

SMALL BUT MIGHTY WARRIORS



XXIV. NEONATOLOGICKE SETKANI
XVIII. HANAKOVY DNY

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Disclosure

Optimism is just a lack of information

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"He's right, when you look at it that way,
it's not so bad!"

Limits of Viability

- 1935 – AAP – preterm infant - $< 2500\text{g}$ (standard adopted in Europe in 1919)
- In the mid 20th century gestational age and crown-to-heel length advocated as markers of viability
- 1950's – RDS described to the RCOG and identified as a principal cause of death in infants younger than 37/40
- This led to distinction between premature and growth restricted infants

Limits of Viability

- 60's – start of positive pressure ventilation, in 70's improving outcomes in infants less than 1800g
- 1973 – viability in US defined as 28⁺⁰/40
- 1978 – 1st infant below 750g ventilated
- 80's – survival of infants born between 24⁺⁰ and 25⁺⁶/40 expected possibility in regional units and limits of viability moving towards 24 weeks of gestation
- 90's – surfactant and antenatal steroids – survival improved in infants 24 to 32 weeks of gestation, long term outcomes more and more important

Limits of Viability

- Late 90's and 21st century– **reports of survival at 23/40 and indeed at 22/40 weeks of gestation**
- Infants too immature to survive, and thus **provision of intensive care is unreasonable at <23 weeks and <500 g**, respectively (Seri I, Evans J. J Perinatol. 2008)
- Infants born **at > or =25 weeks'** gestation and with a **birth weight of > or =600 g** are **warrant initiation of intensive care** (the majority of these patients survive, and at least 50% do so without severe long-term disabilities) (Seri I, Evans J. J Perinatol. 2008)
- For infants born **between 23(0/7) and 24(6/7) weeks'** gestation and with a **birth weight of 500 to 599 g**, survival and outcome are extremely uncertain ('**Grey Zone**')
- '**Grey zone**' of infant viability, the line between patient autonomy and medical futility is blurred, and **medical decision-making is complex and needs to embrace careful consideration of several factors.** (Seri I, Evans J. J Perinatol. 2008)

Limits of Viability

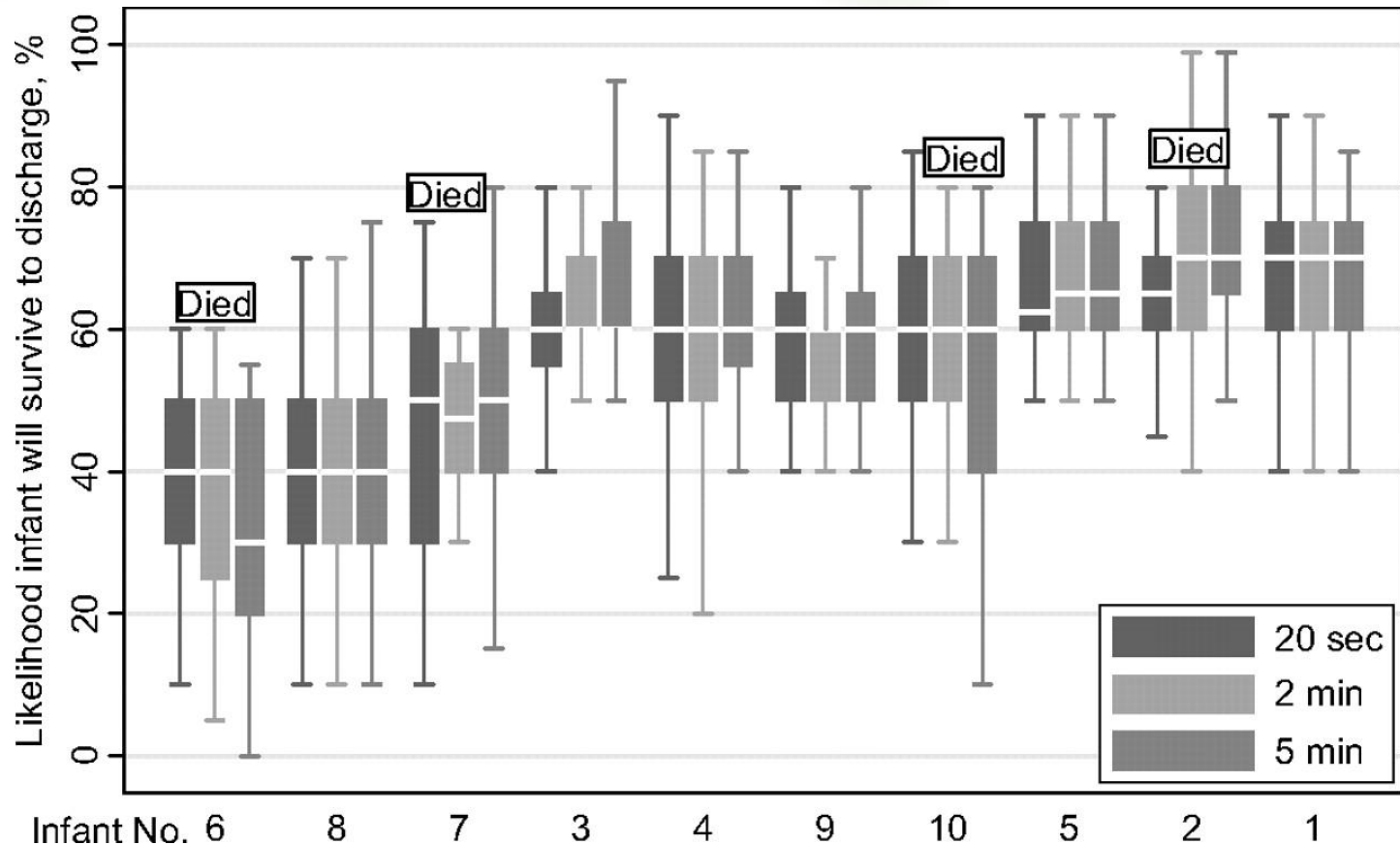
- There is no sharp limit of development, age, or weight at which a human fetus automatically becomes viable
- A baby's chances for survival increases 3-4% per day between 23 and 24 weeks of gestation and about 2-3% per day between 24 and 26 weeks of gestation
- After 26 weeks the rate of survival increases at a much slower rate because survival is high already
- The **limit of viability** was the gestational age at which a prematurely born fetus/infant has a **50% chance** of long-term survival outside its mother's womb
- Currently the limit of viability is considered to be around 24 weeks in the most developed countries

