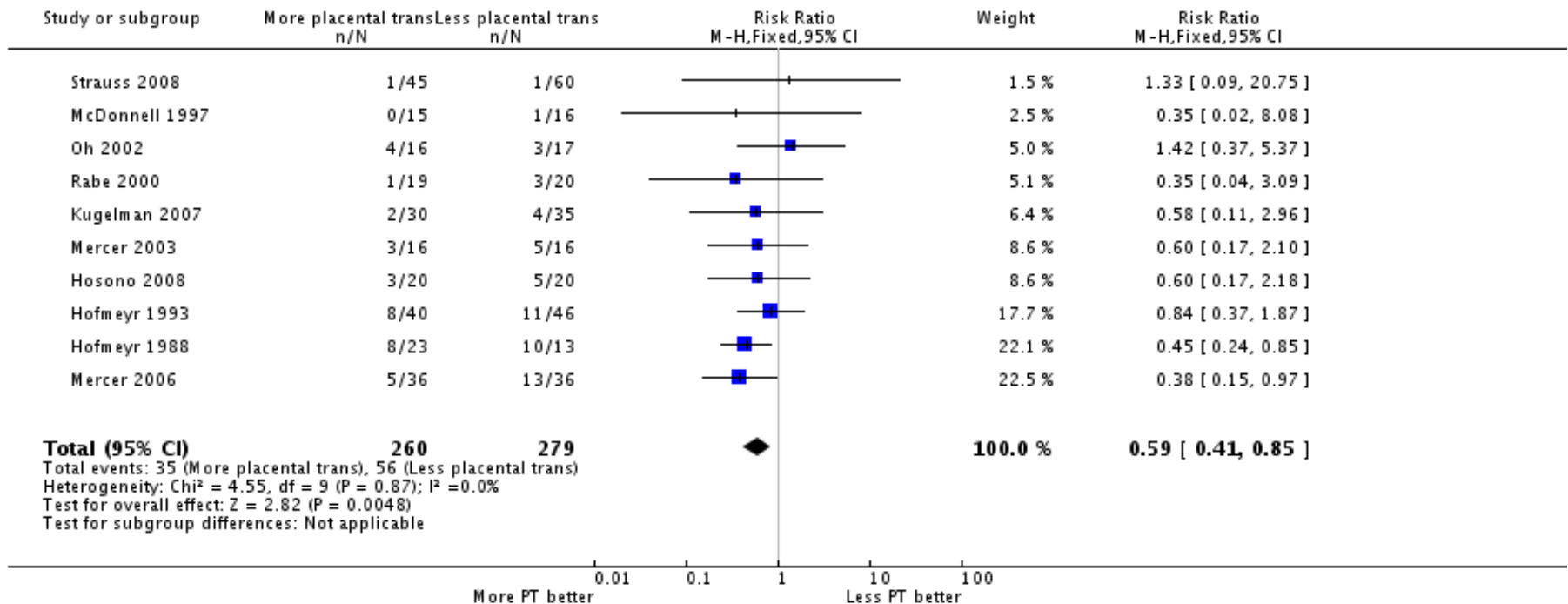
# Intraventricular haemorrhage

## Delayed cord clamping

Meta-analysis of 15 trials shows decr IVH, NEC, sepsis

Rabe Neonatology 2007 Cochrane Review 2012

Review: Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes  
Comparison: 1 More placental transfusion (delayed clamping) versus less placental transfusion (early clamping)  
Outcome: 21 Intraventricular haemorrhage (all grades)





# Intraventricular haemorrhage

Different strategies. Include 24-36 weeks' gestation.

No benefit for severe IVH but small numbers.

Lack of long-term follow-up data.



NZ centres:

Christchurch Women's (Sept 2012)

Auckland Hospital (April 2013)

Dunedin Hospital (June 2013)

Waikato Hospital (May 2013)

Wellington - pending

NHMRC funded

Will recruit 1600 <30 week gestation

Death or major morbidity at 36 wks PMA  
[30% - 10% mort, 20% morbidity]

90% power to detect 8% absolute diff  
[relative risk reduction 27%]

