

**What would you want  
to know about neonatal ethics,  
and when would you want  
to know it?**

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## Undergrad

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Bobila K  
Culver S  
Frain L  
Golchin N  
Grant B  
Kapustka H  
Katznelson J  
Keiser A  
LaPorte J  
Lee G  
Lin K  
Martin C  
Meadow A  
Mercer S  
Mokalla M  
Morkes C  
Reimschisel T  
Ren Y  
Roberts E  
Soneji S  
Subramanian M  
Turnbull Z  
Veldman M  
Yoon G

## Med Student

Carney J  
Dunagan M  
Fedson A  
Foster K  
Hron J  
Kasperski D  
Papillon S  
Sparger K  
Broach V  
Dehne L

## Fellow

Buchh B  
Calderelli L  
Fanaroff J  
Fuller J  
Gin K  
Graham N  
Gresens W  
Hipps R  
Mendez D  
Andrews B  
Lagatta J

## Ancillary

Byrne P  
Corpuz M,  
Gouker L  
Hennessy J  
Plesha-Troyke S  
Pohlman A  
Preston MJ  
Robbins Z  
Troyke S  
Zidar M

## Attending

Driscoll J  
Goldblatt A D  
Hall, J  
Lantos J  
Rosen T  
Ross L  
Schreiber M  
Singh J  
Stocking C  
Tyson J

# Some numbers for perspective -- in the U.S. each year:

Babies born: 4,000,000

People die: 3,000,000

Babies < 1000g: 1% of 4,000,000 = 40,000

Babies die: 0.6% of 4,000,000 = 24,000

Babies < 1000g die: 1/3 of 40,000 = 12,000

**Distributive Justice --  
Ethics of populations**

# Answered Questions in Neonatal Ethics:

1. Neonatal mortality -- BW specific mortality
2. Resource utilization vs mortality
3. Neonatal morbidity -- dead vs burdened vs unscathed
4. Resource utilization vs morbidity
  
5. Individual prognostication by algorithm (mortality)
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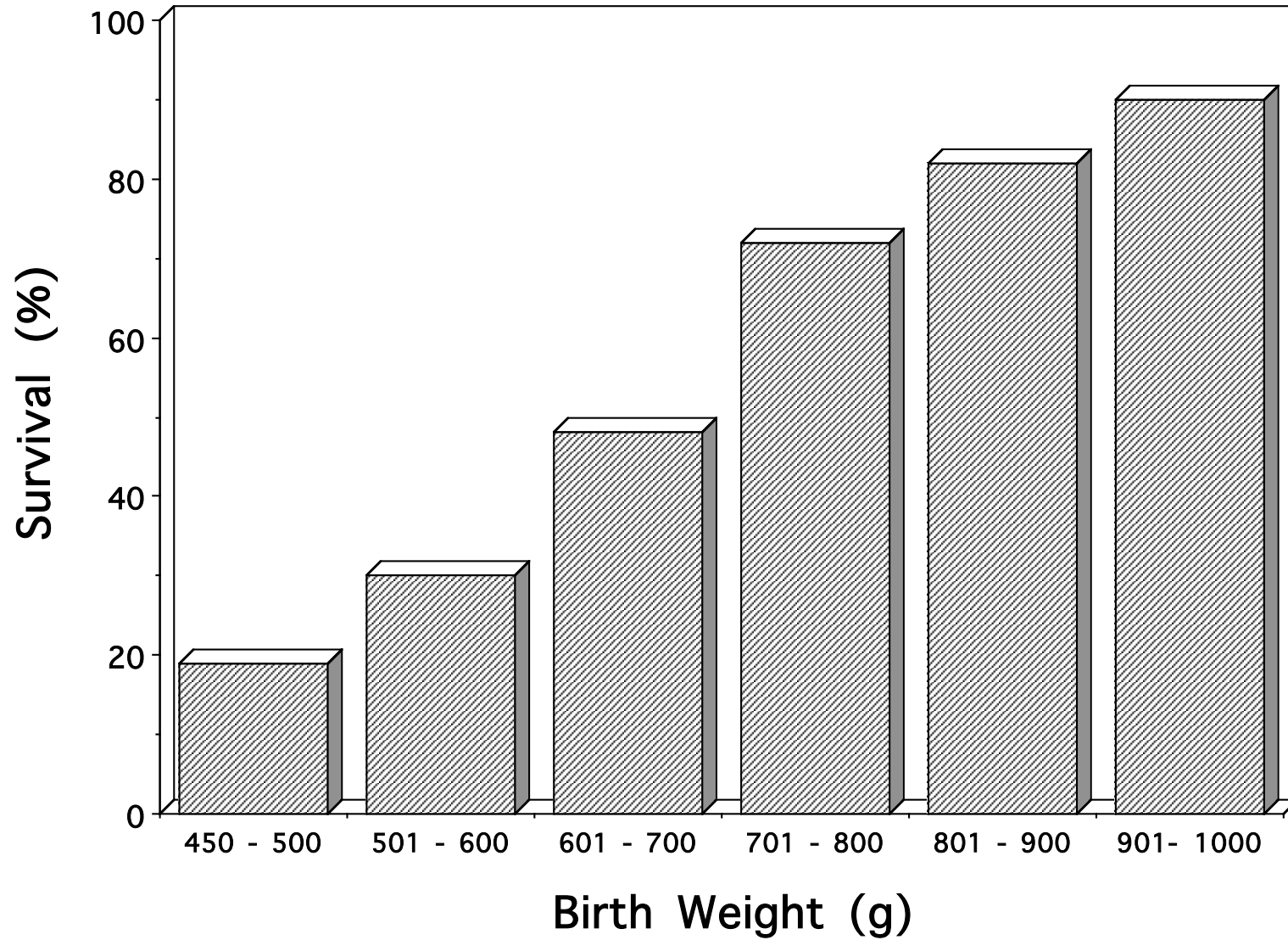
**What are the odds of survival  
if a baby is born at:**

**3 pounds? >95 %**

**2 pounds? >90 %**

**1 pound? < 1 %**

# Survival vs Birth Weight for ELBW Infants



# **1st Law of NICU Ethics**

**Birth weight determines mortality**

# **2nd Law of NICU Ethics**

**Doomed infants die early**

What is the median day of death  
for doomed NICU babies?

