

Review of the Neonatal Report

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Declaration of Conflict

- Previous clinical director
- Many NICU staff are colleagues, friends, and mentors

The Report

- Excellent report – collaborative, perinatally-focussed
 - Executive summary highlights areas for noting
- Builds on previous reports and feedback
 - Trend graphs provide very useful information
 - Raw data available also
- Meticulous, time-consuming attention to detail
- Available much sooner than ANZNN reports

It's hard to be good at everything

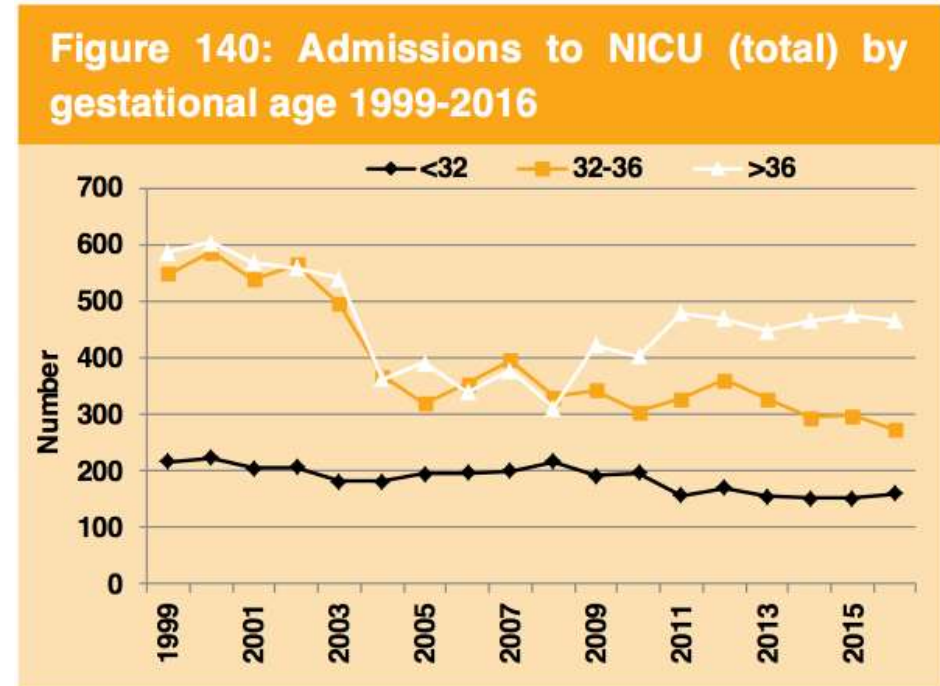
- Are you happy with the outcomes?
 - Benchmarking
 - Avoid complacency
 - Frequent review and horizon viewing
- Need to focus on what you can change or influence
 - Consider the effort required to make an impact or a difference
 - Use available evidence where available

Things not being discussed in detail

- Pneumothorax rates are very low
 - No pneumothoraces in infants <32 weeks
 - ANZNN rate 5% in 2015 in infants <32 weeks
- PDA treatment rates are lower than many NICUs
 - In infants <30 weeks, 17% treated with 1% ligation rate (cf RWH Melbourne – 36% treated, 1% ligation rate)
- Retinopathy of Prematurity rates consistent with ANZNN
 - Stage 3 ROP 6.3% in infants <30 weeks (5.3% <32 weeks)
 - 2015 ANZNN rate 6% in infants <31 weeks
- 2-year follow-up outcomes
 - Good follow-up, with excellent outcomes in infants <1500g

Admission numbers

- Decline in late-preterm infants and preterm infants <32 weeks
 - Preterm birth rate 8.2% lowest in 10 years
- Term infant admissions stable since 2011



Preterm infant outcomes

ANZNN registration

- <32 weeks, or
<1500g, or
Respiratory support for >4 hours, or
Major surgery, or
Therapeutic hypothermia for Hypoxic Ischaemic Encephalopathy

ANZNN outcomes

Survival

- Survival comparable with ANZNN rates
 - Still incrementally rising for infants weighing 501-1000g

Figure 173: Neonatal survival (0-28 days) of ≤ 1500 g inborn live births NWH 1959-2016

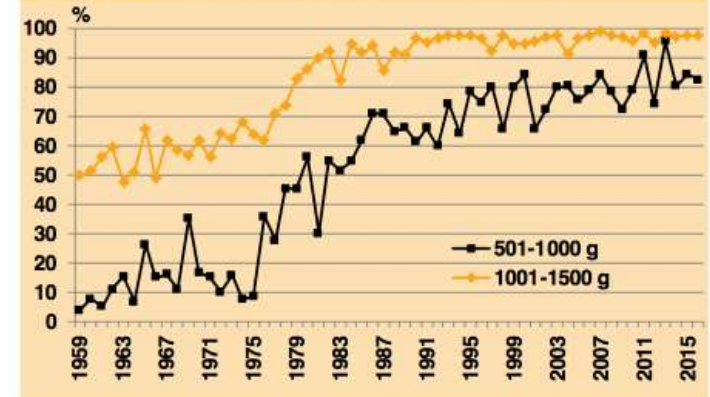
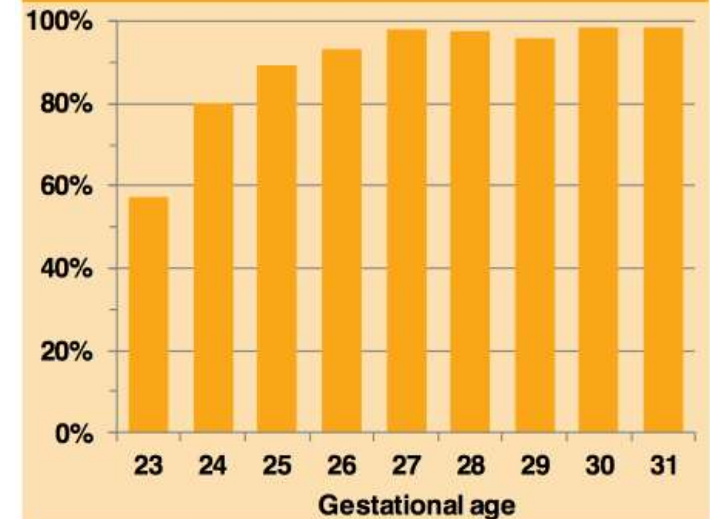


Figure 176: Survival of live inborn babies admitted to NICU 2007-2016 (n=1478)



ANZNN Continuous Practice Improvement Sweden Visit 2016

- iNeo (International Network for Evaluating Outcomes of Neonates) have shown differences in outcomes according to geography

Shah PS, Lui K, Sjors G, et al. Neonatal outcomes of very low birth weight and very preterm neonates: an international comparison. *J Pediatr* 2016;177:144-152