## CPAP usage

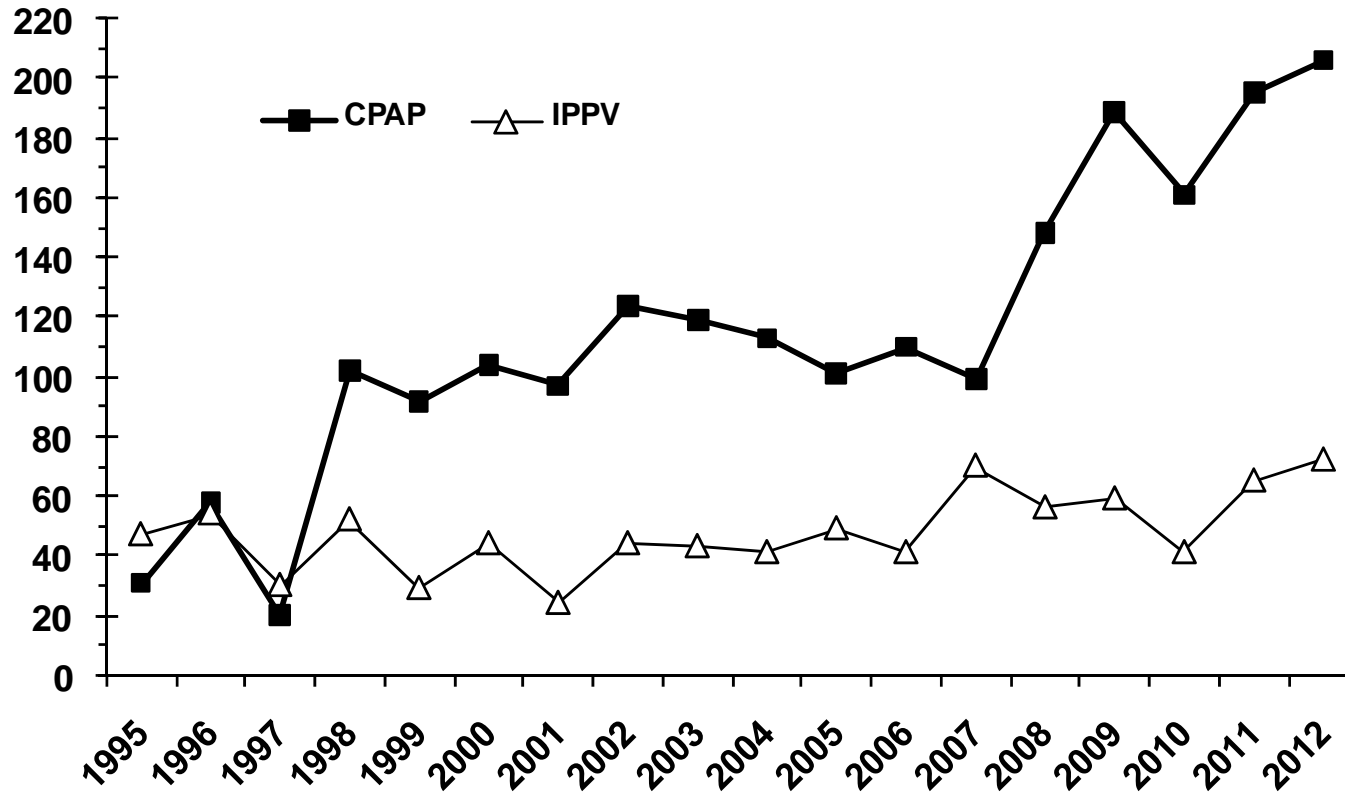
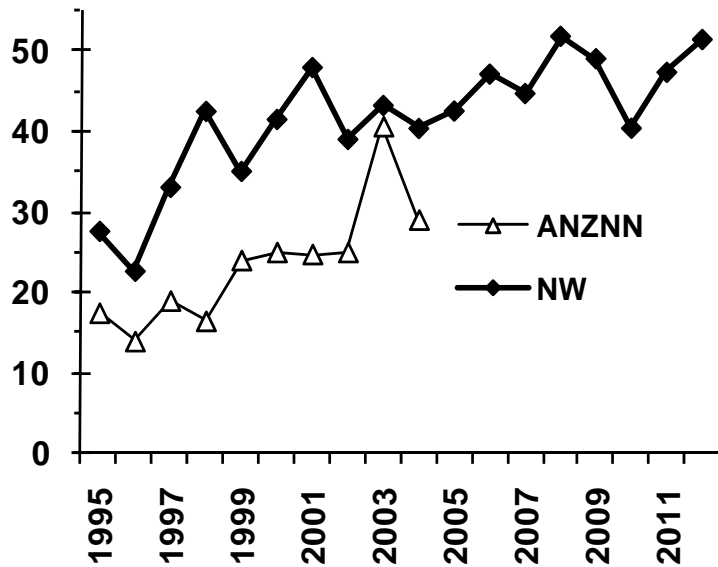
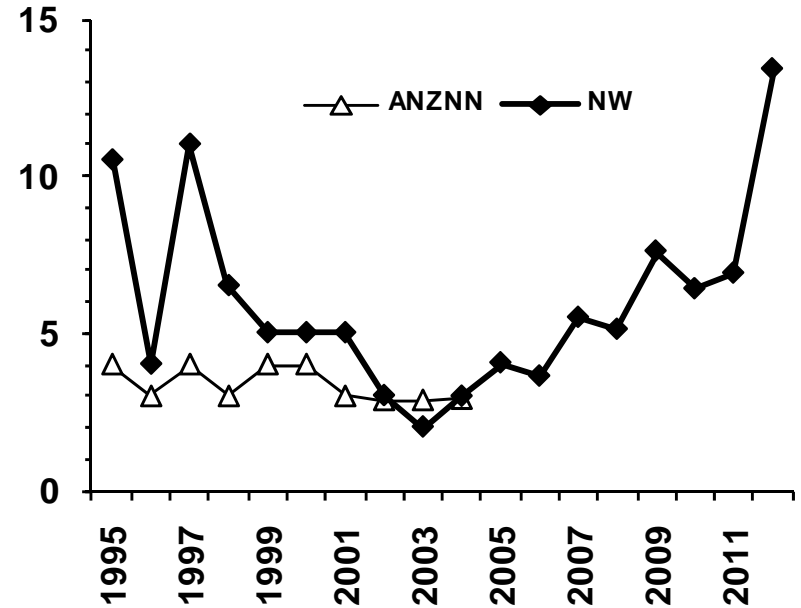


Fig 39. Number of term and post term babies needing assisted ventilation – inborn and outborn

# CPAP usage



Median days on CPAP (24-27 wks ANZNN assigned)



Median days on CPAP (28-31 wks ANZNN assigned)