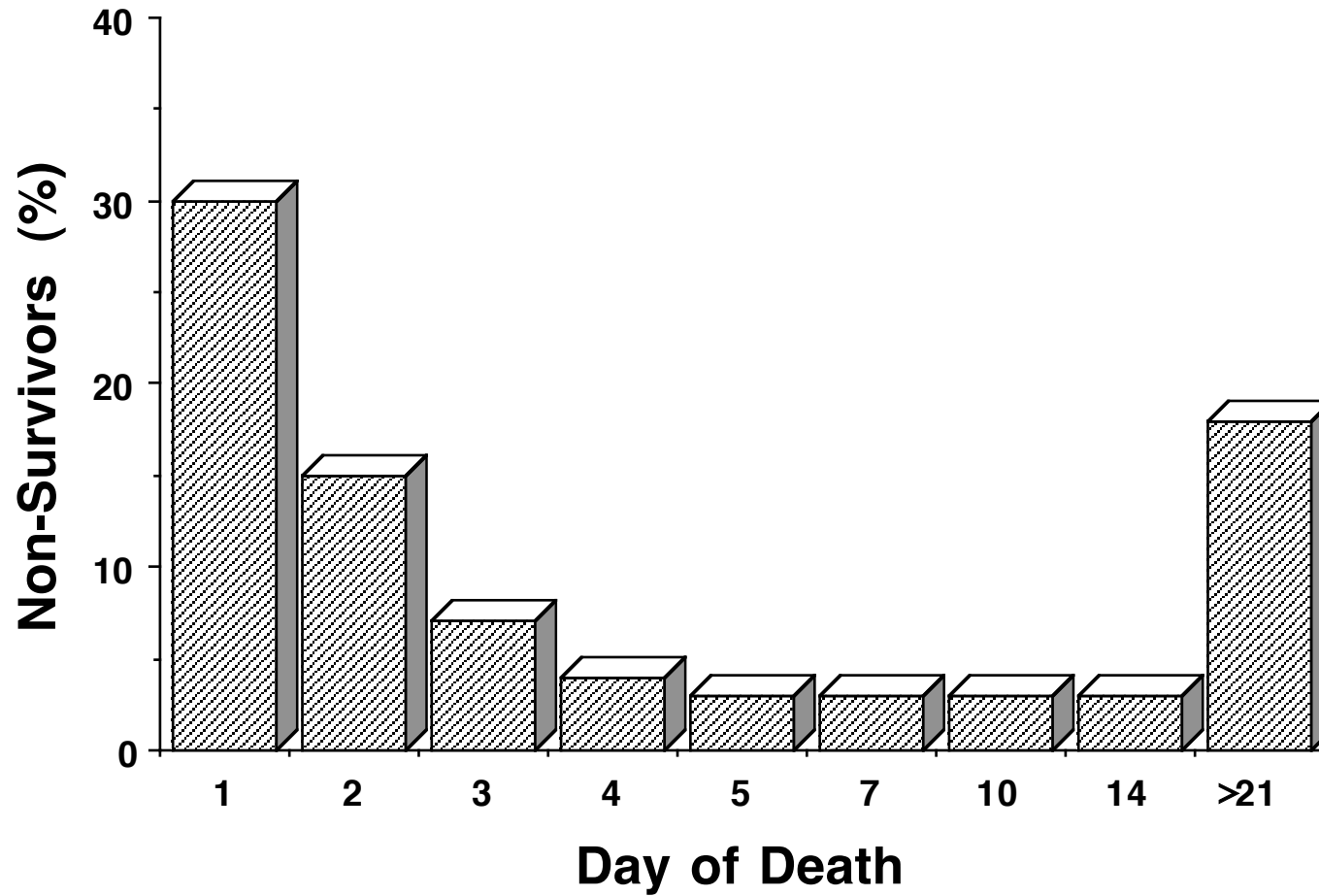
1 day?

3 days?

7 days?

14 days?

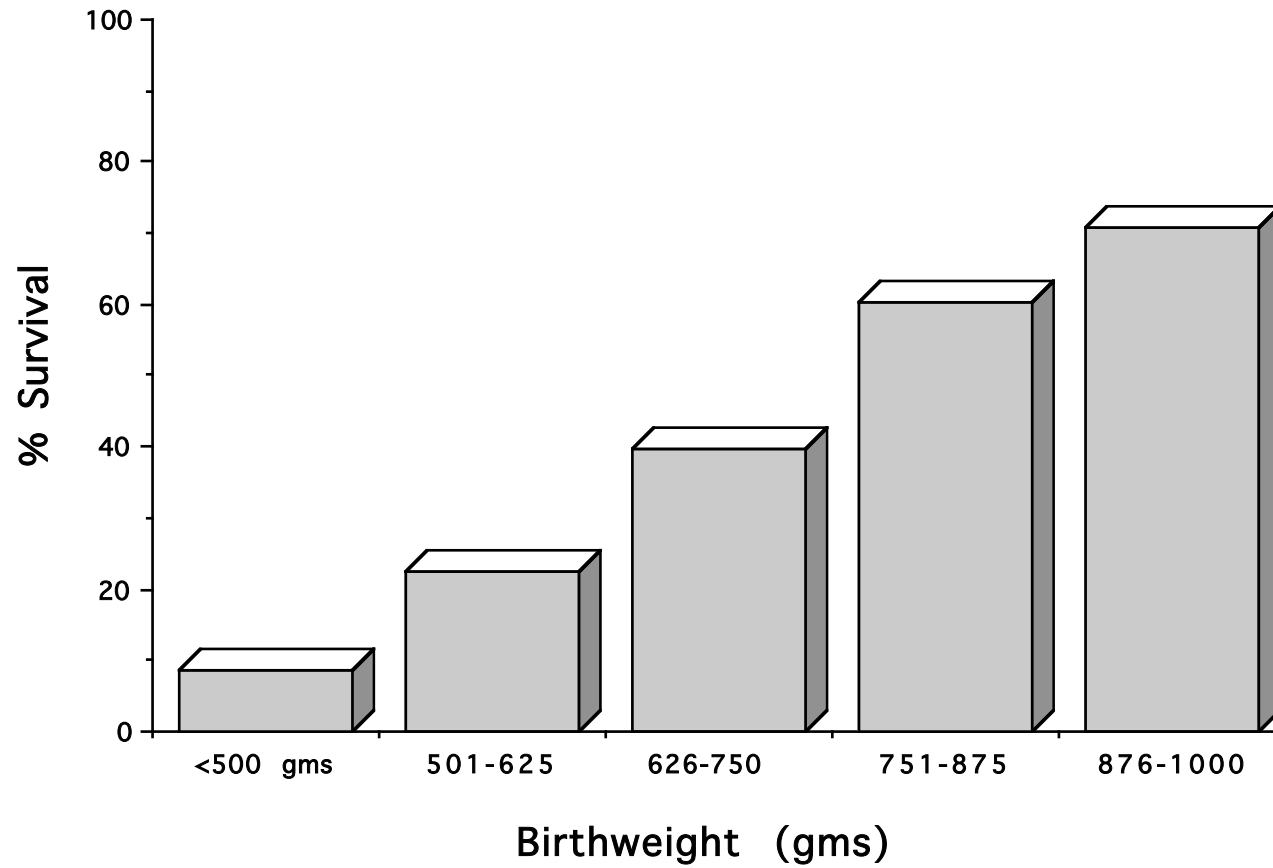
## Day of Death for ELBW Non-Survivors



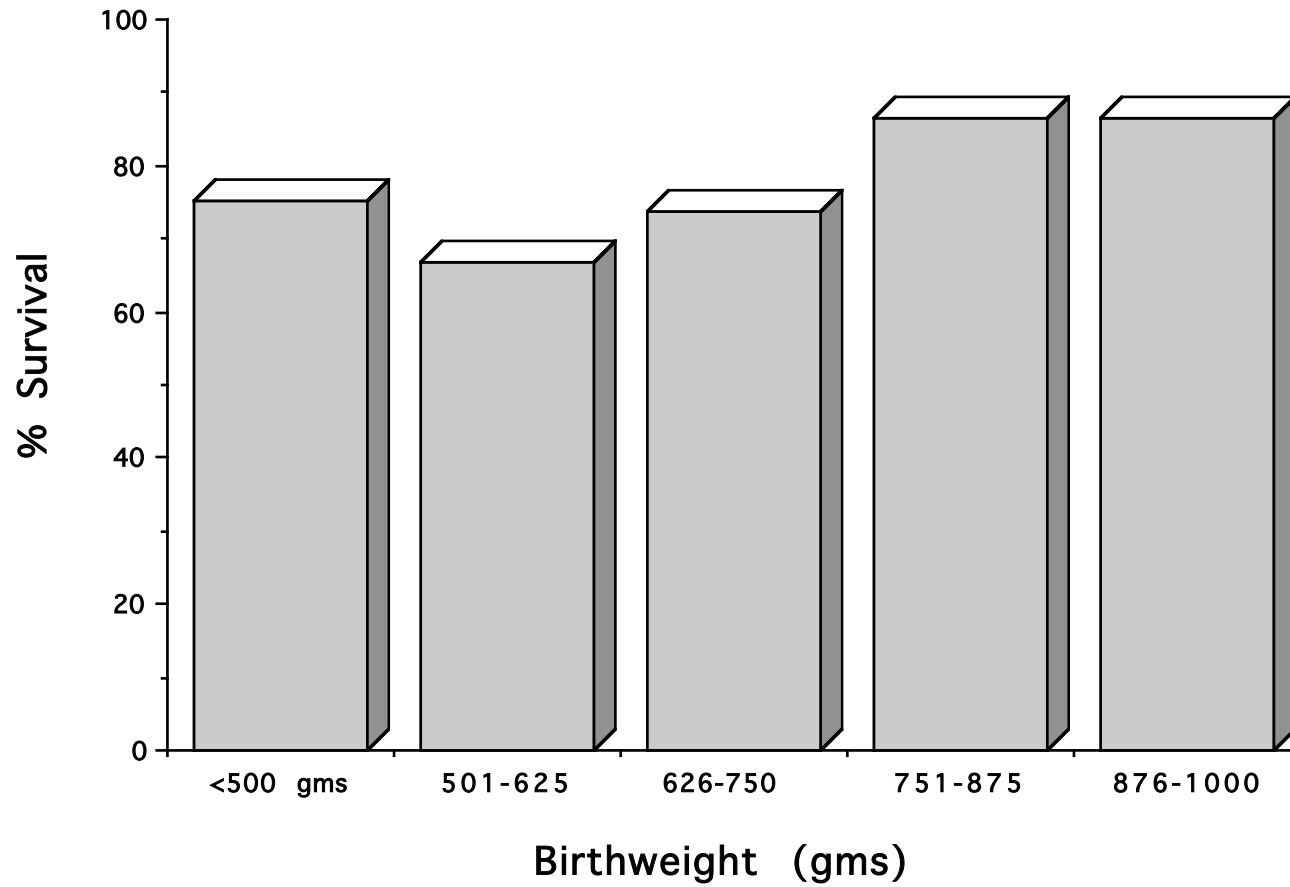
# **Corollary to 2nd Law of NICU Ethics**

