

# **Outcomes for babies born at 23 and 24 weeks gestational age**

# 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 (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?

# Current NZ Practice

## Neonatal Guidelines



## New Zealand Newborn Clinical Network

**New Zealand Consensus Statement on the Care  
of Mother and Baby(ies) at Perivable Gestations  
(Draft)**

# Current Practice

## New Zealand Newborn Clinical Network Consensus Statement

- Multidisciplinary group
- Recommendations for 23<sup>+0</sup> - 24<sup>+6</sup> weeks gestation
- Options for intensive or comfort care
- Interventions from 22<sup>+5</sup> weeks
- Bundle of care
- Shared decision making process

**What is the current practice  
internationally?**

# EXPRESS Study

- Extremely Preterm Infants in Sweden Study
  - ***One-Year Survival of Extremely Preterm Infants After Active Perinatal Care in Sweden***
    - Karel Maršál et al. JAMA. 2009;301(21):2225-2233.
  - ***Intensity of Perinatal Care for Extremely Preterm Infants: Outcomes at 2.5 Years***
    - Fredrik Serenius et al. Pediatrics. 2015;135:e1163-e1172

# EXPRESS Study

- April 2004 to March 2007
- 844 fetuses alive at presentation
- 707 (84%) born alive; 137 (16%) stillborn
- Perinatal activity score based on intensity of care (interventions) provided
- Scored for each gestational week separately and aggregated for centres
- Primary outcomes – 1 year mortality and death or NDI at 2.5 years corrected