## CPAP usage

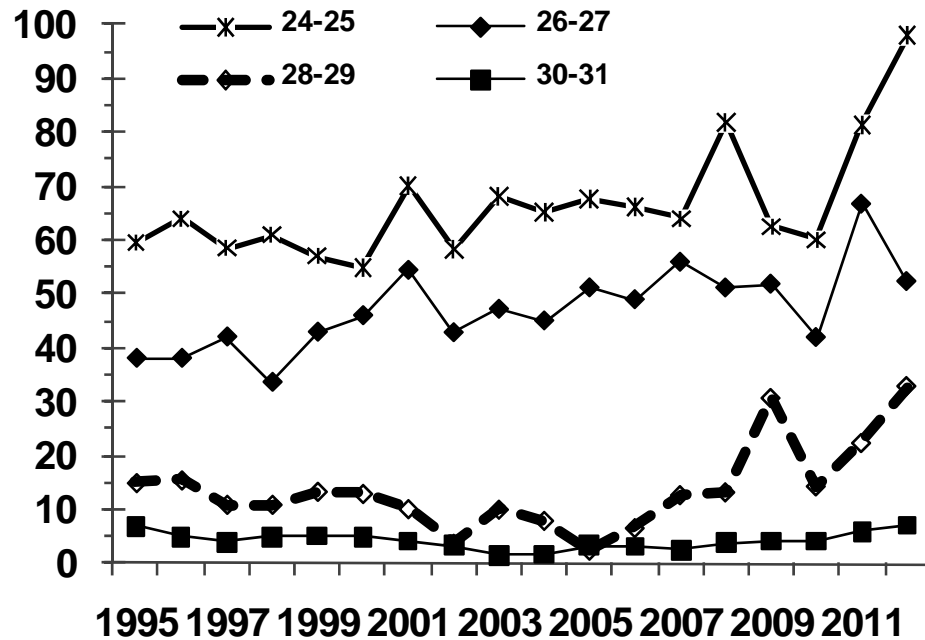


Fig 25. Median days on CPAP + IPPV <32 weeks

## CPAP usage

How do you wean from CPAP?

[From 2010 have used high flow O<sub>2</sub>/air to aid weaning]

Todd *Arch Dis Child FNE* 2012; 97: F236

<30 weeks, “stable” on 4-6 cm H<sub>2</sub>O for ≥24 hrs

Compared 3 methods of weaning in RCT

M 1. Take infant OFF

M 2. Cycle off and on 6hrly with increasing time off

M3. As 2 but use nasal oxygen/air (0.5 l/min) when off

# CPAP usage

Todd *Arch Dis Child FNE* 2012; 97: F236

**Table 2** Outcome indicators by CPAP weaning method (intension to treat multivariate analysis n=177)

	M1 (n=56)	M2 (n=69)	M3 (n=52)	Sig
Time of wean <sup>†</sup>	11.3±0.8	16.8±1.0*	19.4±1.3*	p<0.0001
Total days CPAP	24.4±0.1	38.6±0.1*	30.5±0.1*	p<0.0001
CGA OFF CPAP	31.9±0.1	34.1±0.1*	32.8±0.2*	p<0.0001
Oxygen duration <sup>‡</sup>	24.1±1.5	45.8±2.2*	34.1±2.0*	p<0.0001
BPD	7/56 (12.5%)	29/69 (42%) <sup>†</sup>	10/52 (19%)	p=0.011
Length of Admission <sup>\$</sup>	58.5±0.1	73.8±0.1*	69.5±0.1*	p<0.0001
CGA at D/C <sup>#</sup>	35.8±0.1	36.9±0.1*	36.9±0.1*	p<0.0001

Adjusted for gender and Apgar scores at 1 and 5 min within a generalised linear model.

\*Significantly longer/more than M1 p<0.001, <sup>†</sup>p<0.01 (Bonferroni adjusted).

Estimated marginal means±1SE, <sup>‡</sup>days, <sup>\$</sup>days in level 3 intensive care and <sup>#</sup>D/C, discharge.

CGA, corrected GA; CPAP, continuous positive airway pressure.

M1 shortened weaning time, time on CPAP, O2 duration, and reduced BPD rates and admission time

## CPAP usage

Other data suggest that weaning by pressure is better than “time-cycling”

[Chowdhury *Eur J Pediatr* 2012]

## Pneumothorax

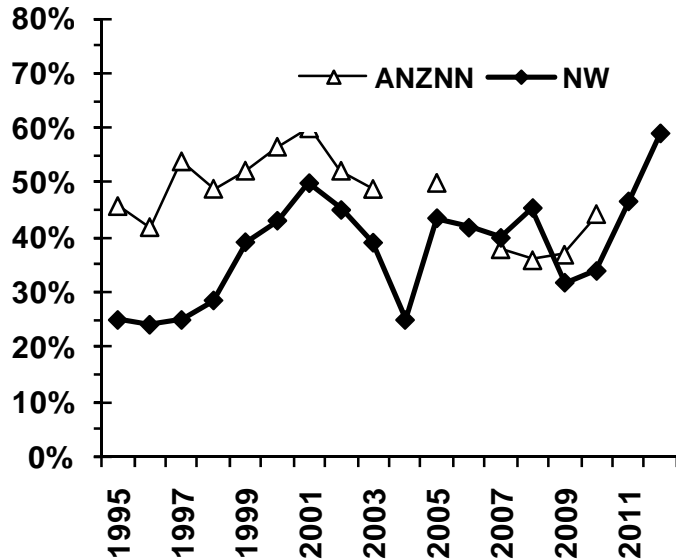
nCPAP associated with increased risk

VTM associated with lower rates than PLV

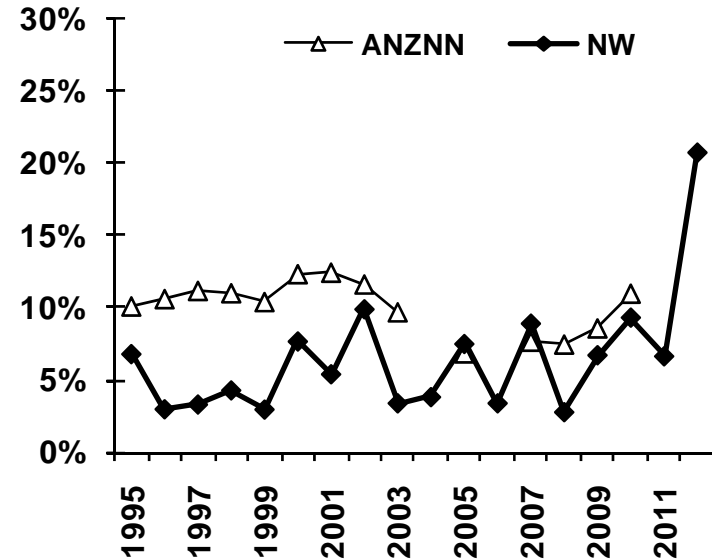
In both 2011 and 2012, number <32 weeks/<1500g having PTx requiring drainage at NWH was **ZERO**



# Chronic lung disease



Chronic lung disease at 24-27weeks



Chronic lung disease at 28-31weeks

Looks to be an increase in 2012 (have yet to see ANZNN returns).