**Birth weight-specific mortality  
vanishes by DOL 4**

Survival as a function of birthweight  
for all patients alive on Day 1 (n = 429)



Survival as a function of birthweight  
for all patients alive on Day 4 (n = 249)



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What % of NICU resources are devoted to ELBW non-survivors, as opposed to resources devoted to babies who survive to discharge?

10 cents on every dollar on ELBW non-survivors?

50 cents?

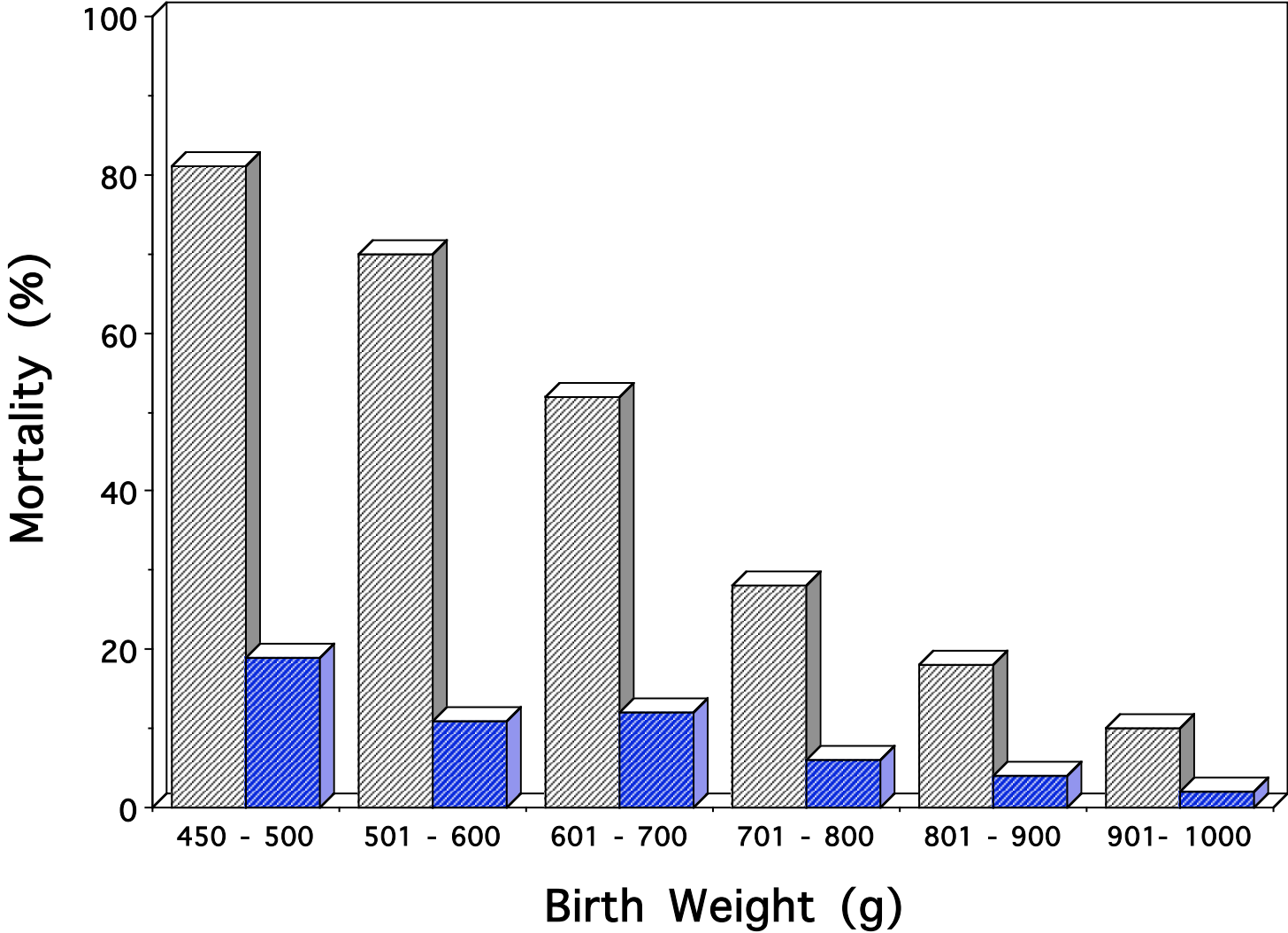
90 cents?

