

# Should We Try to Save 22 Weekers?

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## Treatment Options for Seriously Ill Newborns — Physician's Assessment in Relation to Parent's Preference

Physician's Assessment of Treatment Options*	Parents Prefer to Accept Treatment**	Parents Prefer to Forego Treatment**
Clearly beneficial	Provide treatment	Provide treatment during review process <sup>tt</sup>
Ambiguous or uncertain	Provide treatment	Forego treatment
Futile	Provide treatment unless provider declines to do so	Forego treatment

\* The assessment of the value to the infant of the treatments available will initially be by the attending physician. Both when this assessment is unclear and when the joint decision between parents and physician is to forego treatment, this assessment would be reviewed by intra-institutional mechanisms and possibly thereafter by court.

\*\* The choice made by the infant's parents or other duly authorized surrogate who has adequate decisionmaking capacity and has been adequately informed, based on their assessment of the infant's best interests.

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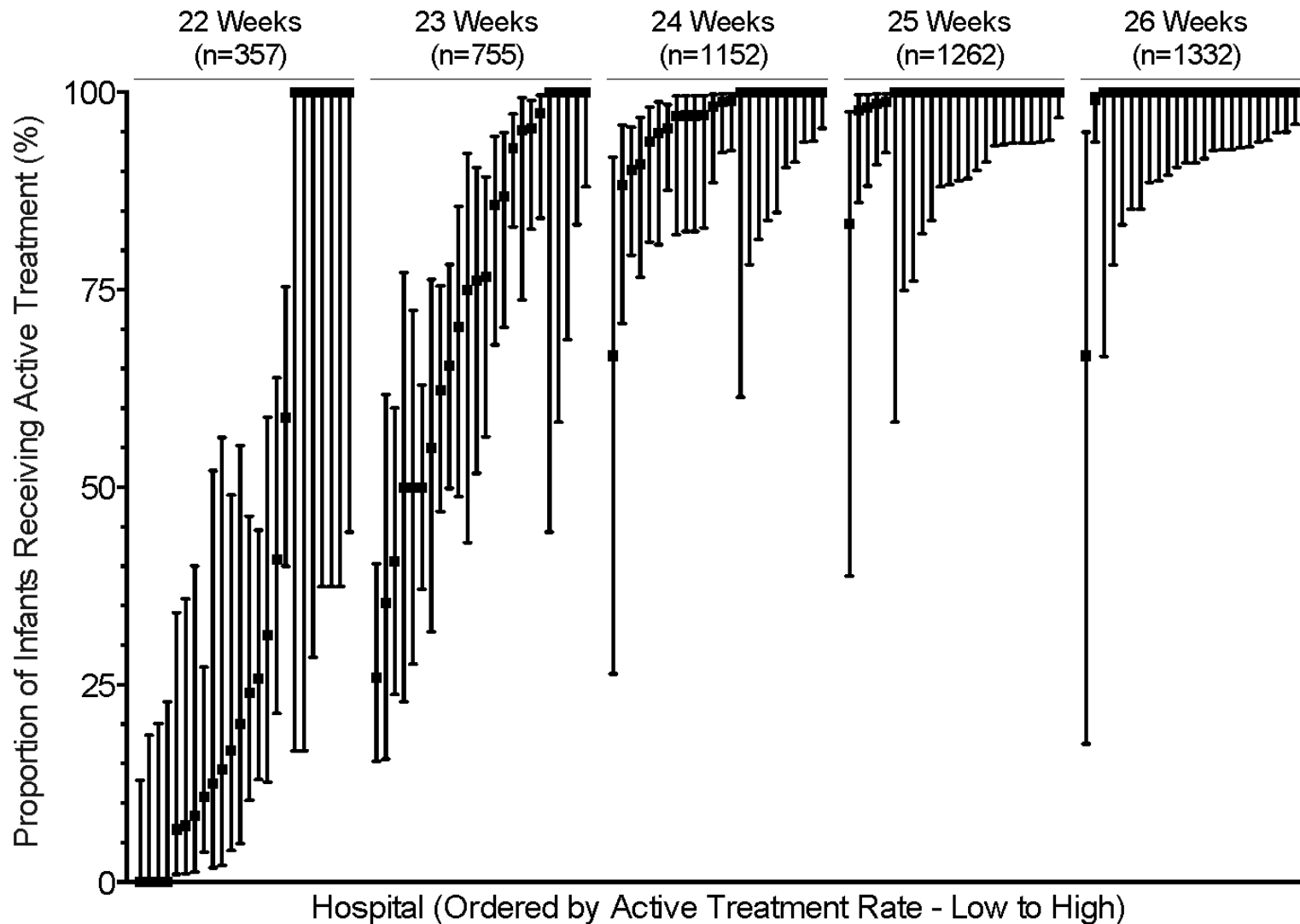
**Does treatment of a 22 weeker belong here? Or here?**

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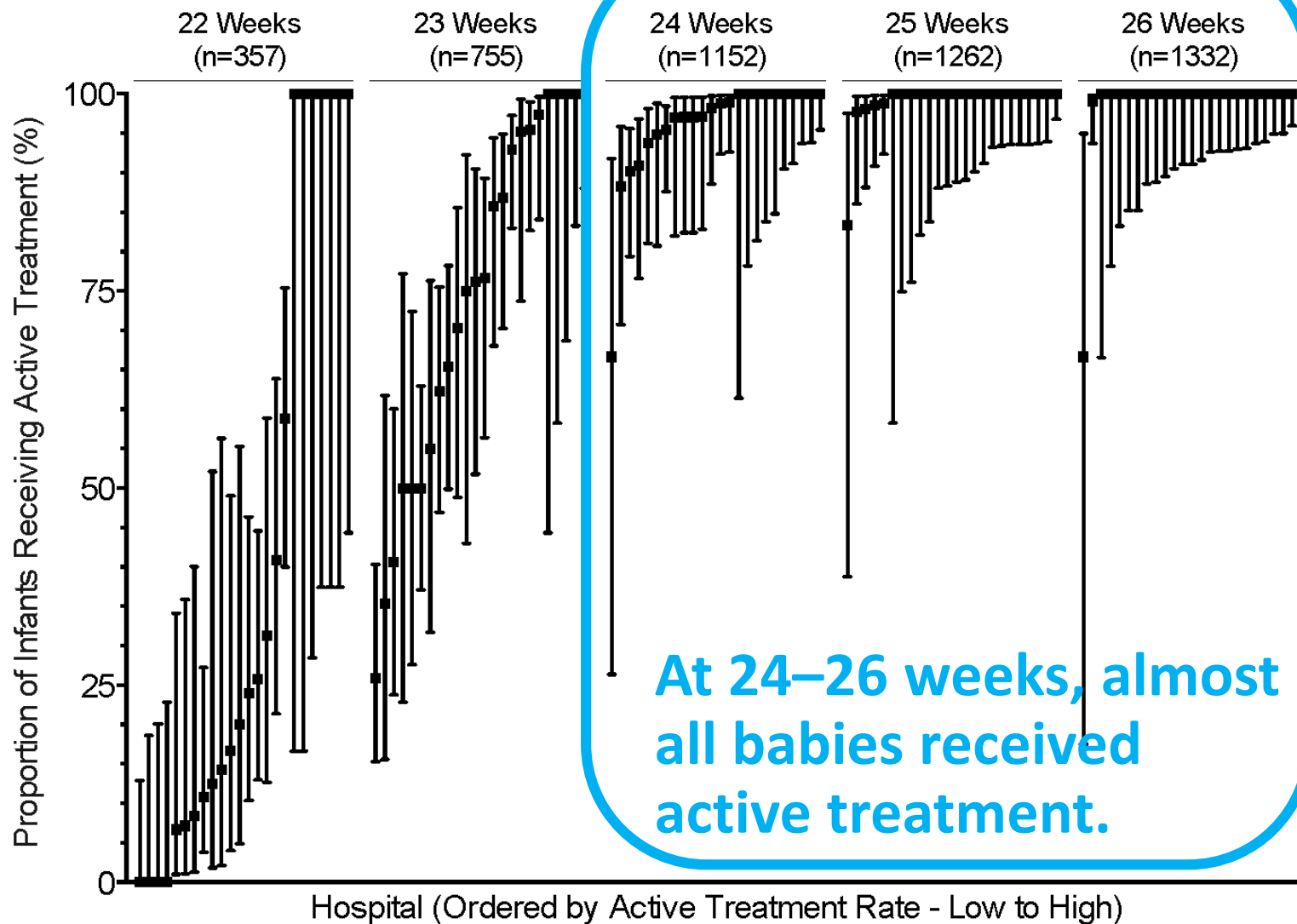
# Current practice variation in the USA

Rates of Neonatal Active Treatment for Infants Born at 22 to 26 Weeks' Gestation in 24 Hospitals in the NICHD Neonatal Research Network



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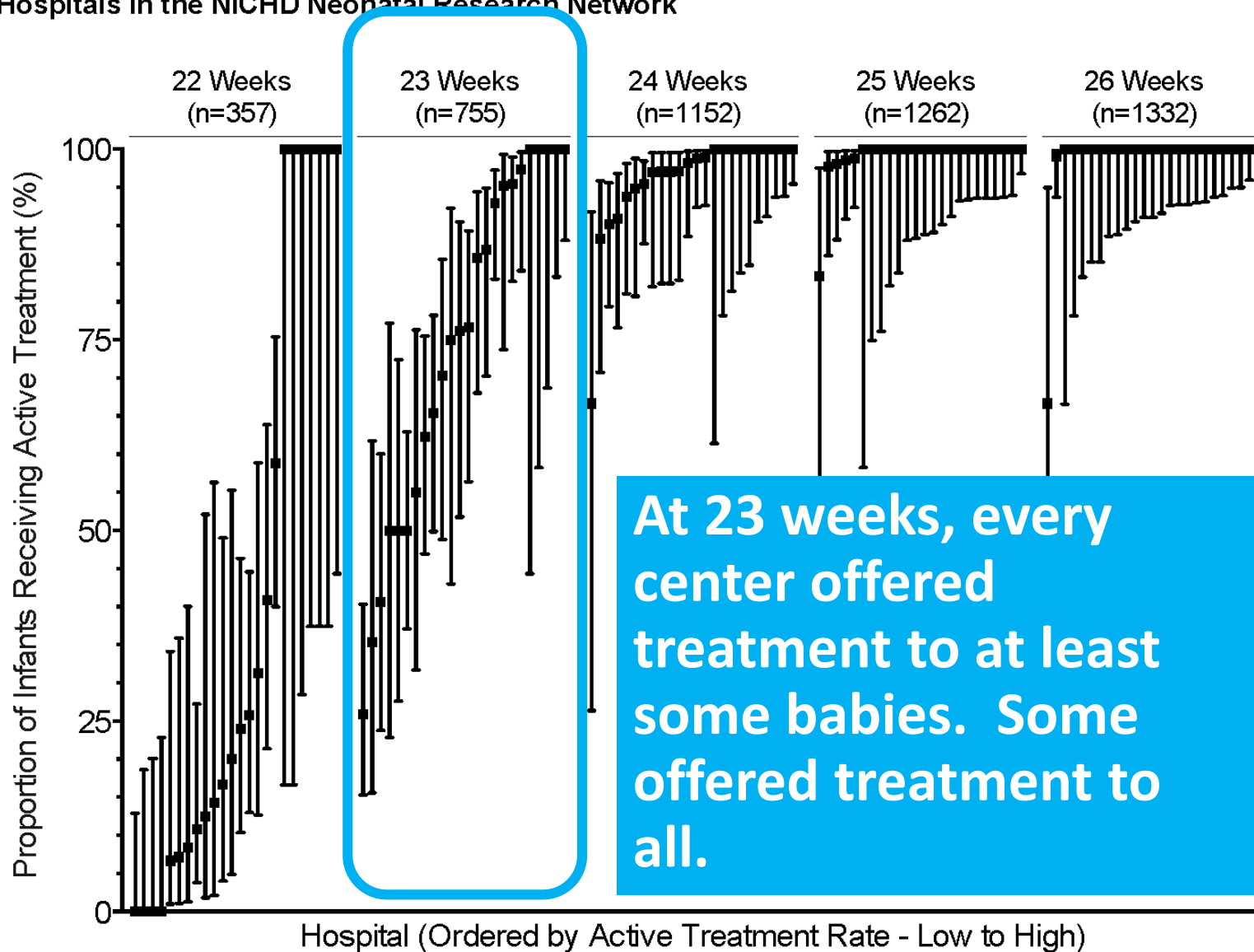
Rates of Neonatal Active Treatment for Infants Born at 22 to 26 Weeks' Gestation in 24 Hospitals in the NICHD Neonatal Research Network



At 24-26 weeks, almost all babies received active treatment.