Limits of Viability – Call the ‘Paeds’



Limits of Viability – Call the ‘Paeds’

Predicted chance of survival to discharge (%) by attending neonatologists and fellows (combined group) at 20 seconds, 2 minutes, and 5 minutes for all infants, shown in ascending order of median.



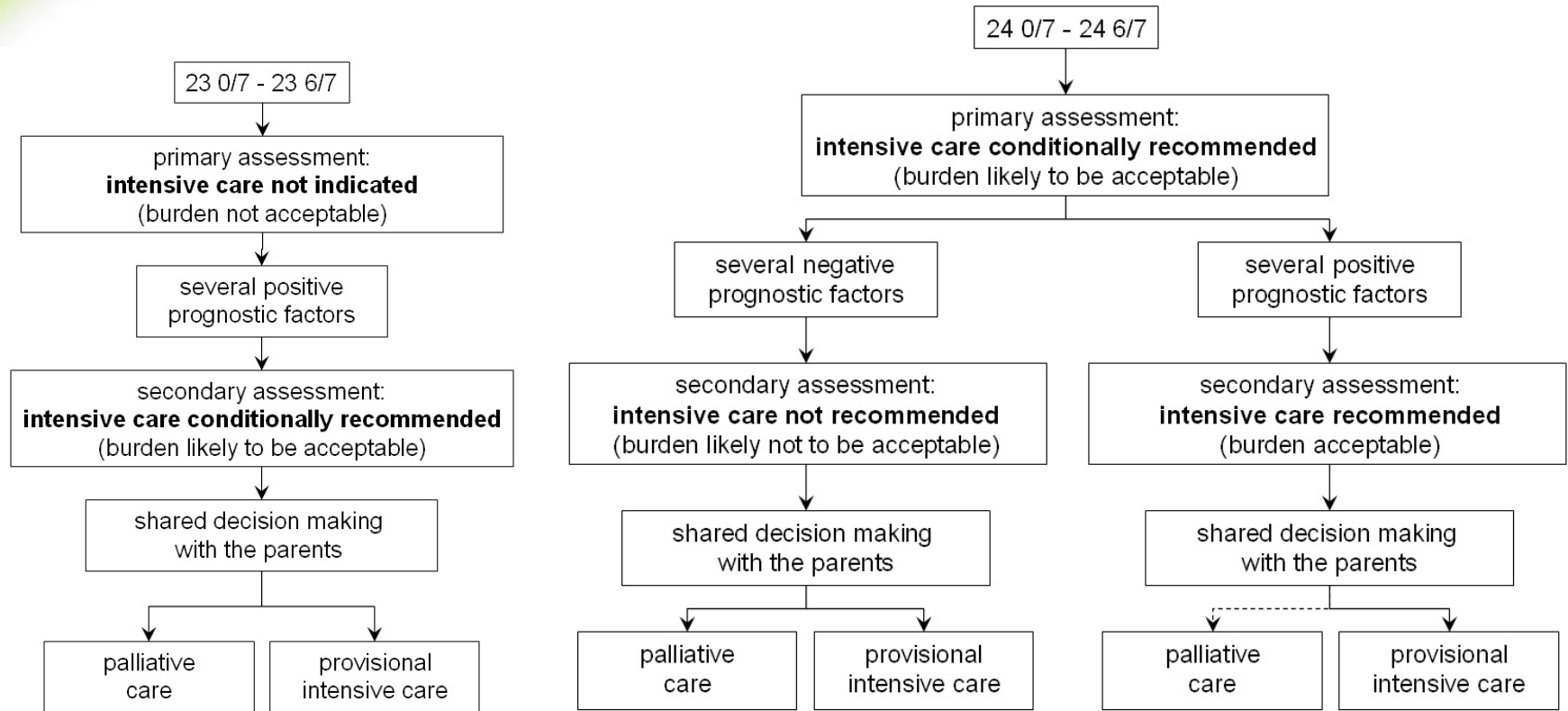
Limits of Viability – Call the ‘Paeds’

Message from the ‘Paeds’

- We do not have a clue about gestation or survival when called to extremely preterm delivery
- But we can provide either intensive or comfort care based on best obstetric and parental information



Limits of Viability - Guidelines



Swiss Society of Neonatology (2011)

My name is Tommy.

I was born at 24 weeks
and weighed 11b 9oz.