# How can this be?

Because doomed infants die early,

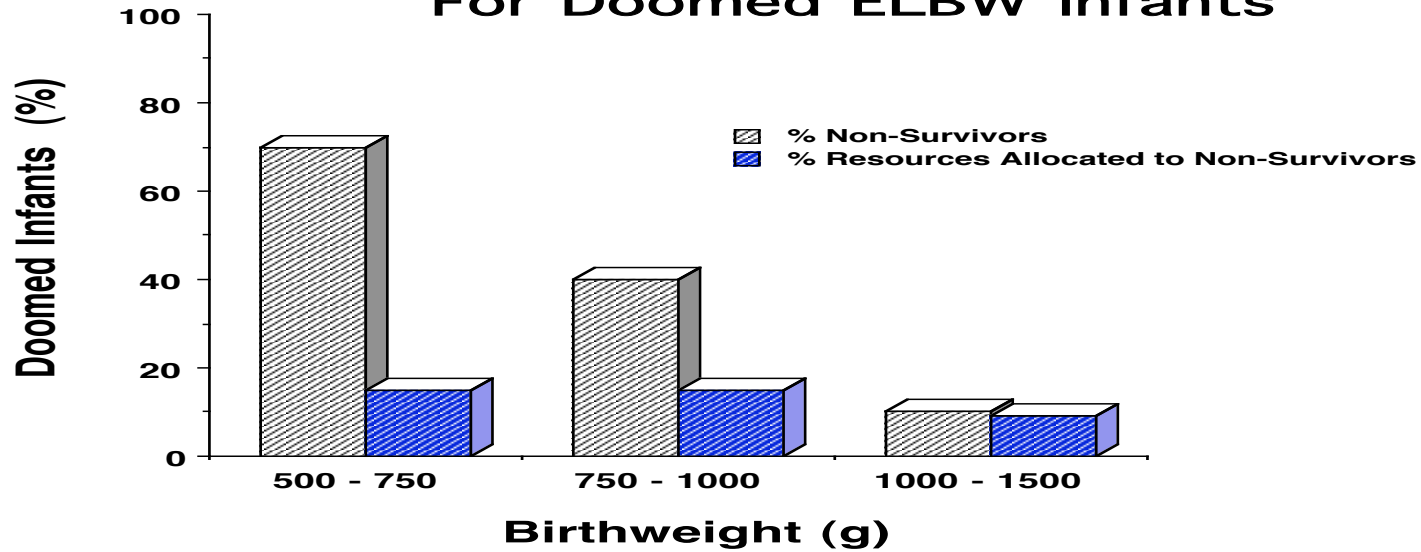
And survivors stay a long, long time

# "Wasted" Resources and Mortality vs Birth Weight

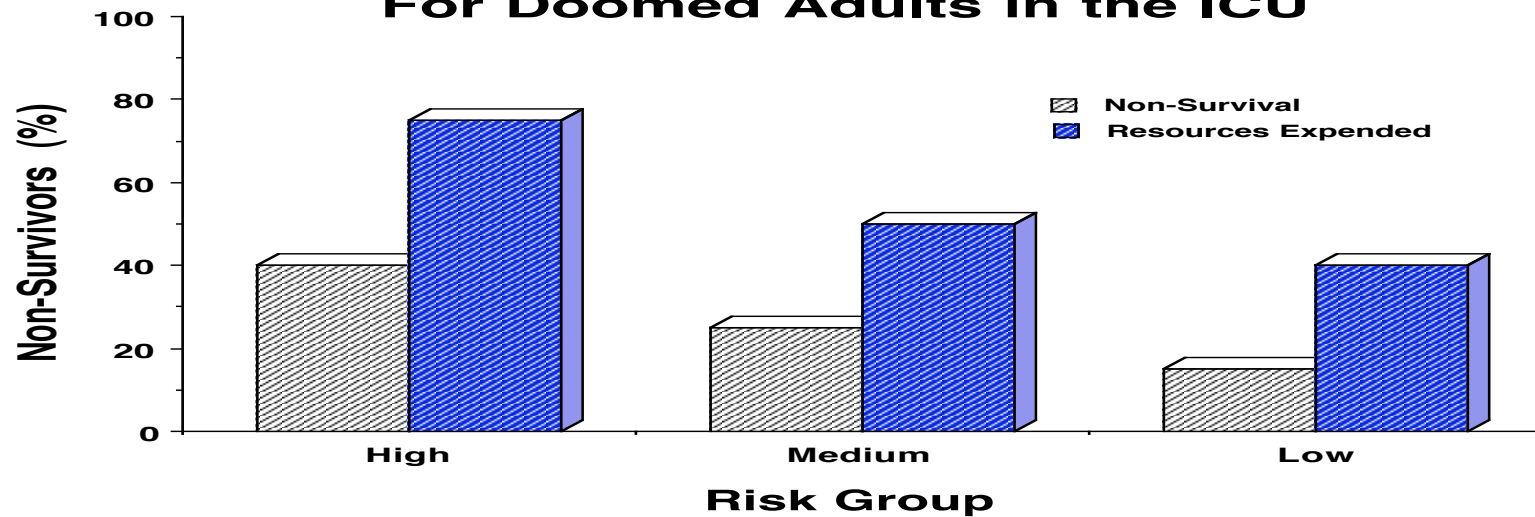


A cross-cultural tidbit

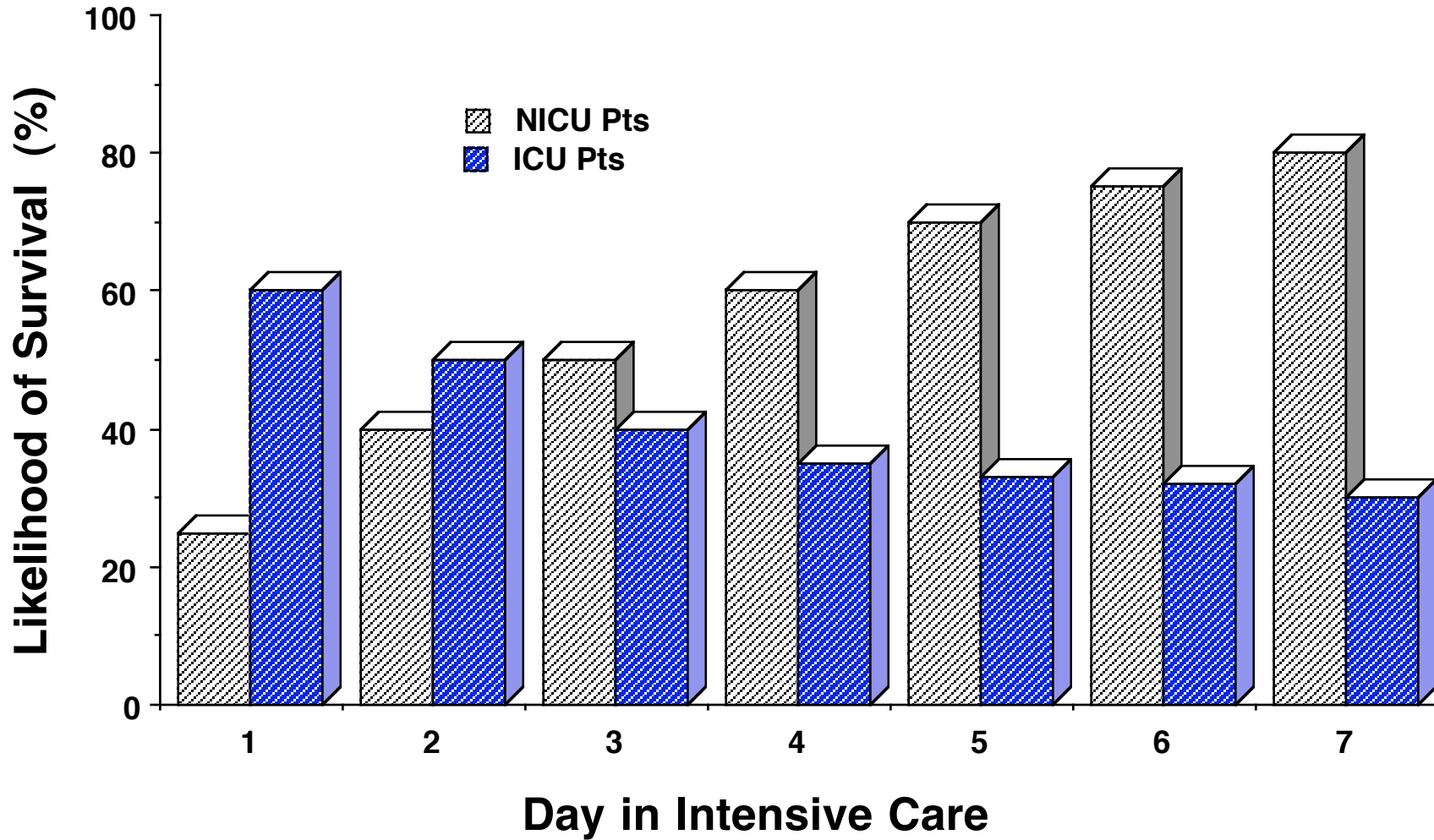
## Survival vs Resource Expenditure For Doomed ELBW Infants



## Non-Survival and Resources Expended For Doomed Adults in the ICU



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



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**What are the outcomes at 2 years  
for babies born < 1000g?**