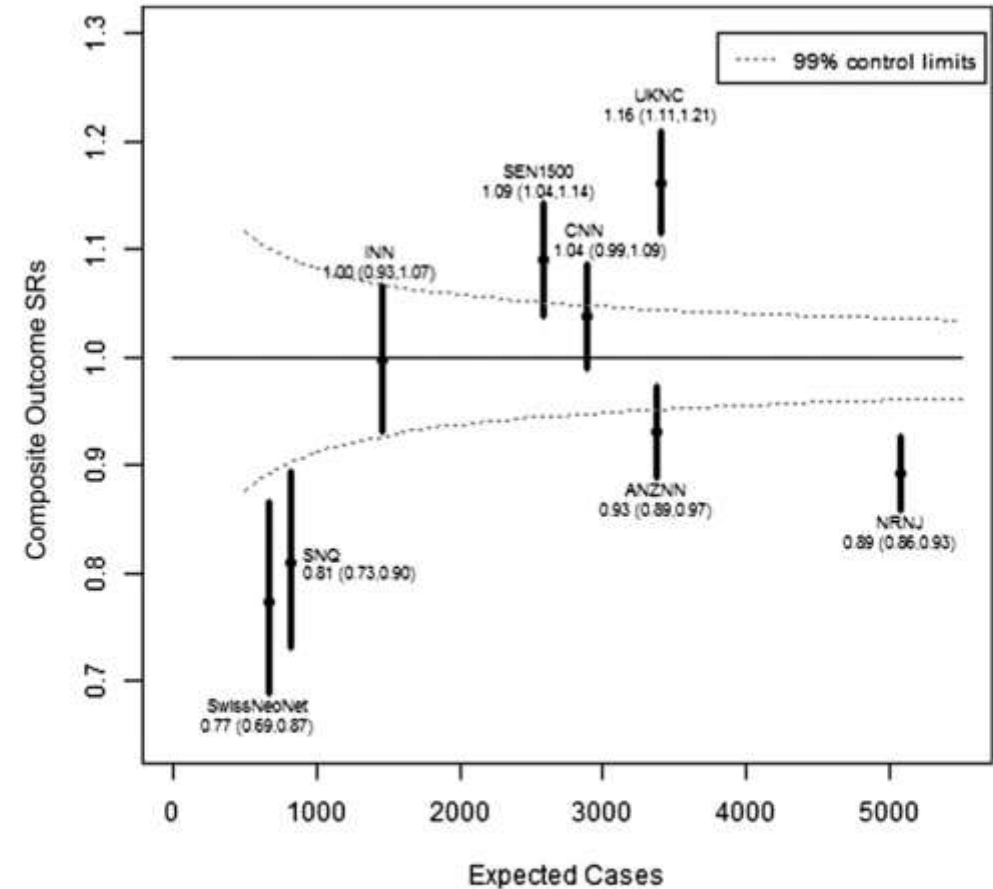


Figure. SRs comparing the composite outcome of each network to all other networks combined. *Vertical bars* are the estimated 99% CIs of the SR. The *dotted curves* represent the 99% control limits expected under the null hypothesis of similar outcome rates (SR = 1). ANZNN, Australian and New Zealand Neonatal Network; CNN, Canadian Neonatal Network; INN, Israel Neonatal Network; NRNJ, Neonatal Research Network of Japan; SEN1500, Spanish Neonatal Network; SNQ, Swedish Neonatal Quality Register; SwissNeoNet, Swiss Neonatal Network.

Preterm outcomes

23 week infants

- Previous external reviewer highlighted low survival of infants born at 23 weeks compared to some ANZNN NICUs
- 5 liveborn infants in 2016
- 4 infants admitted to NICU
 - (cf 4 infants admitted between 2008 and 2015)
 - All received antenatal steroids (but only 1 “complete”)
 - All developed IVH (2 Grade 4, 1 Grade 3, 1 Grade 2)
 - Only one survivor
 - Deaths of 3 infants with major IVH on days 3, 3 and 5
- Overall survival since 2007 nearly 60% - selection bias previously?

Approach to borderline viability

- Previous guideline superseded
 - Appropriate to consider a more proactive approach to care at 23⁰-23⁶ weeks
 - Collaborative approach with obstetrics around use of steroids, delivery considerations
- Newborn Clinical Network plans to write a national periviability guideline

ANZNN Outcomes

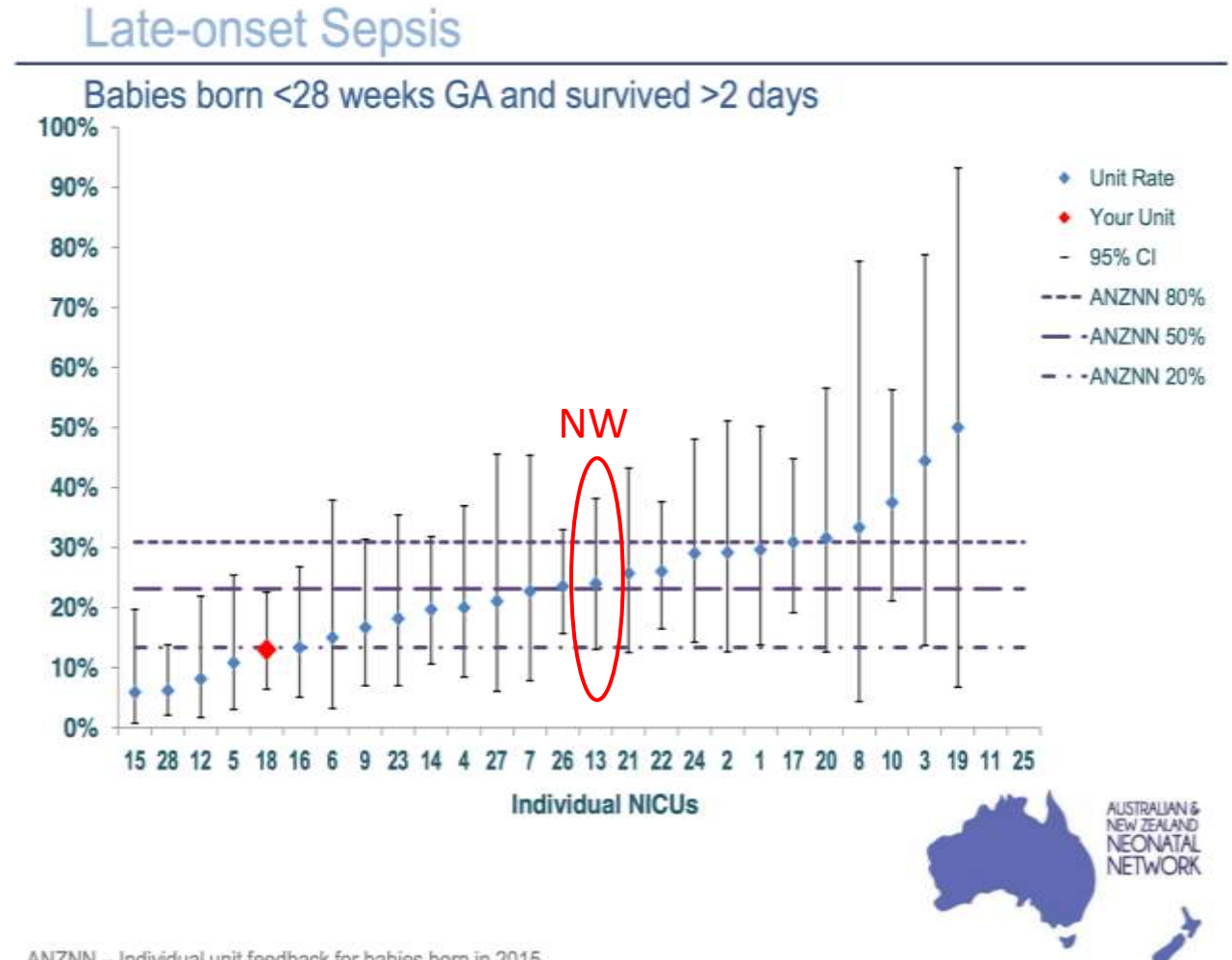
Late-onset infection

- Main preventable cause of late death after the first week
- 19 late infections
 - Main organisms S.epidermis/CONS
 - Two CVL-associated infections
 - Improvement since 2014
- Two deaths from late sepsis
 - 25 weeks, 940g – no organism stated – day 7
 - 29 weeks, 1480g – E.coli meningitis – day 26

ANZNN Outcomes

Late-onset infection

- NWH close to the median for 2015 data
- Fewer infections in 2016
 - However, infection rates in ANZNN also decreasing