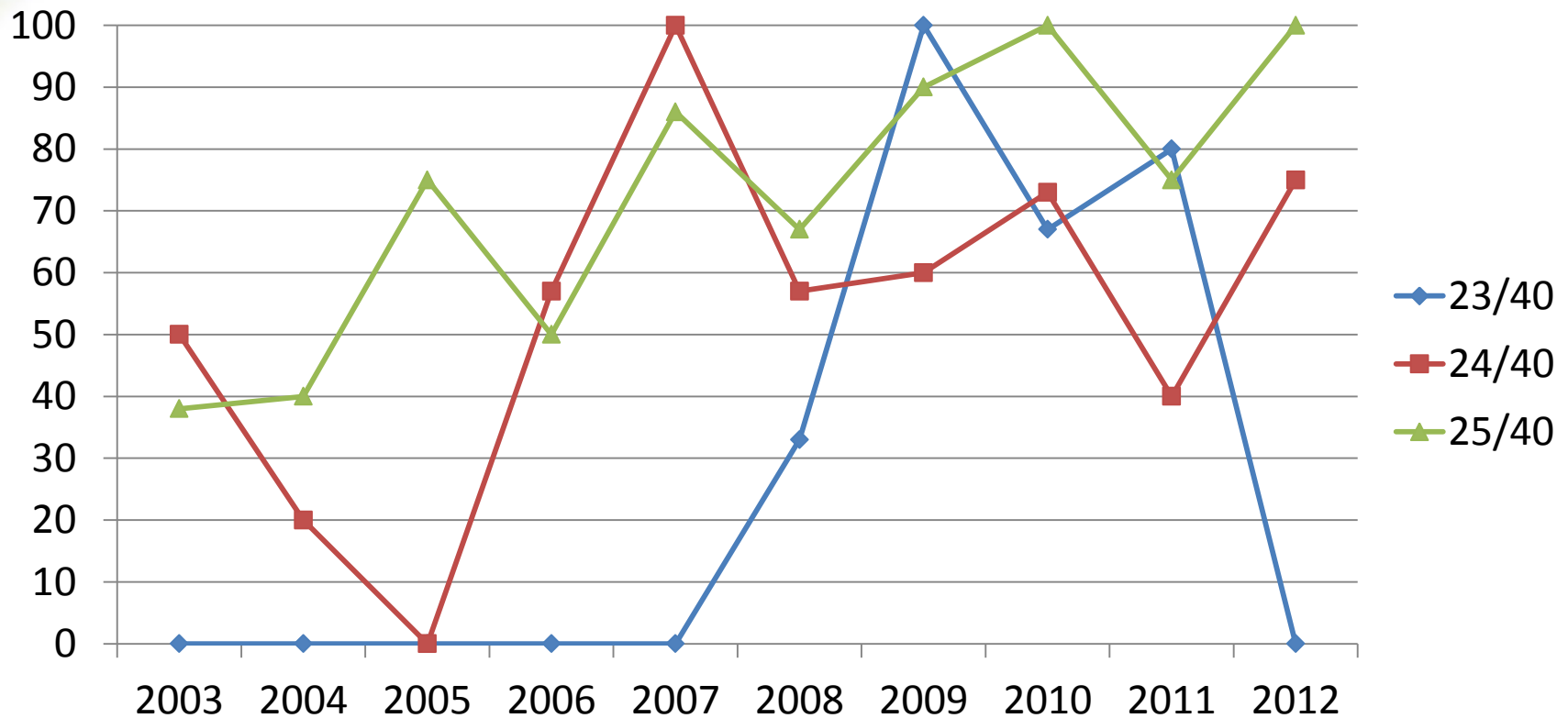
When I grow up, I want
to be a rugby player!



CWUIUH – Results in Grey Zone

Inborn Infants

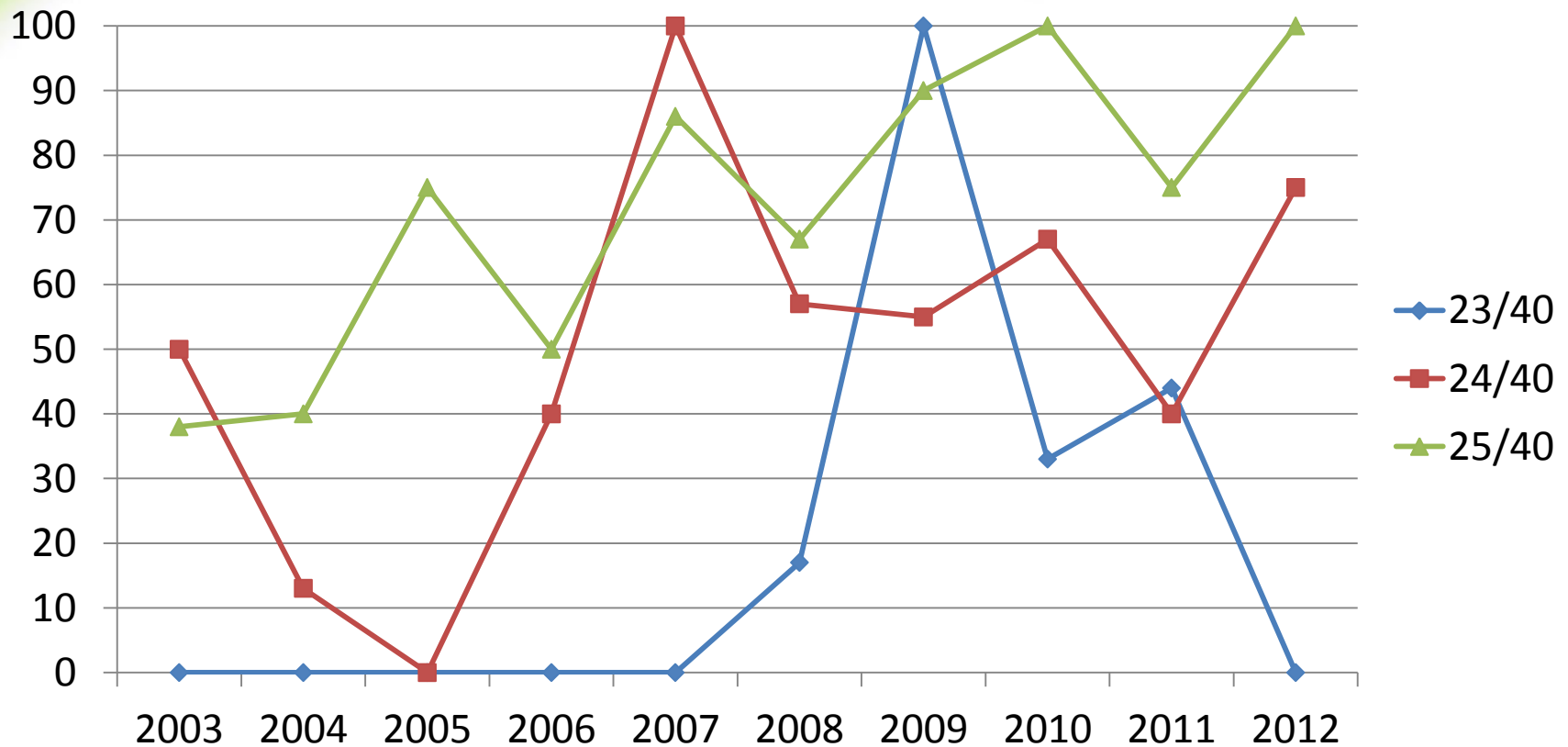
Survival to discharge when Intensive Care Started



