Updates on Periviable Data

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MEDNAX MEDICAL GROUP OF SC.
Historical Perspectives

- **1935**: Prematurity defined as being < 2500 gms at birth, irrespective of GA. This was adopted from an earlier standard used in Europe since 1919.

- 1250 gms was loosely considered as the margin of viability which corresponded to an estimated GA of 28 wks.

- By **1950**, GA and crown heel length was added to assist with the definition of viability.

- In the **1950’s**, RDS (Respiratory distress syndrome) was described by the RCOG and this lead to the distinction between ‘PREMATURITY’ and ‘GROWTH RESTRICTED INFANTS’.

Arzuaga et al, Pediatrics 2011
Historical perspectives

- In the **1950’s and 60’s**, mechanical ventilation and TPN came into vogue, but the same did not change survival of infants < 1800 gms.
- In the **1970’s**, introduction of CPAP markedly altered the outcomes.
- Roe vs Wade legislation legalizes abortion in **1973**. Developed a trimester framework for GA. Implication was the fetus was legally viable at 28 wks.

Arzuaga et al, Pediatrics 2011
In 1978, the first infant < 750 gms was successfully ventilated which led to possibility of increasing survival of infants between 24 and 26 wks. (500-700 gms) This led to anecdotal establishment of the above guidelines as contemporary margins of viability.

Landmark neonatal advances like surfactant and ACS led to further improvement in survival of these infants on the limits of viability.

In 1992, the court in the seminal case of `Planned Parenthood of Southeastern PA vs Casey abandoned the 3rd Trimester framework of Roe vs Wade and established that abortion guidelines should be directed at that time and in the future by viability standards (be it 23 or 24 wks. as might be the standard).

Arzuaga et al, Pediatrics 2011
Historical perspectives

- Born alive act of 2001

Infants who are born alive at any stage of development are persons entitled to the protections of the law. This would include any infant who is expelled or extracted from the mother and who is alive irrespective of whether the infant’s survival was in doubt or there are viability issues.

Applied in 2004 Preston v Meriter Hospital case wherein a 23 wkr 700 gm infant was not evaluated for resuscitation. The court ruled in favor of the plaintiff citing EMTALA.

AAP NRP steering committee states that the “law does not prescribe medical care for newborns delivered at the limits of viability” and would not “mandate medical treatment where none is indicated.”
“In no way, shape or form is a 20-week fetus viable. There’s no evidence of a 20-week fetus surviving, even with intensive medical care.”

–American Congress of Obstetricians and Gynecologists Executive Vice President Hal Lawrence, quoted in a news article, May 13, 2015.

This was quoted in the Washington Post as a response to the 20 wk. abortion ban bill, also called the Pain Capable Unborn child Protection Bill.
Ethical decision making

What should you consider??

- **Futility**: Quantitatively defined as consistent treatment failures when provided to 100 consecutive patients. When applied to the viability decision, better defined as qualitative effects to the WHOLE PERSON rather than individual effects of treatment. Based on the principle of Distributive justice.

- **Use of a surrogate decision maker**: PARENTS??

- **Shared decision making**: The RESPONSIBILITY involving parents and the clinician.

- **Assent vs consent**: Assent traditionally means `concurrence of opinion` while consent denotes permission.
Ethical decision making

- **Quality of life vs sanctity of life**: This involves the issues of long term quality of life which should be considered a minimum standard for life beyond biologic existence (sanctity of life).

- **Maternal vs fetal rights**: C section for fetal distress. Involves mother’s autonomy vs beneficence for the fetus. ACOG and professional guidelines recommend that everything possible should be done to protect the best interests of the fetus, though that cannot override the pregnant woman right to autonomy.
Outcomes: When does futility set in????

Table 2
Rates of death and severe neurodevelopmental impairment among infants enrolled in the NICHD Network

<table>
<thead>
<tr>
<th>Gestational Age (Completed WK)</th>
<th>Outcomes for all infants in the sample</th>
<th>Outcomes Only for Mechanically Ventilated Infants in the Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Death Before NICU Discharge</td>
<td>Death</td>
</tr>
<tr>
<td>22 wk</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>23 wk</td>
<td>74%</td>
<td>74%</td>
</tr>
<tr>
<td>24 wk</td>
<td>44%</td>
<td>44%</td>
</tr>
<tr>
<td>25 wk</td>
<td>24%</td>
<td>25%</td>
</tr>
</tbody>
</table>

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Estimated outcomes* for infants in the NRN sample are as follows:

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Outcomes for All Infants</th>
<th>Outcomes for Mechanically Ventilated Infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival</td>
<td>9%</td>
<td>25%</td>
</tr>
<tr>
<td>Survival Without Profound Neurodevelopmental Impairment</td>
<td>5%</td>
<td>14%</td>
</tr>
<tr>
<td>Survival Without Moderate to Severe Neurodevelopmental Impairment</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>Death</td>
<td>91%</td>
<td>75%</td>
</tr>
<tr>
<td>Death or Profound Neurodevelopmental Impairment</td>
<td>95%</td>
<td>86%</td>
</tr>
<tr>
<td>Death or Moderate to Severe Neurodevelopmental Impairment</td>
<td>97%</td>
<td>91%</td>
</tr>
</tbody>
</table>

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*These estimates are based on standardized assessments of outcomes at 18 to 22 months of infants born at NRN centers between 1998 and 2003; infants were 22 to 25 weeks, between 401 and 1,500 grams at birth. Infants not born at a network center and infants with a major congenital anomaly were excluded. The first column of estimates is based on findings for all 4,446 infants in the study. The second column of estimates is based only on the 3,202 infants who received intensive care. The rate of a given outcome had intensive care been attempted for all infants is likely to be intermediate between these two estimates. Sonographic estimates of fetal weight may be used in anticipating birth weight, while assessing the minimum and maximum likely birth weight consistent with the potential error of sonographic estimates.

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**COMPARISON OF COHORTS**

Vermont Oxford Network (US)
Horbar et al, Pediatrics, 2012

NEPS 1 and 2 (NORWAY)

Stensvold et al, Pediatrics, 2017
VARIATIONS and COMPARISON OF BIRTH COHORTS

Figure: Survival in 1995 and 2006, showing for 2006 those babies for whom care was intended

Survival in 2006 with intended care:

- No care
- Deaths following care
- Survivors

Gestational age at birth (completed weeks)

- 95
- 06
- 23w
- 24w
- 25w
- 26w

Percentage (%)

- 0
- 20
- 40
- 60
- 80
- 100

EPIcure study 1 and 2 (UK)
Costeloe et al, BMJ 2012

EPIPAGE Study 1 and 2 (France)
Ancel et al, JAMA Pediatr 2015
CAN we say no to RESUSCITATION??

- Principle of **futility** (rejected earlier).
- Principle of **distributive justice** – difficult for an individual clinician to decide unless society upholds the idea of withholding care for the greater good of distribution of resources.
- **Best interests**: Committee On Bioethics clearly recommends and endorses overriding of parental decisions when `those views clearly conflict with the best interests of the child`. Most common basis for recommendation of DNR and withdrawal of care.
### Epidemiology - Problem in SC

#### 2007 data

<table>
<thead>
<tr>
<th></th>
<th>USA</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live births</td>
<td>4,317,119</td>
<td>62,891</td>
</tr>
<tr>
<td>Preterm births</td>
<td>12.7 %</td>
<td>15.5 %</td>
</tr>
<tr>
<td>LBW births</td>
<td>8.2 %</td>
<td>10.1 %</td>
</tr>
</tbody>
</table>

#### 2015 data

<table>
<thead>
<tr>
<th></th>
<th>USA</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live births</td>
<td>3,977,745</td>
<td>58,124</td>
</tr>
<tr>
<td>Preterm births</td>
<td>9.62 %</td>
<td>11.07 %</td>
</tr>
<tr>
<td>LBW births</td>
<td>8.07% (ELBW – 1.39%)</td>
<td>9.7% (VLBW – 1.79%) and (&lt; 31 wks. – 2%)</td>
</tr>
</tbody>
</table>

CDC vital statistics.
Why is Prematurity a problem?

- Amongst the most common cause of perinatal and infant mortality in the US.
- Has resisted most of medical science's best efforts to prevent or even reduce it.
- 1/3 of all infant mortality is attributable directly to prematurity or its related complications.
- The IOM has estimated the cost of prematurity to be at least 26.2 Billion $ in 2007 which does not include care giver costs, total costs related to special educational services and medical care beyond childhood.
Fetal deaths

20–27 weeks of gestation: 25.2%
28 weeks of gestation or more: 24.9%

Infant deaths

Under age 28 days: 33.8%
28 days to under 1 year: 16.1%

INFANT MORTALITY – NEONATAL AND POSTNEONATAL MORTALITY

Figure 3.

Infant Mortality Gap with Age
Cumulative Probability of Infant Death per 1000 live births by Infant Age

Widening Gap in Probability of Infant Death during the POSTNEONATAL PERIOD

Neonatal Mortality

Postneonatal Mortality

United States  Austria  Finland

Table 2.