BOOST-NZ recruited in 2006-end 2009.

SpO2 targets increased to 90%-94% (when? Website update Feb 2013)

May be helpful if ANZNN adopts physiological criteria

# Follow-up data

<1500g birthweight; at 2 years corrected

Bayley Scales – III<sup>rd</sup> Edition

Severe delay includes Cognitive Score >2sd below mean

## Comments:

- Why birthweight based criteria?
  - Historical cohorts were based on weight but all now by GA
  - B Wt can mask disadvantage of SGA and male infants
  - The obstetrician knows the gestation – what we need to use when talking with parents
  - ANZNN Follow-up dataset is: <28 weeks and/or <1000g

# Follow-up data

## Comments:

- BSID III scales – very different from Bayley II
  - Now 2 motor (fine and gross), 2 language (receptive and expressive) and cognitive scale. Cognitive and Language CS not  $\equiv$  MDI
  - Reference population for norming B III was seeded with 10% at risk children –prems, Down syndrome etc.
  - Victoria cohort (Anderson *APAM 2010*) EP/ELBW vs controls.  
Mean CCS Controls 108.9 : EP 96.9  
3% EP group CCS <70, compared with 18-24% earlier cohorts BII MDI  
(*They concluded always need a local control group*)
  - Marlow using UK data has shown a BIII Cog or Lang <85 has good sensitivity / specificity for BII MDI <70  
This is being used in BOOST II, COT, NeOPRoM for major disability

**BSID CCS < 70:**

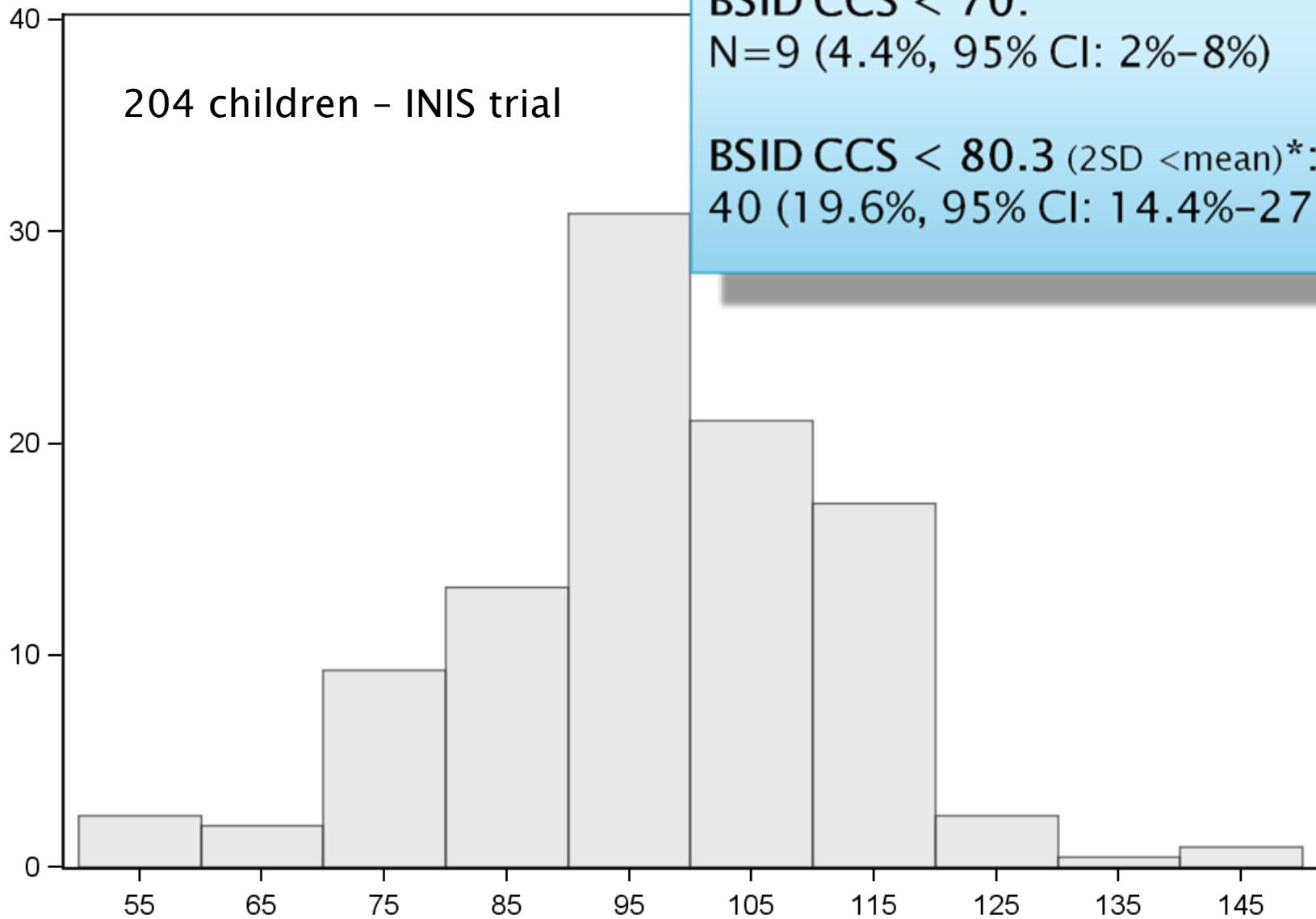
**N=9 (4.4%, 95% CI: 2%–8%)**

**BSID CCS < 80.3 (2SD < mean)\*:**

**40 (19.6%, 95% CI: 14.4%–27.7%)**

204 children – INIS trial

Percent



BSID III: Cognitive composite

*\* Using Australian normative cohort as reference group*

# Follow-up data

148 <1500g born in 2010

9 Congen Abn : 11 lost : 13 other centres : 7 overseas : 1 DNA

103 (76%) have data (86 seen CDU at ACH)