CWIUH – Results in Grey Zone

Inborn Infants

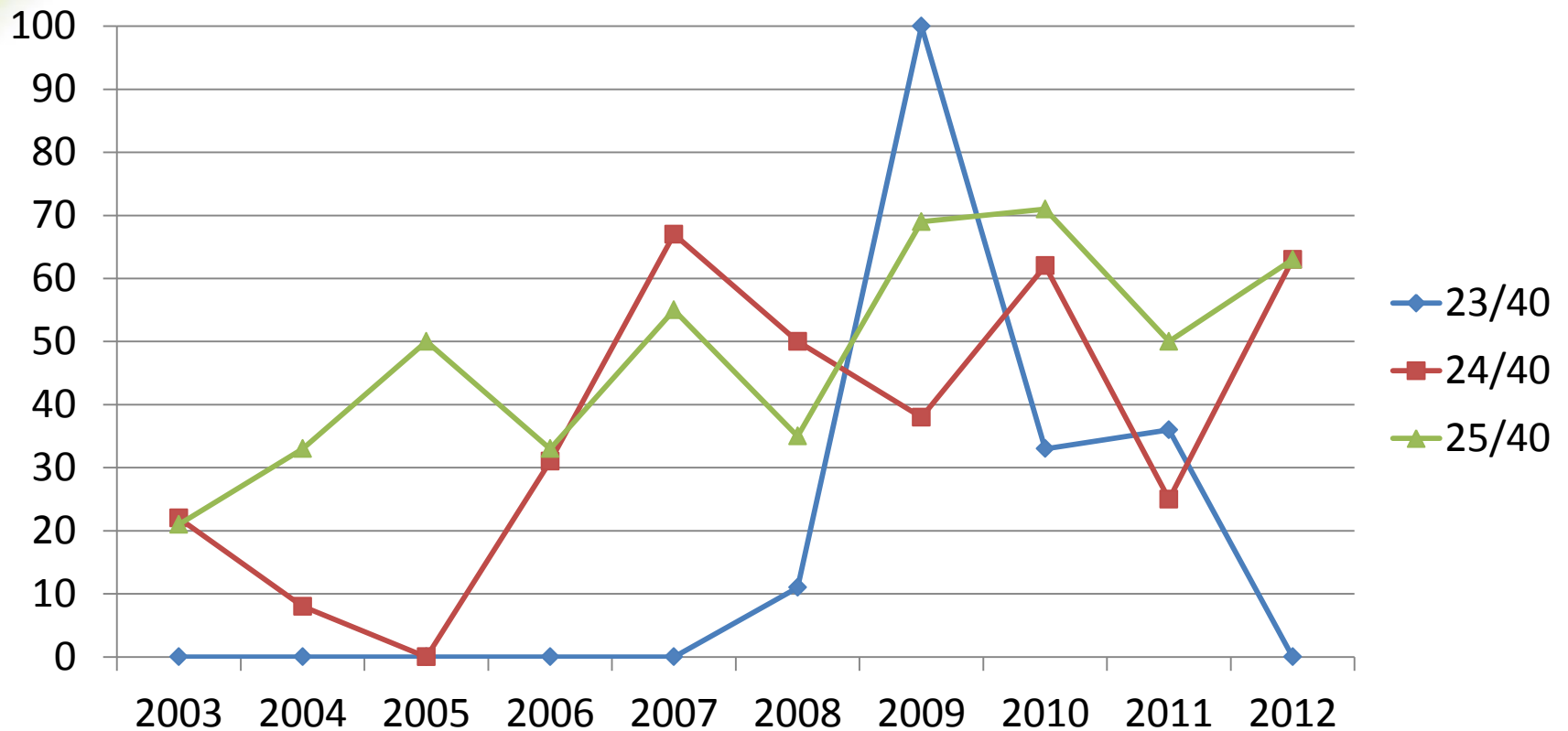
Survival to Discharge when Born Alive



CWIUH – Results in Grey Zone

Inborn Infants

Survival to Discharge – Including Stillbirths



CWUIUH – Results in Grey Zone

Inborn Infants

Based on outcomes at 25/40

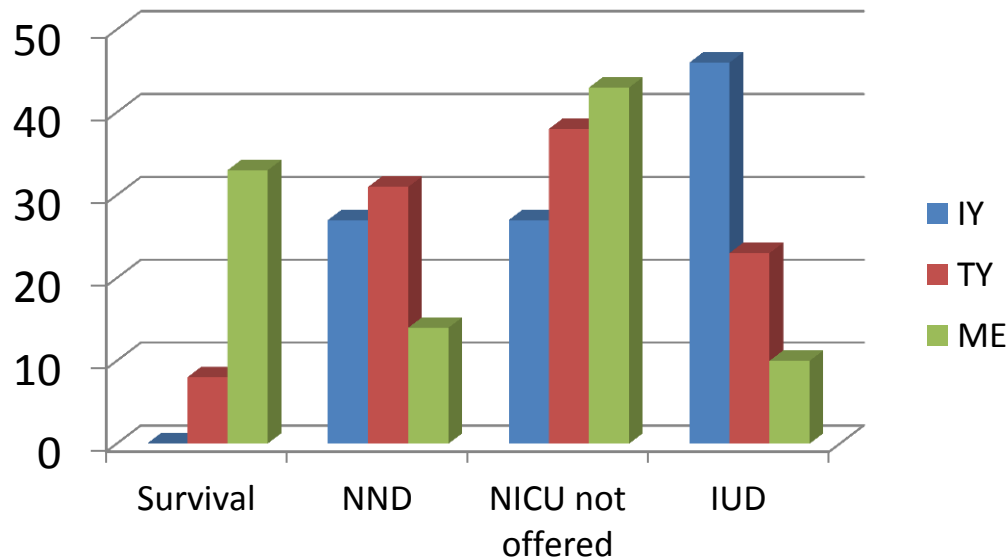
- Initial Years – 2003 - 2005
- Transitional Years – 2006 - 2008
- Modern Era – 2009 - 2012