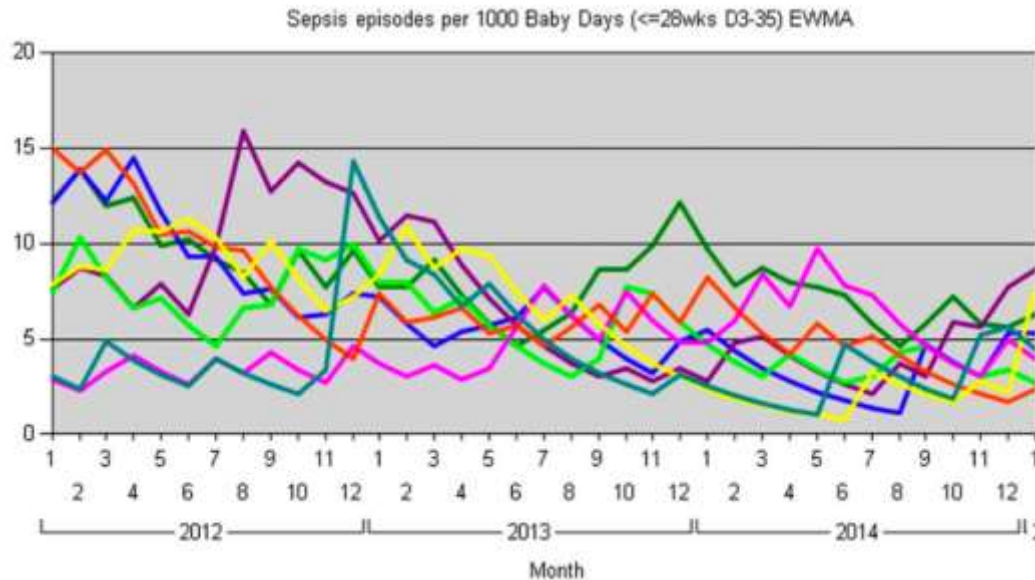


NSW SPRING sepsis indicator

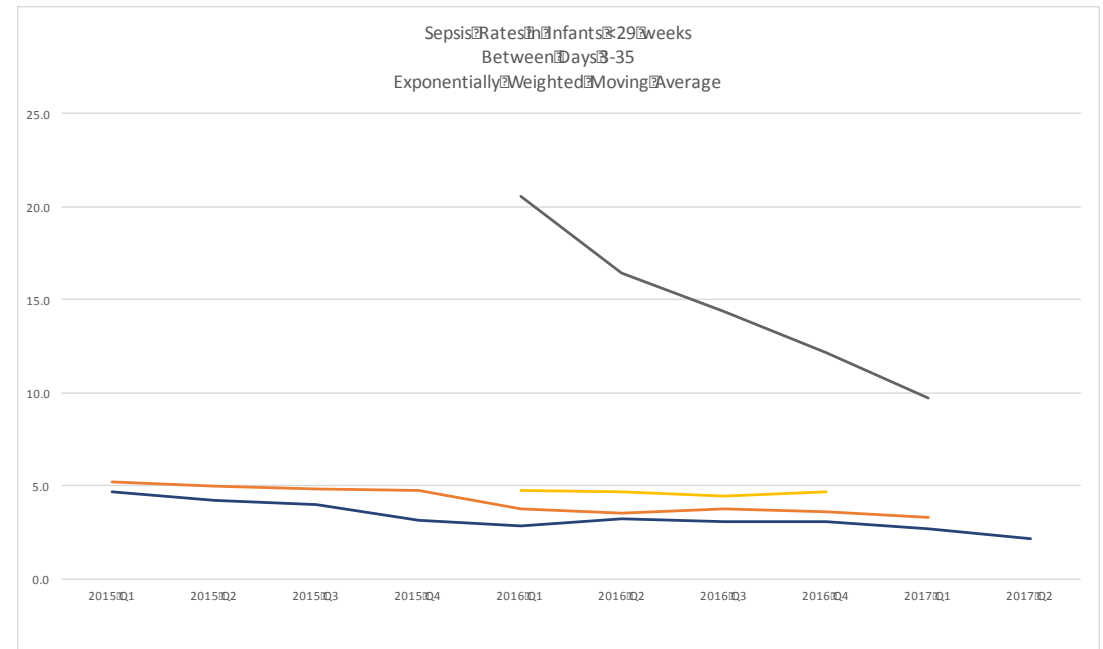
- Numerator: Definite blood-culture positive infection
- Denominator: Bed days
<29 weeks' gestation
between days 3 and 35
- Expressed as infections per 1000 bed days
- Use of an exponentially-weighted moving average (EWMA) to smooth large fluctuations in rates related to small numbers

Benchmarking of late infection rates

- Long delay between ANZNN data being collected and submission
- There is merit in more frequent assessments