**1/3 die**

**1/3 survive with neurologic deficits**

**1/3 are neurologically normal**

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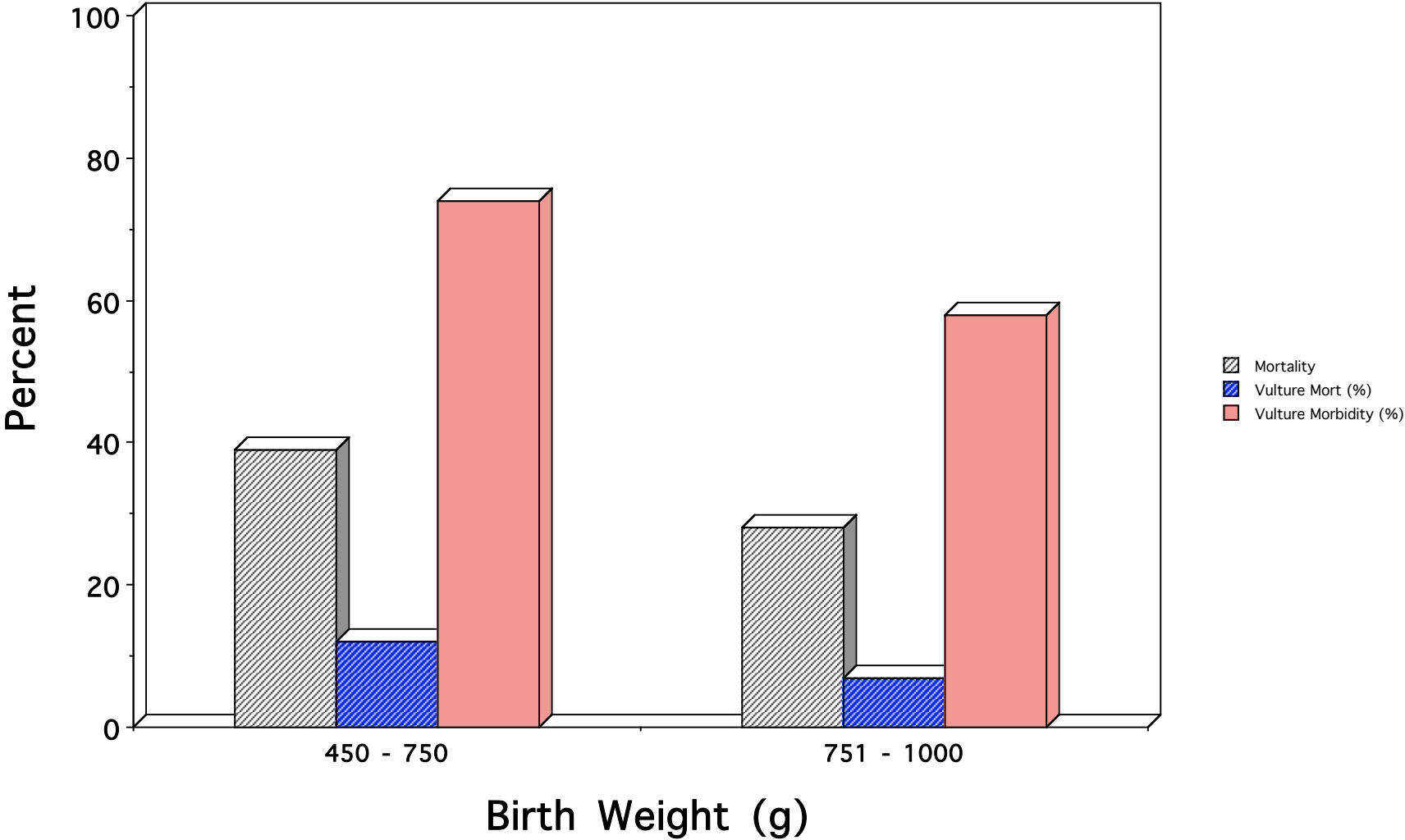
**What % of NICU resources are devoted to ELBW infants with morbid outcomes, as opposed to resources devoted to ELBW babies who survive unscathed?**

10 cents on every ELBW dollar on morbid outcomes?

50 cents?

90 cents?

# Resources vs Mortality and Morbidity for ELBW Infants



# Personal Justice

Ethics of babies taken one at a time

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# Do babies declare themselves?

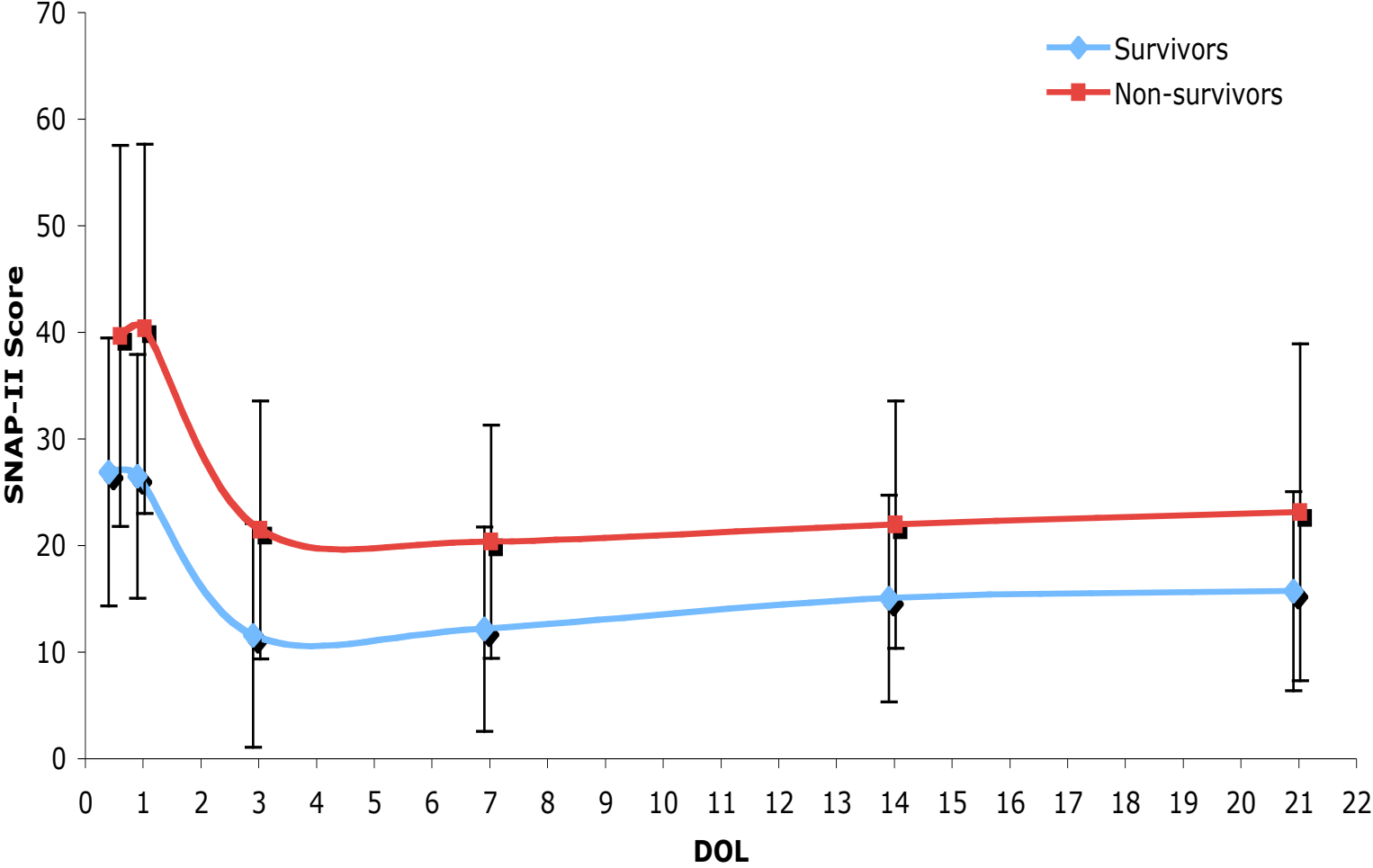
do survivors improve steadily prior to d/c,  
while doomed babies get sicker and sicker  
before they die?