CWIUH – Results in Grey Zone

Inborn Infants

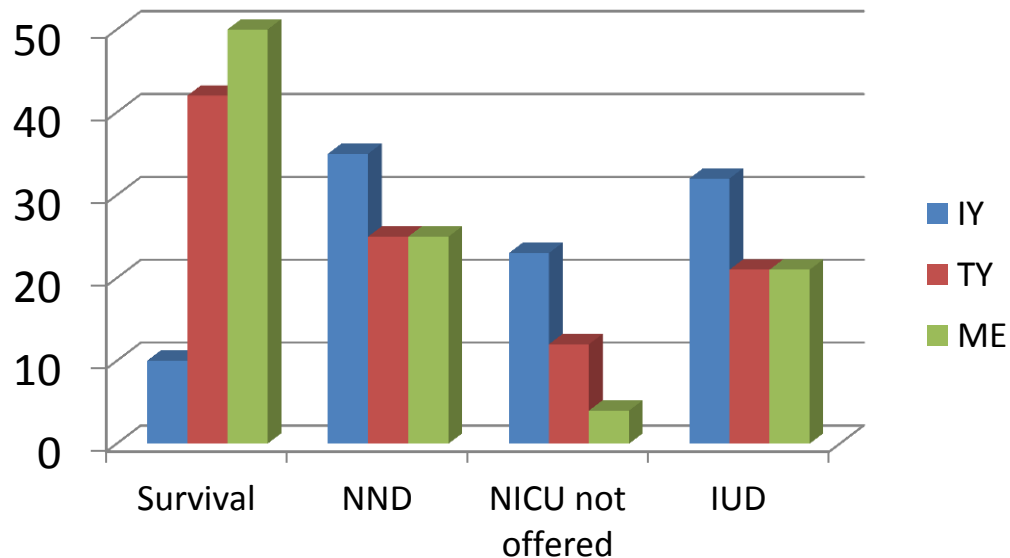
23/40	Initial Years	Transitional Years	Modern Era
Number of Deliveries	11	13	21
Survival (%)	0 (0)	1 (8)	7 (33)
Neonatal Deaths after Starting Intensive Care (%)	3 (27)	4 (31)	3 (14)
Intensive Care not Started (%)	3 (27)	5 (38)	9 (43)
Stillbirths (Intra/Ante partum deaths) (%)	5 (46)	3 (23)	2 (10)



CWUIUH – Results in Grey Zone

Inborn Infants

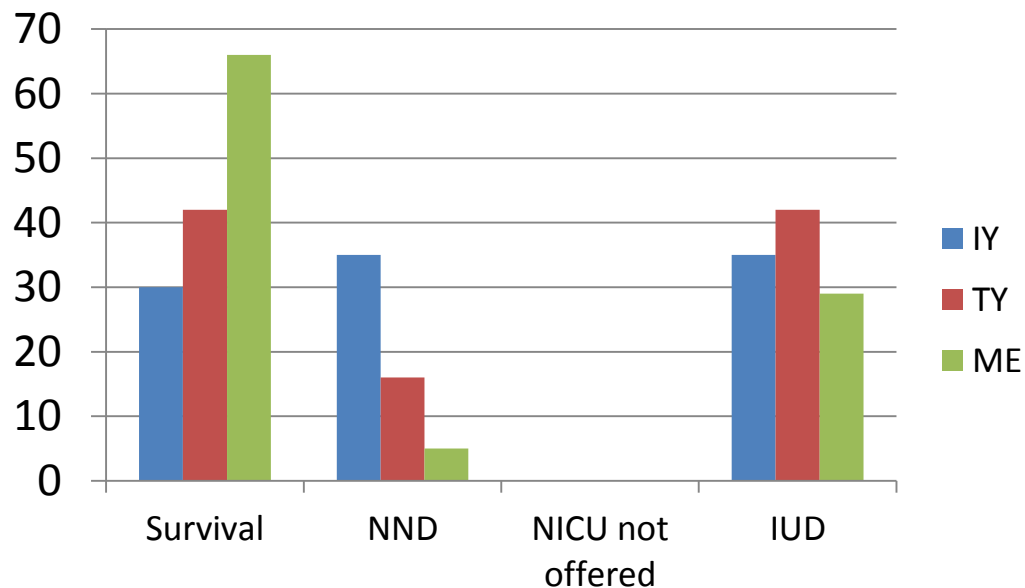
24/40	Initial Years	Transitional Years	Modern Era
Number of Deliveries	31	24	56
Survival (%)	3 (10)	10 (42)	28 (50)
Neonatal Deaths after Starting Intensive Care (%)	11 (35)	6 (25)	14 (25)
Intensive Care not Started (%)	7 (23)	3 (12)	2 (4)
Stillbirths (Intra/Ante partum deaths) (%)	10 (32)	5 (21)	12 (21)