**Table 17: Outcome of children <1500g born in 2010 at 2 years (corrected) by gestational age groups (n=103)**

Outcome Category	Gestational age (weeks)					
	24 - 28 weeks n= 59		29 – 35 weeks n= 44		Total n=103	
	n	%	n	%	n	%
I	3	5.1	0	0.0	3	2.9
II	2	3.4	2	4.5	4	3.9
III	0	0.0	2	4.5	2	2.0
IV	54	91.5	40	91.0	94	91.2

- I. Sensorineural deaf, blind, severe CP, BIII CS 2 SD below mean (CS <70)
- II. BIII CS 1-2 SD below mean, mild-mod CP, require spectacles, conduct deaf
- III. B III CMotorS >1 SD below mean but CS normal

## Data from BOOST II studies in Australia, NZ, UK *NEJM* 2013

	Australia		New Zealand		UK	
	Low (N=568)	High (N=567)	Low (N=170)	High (N=170)	Low (N=486)	High (N=487)
<b>GA Wks Mean (SD)</b>	26.0 (1.2)	26.0 (1.2)	26.1 (1.2)	26.1 (1.2)	26.0 (1.3)	26.0 (1.3)
<b>B Wt g Mean (SD)</b>	817 (177)	833 (190)	873 (202)	884 (186)	818 (182)	824 (188)
<b>Outborn</b>	7.7%	7.4%	6.5%	7.6%	11.7%	12.3%
<b>Death at discharge</b>	17.5%	14.6%	12.4%	14.1%	23.8%	19.9%

Male, Multiples, ANS all similar

Why are NZ infants so much heavier?

Accuracy of dates?  
Fewer SGA babies?

## Neonatal outcomes: multivariate analysis

Adjusted odds ratios – ANZNN vs. CNN

Outcomes	<25	25 – 26	27 – 28	29 – 31	Overall
Mortality	0.98	0.93	1.14	1.08	1.01
CLD	1.18	0.72	0.63	0.53	0.67
IVH grade 3+	1.02	0.72	0.6	0.45	0.68
ROP grade 3+	0.7	0.64	0.75	1.65	0.71
NEC	1.39	0.73	0.67	0.3	0.65
Airleak	1.06	0.86	1.43	1.48	1.2
Early onset sepsis	0.69	1.28	1.7	1.46	1.33
Late onset sepsis	0.9	0.76	0.81	0.88	0.83
ANZNN better outcome					
CNN better outcome					

29 ANZNN (9995) and the 26 CNN (7141) NICUs between 2005 and 2007

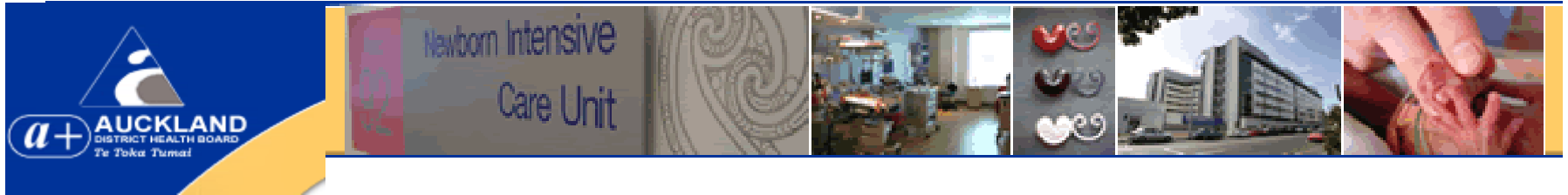
*Adjusted for GA, sex, SGA, Apgar 5<sup><7</sup>, outborn, mat age, mat hypertension, ANS, mode delivery, multiples.*



# Summary

- Excellent report
- Excellent outcomes – benchmarking with ANZNN shows a “top NICU”
- ANZNN data very good in international terms (but some questions in these data)
- *Please* be careful/clear about denominators – if others want to use now or in future need to be able to interpret
- Could be value in showing some DHB data (or hospital data from Waitakere and North Shore) to aid interpretation