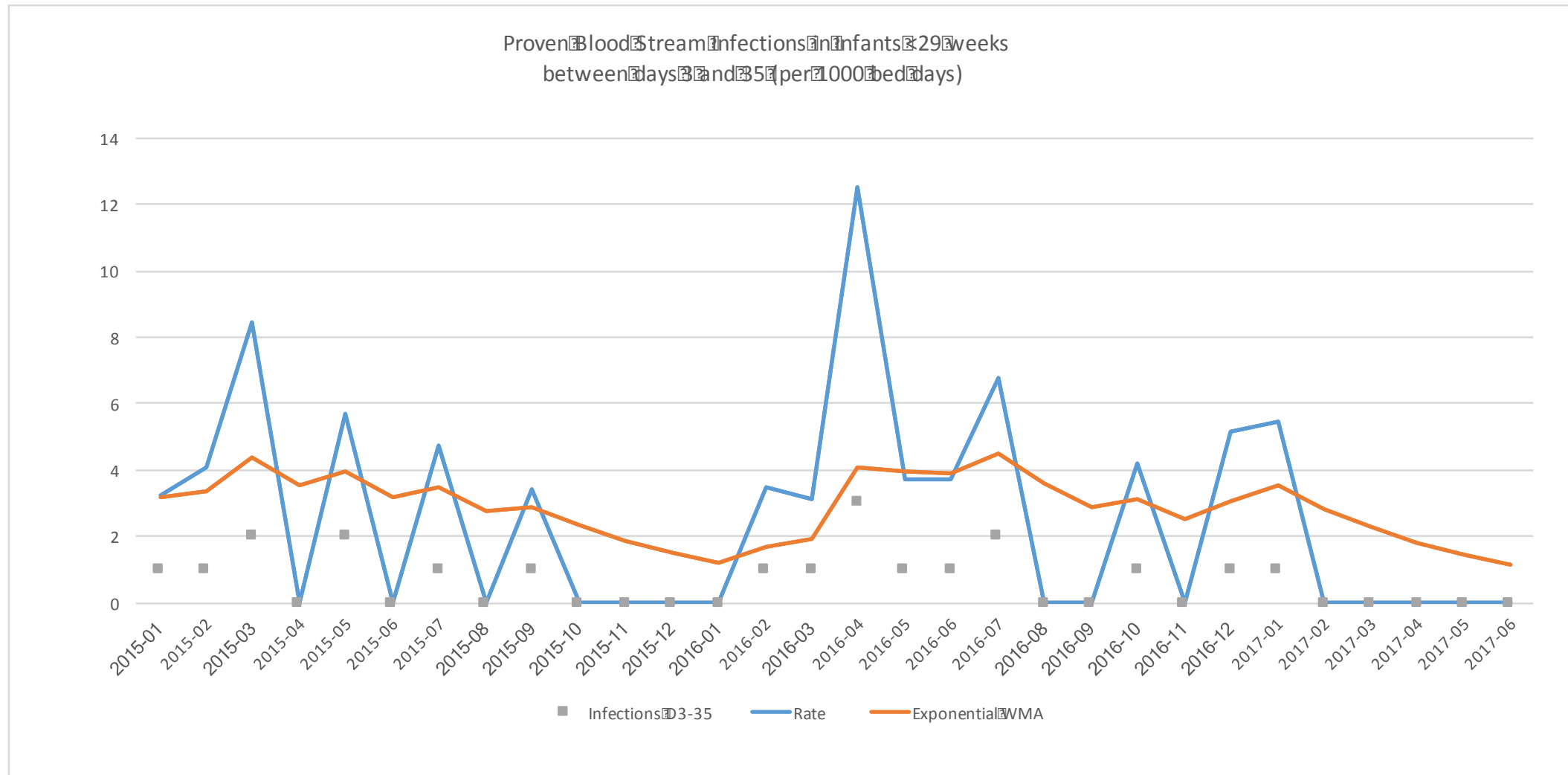


NSW NICUS



VicTas Data Group

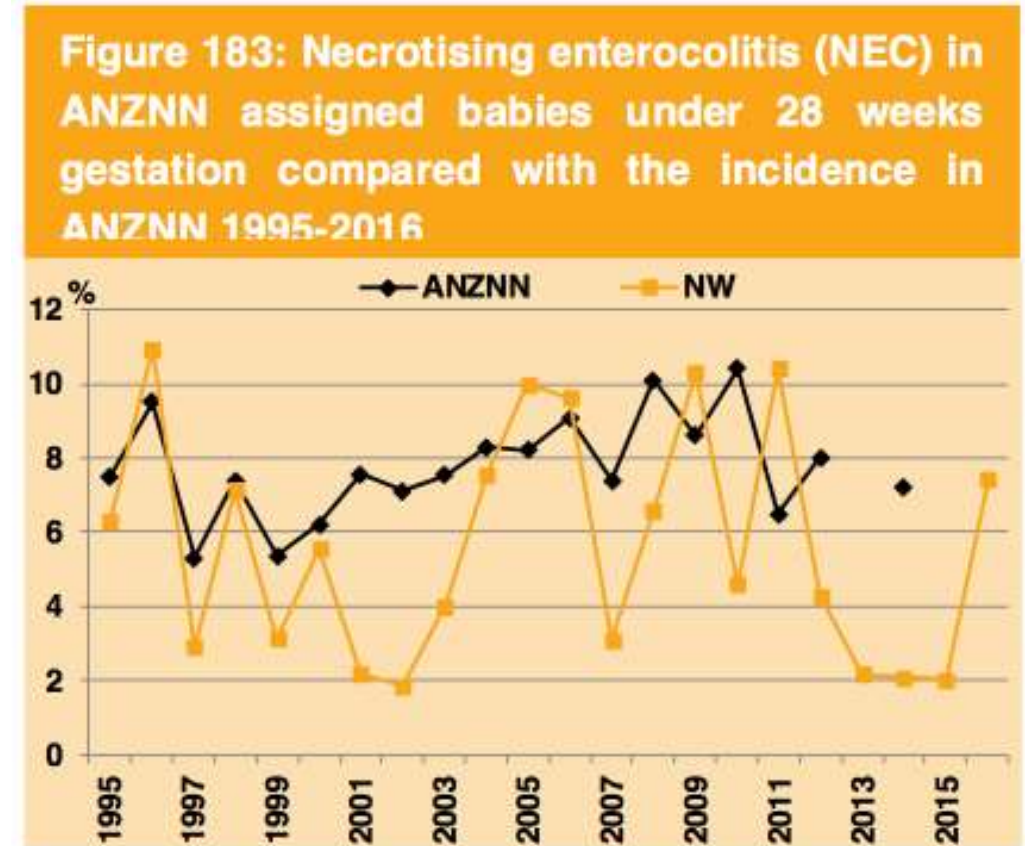
Monthly monitoring of late infection rates



ANZNN Outcomes

Necrotising enterocolitis

- Major cause of late death
- Associated with significant morbidities, including adverse neurodevelopmental outcomes
- Probiotics introduced in 2011
- 5% incidence <32 weeks
 - 9 infants
 - 5 required surgery
 - 2 deaths
- Previous incidence $\approx 2\%$



ANZNN Outcomes

Chronic lung disease

- Historically low rates of CLD
- Defined as a requirement for oxygen or respiratory support at 36 weeks' CGA
- Increase from 2012 onwards
 - ?Related to changes in saturation targets and/or changes in use of nHF/CPAP
- Physiological assessment of CLD ("Shift" test) may assist in determining severity and significance of lung disease

Figure 181: Chronic lung disease at 24-27weeks NWH 1995-2016

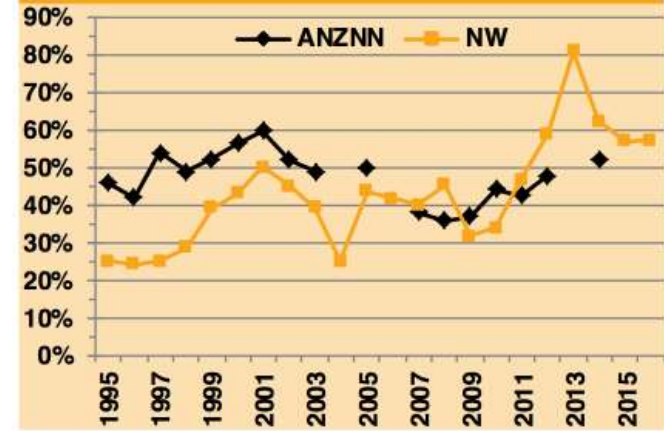
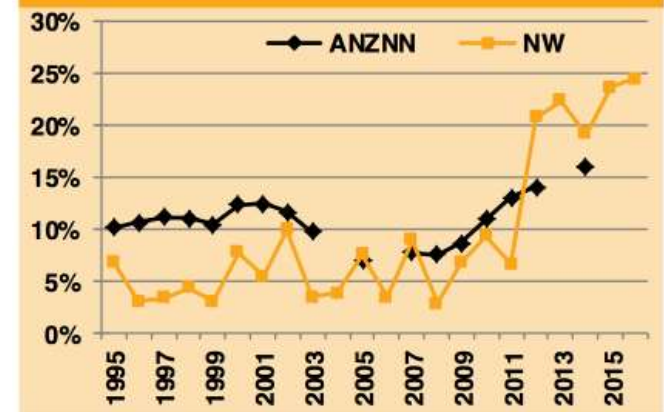


Figure 182: Chronic lung disease at 28-31weeks NWH 2016



Use of postnatal steroids for CLD

- Postnatal corticosteroids given after the first week increase survival and reduce CLD
- Rates of steroid use are increasing in the extremely preterm population

Figure 184: Percentage receiving postnatal dexamethasone by gestational age (ANZNN alive at one week <32wks) NWH 1995-2016

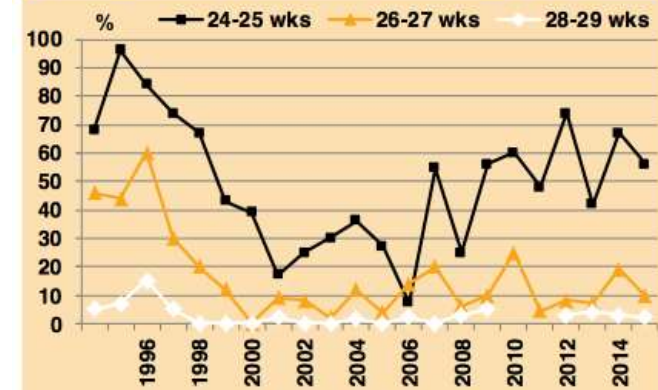
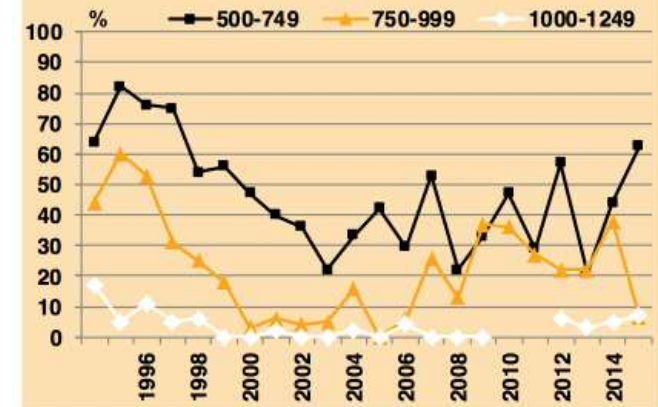


Figure 185: Percentage receiving postnatal dexamethasone by birth weight (ANZNN alive at one week <1500g) NWH 1995-2016



ANZNN Outcomes

Intraventricular haemorrhage

- Severe (Grade 3 or 4) IVH is a strong predictor of early mortality and late neurodisability
- NWH rates have been consistently low
 - 5 of 6 infants with Grade 3/4 IVH below 26 weeks'
 - 3 infants at 23 weeks
- ANZNN CPI stream on early neonatal care is looking at best practice to prevent or minimise IVH
 - Do IVH rates reflect perinatal characteristics or are they influenced by early neonatal care?