# Current practice variation in the USA

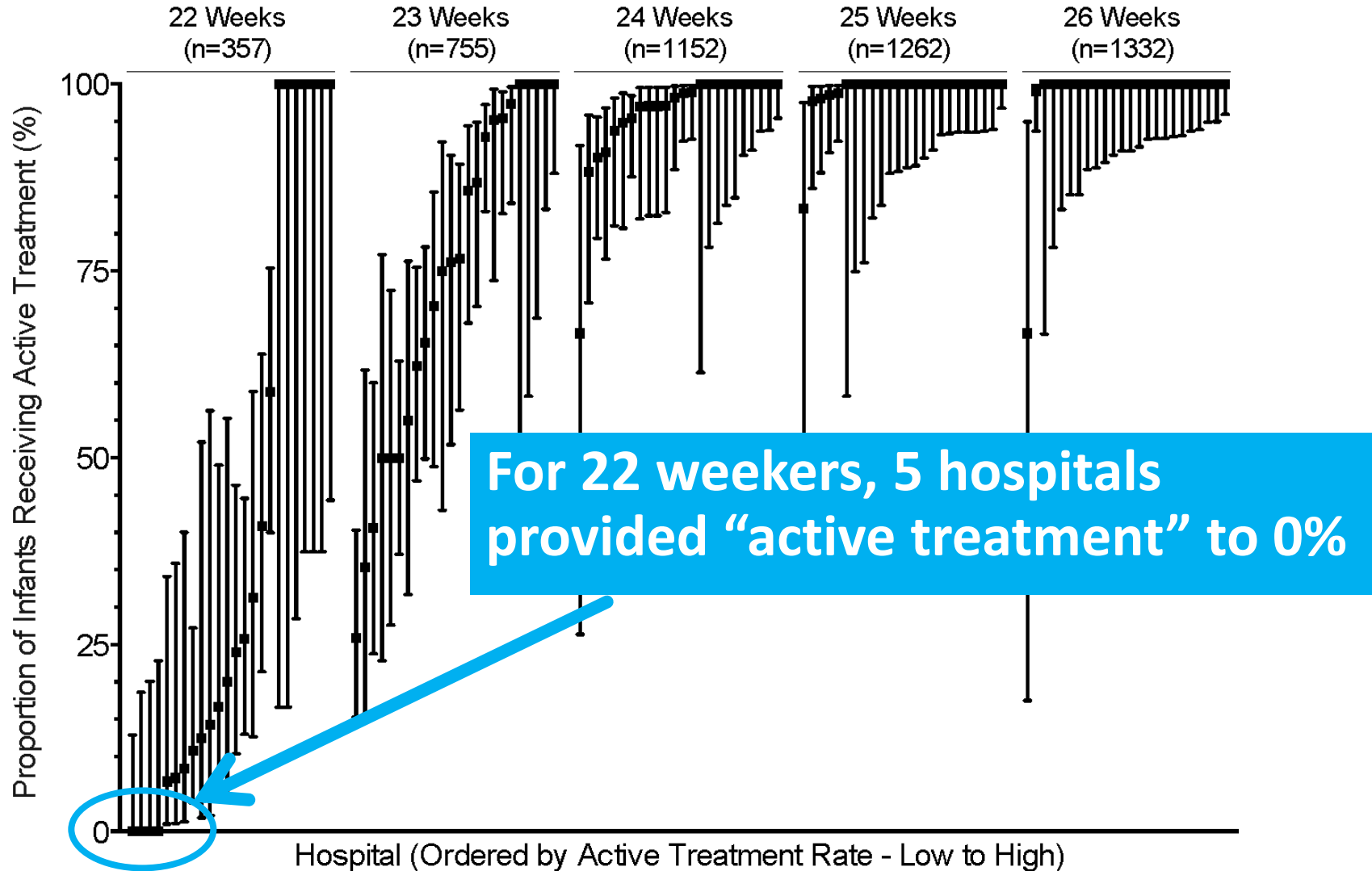
Rates of Neonatal Active Treatment for Infants Born at 22 to 26 Weeks' Gestation in 24 Hospitals in the NICHD Neonatal Research Network



At 23 weeks, every center offered treatment to at least some babies. Some offered treatment to all.

# Current practice variation in the USA

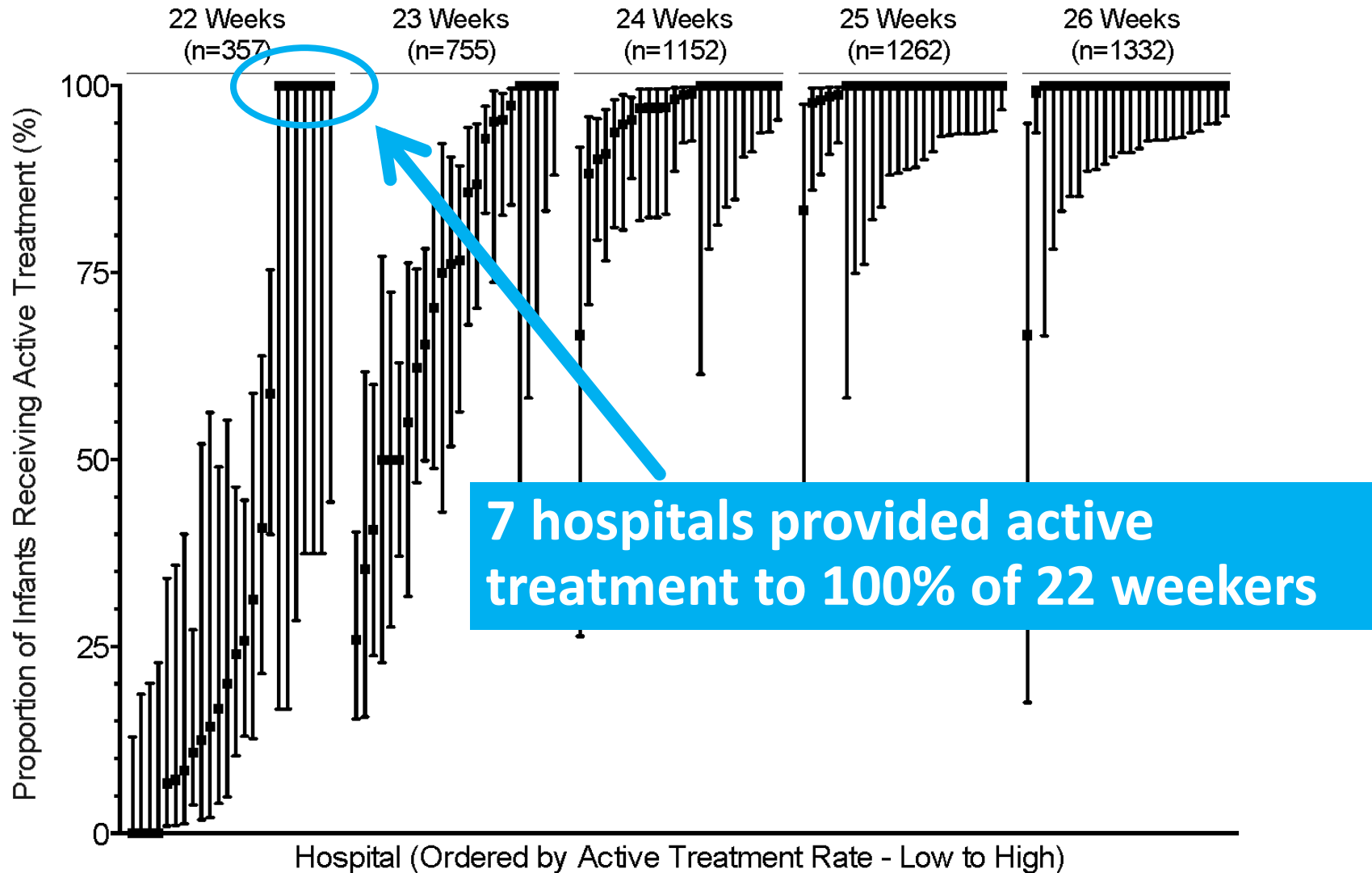
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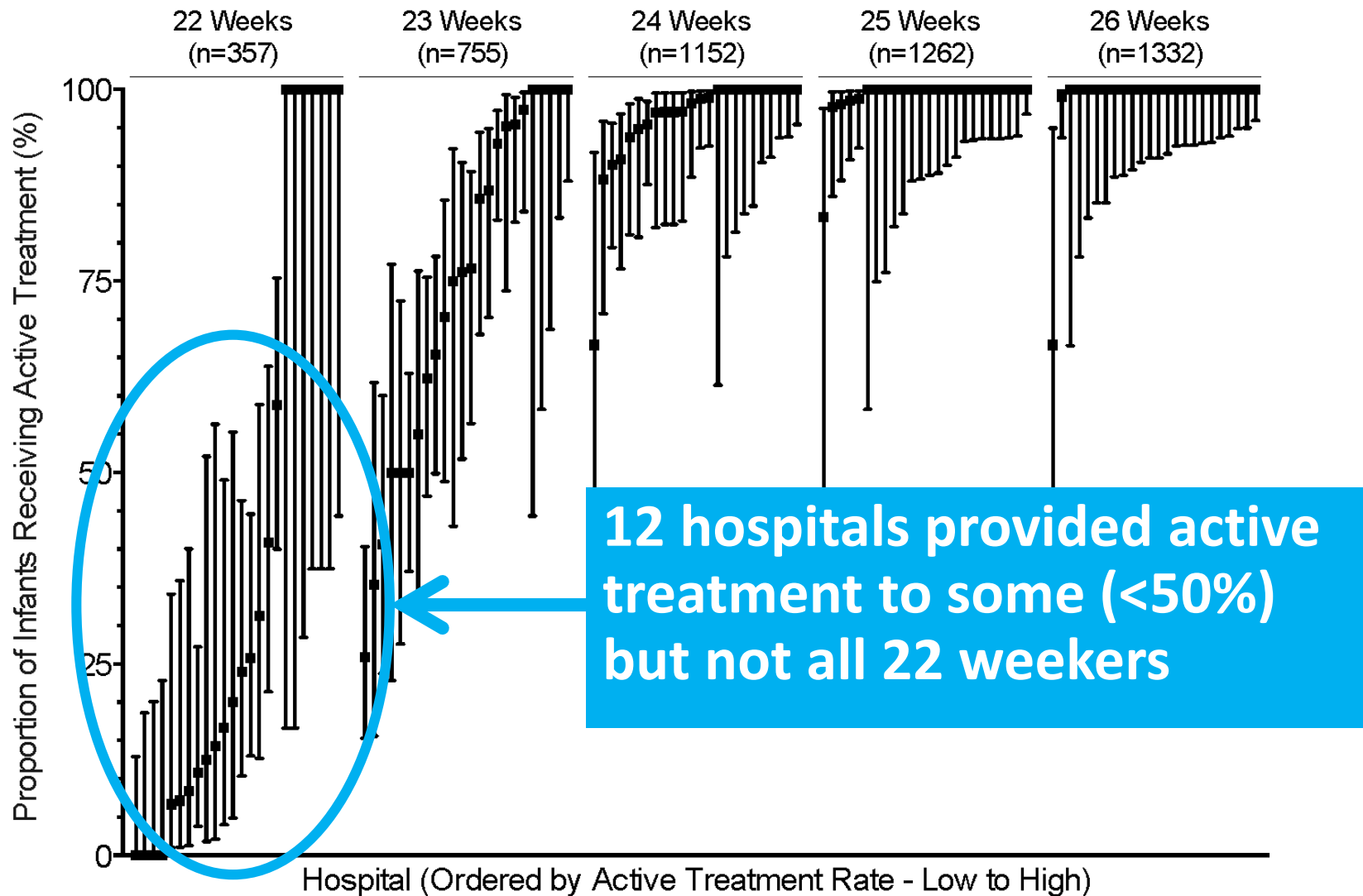
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Collectively, doctors are uncertain whether treatment is beneficial, futile, or in between.