# How would we know?

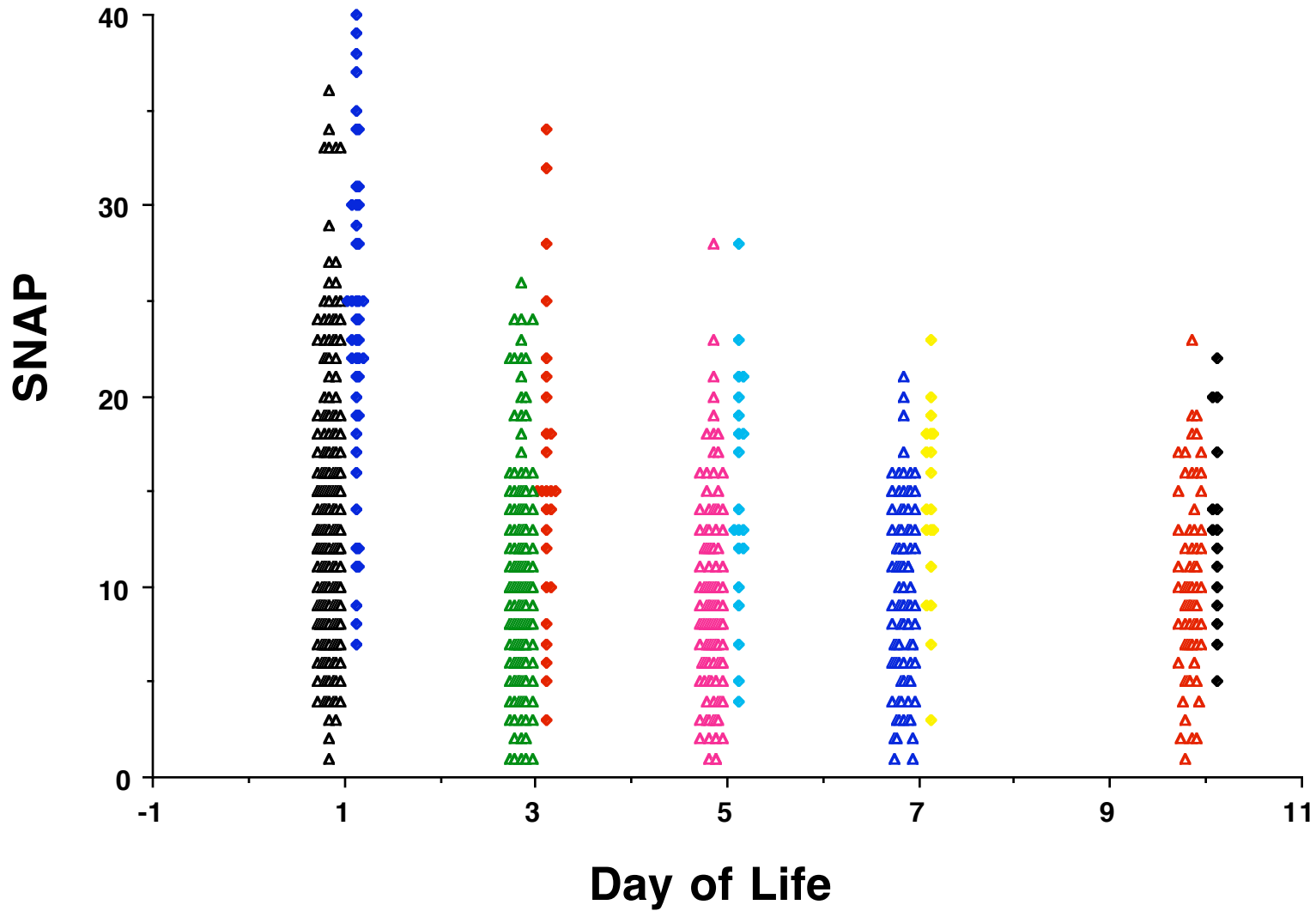
1. Algorithm

2. Intuition

**Mean SNAP-II vs DOL for Survivors and non-survivors**



# SNAP vs DOL for 285 Ventilated Infants



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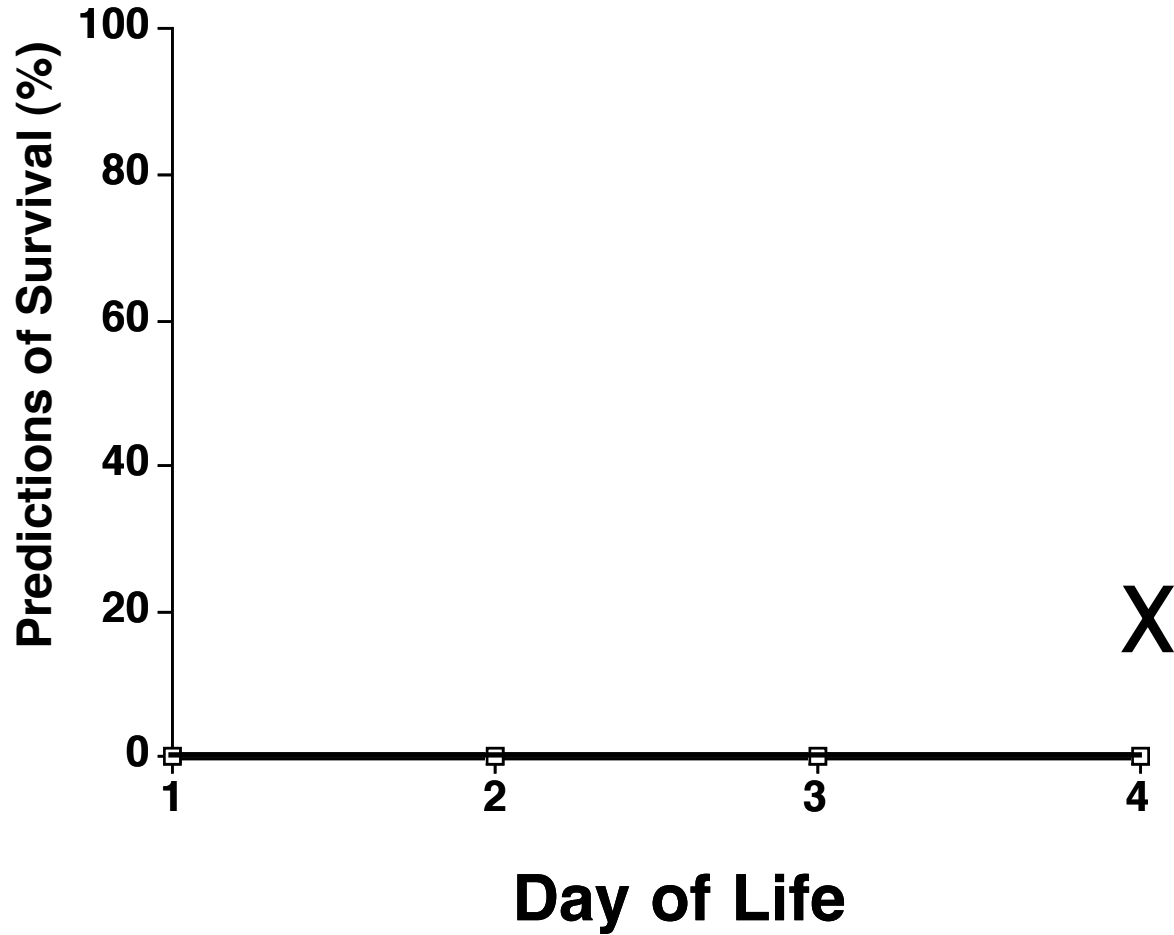
On every day of mechanical ventilation,  
we asked caretakers (MDs, RNs)  
one question:

“do you think this baby will survive to  
be discharged, or die in the NICU”?