Figure 149: Any IVH at 24-27 weeks 1995-2016

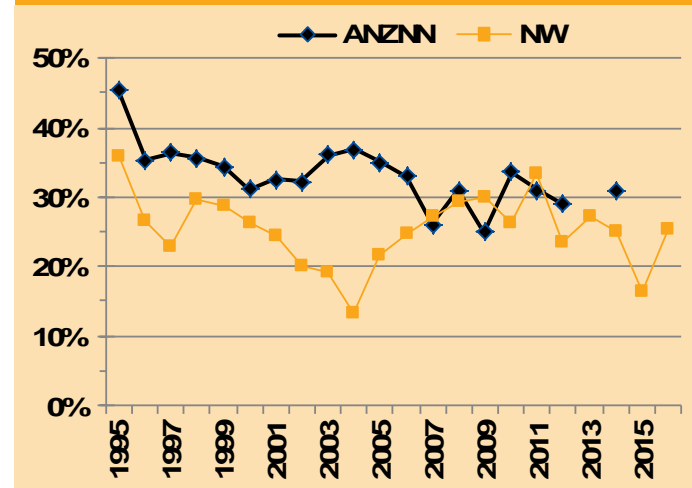
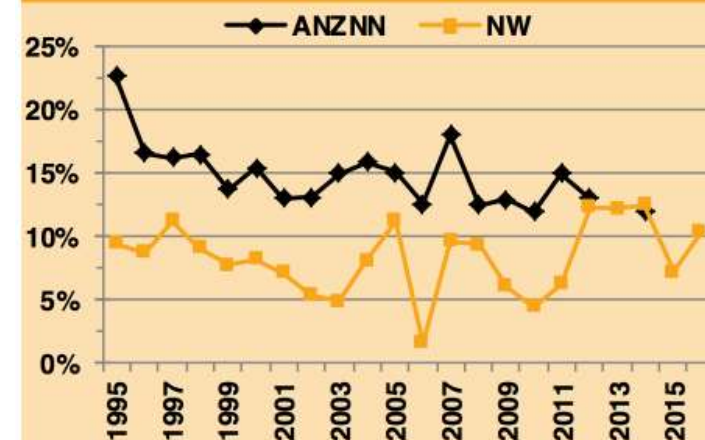


Figure 151: Any IVH at 28-31 weeks 1995-2016



Assumes no IVH in infants 30-31 weeks with no HUSS

Ventilation practices

- Numbers of preterm infants receiving ventilatory support are stable
- Large increase in term infants receiving support since 2007
- Stable numbers of preterm infants receiving invasive ventilation

Figure 161: Number on any ventilation NWH 1995-2016

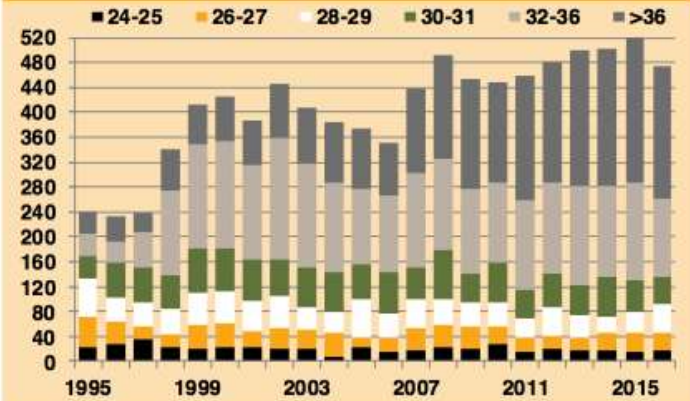
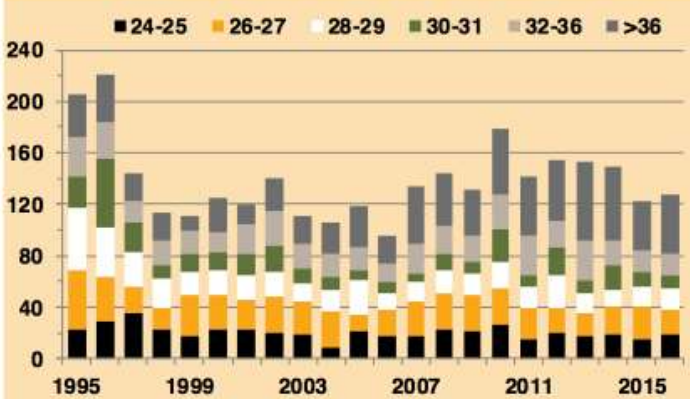
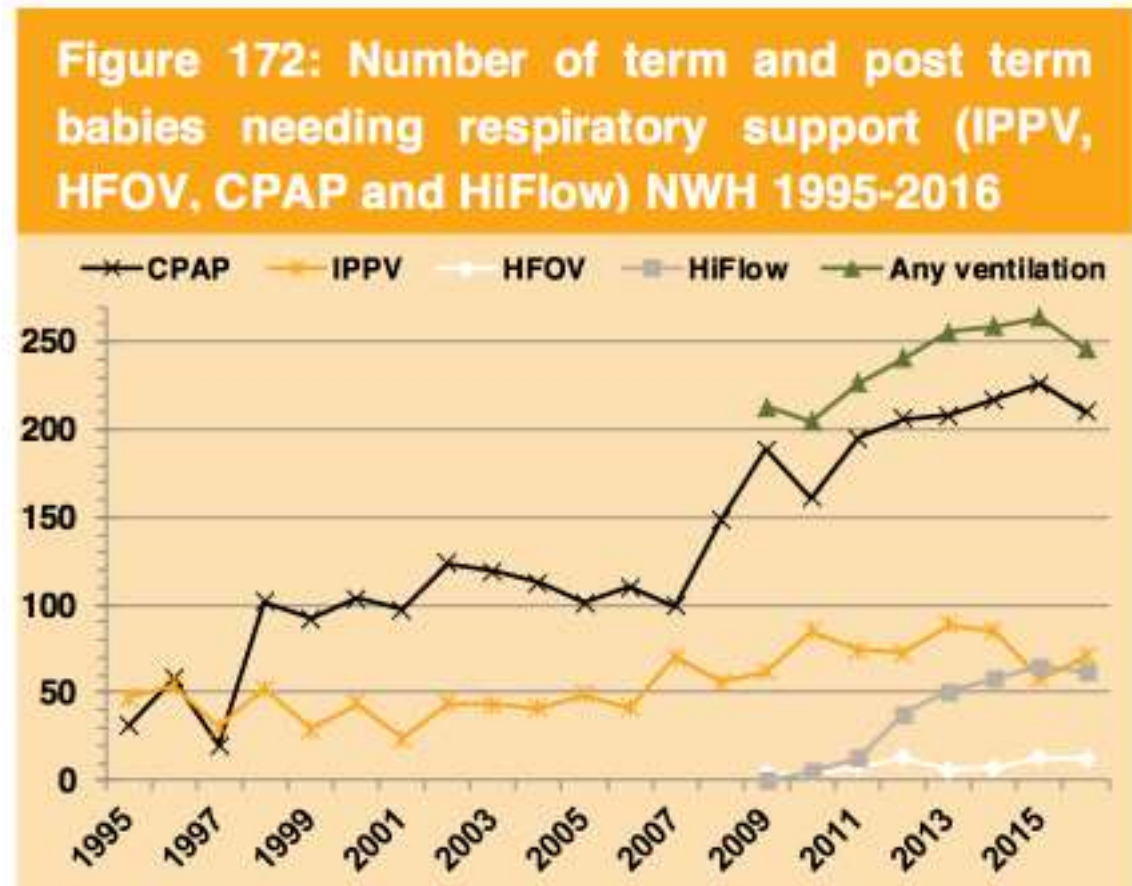