There is no standard approach to decisions for these tiny babies

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treat

**When doctors disagree and  
practices vary, these are  
precisely the situations in  
which we should defer to  
parental preferences!**

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## Variation in Treatment and Outcomes in Preterm Infants

**Table 2. Crude Outcomes by Gestational Age at Birth.\***

Outcome	All Infants		Infants Who Received Active Treatment	
	Overall Rate <sup>†</sup> <i>mean (95% CI)</i>	Hospital Rate <sup>‡</sup> <i>median (interquartile range)</i>	Overall Rate <sup>†</sup> <i>mean (95% CI)</i>	Hospital Rate <sup>‡</sup> <i>median (interquartile range)</i>
22 Wk of gestation				
Survival	5.1 (3.2–7.9)	3.4 (0.0–10.6)	23.1 (14.9–34.0)	21.1 (0.0–50.0) <sup>§</sup>
Survival without severe impairment	3.4 (1.9–5.9)	0.0 (0.0–6.9)	15.4 (8.8–25.4)	5.0 (0.0–33.3) <sup>§</sup>
Survival without moderate or severe impairment	2.0 (0.9–4.1)	0.0 (0.0–0.7)	9.0 (4.3–17.9)	0.0 (0.0–14.6) <sup>§</sup>

**Overall survival at 22 weeks was just 5%**

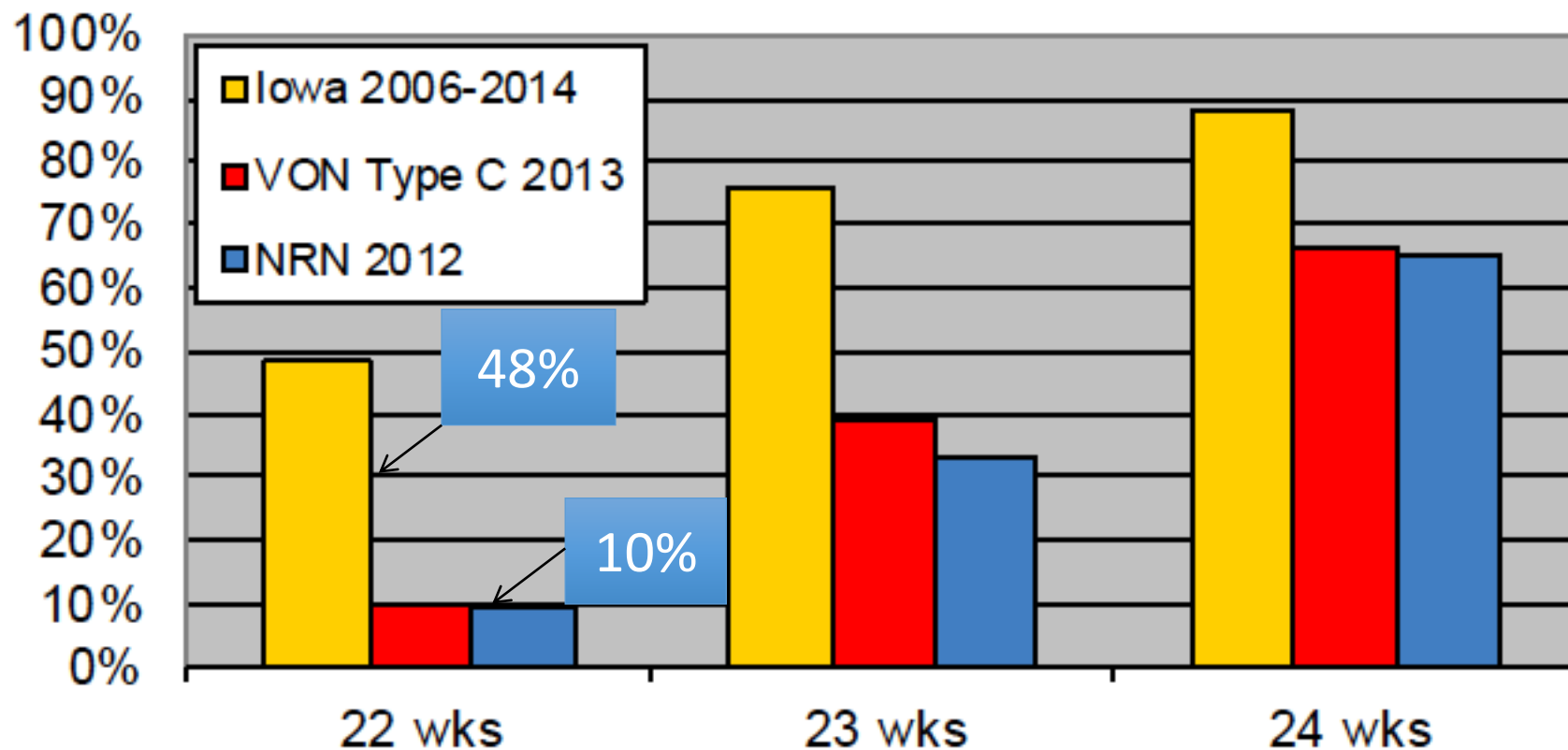
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**Among infants who were treated, it was 23%, with one hospital reporting 34%**

# Survival of Inborn VLBW Infants 22–24 weeks EGA



# Current survival rates in Iowa

EGA	Survival rates	% no/mild NDI
22 weeks –	12/20; 70%	55%
23 weeks –	41/50; 82%	68%
24 weeks –	70/79; 87%	79%
25 weeks –	89/99; 90%	73%



How do they do it?

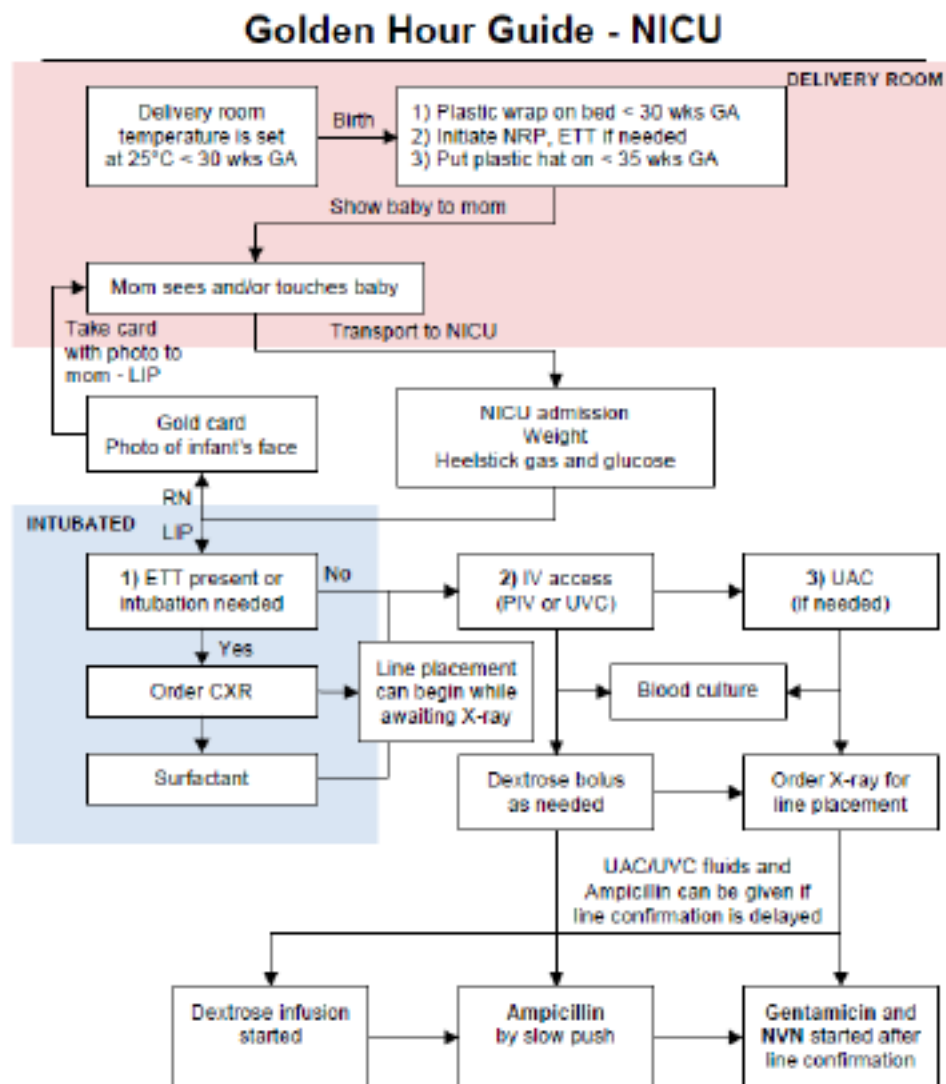
# A number of innovations

- Collaboration with MFM
  - All women get antenatal steroids, starting at 21-22 weeks.
    - Reduces mortality, IVH, and severe NDI.
  - Discussion about C-section if indicated.
  - Parental informed consent for NICU treatment.
- Golden Hour Protocols for first hour of life
  - Attention to physiological and psychological needs
- Tiny Baby Unit within the NICU
  - RNs and RTs both highly trained in care of tiny babies
  - Meticulous attention to pCO<sub>2</sub>.

# In the NICU Standardization of Care Golden Hour Protocol

## Golden Hour Goals:

- 1) Admission temperature  $\geq 36.0$
- 2) Surfactant given
- 3) Dextrose infusion started
- 4) Antibiotics started
- 5) Communication post-delivery with mom



Golden Hour Goals:

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- 5) Communication post-delivery with mom - Gold card given

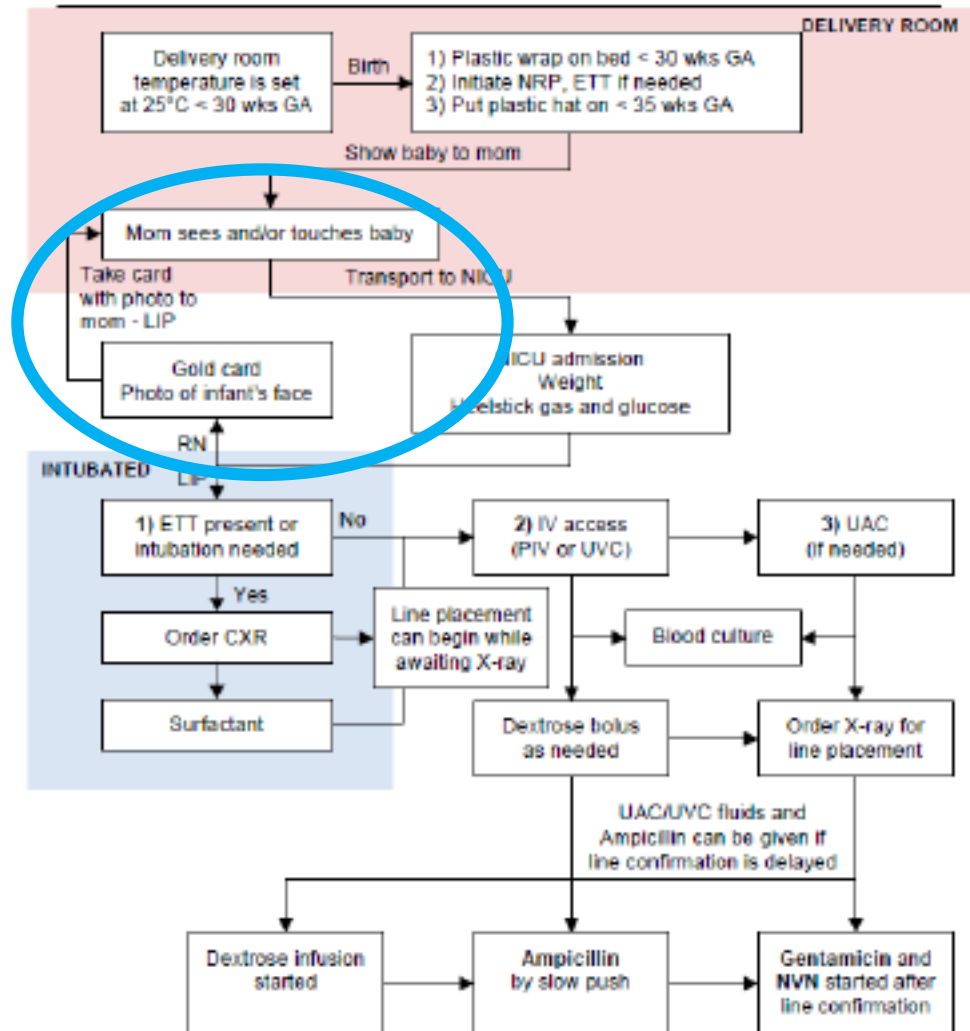
# In the NICU

## Standardization of

Mom sees, touches baby  
Photo of baby given to  
parents

- 2) Surfactant given
- 3) Dextrose infusion started
- 4) Antibiotics started
- 5) Communication post-delivery with mom