# One-Year Survival of Extremely Preterm Infants After Active Perinatal Care in Sweden

**Table 2.** Mortality by Gestational Age for All Infants and Live-Born Infants

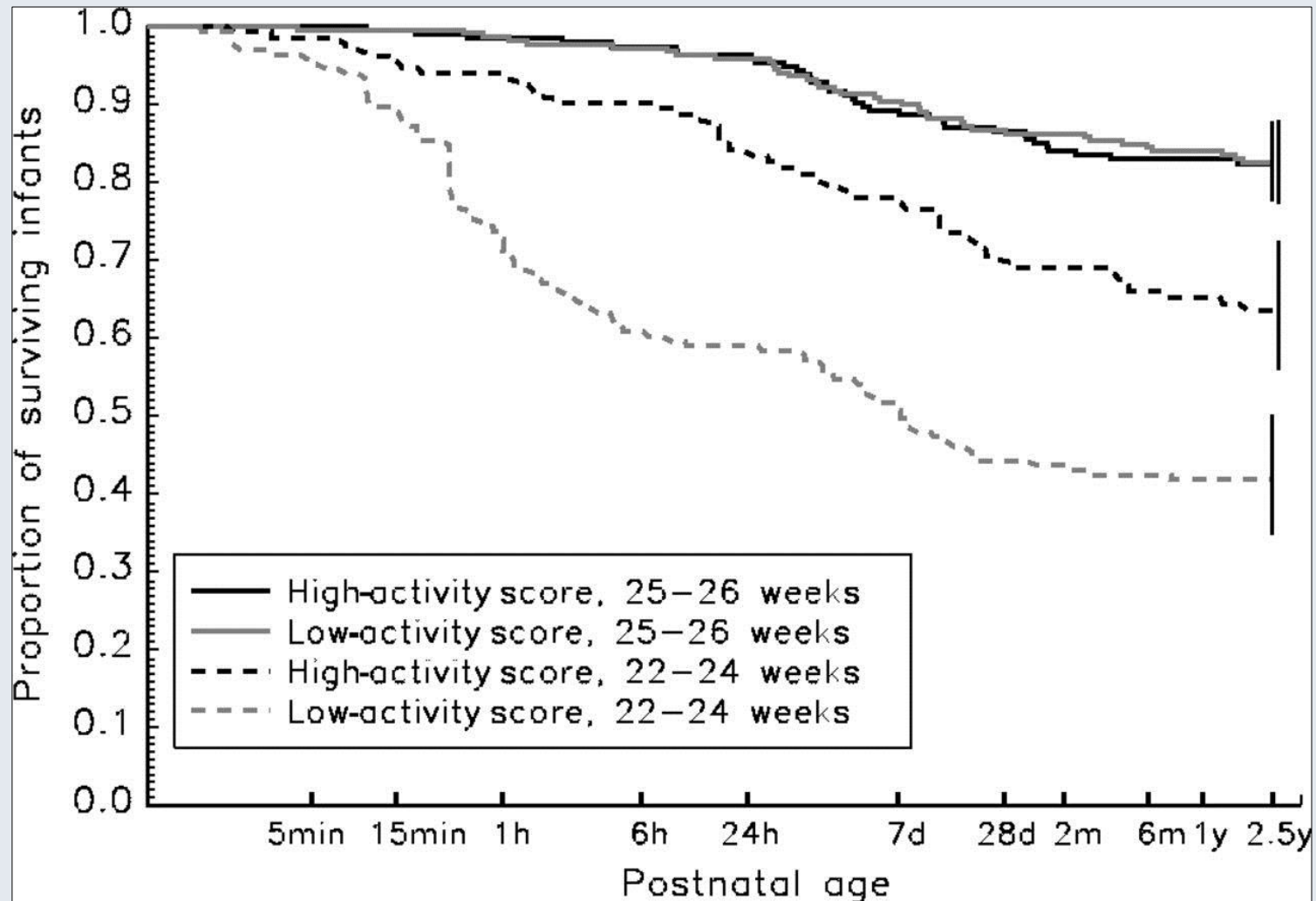
	No. (%) of Infants by Gestational Age, wk					Total <27 wk
	≤22 <sup>a</sup>	23	24	25	26 <sup>b</sup>	
All infants	(n= 142)	(n=183)	(n= 191)	(n=250)	(n=245)	<b>(N= 1011)</b>
Perinatal death	132 (93)	121 (66)	77 (40)	68 (27)	58 (24)	456 (45)
Stillbirth	91 (64)	82 (45)	47 (25)	45 (18)	39 (16)	304 (30)
Intrapartum death	40 (28)	19 (10)	2 (1)	3 (1.2)	2 (0.8)	66 (6.5)
Live-born infants	(n=51)	(n=101)	(n= 144)	(n=205)	(n=206)	<b>(N=707)</b>
Neonatal death	45 (88)	46 (46)	41 (29)	29 (14)	26 (13)	187 (26)
Early neonatal death, 0-6 days	41 (80)	39 (39)	30 (21)	23 (11)	19 (9.2)	152 (22)
Delivery room death	28 (55)	16 (16)	10 (6.9)	4 (2)	0	58 (8.2)
Late neonatal death, 7-27 days	4 (7.8)	7 (6.9)	11 (7.6)	6 (2.9)	7 (3.4)	35 (5)
Infant death, 0-365 days	46 (90)	48 (48)	48 (33)	38 (19)	30 (15)	210 (30)

<sup>a</sup>Category denotes gestational age of 22 weeks 0 days to 22 weeks 6 days but also includes 1 infant born at 21 weeks 5 days and 1 infant born at 21 weeks 6 days.

<sup>b</sup>Category denotes gestational age of 26 weeks 0 days to 26 weeks 6 days.