CWIUH – Results in Grey Zone

Inborn Infants

25/40	Initial Years	Transitional Years	Modern Era
Number of Deliveries	26	31	41
Survival (%)	8 (30)	13 (42)	27 (66)
Neonatal Deaths after Starting Intensive Care (%)	9 (35)	5 (16)	2 (5)
Intensive Care not Started (%)	0 (0)	0 (0)	0 (0)
Stillbirths (Intra/Ante partum deaths) (%)	9 (35)	13 (42)	12 (29)



CWUIUH – Results in Grey Zone

Inborn Infants

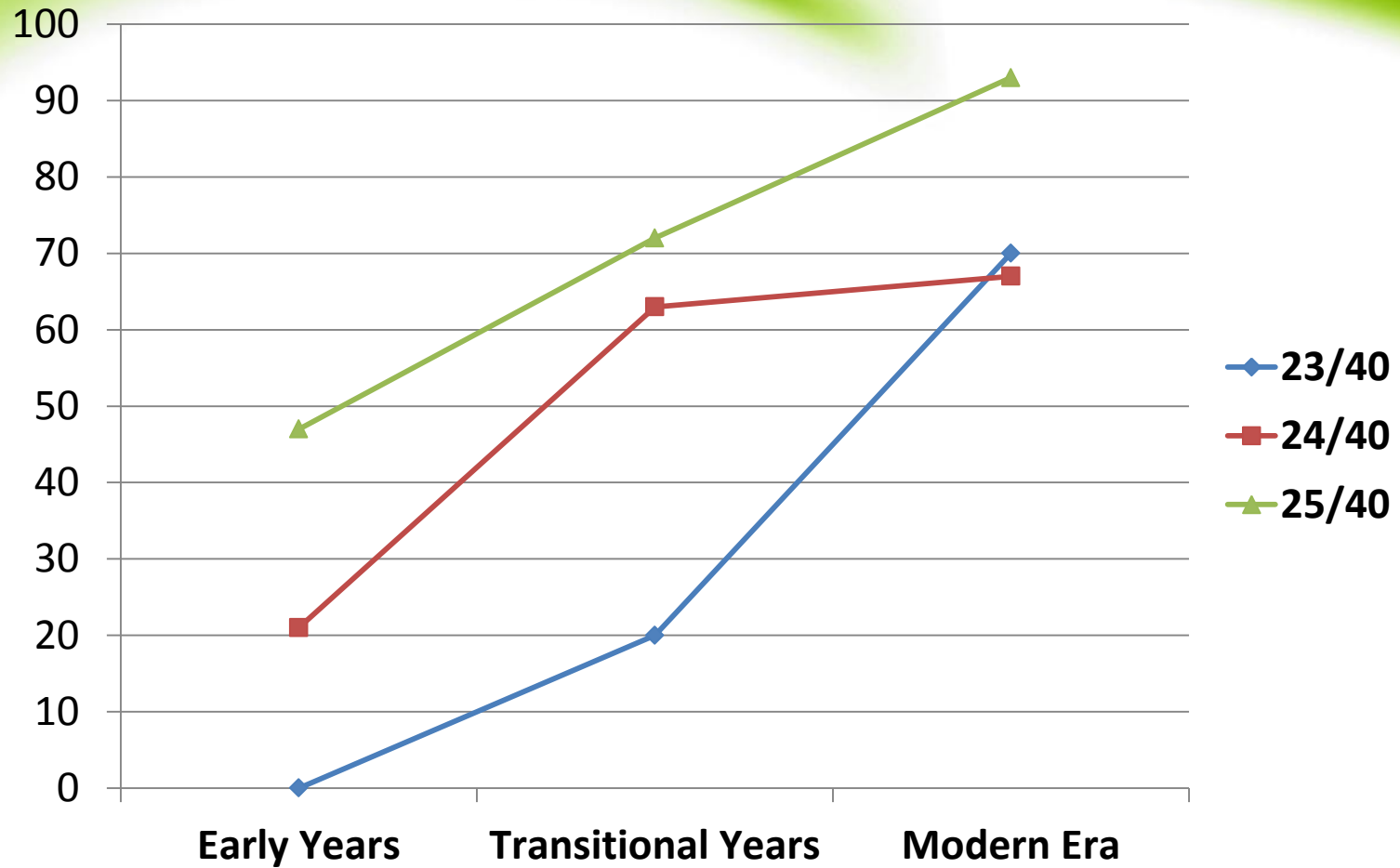
23/40	Initial Years	Transitional Years	Modern Era
Number of Infants NICU Started	3	5	10
Survival (%)	0 (0)	1 (20)	7 (70)

24/40	Initial Years	Transitional Years	Modern Era
Number of Infants NICU Started	14	16	42
Survival (%)	3 (21)	10 (63)	28 (67)

25/40	Initial Years	Transitional Years	Modern Era
Number of Infants NICU Started	17	18	29
Survival (%)	8 (47)	13 (72)	27 (93)

CWIUH – Results in Grey Zone

Inborn Infants



My name is Lorcán.

I was born at 24 weeks
and weighed 11b 7oz.