## Golden Hour Guide - NICU



- Golden Hour Goals:
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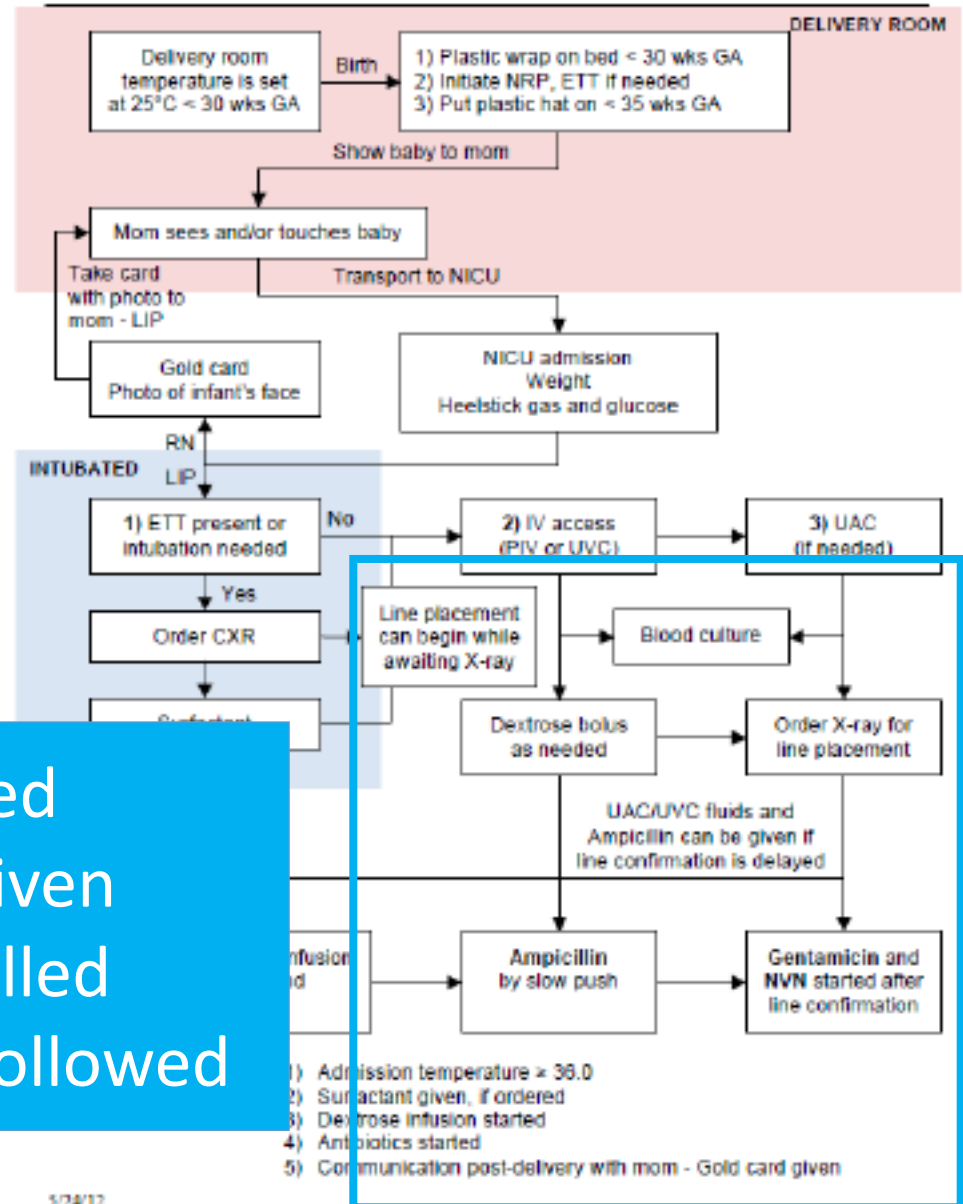
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Lines started  
Antibiotics given  
Temp controlled  
CO2 guidelines followed

## Golden Hour Guide - NICU



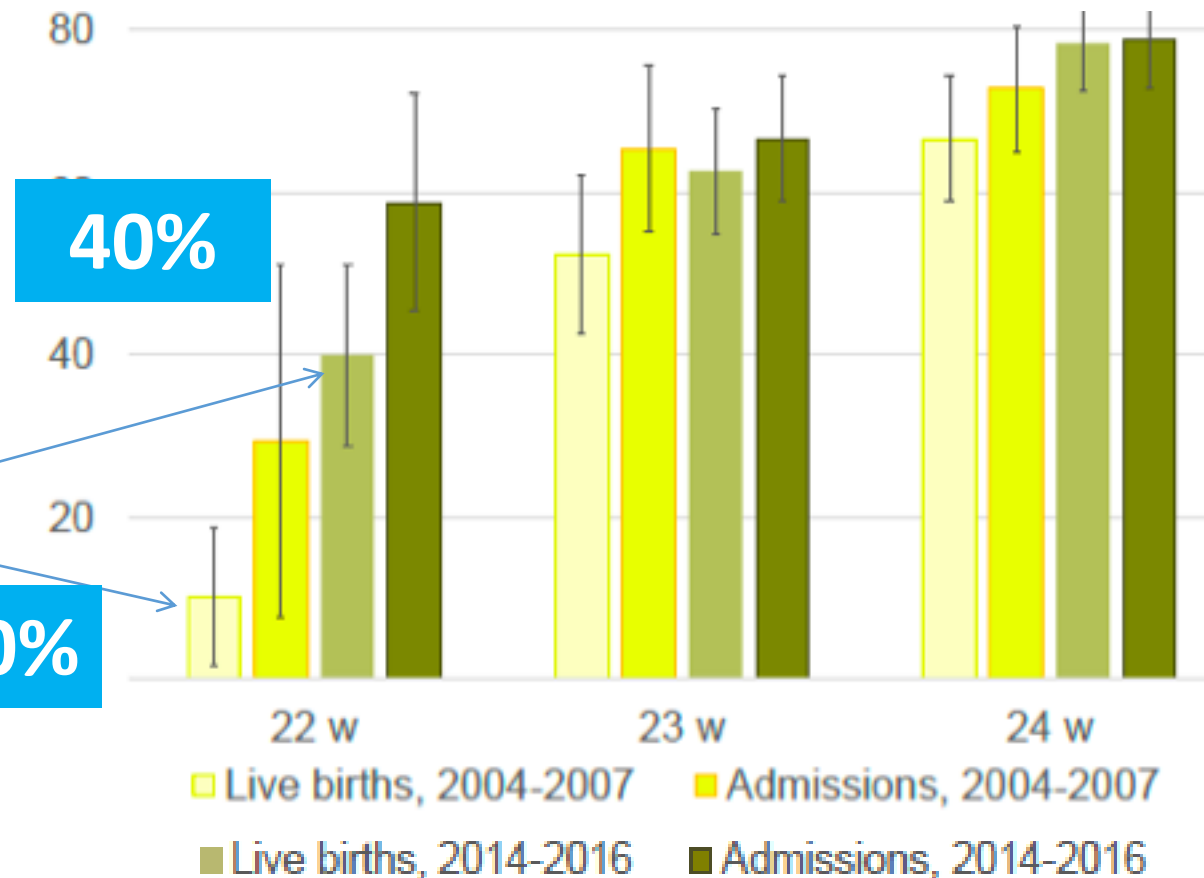
# Standardized Ventilator Goals

- 1) 1<sup>st</sup> Intention HFV Center at Iowa
  - ✓ High Frequency Jet Ventilation for all infants < 25 weeks at birth
- 2) Critically important to avoid volutrauma (shear force injury) to the lung especially at 22 to 23 weeks gestation
  - ✓ Follow pCO<sub>2</sub> levels closely with **rigid adherence** to goals to avoid fluctuations in Cerebral Blood Flow
    - 1) Target 45 - 55 first 3 days
    - 2) Target 45 - 60 next 4 days
    - 3) Gases Q2-3 hours or more frequently in the beginning
    - 4) After ventilator change, repeat in 20 minutes

Sweden reports similar results

# Survival rates by GA and treatment intensity for two cohorts – 2004-7 and 2014-16.

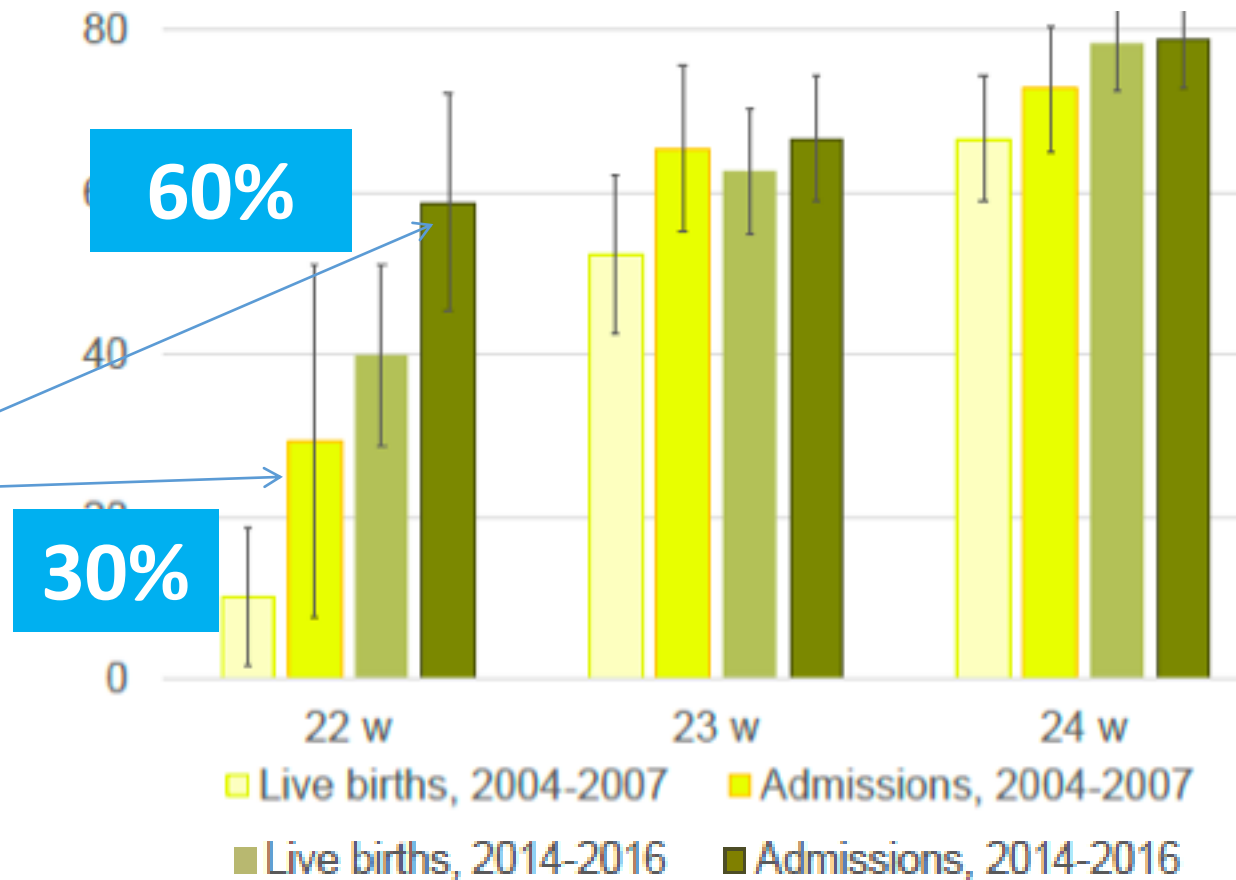
Overall survival and survival for treated babies in 2004-7





# Survival rates by gestational age and treatment intensity for two cohorts – 2004-7 and 2014-16

Overall survival and survival for treated babies in 2014-16



# Common elements of proactive treatment

- They anticipate medical and psychosocial needs...
- They have a well-developed protocol
- They implement it smoothly and consistently
- And it seems to work – though we don't know what, exactly is working.

In spite of very promising preliminary results

- Other centers don't want to emulate it.
- NICHD doesn't want to study it.
- Professional societies misrepresent the data.

## ACOG/SMFM statement (2016)

“Delivery before 23 weeks typically results in neonatal death irrespective of newborn resuscitation (5–6% survival) and, among rare survivors, significant morbidity is universal. (98–100%).”