# Survival curves from birth to 2.5 years' CA for infants born alive in high- and low-activity regions by GA group



# Risk of death or NDI at 2.5 years for 3 High-Activity Compared With 4 With Low-Activity Perinatal Care Centres

Outcome	Regional Activity Group							
	High		Low		Unadjusted		Adjusted <sup>#</sup>	
	<i>n/N</i>	%	<i>n/N</i>	%	OR	95% CI	OR	95% CI
Alive at mother's admission for delivery ( <i>n</i> = 844)								
Primary composite outcome death or NDI at 2.5 years' CA								
22–26 weeks	194/358	54.2	289/451	64.1	0.66*	0.50–0.88*	0.69*	0.50–0.96*
22–24 weeks	112/158	70.9	199/232	85.8	0.40*	0.24–0.67*	0.44*	0.25–0.77*
25–26 weeks	82/200	41.0	90/219	41.2	1.00	0.68–1.47	0.91	0.61–1.36

<sup>#</sup>Death or NDI was adjusted for GA, multiple birth, gender, Birth weight SD, maternal education, paternal education, ethnicity

# EXPRESS Study

- Survival improved after antenatal and neonatal interventions
- Survival better in units with high perinatal activity scores
- Data not shown today:
  - Improved survival did not result in more children with severe NDI

# Australasian Context

- *Survival and neurodevelopmental outcomes in extremely preterm infants 22–24 weeks of gestation born in Western Australia*
  - Mary Sharp et al. *J Paeds Child Health*.2018 ;54: 188–193

# **Survival and ND in 22–24 weeks gestation infants in Western Australia**

- Retrospective collection of survival data from NICU and Health Department records
- All babies born at 22, 23 and 24 weeks gestation between 2004 and 2010
- Neurodevelopment assessed using standardised tests
- Medical examination findings from follow-up records

# Survival for infants born at 22–24 weeks in 2004–2010 in WA

Gestation	22 weeks	23 weeks	24 weeks	All
	<i>n</i> (survival %)	<i>n</i> (survival %)	<i>n</i> (survival %)	<i>n</i> (survival %)
Total survival ( <i>n</i> )	3	44	112	159
All births (LB + SB)	227 (1.3)	188 (23)	199 (56)	614 (24)
All live births	60 (5)	96 (46)	146 (77)	302 (53)
All NICU admissions	5 (60)	78 (56)	139 (81)	222 (72)

LB, live births; NICU, neonatal intensive care unit; SB, stillbirths

# Neurodevelopmental Outcomes for infants born at 22–24 weeks in 2004–2010 in WA

Gestational age	22 weeks	23 weeks	24 weeks	All
Survivors, <i>n</i>	3	44	112	159
Overall outcome, <i>n</i> (%)				
Outcome assessed in FU Program	3 (100)	41 (85)	103 (92)	147 (93)
Outcome known assessed elsewhere	0	3	2	5
Outcome unknown	0	0	7	7
Corrected median age at last assessment, months, median (IQR)	59 (57–122)	58 (39–62)	59 (56–61)	59 (55–62)
Overall disability, <i>n</i> (%)				
Mild	1 (33)	11 (25)	21 (19)	32 (20)
Moderate	2 (67)	5 (11)	5 (5)	12 (8)
Severe	0	9 (21)	12 (11)	21 (13)
Free of moderate/severe disability	1 (33)	30 (68)	84 (83)	118 (78)

# **Survival and ND in 22–24 weeks gestation infants in Western Australia**

**Babies born <25 weeks gestation 2004 - 2010**

- 53% survived if born alive
- 72% of NICU admissions survived
- 78% of the survivors were free of moderate to severe disability i.e. normal development or mild NDI



# North America

- ***Survival and Neurodevelopmental Outcomes among Periviable Infants***
  - *Noelle Younge et al., for the Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network. N Engl J Med 2017; 376:617-628.*

# **Survival and Neurodevelopmental Outcomes among Periviable Infants**

- Survival and neurodevelopment at 18-22 months for infants born at 22-24 weeks
- Three epochs:  
Epoch 1 - 2000 – 2004, Epoch 2 - 2004 – 2007,  
Epoch 3 - 2008 – 2011
- Primary outcome (3 level)
  - Survival without neurodevelopmental impairment
  - Survival with neurodevelopmental impairment
  - Death