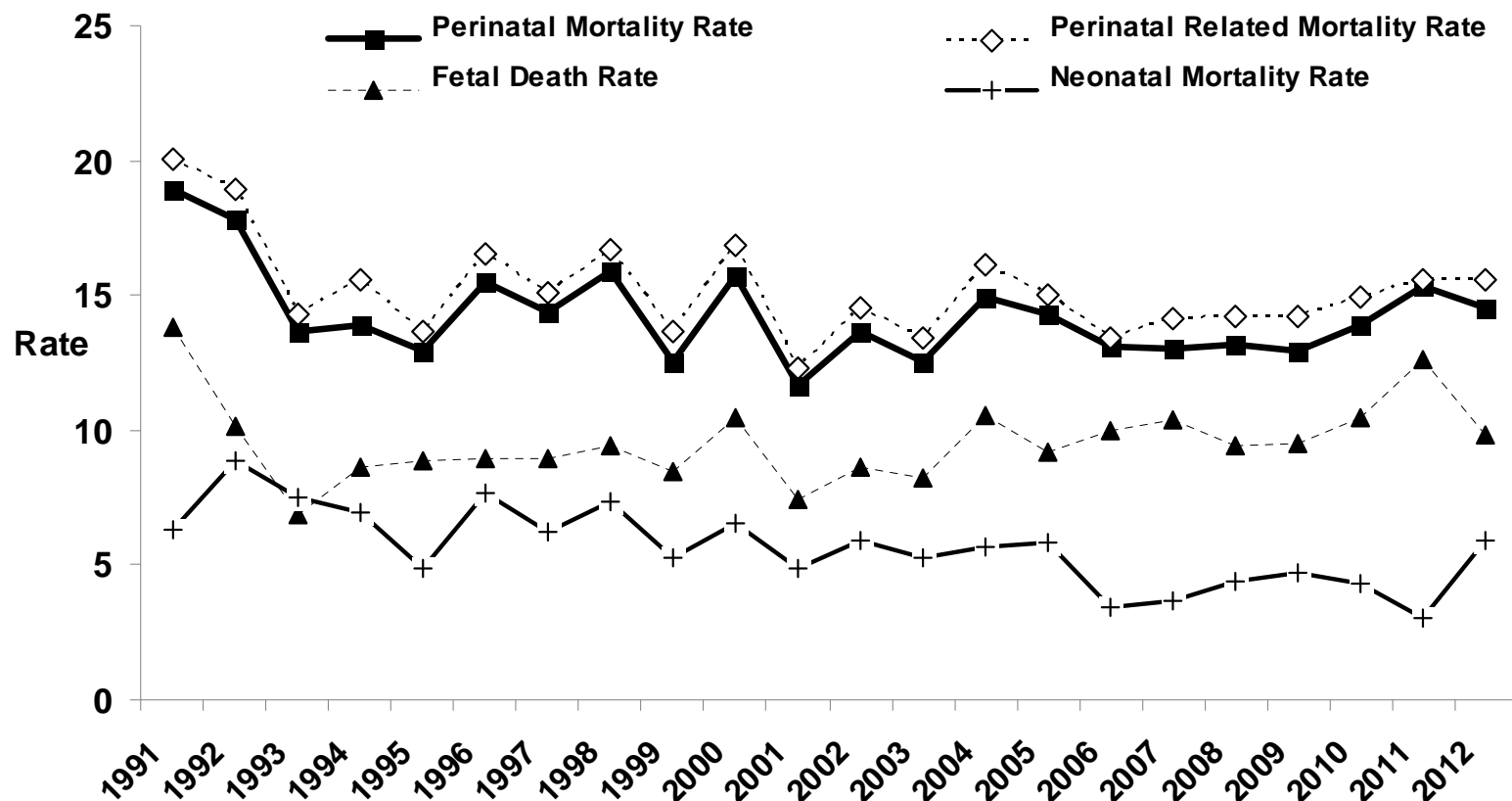
# Thank you



## Newborn Services pages and Clinical Guidelines

are much appreciated by other centres





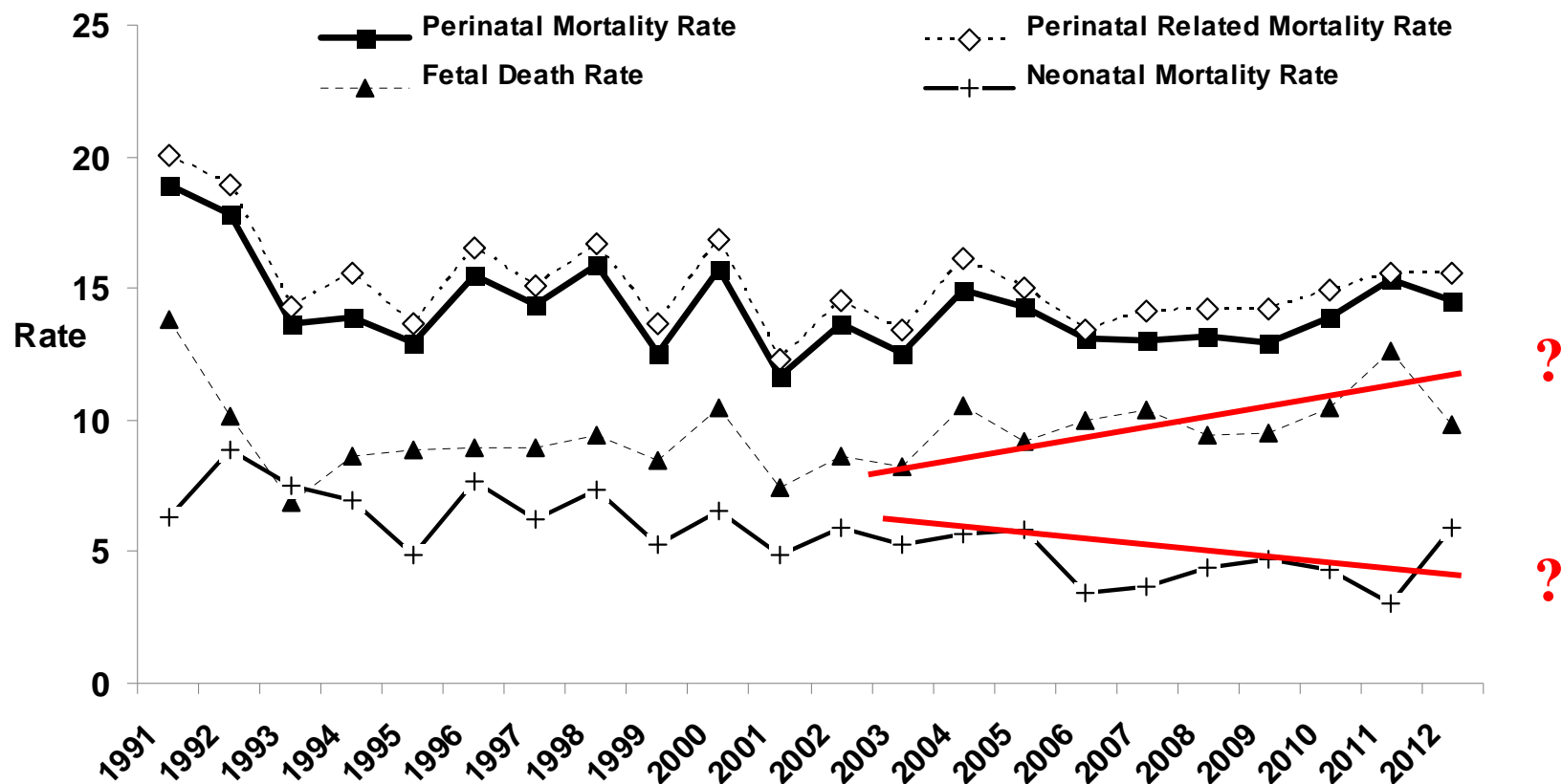
PMMRC 2013

2012 NWH PMR (fetal and early neonatal deaths) 14.5 per 1000

2011 NZ PMR 10.2 per 1000

ADHB 2011 10.8 per 1000  
1000

Waitemata DHB 2011 10.5 per 1000



PMMRC 2013 Report  
Auckland PMR 2011 10.