<http://www.acog.org/Resources-And-Publications/Obstetric-Care-Consensus-Series/Perivable-Birth>

# A great mystery

Is there any other situation in medicine in which...

- A patient has a disease that is uniformly fatal;
- Some centers report 40–50% survival rates;
- Other centers do not offer treatment;
- Some even say that it is unethical to offer treatment;
- And many bioethicists support them!?

Really Weird

I know what you are thinking

All the survivors  
must be severely disabled.



Not True

# NDI at 2 years for babies born at 22-24 weeks, who received treatment, NICHD (2006-11)

EGA (wks)	survival	% of survivors w/ severe impairment	% without severe NDI
22	23%	35%	65%
23	33%	25%	75%
24	57%	19%	81%

Data from Rysavy et al NEJM 2015

# Data are complicated because....

- People report results using different denominators
  - Outcomes for all live births
  - Outcomes for babies who received active treatment
- What are the important outcomes?
  - Combined variable of “Death or NDI”
  - Overall survival without severe NDI
  - Rates of NDI among survivors

# How data get reported: NICHD “Neonatal Calculator”

## How many 500g, 23 week singletons survive unimpaired?

- Boys, no steroids 5%
- Boys, steroids 11%
- Girls, no steroids 9%
- Girls steroids 18%

Three things to note:

1. Fourfold difference in survival at same BW and GA.
2. Survival rates double if given steroids
3. Doesn't distinguish death from disability in survivors

These numbers combine “death” and “severe disability.”  
So to count as surviving unimpaired you had to  
a) survive; and b) be unimpaired.

How many 500g, 23 week singletons who survive are unimpaired?

• Boys, no steroids	5%	50%
• Boys, steroids	11%	55%
• Girls, no steroids	9%	67%
• Girls steroids	18%	67%

Very different if the statistic is “disability among survivors,” rather than “overall survival without disability.”

# Simple way to think about this

- Imagine 100 babies
  - 90 die
  - Among survivors, 3 have severe NDI
- Two claims are true
  - 93% of babies (93/100) either died or had severe NDI
  - 70% of survivors (7/10) did not have severe NDI

# Another quirk

Studies don't often account for either

- Non-treatment
- Substandard treatment
- Decisions to withdraw life support.

## EPIcure: Among 22 weekers (n=152)

- 8 (6%) moms received antenatal steroids
  - 69 (45%) born in tertiary care center
  - 111 (73%) treatment withheld
  - 19 (13%) admitted for intensive care
- 
- Survival to discharge –  $3/152 = 1.5\%$
  - $1/3$  survived without major morbidity.



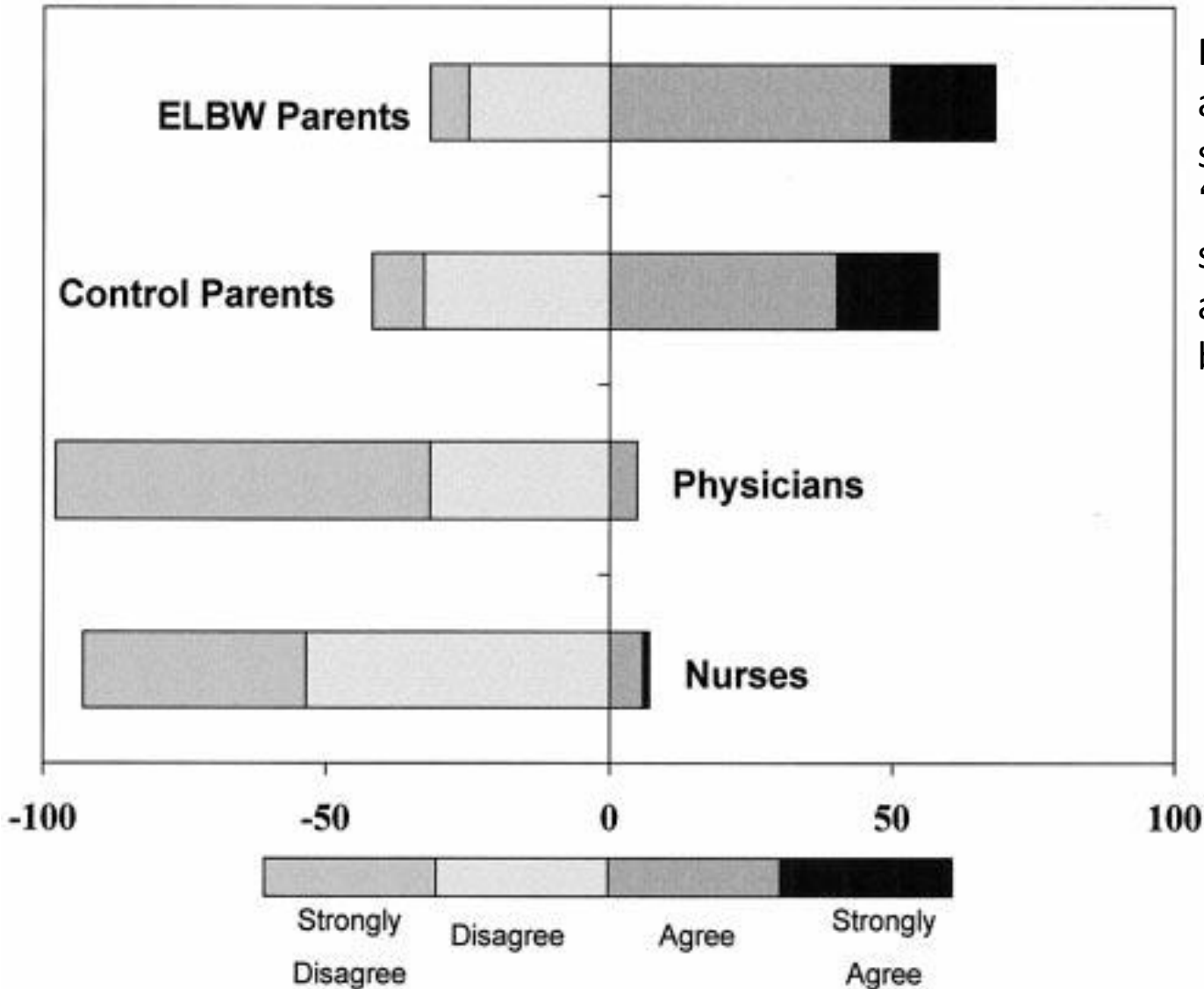
This would be like reporting outcomes for children treated for ALL by family practitioners in rural hospitals using high dose vitamin C.

# Bottom line

- Most babies who survive do pretty well...
- But you may not know it from the way outcomes are reported

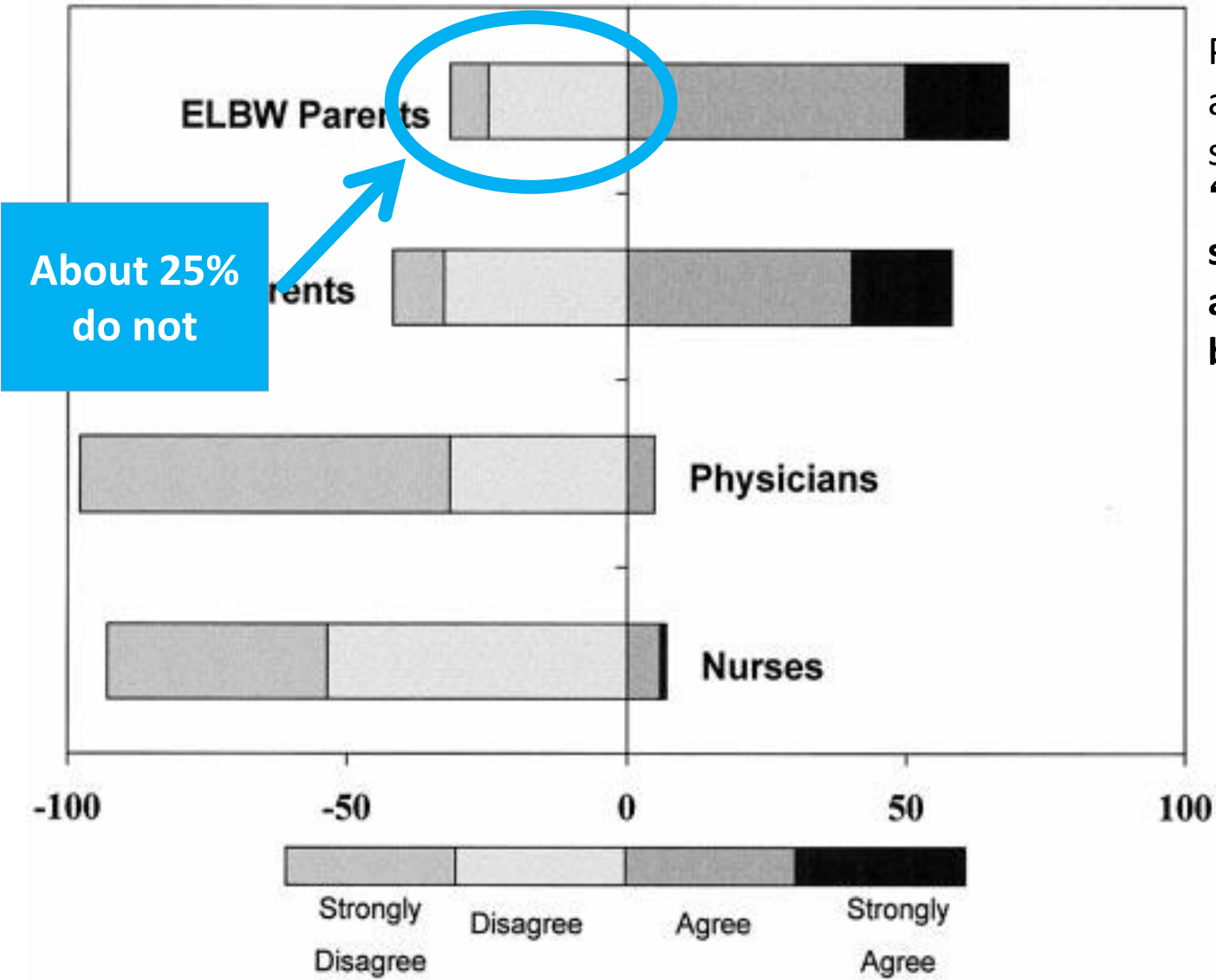
What do parents want?

# Most parents say they want “everything.”



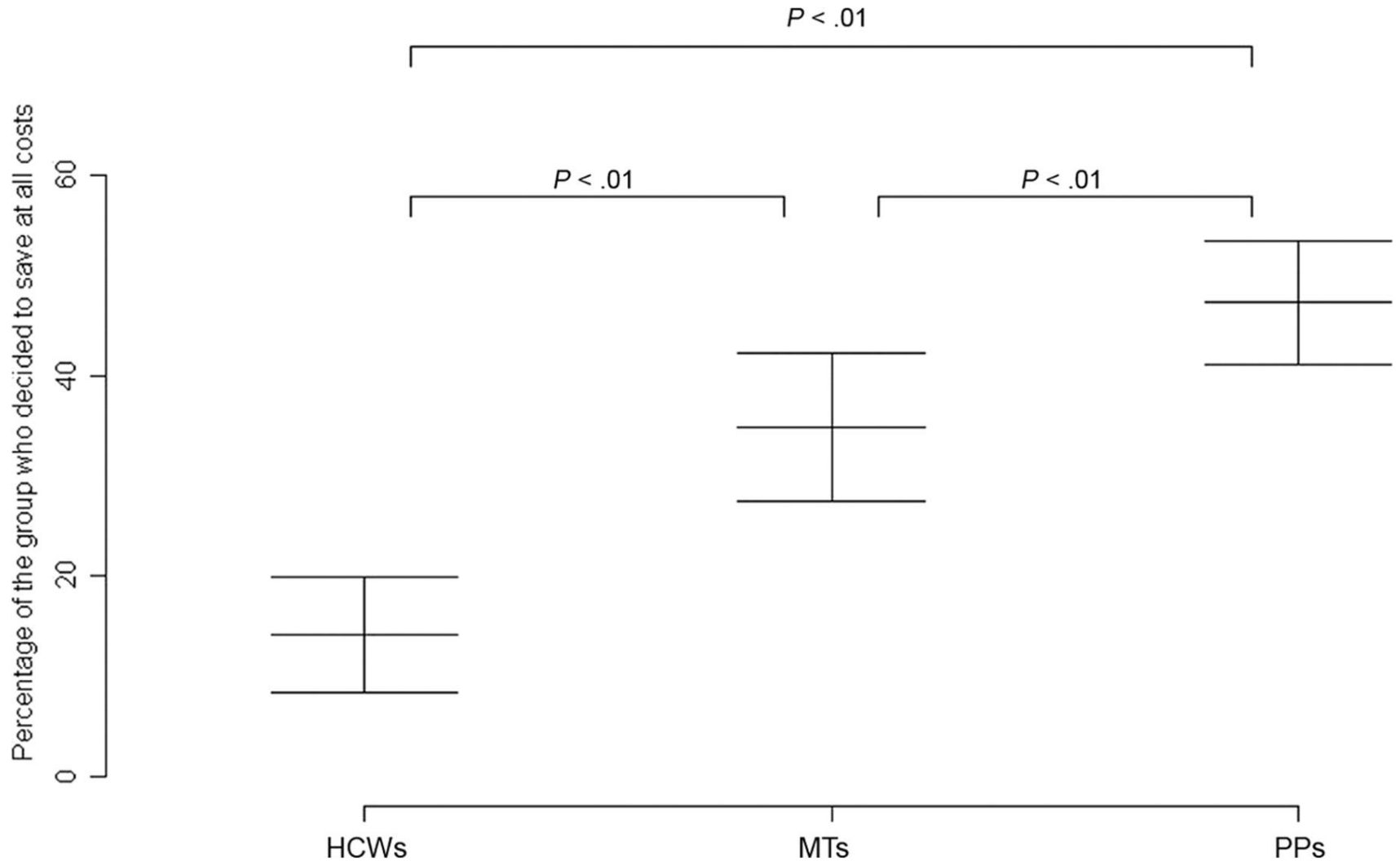
Parent and professional agreement with the statement:  
“I believe an attempt should be made to save all infants regardless of birth weight.”