# **Survival and Neurodevelopmental Outcomes among Periviable Infants**

- Data available on 4274 out of 4458 (96%) babies
- 11 centres in National Institute of Child Health and Human Development Neonatal Research Network

**Table 4. Survival and Neurodevelopmental Outcomes at 18 to 22 Months of Corrected Age.**

Outcome	Adjusted Relative Risk (95% CI)*	
	Epoch 3 (2008–2011) vs. Epoch 2 (2004–2007)	Epoch 3 (2008–2011) vs. Epoch 1 (2000–2003)
<b>All infants‡</b>		
Survived without neurodevelopmental impairment vs. died	1.52 (1.22–1.88)	1.59 (1.28–1.99)
Survived with neurodevelopmental impairment vs. died	1.43 (1.14–1.79)	1.27 (1.01–1.59)
Survived without neurodevelopmental impairment vs. survived with neurodevelopmental impairment	1.08 (0.83–1.40)	1.27 (0.99–1.65)
Survived without neurosensory impairment vs. died	1.39 (1.15–1.68)	1.44 (1.18–1.75)
Survived with neurosensory impairment vs. died	1.93 (1.38–2.70)	1.54 (1.11–2.15)
Survived without neurosensory impairment vs. survived with neurosensory impairment	0.72 (0.51–1.02)	0.93 (0.66–1.32)
<b>Infants born at 22 wk§</b>		
Survived without neurodevelopmental impairment vs. died	0.74 (0.16–3.47)	1.30 (0.21–8.08)
Survived with neurodevelopmental impairment vs. died	0.63 (0.20–1.97)	1.30 (0.34–5.02)
Survived without neurodevelopmental impairment vs. survived with neurodevelopmental impairment	1.13 (0.17–7.41)	0.99 (0.11–9.34)
<b>Infants born at 23 wk¶</b>		
Survived without neurodevelopmental impairment vs. died	1.29 (0.86–1.94)	2.31 (1.46–3.66)
Survived with neurodevelopmental impairment vs. died	1.53 (0.98–2.40)	1.07 (0.71–1.62)
Survived without neurodevelopmental impairment vs. survived with neurodevelopmental impairment	0.86 (0.49–1.50)	2.17 (1.23–3.83)
<b>Infants born at 24 wk¶¶</b>		
Survived without neurodevelopmental impairment vs. died	1.63 (1.26–2.11)	1.46 (1.12–1.90)
Survived with neurodevelopmental impairment vs. died	1.46 (1.11–1.92)	1.34 (1.01–1.78)
Survived without neurodevelopmental impairment vs. survived with neurodevelopmental impairment	1.12 (0.83–1.51)	1.08 (0.79–1.47)
<b>Infants receiving active treatment  </b>		
Survived without neurodevelopmental impairment vs. died	1.55 (1.24–1.93)	1.64 (1.30–2.06)
Survived with neurodevelopmental impairment vs. died	1.44 (1.14–1.81)	1.30 (1.03–1.64)
Survived without neurodevelopmental impairment vs. survived with neurodevelopmental impairment	1.08 (0.83–1.40)	1.26 (0.97–1.65)

# Summary

- Significant increase in the rate of survival at 18 to 22 months of age in babies born between 22 and 24 weeks
- Rates of death, NDI and other adverse outcomes remains high
- Despite the improved survival, the rates of neurodevelopmental impairment hasn't increased