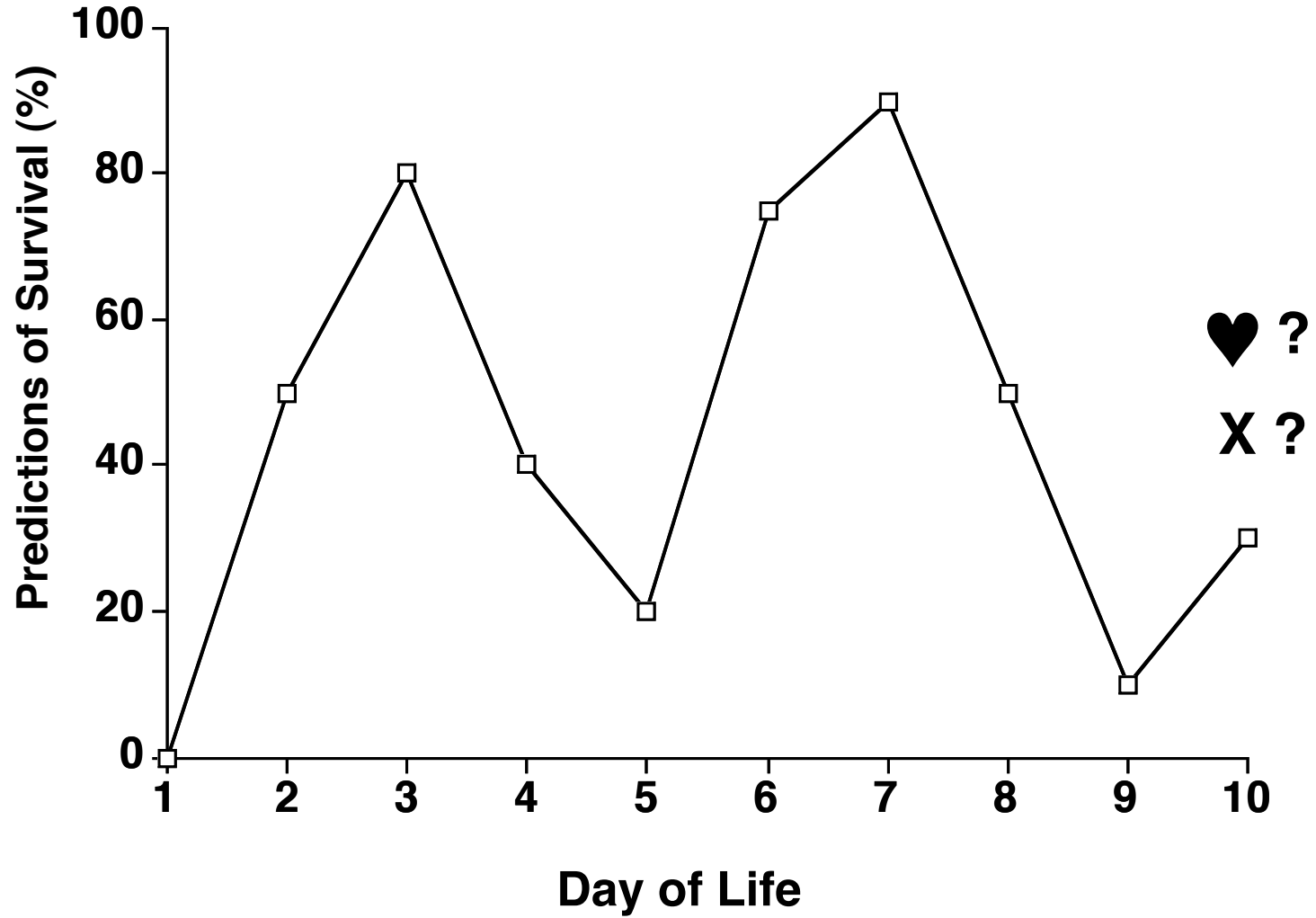
# Concordant Correct Predictions of Survival



# Concordant Correct Predictions of Death



# Discordant Predictions of Survival



## Distribution of Intuitions of “die before discharge”

$2/3$  of infants were never predicted to die:  
almost all survived

$1/3$  of infants were predicted to die:  
half of these survived as well!

**Imagine this conversation:**

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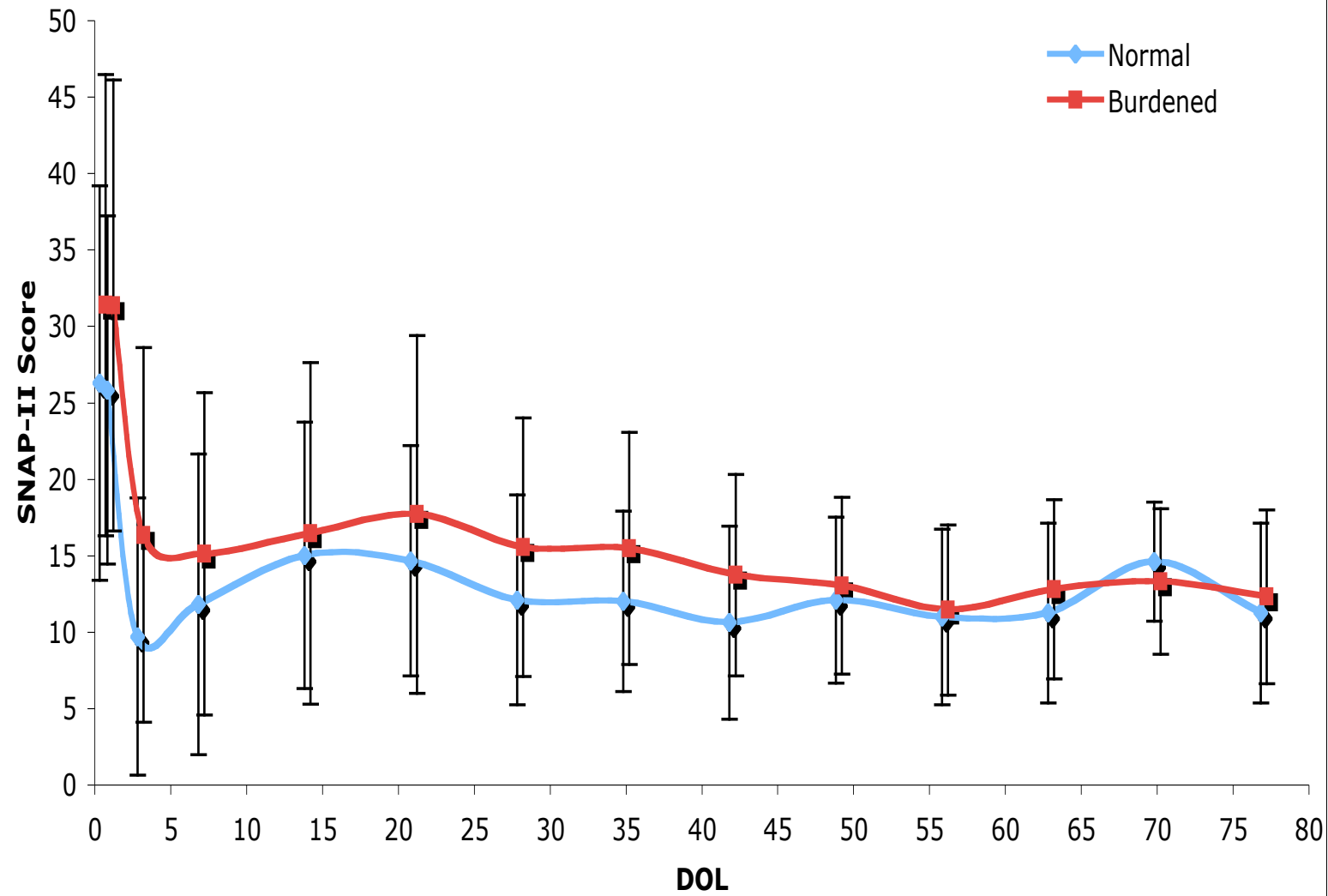
# Do babies declare themselves?

do 'unscathed' survivors improve steadily,  
while babies who will ultimately be 'burdened'  
get sicker and sicker in the NICU?