# Most parents say they want “everything.”



Parent and professional agreement with the statement:  
**“I believe an attempt should be made to save all infants regardless of birth weight.”**

# More likely than HCWs to say we should try to save babies “at all costs.”



More likely to rank “death” lower than  
“severe global impairment”

Death.

Severe global impairment – wheelchair, intelligence of 1 yo, unable to speak, read or write, incontinent, no independent ADLs.

Moderate global impairment – crutches, attends special school, cannot read or write, unable to live independently, continent.

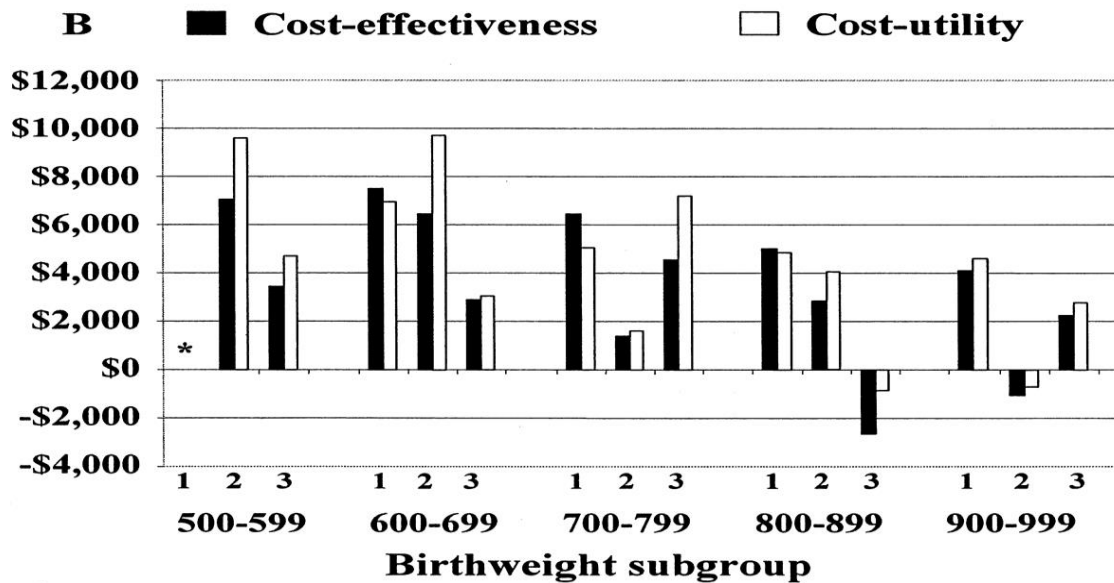
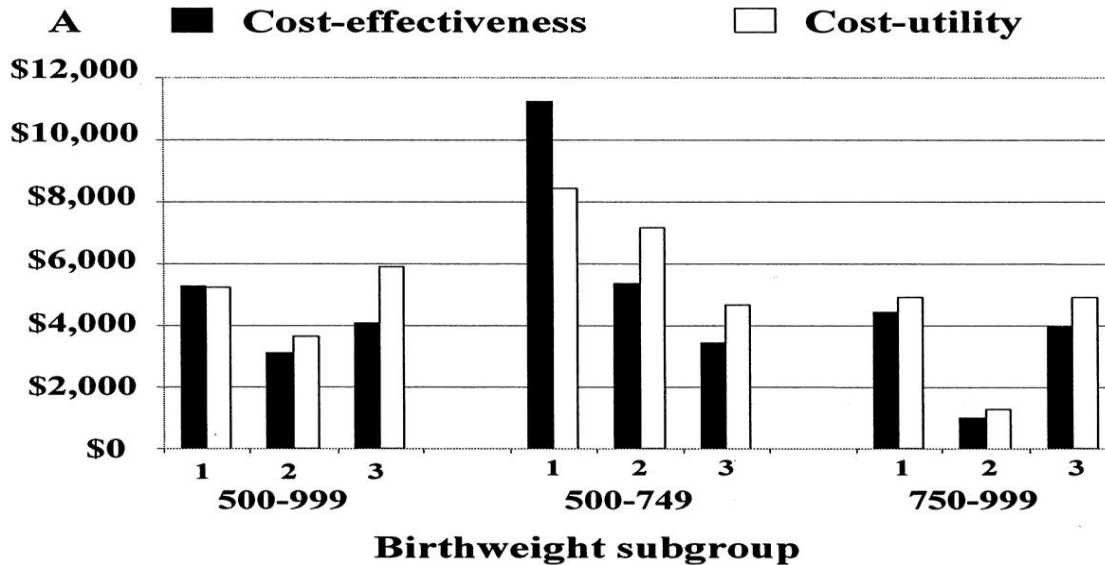
# Is severe disability worse than death?

- Doctors and nurses – 55%
- Mothers of term babies – 40%
- Parents of preemies – 25%

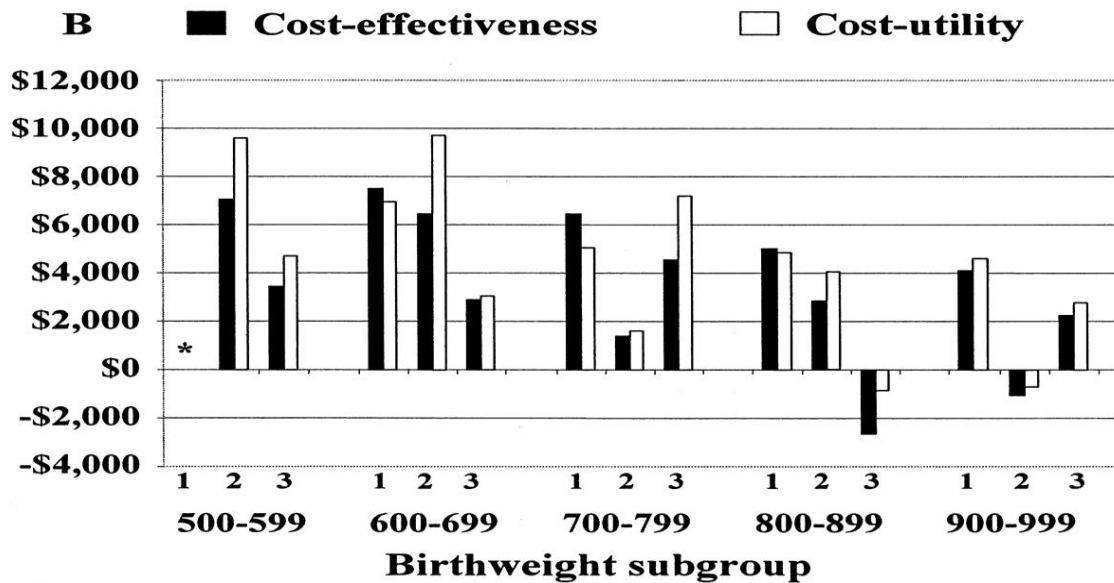
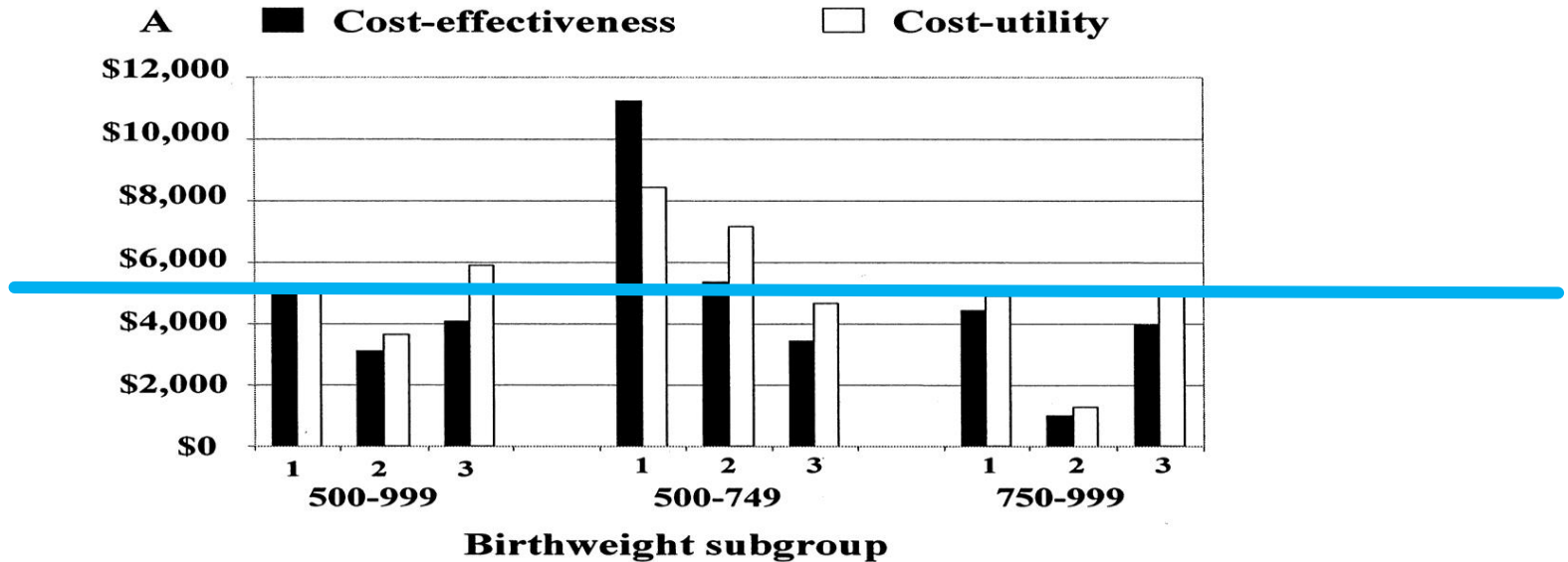


Is NICU care cost-effective?