Currently WHO recommends:

National Data

**Fetal deaths** – B.Wt **500g** or more, or if B.Wt not available, G.A. of at least **22 weeks**, plus

**Liveborn infants** (B.Wt /G.A. as above) who die **before 7** completed days.

International Data

**Fetal deaths** – B.Wt **1000g** or more, or if B.Wt not available, G.A. of at least **28 weeks**, plus

**Liveborn infants** (B.Wt /G.A. as above) who die **before 7** completed days.

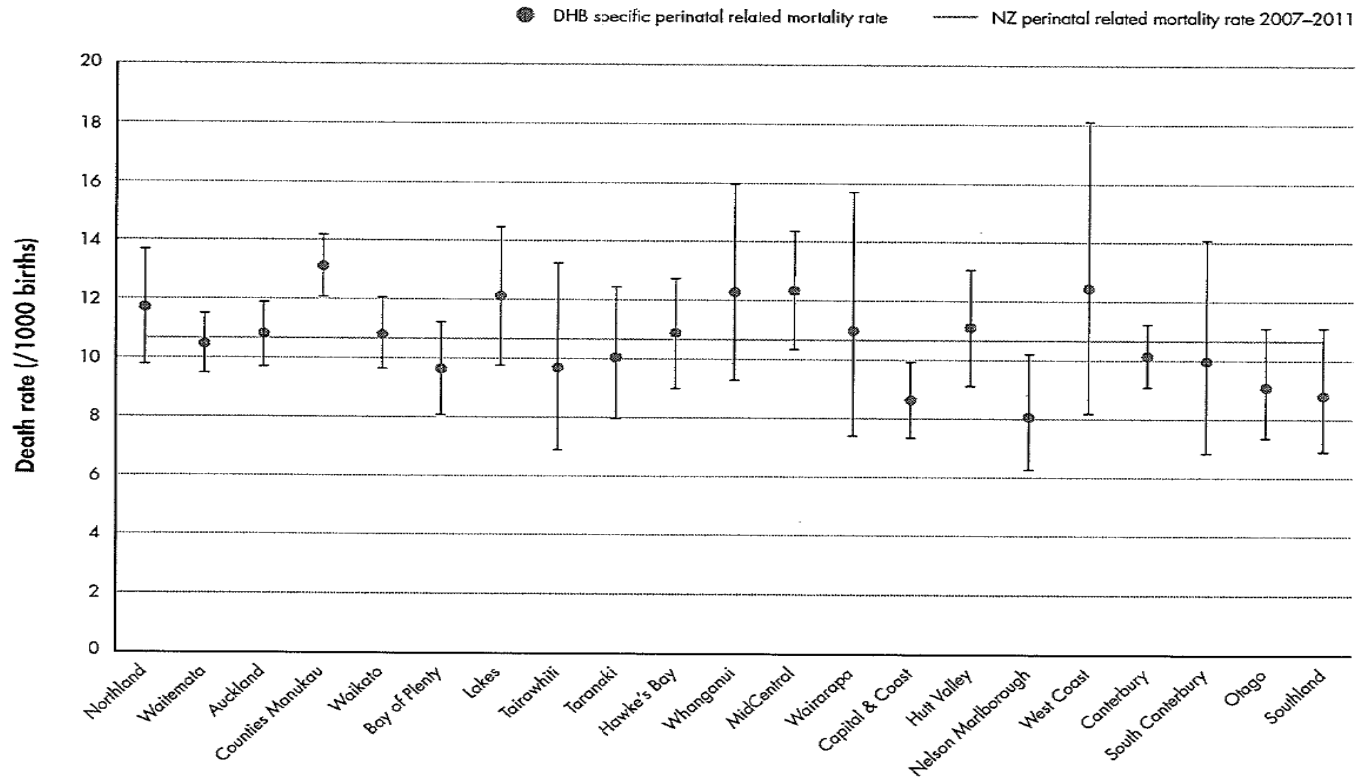
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Both Australia and New Zealand use:

**Fetal deaths** – B.Wt **400g** or more, or if B.Wt not available, G.A. of at least **20 weeks**, plus

**Liveborn infants** (B.Wt /G.A. as above) who die **before 28** completed days.

Figure 27: Perinatal related death rates (per 1000 births) by DHB of residence (mother) compared to New Zealand perinatal related mortality (with 95% CIs) 2007–2011