Figure 157: Number on IPPV NWH 1995-2016



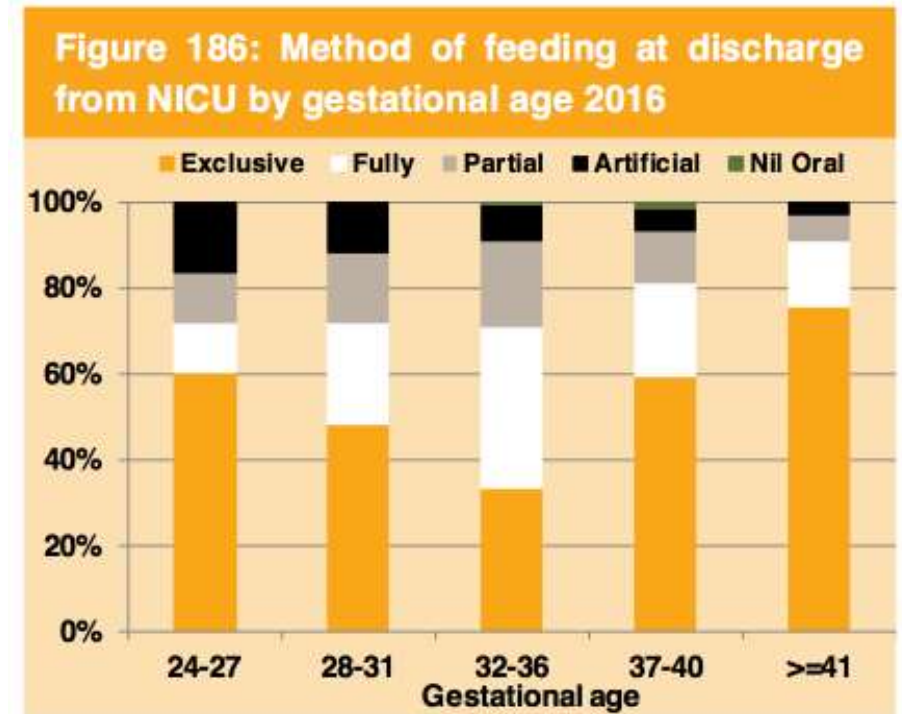
Ventilation practices in term infants

- Increase in term infants receiving respiratory support
 - IPPV relatively stable
 - CPAP since 2008
 - nHF since 2010



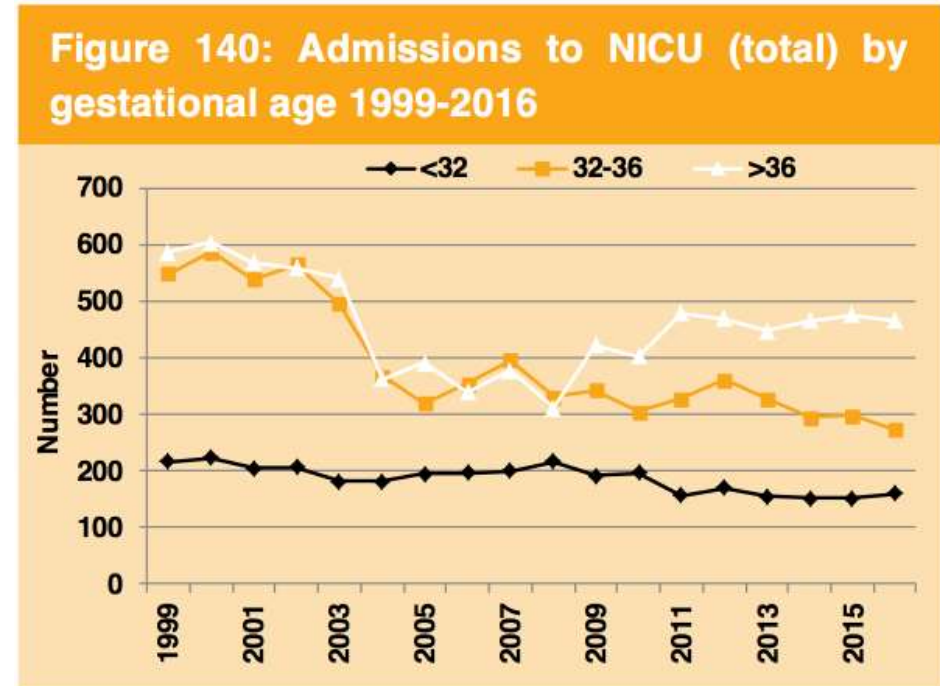
Feeding outcomes

- 76.5% of inborn babies received exclusive or full breast milk feeds at discharge
- Method \neq route
- Approximately 75% of ANZNN infants <32 weeks receive breast milk at discharge home (2015)
 - NWH 87% on discharge from NICU



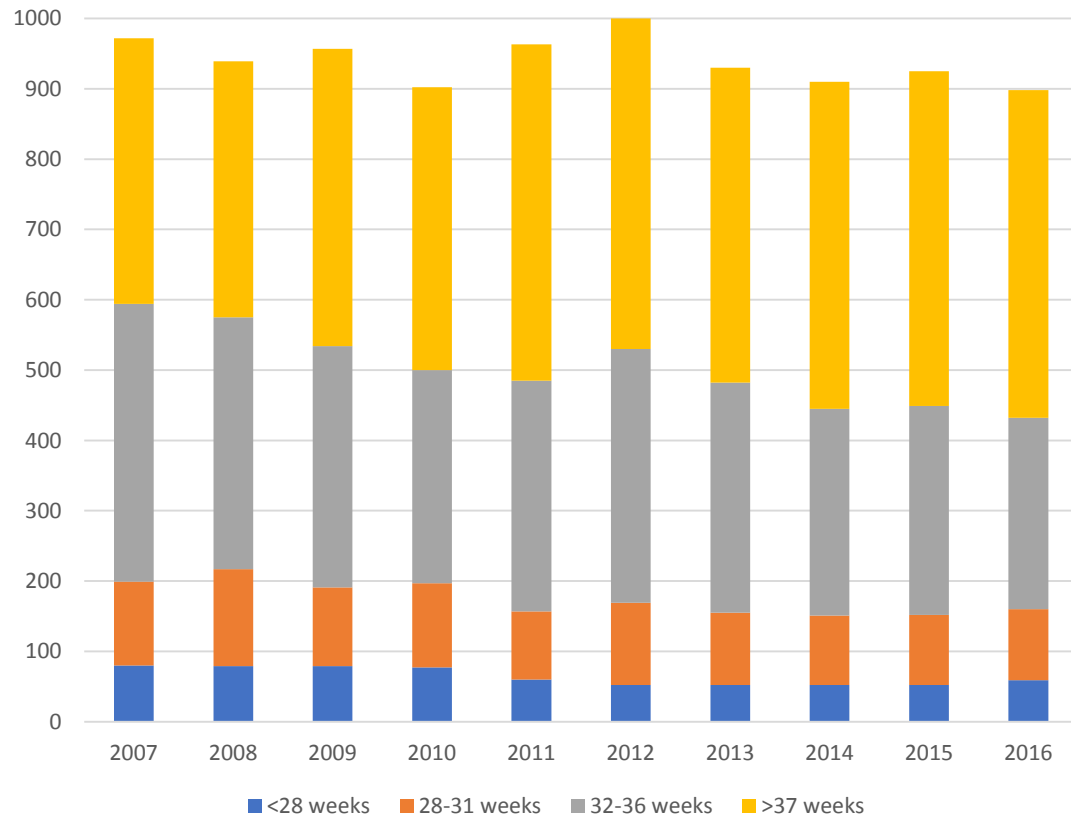
Admission numbers (again)

- Decline in late-preterm infants and preterm infants <32 weeks
 - Preterm birth rate 8.2% lowest in 10 years
- Term infant admissions stable since 2011