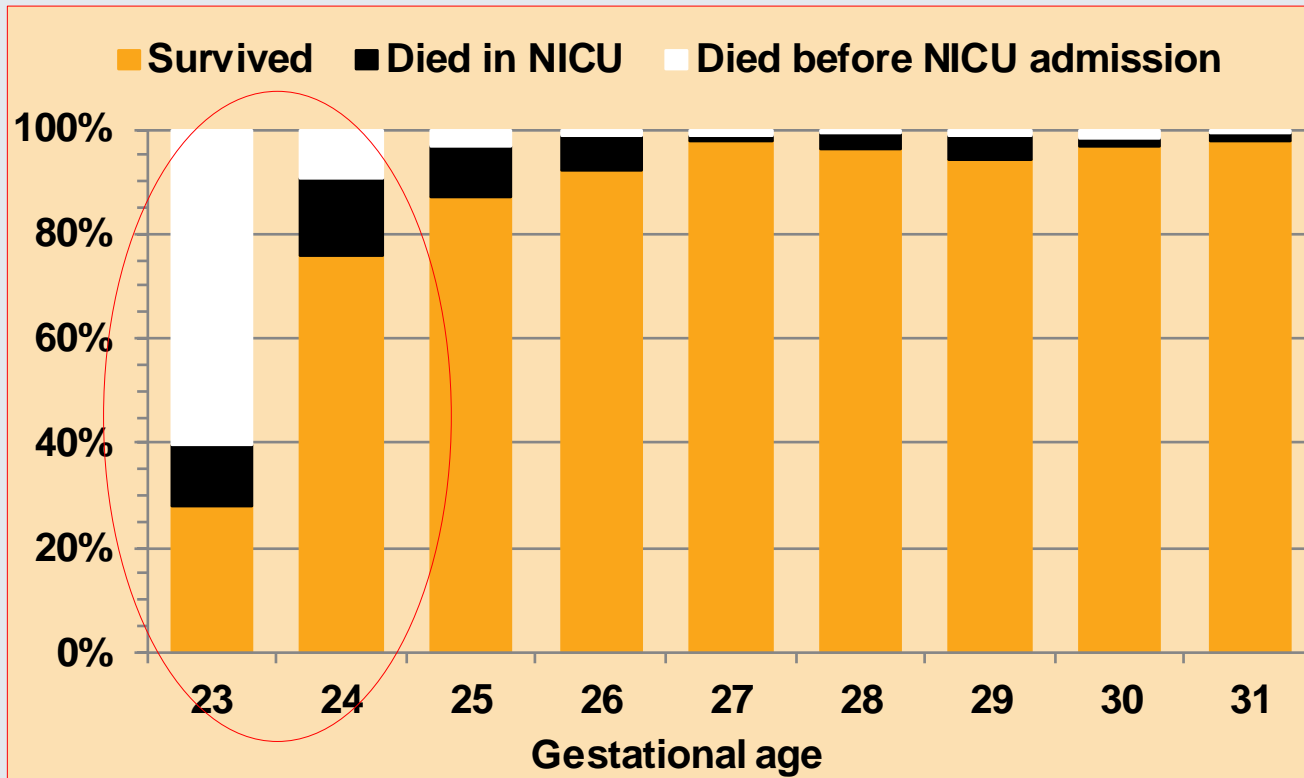
# Newborn Outcomes (1)

## Admissions of *inborn* babies to NICU by gestational age 2008-2017

Gestation (weeks)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
23	0	1	0	2	0	1	0	0	4	3
24	8	9	13	8	7	7	12	6	11	8
25	16	12	15	8	13	10	7	9	9	10
26	17	15	10	14	7	13	14	14	10	11