## Cost-effectiveness and cost-utility ratios (1997 Australian dollars)



## Cost-effectiveness and cost-utility ratios (1997 Australian dollars)



Cost effectiveness: costs per QALY for selected medical interventions

Intervention	Birthweight	
	<1,000	1,000–
Neonatal care	\$6,101	\$1,290
Compared with other interventions		
Prenatal care		
Influenza vaccination age <3 years		\$1,745
Neonatal care for all low-birthweight infants		3,726
Pap smear every 3 years, ages 20–74		17,000
Treatment of severe hypertension		17,000
Coronary artery bypass		\$33,600–\$48,300

**For babies <1000gms, cost is about \$6000 per QALY**

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Cost effectiveness: costs per QALY for selected medical interventions

	Birthweight	
Intervention	<1,000	<div style="background-color: #00aaff; color: white; padding: 10px; text-align: center;"> <p><b>Pap smears to prevent cervical cancer - \$17,000 per QALY</b></p> </div>
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**Treatment of severe hypertension: \$17,000 per QALY**

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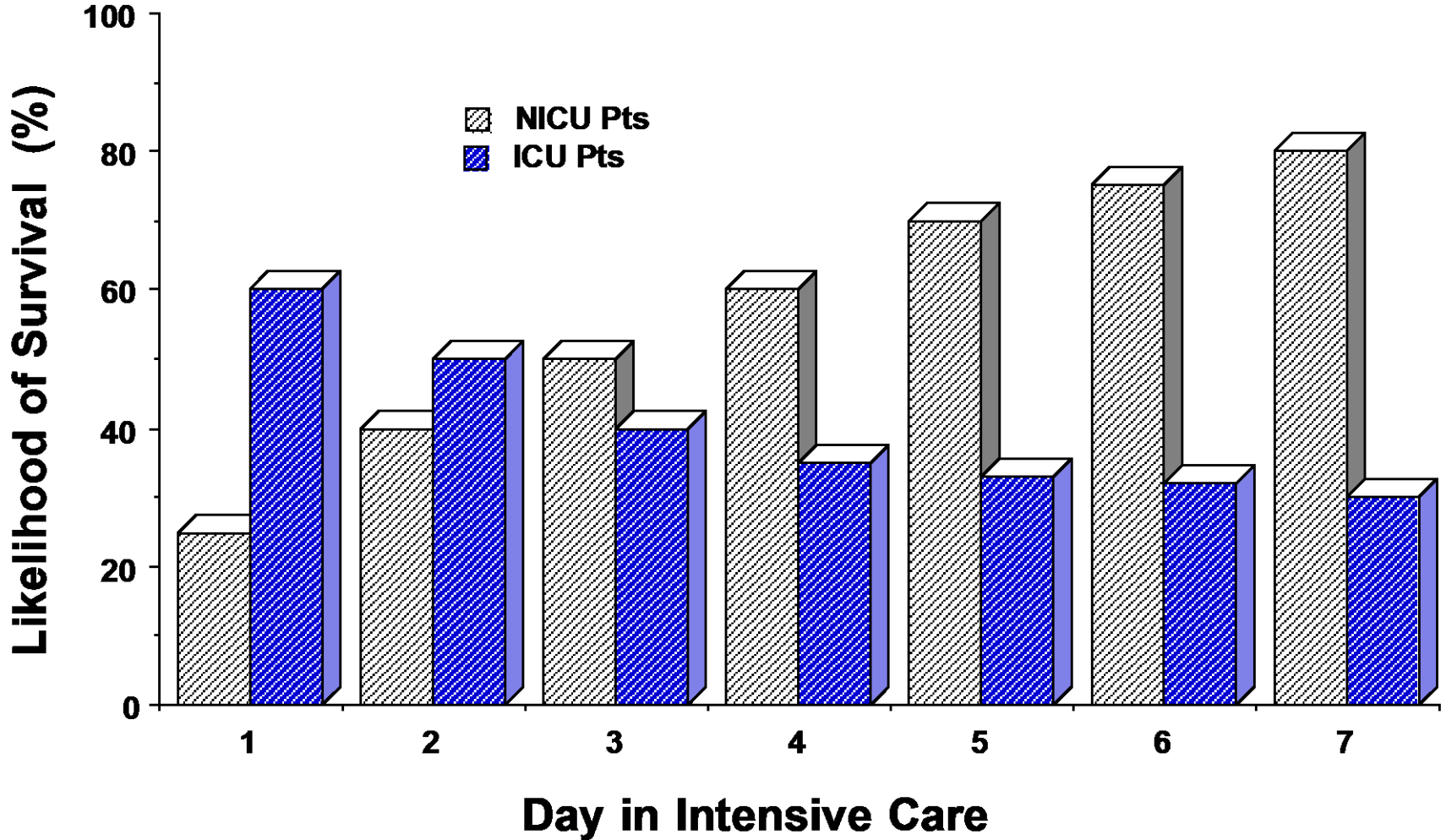
Cost effectiveness: costs per QALY for selected medical interventions

Intervention	Birthweight				All weights <2,500 g
	<1,000	1,000–1,500	1,500–2,500	>2,500	
Neonatal care	\$6,101	\$	\$	\$	\$
Compared with other interventions					
Prenatal care					
Influenza vaccination age <3 years					
Neonatal care for all low-birthweight					
Pap smear every 3 years, ages 20–74					
Treatment of severe hypertension			17,000		
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**Coronary bypass surgery—\$40K/QALY**