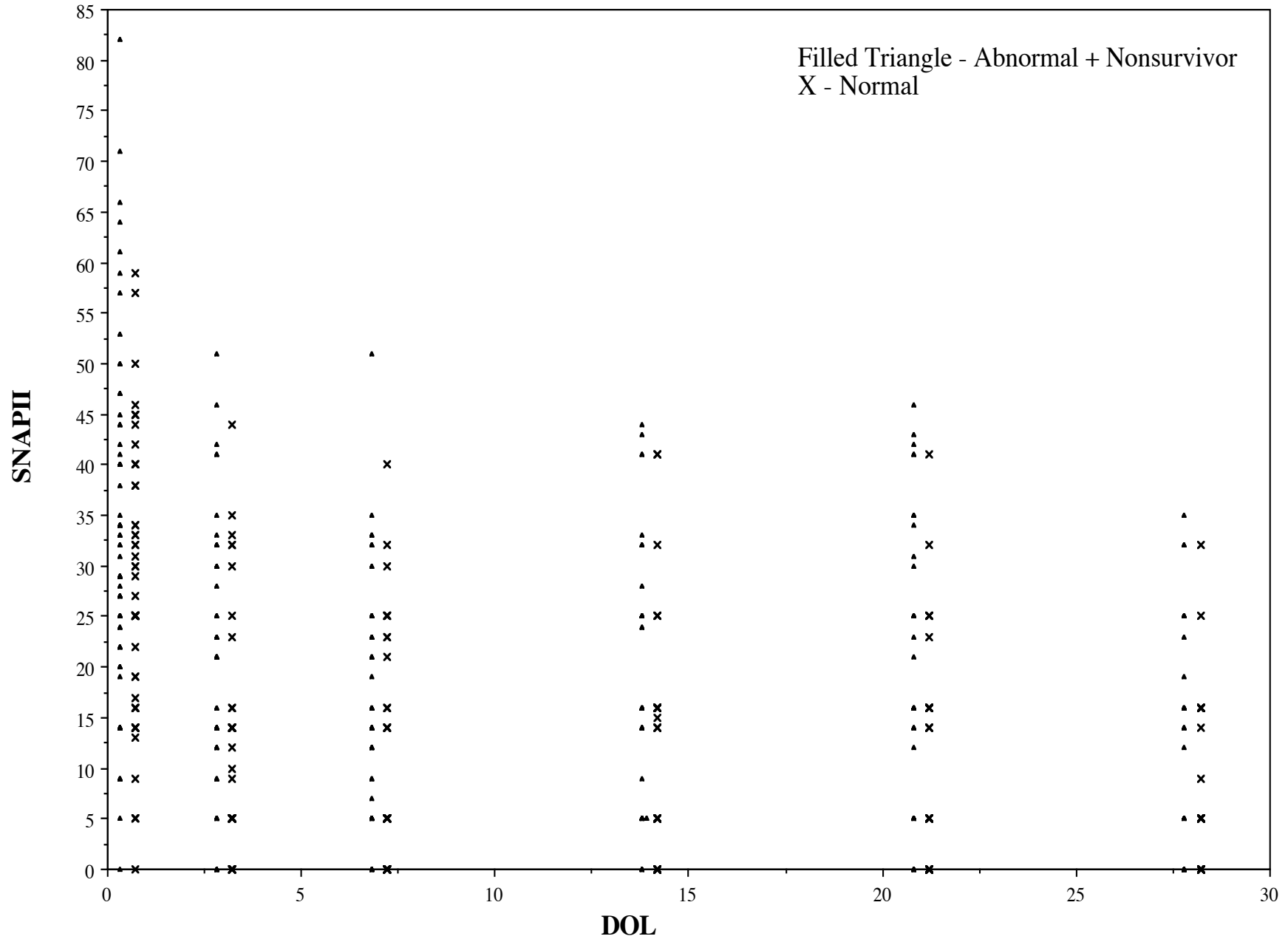
# How would we know?

1. Algorithm
2. Intuition

**Mean SNAP-II vs DOL for Normal and Burdened Infants**



# All SNAP II Over Time: Comparing [Abnormal + Nonsurvivor] vs. Normal



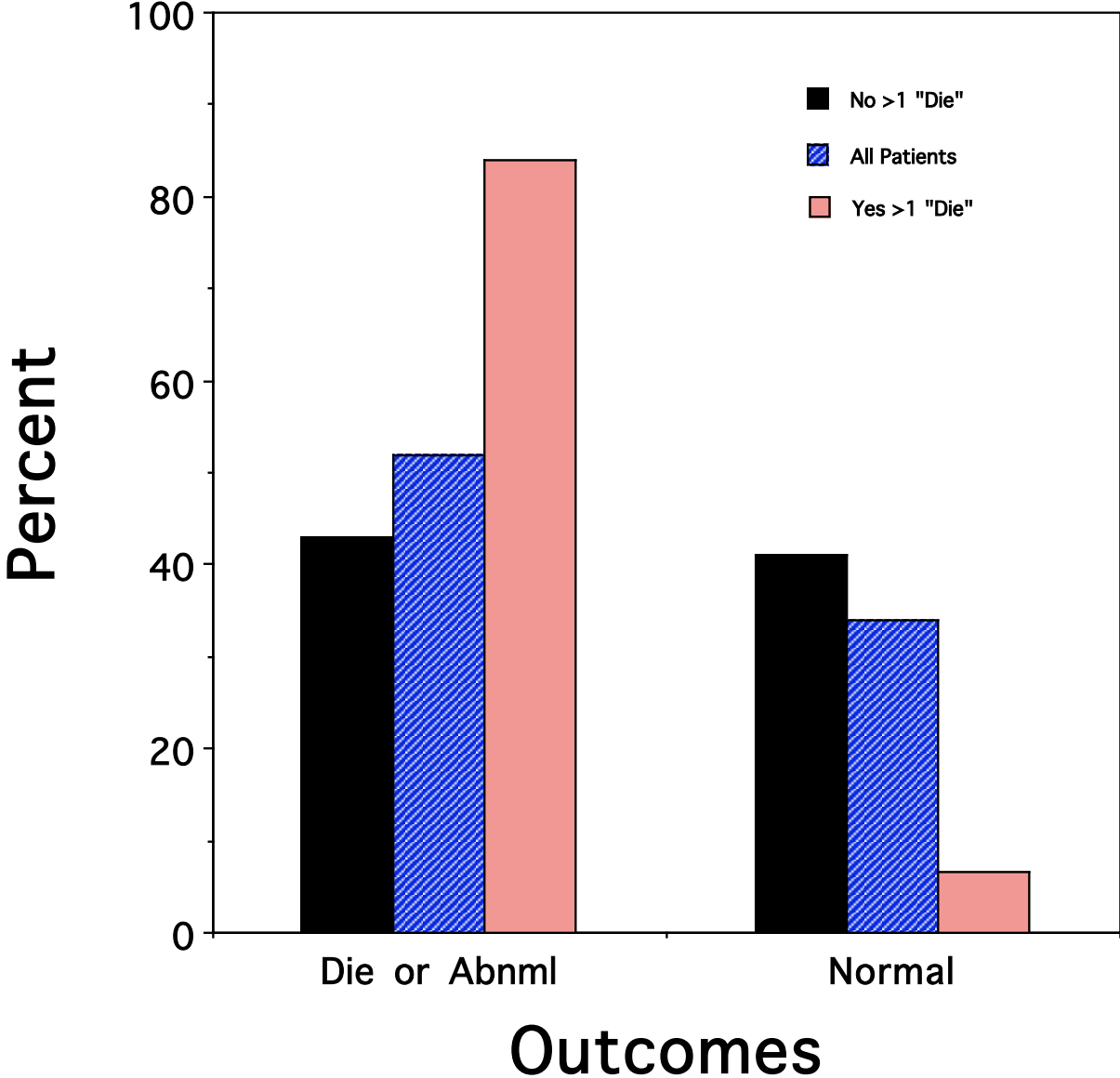
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On every day of mechanical ventilation,  
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one question:

“do you think this baby will survive to  
be discharged, or die in the NICU”?

# Two-Year Outcomes vs Intuitions of "die before d/c"



For infants with a corroborated prediction of “die before d/c” ....

only 6 in 100 will be be alive and normal at 2 years of age

**Imagine this conversation:**

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# Unanswered Questions in Neonatal Ethics:

1. What % "counts"? parent autonomy vs infant best-interests
2. Delivery-room prognostication -- mortality/morbidity
3. Saroj Saigal's data on self-reported happiness
4. Maureen Hack's data on poor PPV of 2 year exam to 8 year school follow-up

# Conflict Resolution is Easy

Continue + Continue = Continue

Stop + Stop = Stop

Continue + Stop = Continue

# Limitations

1. Confidence intervals are inevitable
2. How low a % should 'count'?
3. How abnormal an exam should 'count'?
4. Who should decide?

# Response

1. No different from all other ICUs
2. Indeed, our data are probably better

**Thank you**