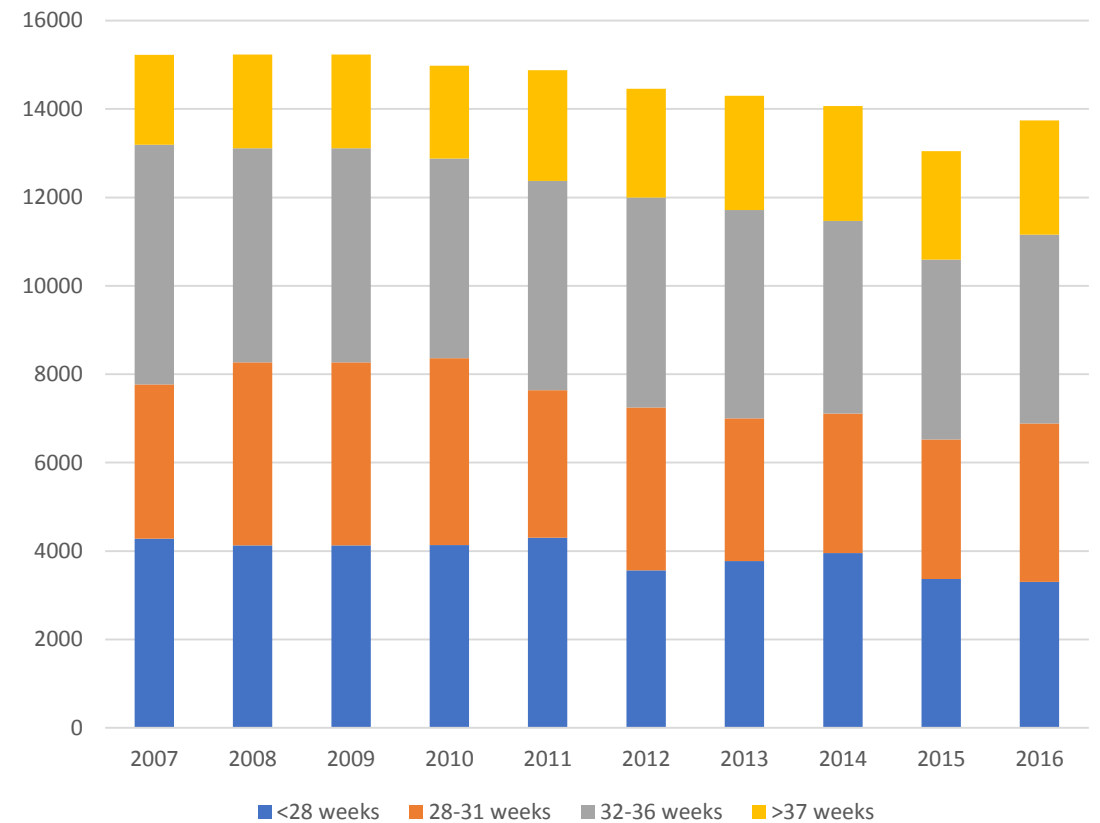


Admissions and bed days by gestation

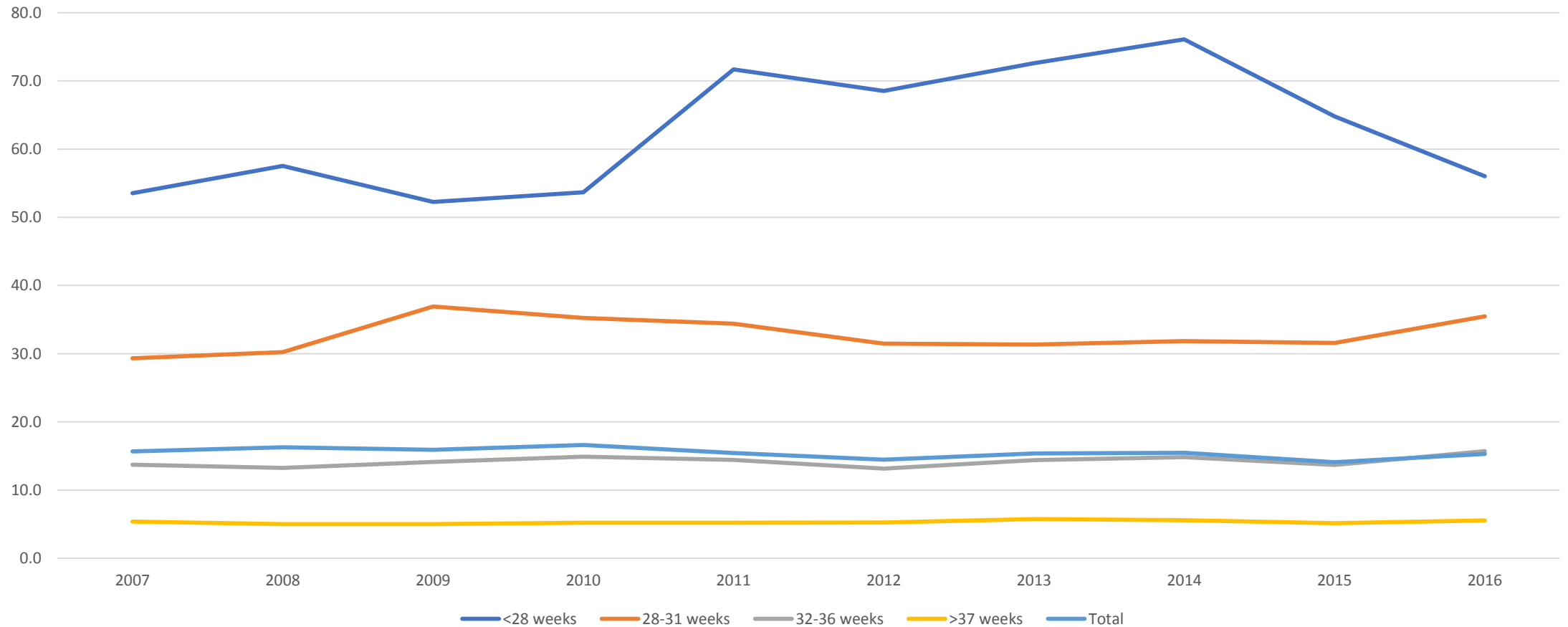
Number of Admissions by Gestational Age Group