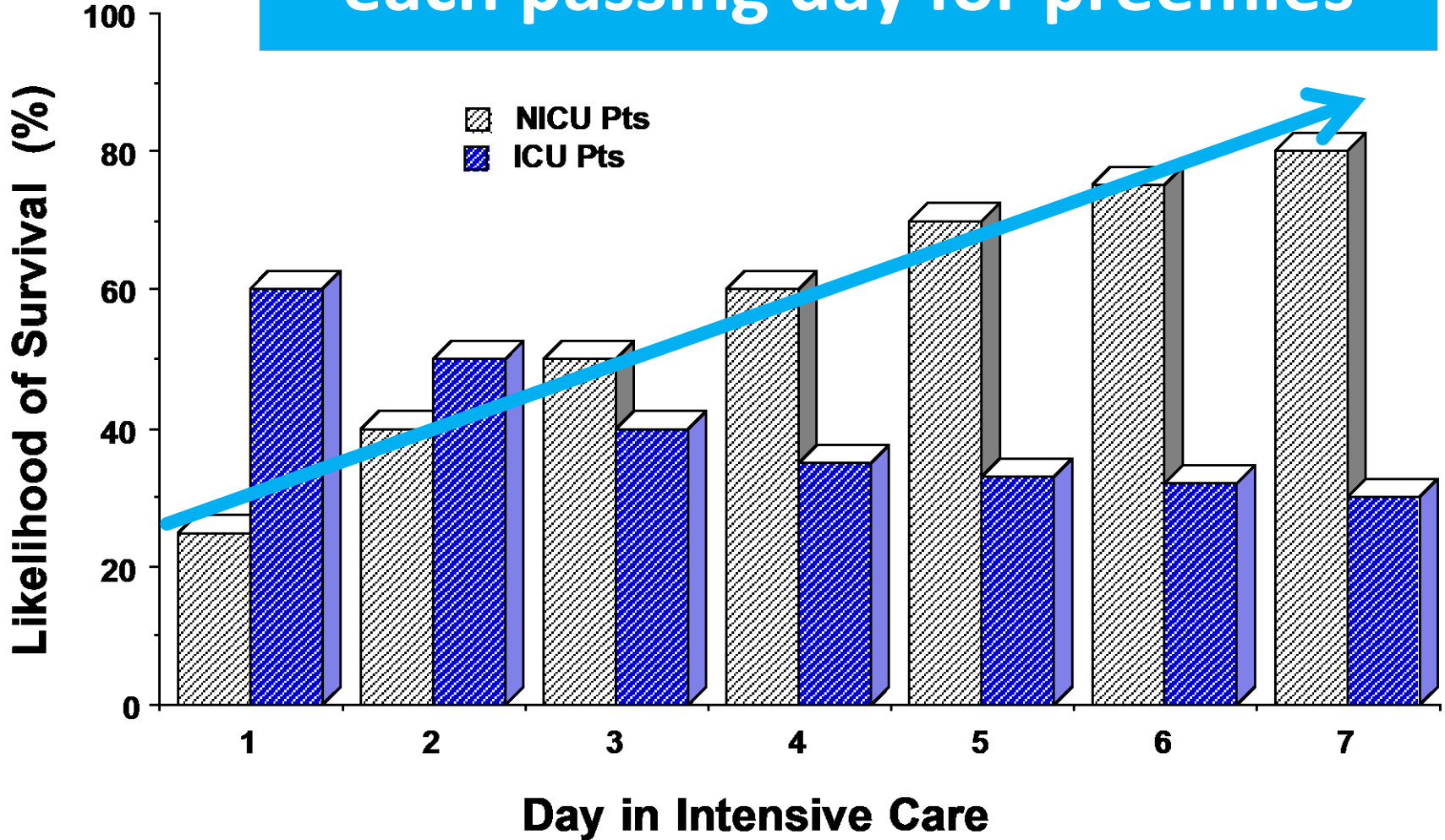
Coronary artery bypass

# Likelihood of Survival With Each Passing Day NICU vs ICU Patients



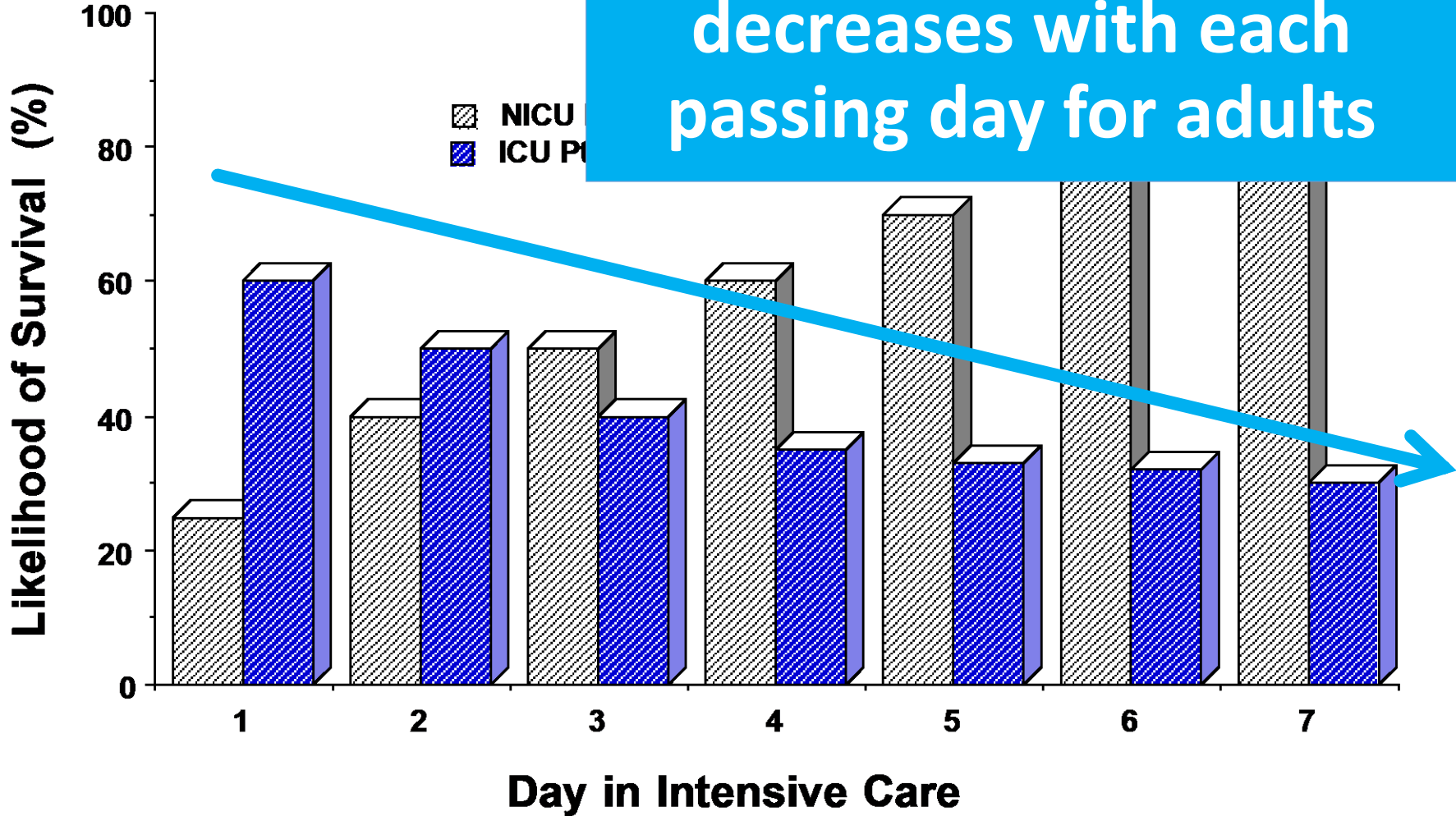


Chance of survival increases with each passing day for preemies



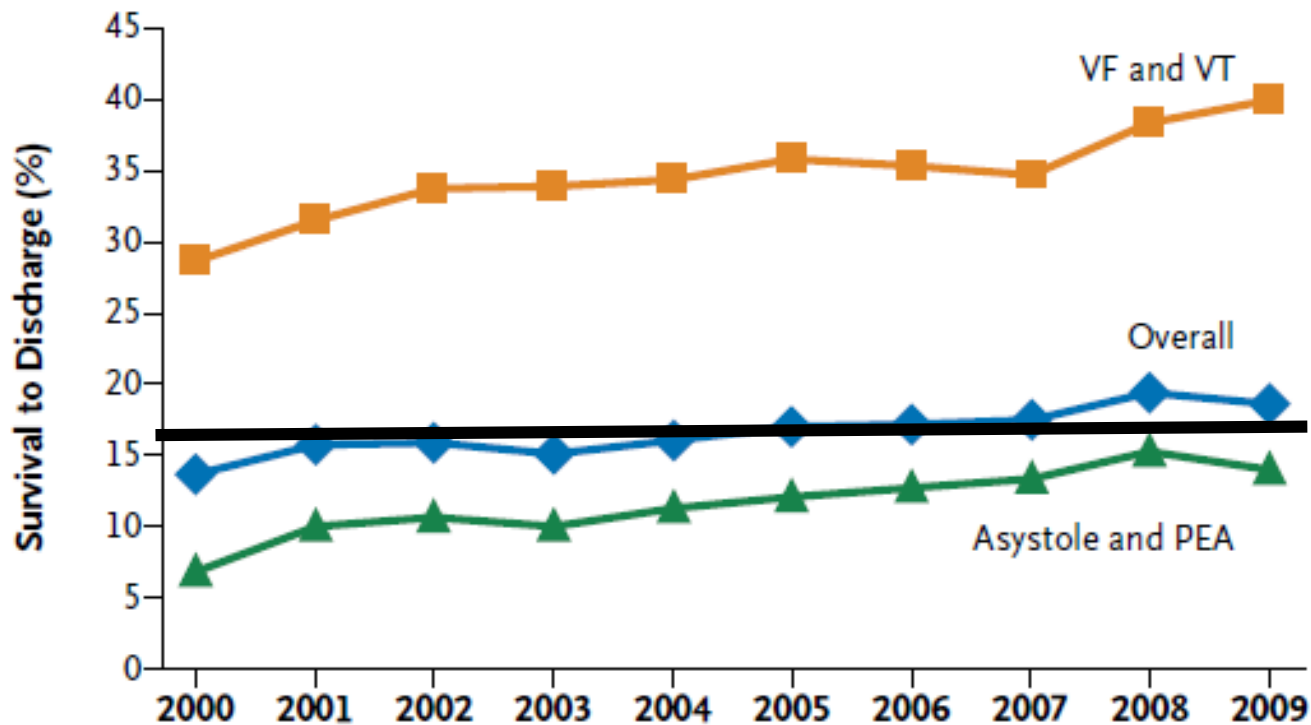
# Likelihood of Survival NICU vs ICU

Chance of survival decreases with each passing day for adults



## Which is more cost-effective?

- Case #1: A baby is born at 22 weeks of gestation at 500 gms. Apgar scores of 3 and 6. He is intubated and given oxygen and his color and tone improve.
- Case #2: An 85 year old comes to the ER. He is diaphoretic, short of breath, with chest pain and ST elevation on EEG.



Overall survival after CPR in adults – 16%

**Figure 2. Unadjusted Rates of Survival to Hospital Discharge by Calendar Year.** Observed (crude) rates for survival to discharge are shown for the overall cohort and separately for shockable cardiac-arrest rhythms (ventricular fibrillation [VF] and pulseless ventricular tachycardia [VT]) and nonshockable cardiac-arrest rhythms (asystole and pulseless electrical activity [PEA]).  $P < 0.001$  for trend for each survival curve.

Bottom Line on “the bottom line.”

- Remember “Sutton’s Law”: “Go where the money is!”



**“That’s Where  
the Money is...”**

— *Willie Sutton*

# A modest proposal

- Evaluate treatment for 22 weekers and figure out what works.
- Be prepared for these babies
- In deciding who to resuscitate,
  - Listen to the parents
  - Examine the patient
  - Make individualized decisions

There are  
some  
elephants in  
the room.



Credit: viczast/Bigstock

# Elephants in the room

1. Institutional culture
2. Abortion politics
3. Artificial placenta as a disruptive technology



# Elephants in the room

## 1. Institutional political culture

- If we ask parents, many will want treatment
- We will need to be prepared to do it right
  - Collaboration between NICU and OB
  - Steroids routine after 20 weeks
  - Tiny baby units

# Elephants in the room

## 2. Abortion politics

1. If 22 weekers are viable, can we permit abortion up until 24 weeks?
2. (Should we not save 23 weekers to preserve legal abortion?)

***Preterm Babies  
Can Be Viable  
At Earlier Birth***

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***Amazing Breakthrough in  
Neonatal Intensive Care!***

*The New York Times*  
Front Page  
May 7, 2015

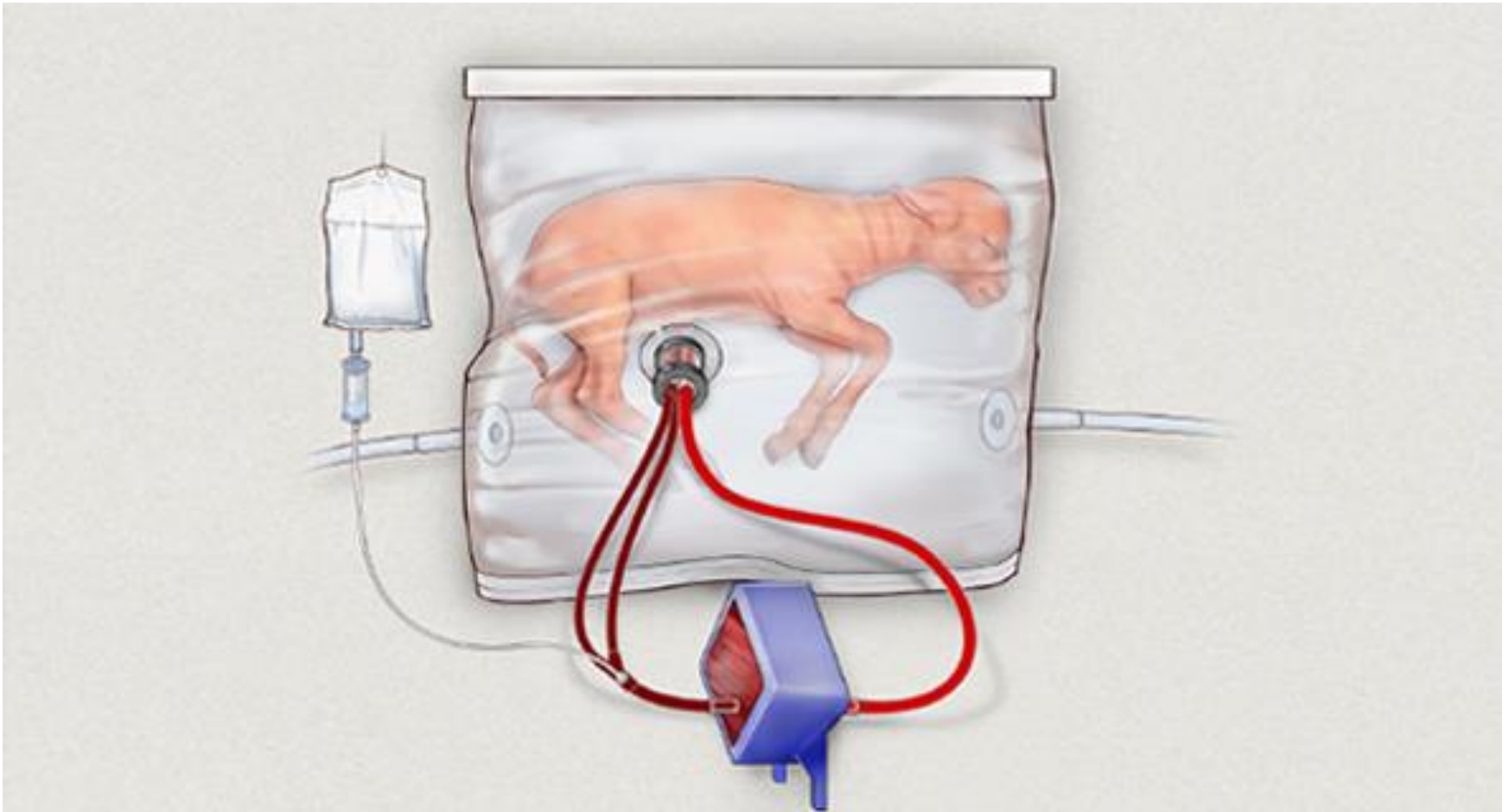
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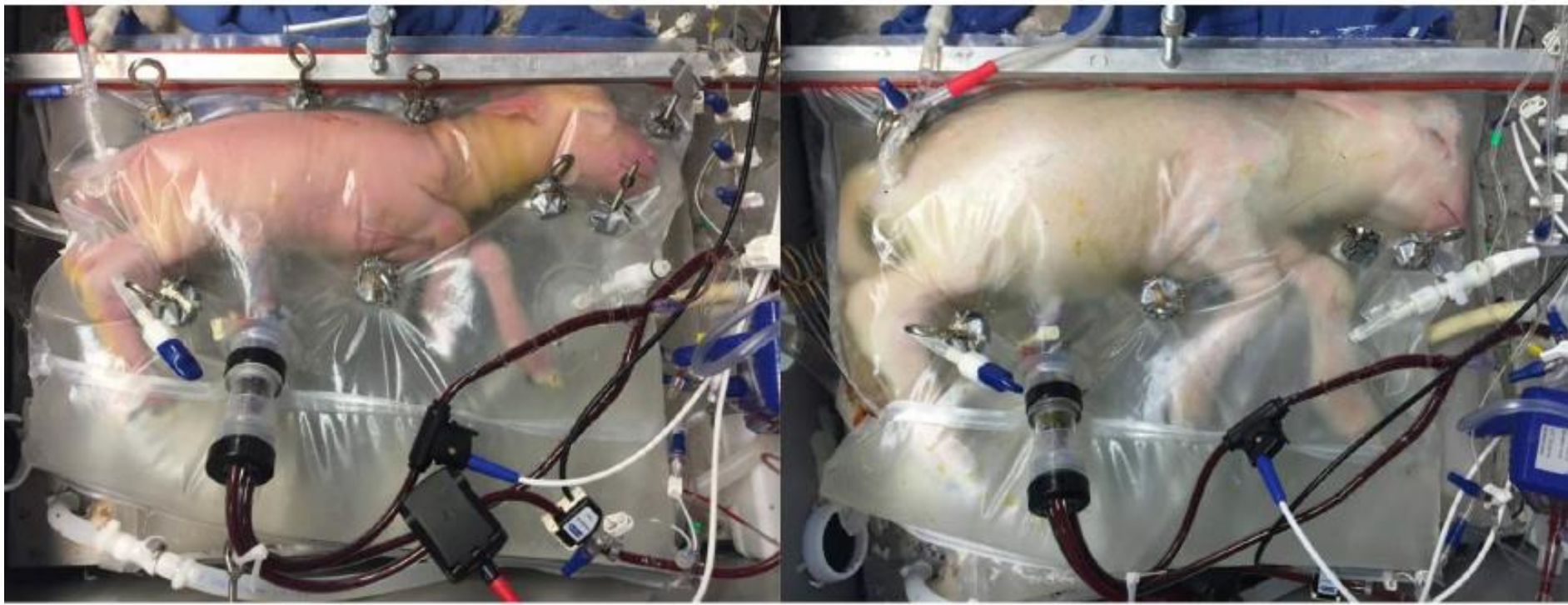
***Study Could Affect the  
Debate on Abortion***

*The New York Times*  
Front Page  
May 7, 2015

# Babies born in “Biobags.”



Credit: Children’s Hospital of Philadelphia



**(b)** Representative lamb cannulated at 107 days of gestation and on day 4 of support. **(c)** The same lamb on day 28 of support illustrating somatic growth and maturation.



Credit: mirceab/Bigstock

NATIONAL HEALTHCARE

# Science of the lambs: Researchers perfect artificial womb that works as well as ewe do

By [Rania Spooner](#)

April 25, 2017 – 8.02pm



An artificial womb has been invented that researchers say can support the growth of premature lambs for a month, as if they had still been growing inside their mother.



# Conclusions

- Survival rates improving at 22 weeks
- Non-treatment is self-fulfilling prophecy
- Most parents favor treatment
- Why not study it, find out what works, and, with parental permission, try to save more babies?