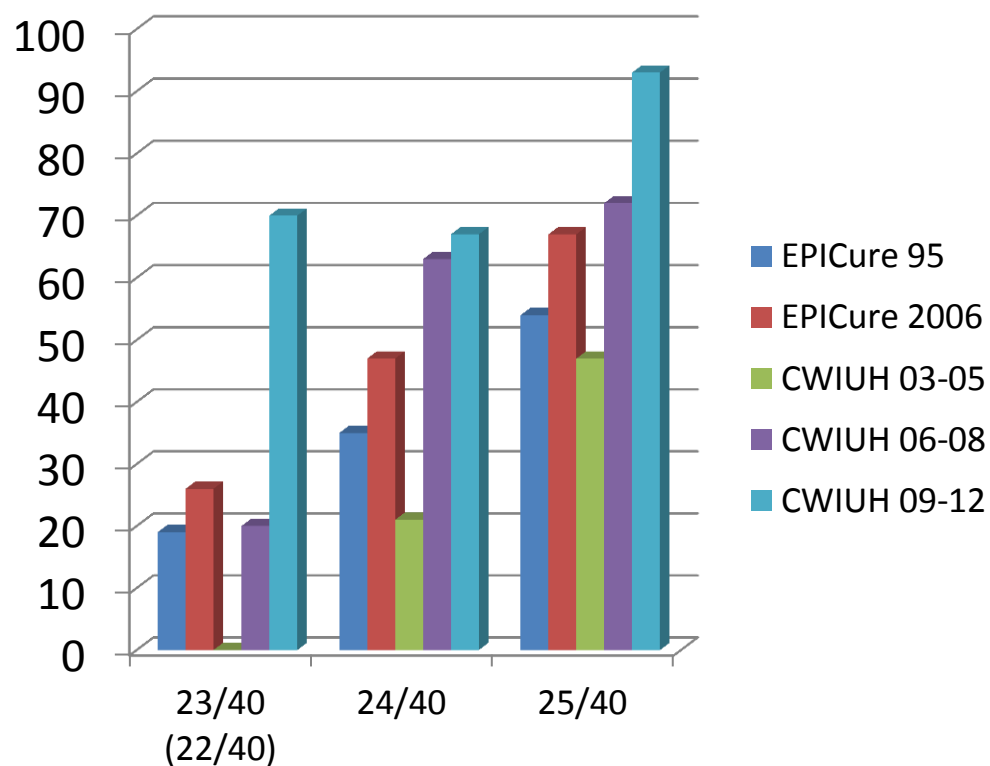
When I grow up, I want
to be a race car mechanic!



European Perspective (UK and Ireland)

EPICure study 1 and 2

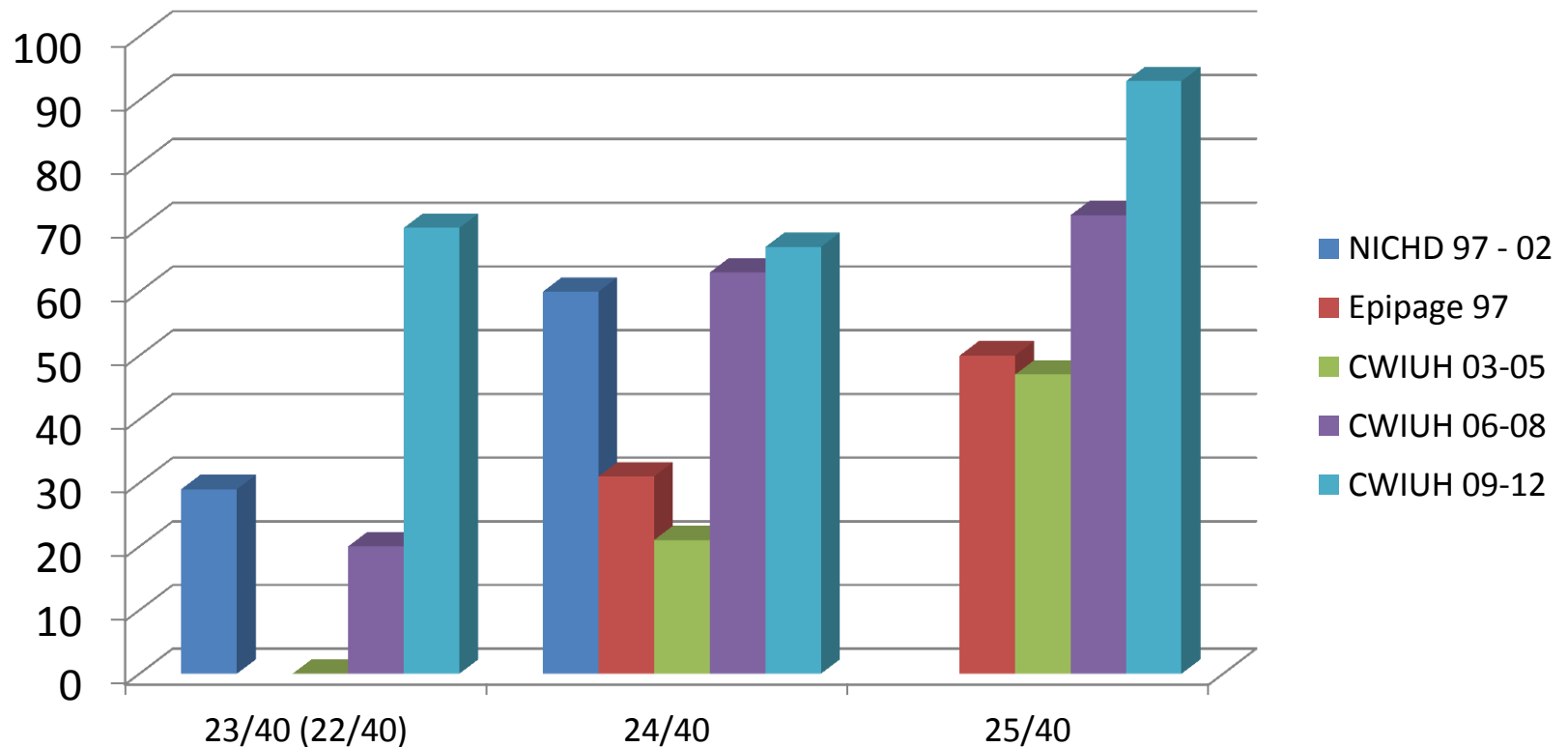
GA at birth	22-23w	24w	25w
Admissions 1995 n	130	244	290
Survival (n) (%;95%CI)	25 (19;12-26)	85 (35;29-41)	156 (54;48-59)
Admissions 2006 n	196	330	426
Survival (n) (%;95%CI)	51 (26;20-32)	155 (47;42-52)	285 (67;62-71)
Survival change % (96%CI)	+7 (-2to16)	+12 (4-20)	+13 (6-21)
Chi-squared p	0.1	0.004	<0.001



Kate L. Costeloe et.al. EPICure 2: Survival and Early Morbidity of Extremely Preterm Babies in England: Changes Since 1995. Pediatric Academic Societies and Asian Society for Pediatric Research Joint Meeting 2008, Hawaii, USA.