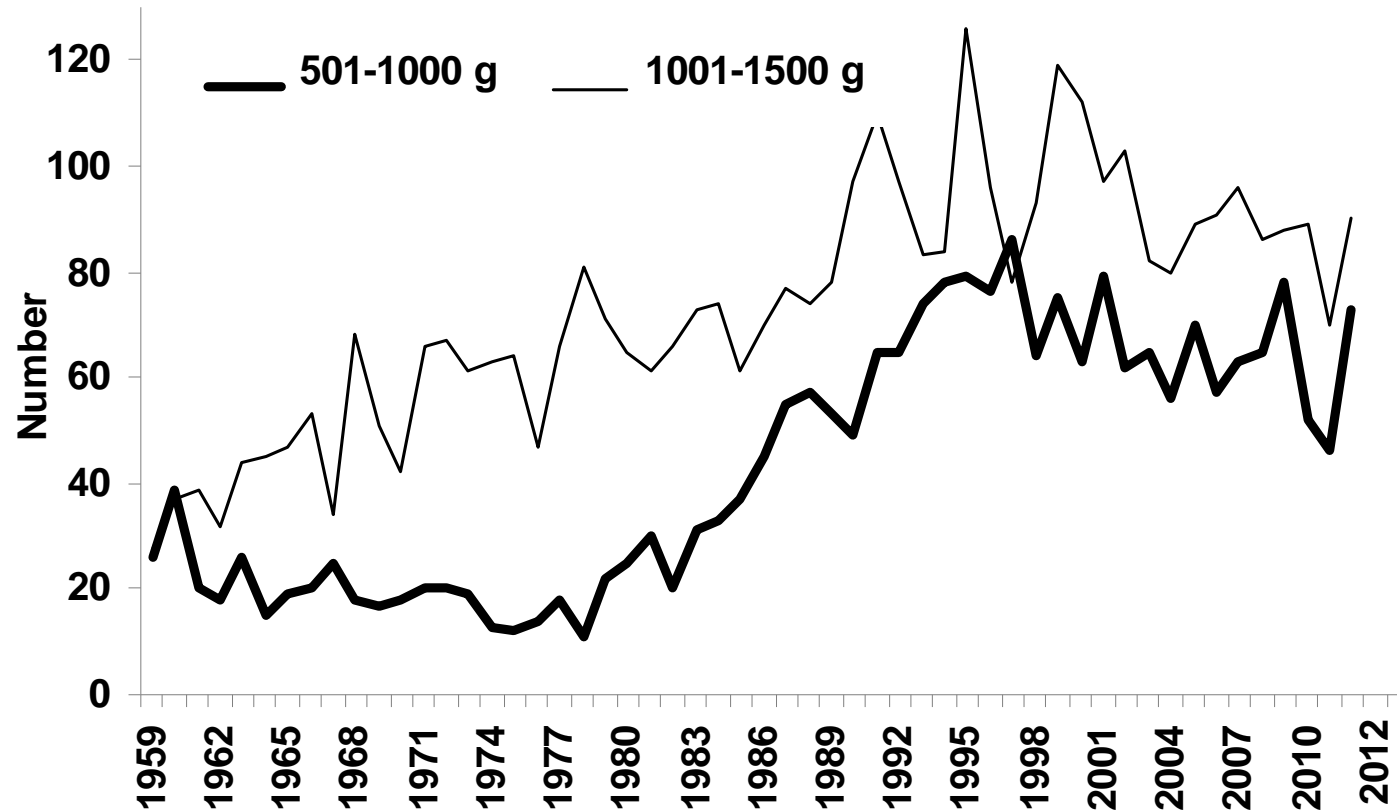


## Births in 2012

Auckland DHB domicile 6573

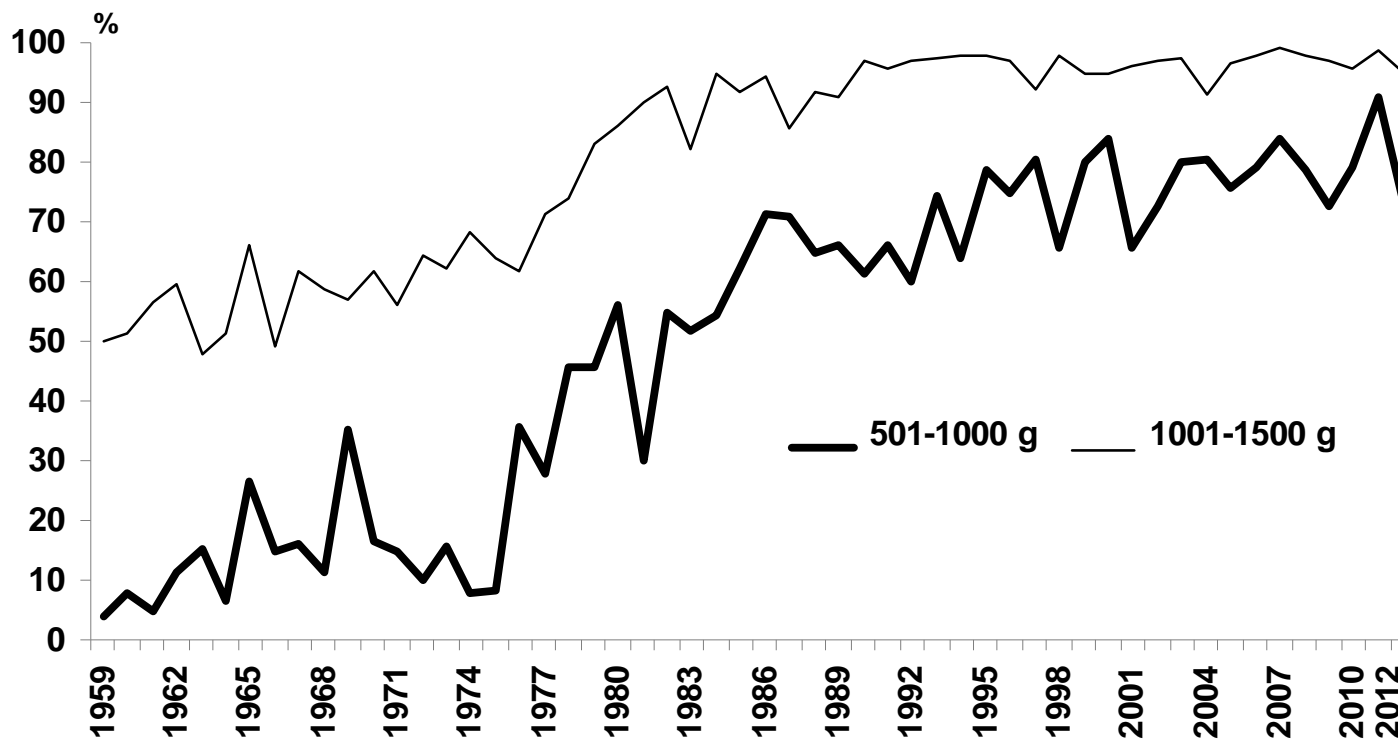
Waitemata DHB domicile 7951

# Inborn live birth at National Women's 1959-2012



Number of inborn live births  $\leq 1500$ g from 1959 to 2012

# Inborn live birth at National Women's 1959-2012



Neonatal survival (0-28 days) of inborn live births  $\leq 1500\text{g}$   
from 1959 to 2012