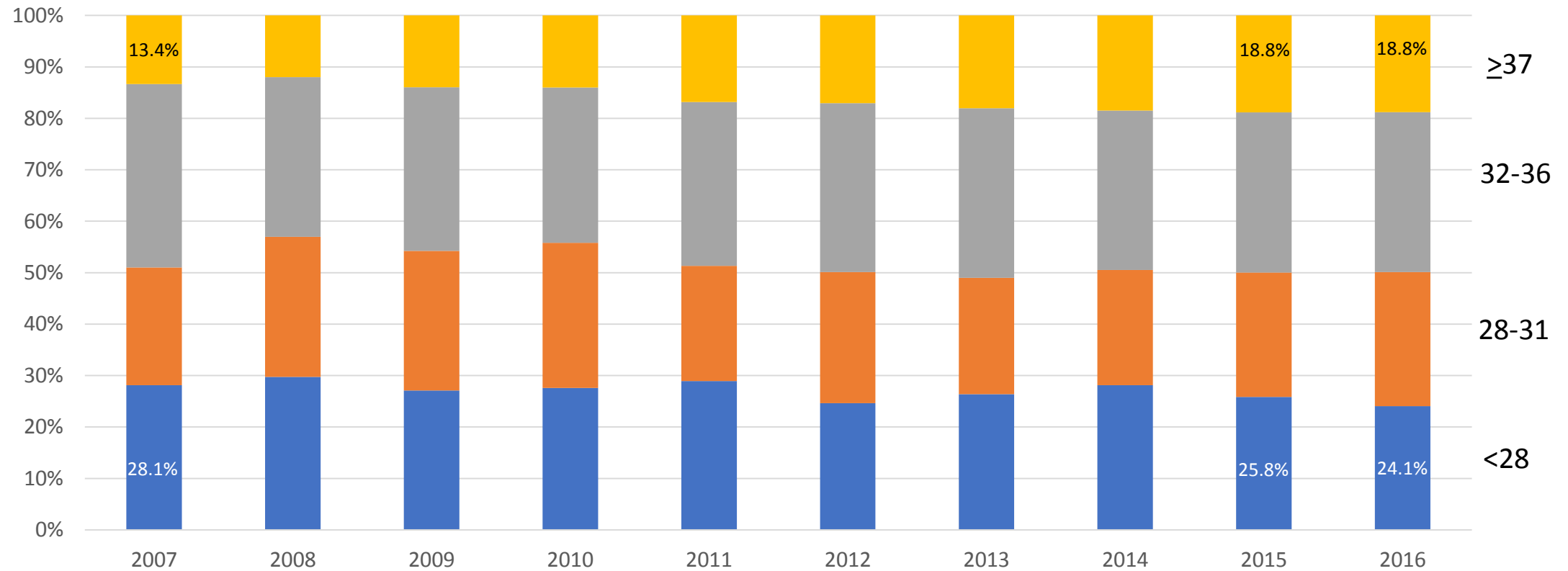
Bed Days by Gestational Age Group



Fewer admissions and higher occupancy equals longer length of stay

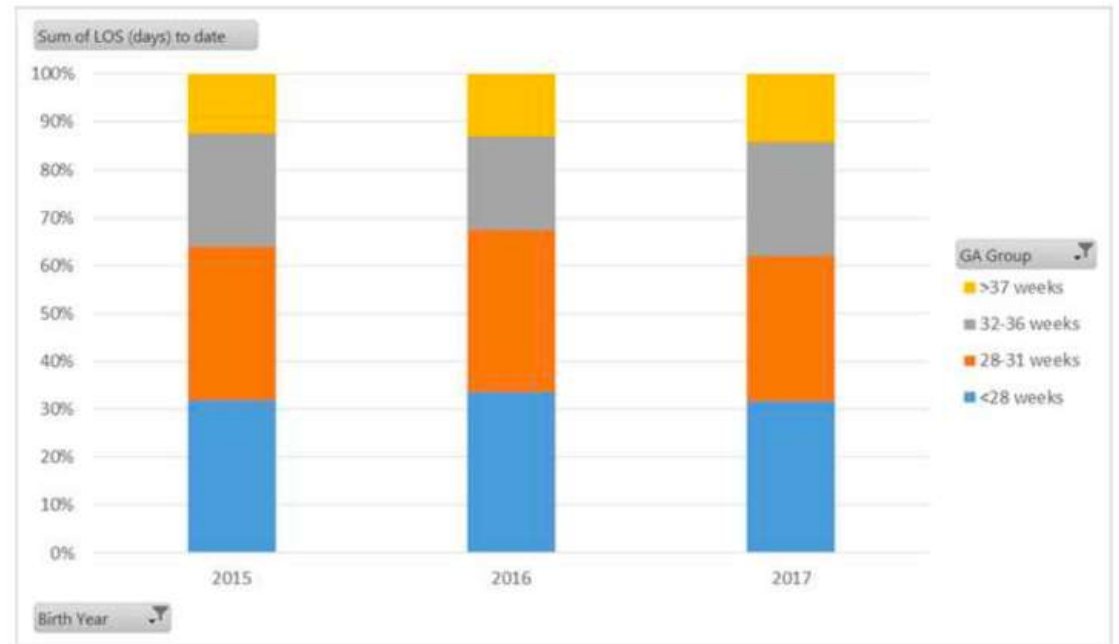


Proportion of bed days by gestation



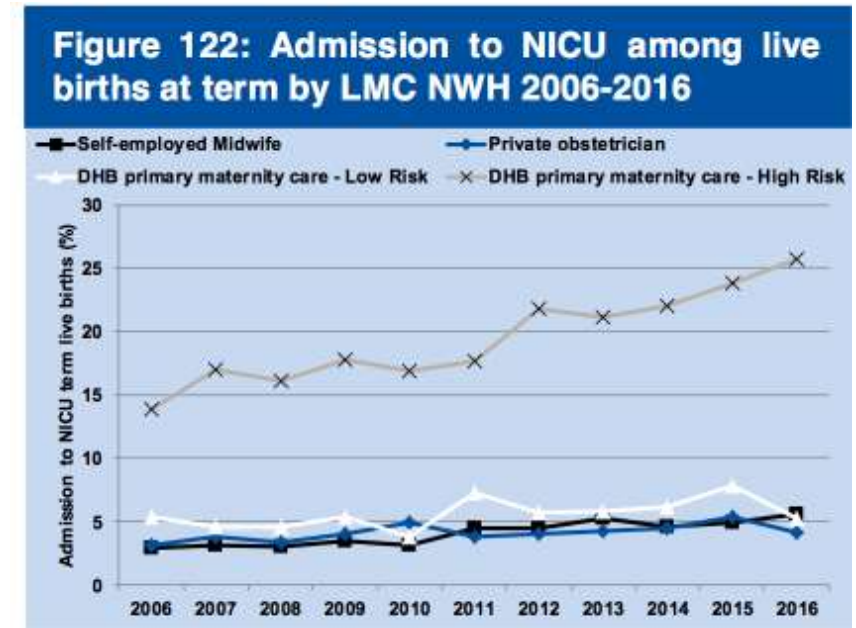
Similar Concerns at RWH Melbourne

- Staff perception that term infants are occupying a greater proportion of bed days
- No answers or strategies as yet...



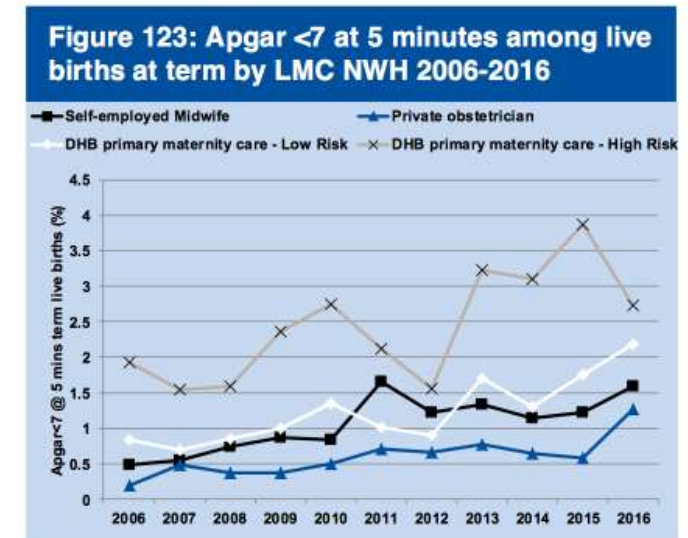
Term infant admissions to NICU

- Have increased since 2007
 - High risk 16.9% to 25.6%
 - Self-employed MW 3.1% to 5.5%
- Most common reasons for admission
 - Respiratory distress 39.9%
 - Congenital abnormality 23.2%
 - Hypoglycaemia 7.5%
 - Depression at birth 3.4%
 - Other 9.9%



Term infants with Apgar scores @5 minutes <7

- Statistically-significant increase in the proportion of term infants with low 5-minute Apgar scores
 - Across all professional groups responsible for birth
- Are more babies really in worse condition at 5 minutes? If so, why?



What's missing?

- NWH is a surgical perinatal centre
- Increasing emphasis on benchmarking surgical outcomes for ANZNN
 - Diaphragmatic hernia
 - Gastroschisis
- May be useful to include some data about babies who undergo surgical procedures whilst admitted to the NICU

Summary

Highlights	For attention/monitoring
<ul style="list-style-type: none">Major morbidities are low compared to ANZNN	<ul style="list-style-type: none">Survival at 23 weeks is low
<ul style="list-style-type: none">Infection rates are decreasing	<ul style="list-style-type: none">Severe IVH is common in infants <26 weeks
<ul style="list-style-type: none">ROP rates are low when some NICUs are reporting higher rates from increased SpO2 targets	<ul style="list-style-type: none">CLD rates are increasing
<ul style="list-style-type: none">Breast milk feeding is high	<ul style="list-style-type: none">Steroid use is increasing
	<ul style="list-style-type: none">NEC rates increased in 2016
	<ul style="list-style-type: none">Noninvasive ventilation use is increasing
	<ul style="list-style-type: none">Term infant admissions have increased<ul style="list-style-type: none">Low Apgar scores @ 5 minutesRespiratory distress/support
	<ul style="list-style-type: none">Consider reporting surgical outcomes

Recommendations

- Monitor outcomes at 23 weeks
 - Small numbers make gaining experience and assessing outcomes difficult
- Monitor use of non-invasive ventilation (nHF, CPAP)
 - Is there a KPI that may be useful, such as CGA when ceased?
- Report route of feeding on babies discharged directly home
- Explore reasons for rise in term infant admissions and low 5-minute Apgar scores
- Consider “near real-time” monitoring of infections
- Consider reporting surgical procedures and outcomes
- Is there a role for collaborative benchmarking outside ANZNN?