International Perspective (France and USA)

Epipage Study and NICHD

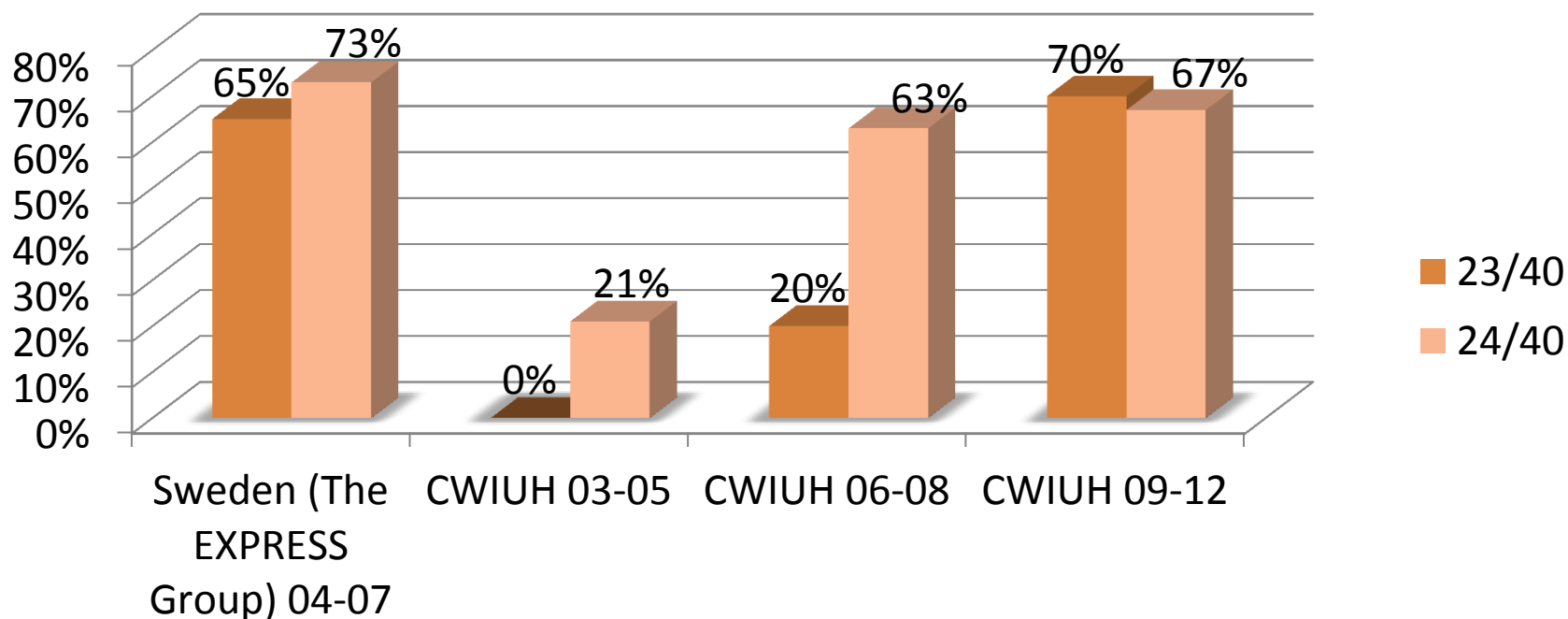


Larroque B et al. Survival of very preterm infants: Epipage, a population based cohort study. Arch Dis Child Fetal Neonatal Ed. 2004 Mar;89(2):F139-44

Fanaroff AA et al. Trends in neonatal morbidity and mortality for very low birthweight infants. Am J Obstet Gynecol. 2007 Feb;196(2):147.e1-8

Swedish Perspective

- CWIUH only inborn infants
- Sweden survival to 365 days
- All babies admitted to NICU (offered full intensive care)



One-Year survival of Extremely Preterm infants After Active Perinatal Care in Sweden, JAMA 2009 (The EXPRESS Group)

Swedish Perspective

- In infants born at **22 to 26 weeks of gestation**, **increased intensity of perinatal care reduced 1-year mortality** in fetuses alive at the mother's admission for delivery
- **Death or survival with NDI at 2.5 years' CGA was reduced** in health care regions **with higher intensity** compared with regions with lower intensity of perinatal care
- Increased survival was not associated with increased neonatal morbidity or rate of NDI
- **These findings**, combined with the knowledge that survival cannot be predicted by initial appearance at birth, **support a proactive approach to perinatal management of the EPT infant**

Summary

- **There is no exact threshold for ‘limit of viability’**
- **Early ultrasound dating scan is better than any postnatal assessment**
- **Survival is improving in the extremely premature infants - 23, 24, 25 weeks of gestation (even in the Irish level III centers – CWIUH)**
- **Survival at 24/40 is consistently above 60%**
- **Survival at 25/40 is well above 70%, reaching 90%**
- **When care started at 23/40 survival seems to be above 50%**
- **Neurodevelopmental impairment at 2.5 yrs of age in infants between 22 to 26 weeks of gestation is 30% (based on Sweden data from 2004-2007 – EXPRESS study)**
- **Proactive management and antenatal steroids are linked with improved survival without increase in NDI (and in fact with some decreased morbidity)**
- **It seems reasonable to offer NICU care to infants from 23+0/40 however that includes active perinatal care**

Acknowledgements

- Dr. Eugene Dempsey
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- The Nurses and Midwives of The Coombe