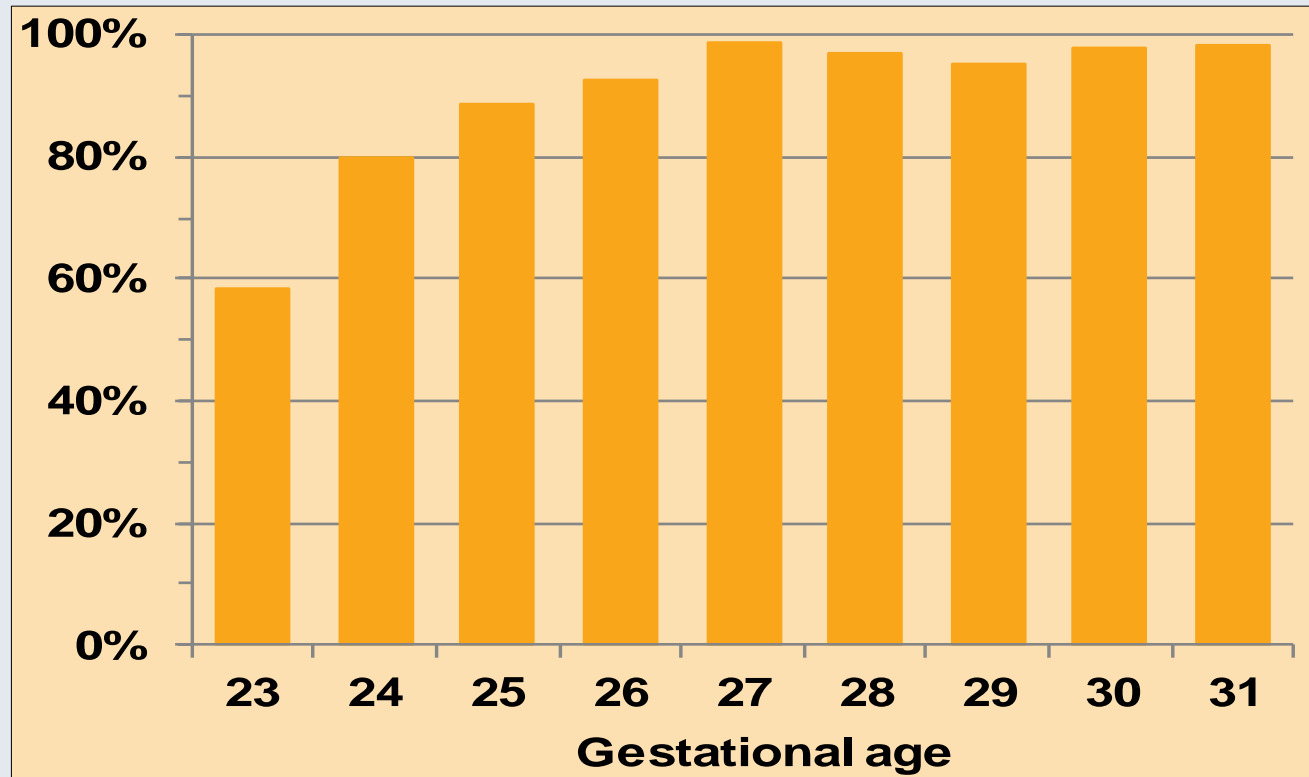
# Newborn Outcomes (3)

Survival of live inborn babies 23-31 weeks 2008-2017 (n=1481)



# Newborn Outcomes (4)

Survival of live inborn babies admitted to NICU 2008-2017 (n=1426)





# Newborn Outcomes – long term

**Outcome of children <1500g born in 2015 at 2 years (corrected) by gestational age groups**

Outcome Category	23 - 28 weeks n= 48
	n (%)
<b>I</b> (Severe disability – deafness, blindness, severe CP, developmental delay – Bayley cognitive score >2 SD below mean)	<b>1 (2)</b>
<b>II</b> (impaired vision requiring glasses, deafness corrected with hearing aid, mild – mod CP without developmental delay, Bayley cognitive score 1-2SD below mean)	<b>3 (6)</b>
<b>III</b> (Presence of tone disorder or motor delay without cognitive impairment)	<b>0 (0)</b>
<b>IV</b> (normal development)	<b>44 (92)</b>

*74% follow-up rate for all children <1500 g at birth*

# Outcomes for babies born at 23 and 24 weeks' gestation

- Outcomes for babies born at 23 and 24 weeks gestation has improved over the years
- Outcomes improve with provision of antenatal and neonatal care
- Higher rates of mortality and short & long term morbidity compared to babies born > 24 weeks' gestation
- Improved survival  $\neq$  more survivors with NDI