**Infant Mortality by Gestational Age**

*International Rankings (8 to 12 Countries per Gestational Age)*

<table>
<thead>
<tr>
<th>Countries</th>
<th>24-27 weeks</th>
<th>28-31 weeks</th>
<th>32-36 weeks</th>
<th>37+ weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>6</td>
<td>1 (34.38)*</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Denmark</td>
<td>3</td>
<td>NA</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Finland</td>
<td>4</td>
<td>NA</td>
<td>8</td>
<td>1 (0.97)*</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>11</td>
<td>NA</td>
<td>NA</td>
<td>11</td>
</tr>
<tr>
<td>Norway</td>
<td>2</td>
<td>NA</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Poland</td>
<td>12</td>
<td>8</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Scotland</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Sweden</td>
<td>1 (165.08)*</td>
<td>2</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Switzerland</td>
<td>10</td>
<td>4</td>
<td>1 (6.77)*</td>
<td>5</td>
</tr>
</tbody>
</table>

**UNITED STATES**

5 (208.08)*

5 (44.65)*

10 (10.20)*

12 (2.20)*

Figure 4. Infant mortality rates for the 10 leading causes of infant death: United States, 2013 and 2014

NOTES: A total of 23,215 deaths occurred in children under age 1 year in the United States in 2014, with an infant mortality rate of 5.82.1 infant deaths per 100,000 live births. The 10 leading causes of infant death in 2014 accounted for 69.1% of all infant deaths in the United States. Access data table for Figure 4 at: http://www.cdc.gov/nchs/data/databriefs/db229_table.pdf#2. Causes of death are ranked according to number of deaths.

Pre viability decisions

- What is `viability`?

  Viability is reached when, in the judgment of the attending physician, there is a reasonable likelihood of fetal sustained survival outside the womb, with or without artificial support.

  The Nuffield Council on Bioethics defines the borderline of viability as an infant born at or before the GA of 25 wks.

  Seri and Evans have defined viability as the age at which the infant has a 50% chance of long-term survival.

- At present, specific regulations on abortion limits or legal definitions of viability have been delegated to the individual states and territories of the United States, the majority of these statues have deferred judgment of viability to the attending physician. Of those that state or infer a gestational limit of viability, the limit ranges from 19 to 28 weeks.
A recent executive summary of proceedings from a joint workshop sponsored by the Society for Maternal–Fetal Medicine, the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the Section on Perinatal Pediatrics of the American Academy of Pediatrics, and the American College of Obstetricians and Gynecologists, in which a diverse group of experts were invited to participate, defined *periviable* birth as delivery occurring from 20 0/7 weeks to 25 6/7 weeks of gestation.
Recommendations of the Consensus Group

- Combined rate of moderate to severe NDI amongst survivors decreased with increasing gestation though severe NDI alone did not decrease substantially with increasing gestation.

- Though data was stratified at weekly intervals, outcomes for deliveries at the extreme of a specific gestation are closest to those of the adjacent week. Outcomes for 23 6/7 closely matches to those at 24 weeks rather than 23 wks.

- Maternal risks may not vary widely thru a wide range of periviable gestations but expectations for better neonatal outcomes makes it easier to support taking such risks at higher gestational age. This might include risks like option for a C section.

- Deliveries at periviable gestations should occur at centers with a higher Level NICU and a maternal care designation. Every effort should be made to transfer women prenatally to such centers as ex-utero neonatal transfers have dismal outcomes.
Protocols and guidelines should be provided to lower level maternal care hospitals including use of ACS, Magnesium Sulfate for neuroprotection, tocolysis, Latency ABX and GBS prophylaxis.

AAP does recommend that parents should be given a choice for palliative care in the light of a significant degree of NDI amongst infants in the periviable gestation.

Use of obstetric interventions to improve neonatal outcomes like ACS, Magnesium sulfate and ABX does not mandate other interventions like C sections or Neonatal resuscitation.

Obstetric Care consensus, June 2016
Survival and survival without major morbidity

Enter the characteristics below.

**Gestational Age (Best Obstetric Estimate in Completed Weeks):** 23 weeks

**Birth Weight (401 Grams to 1,000 Grams):** 500 grams

**Sex:**
- Female
- Male

**Singleton Birth:**
- Yes
- No

**Antenatal Corticosteroids (Within Seven Days Before Delivery):**
- Yes
- No

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<td>27%</td>
<td>38%</td>
</tr>
<tr>
<td>Survival Without Profound Neurodevelopmental Impairment</td>
<td>18%</td>
<td>25%</td>
</tr>
<tr>
<td>Survival Without Moderate to Severe Neurodevelopmental Impairment</td>
<td>11%</td>
<td>15%</td>
</tr>
<tr>
<td>Death</td>
<td>73%</td>
<td>62%</td>
</tr>
<tr>
<td>Death or Profound Neurodevelopmental Impairment</td>
<td>82%</td>
<td>75%</td>
</tr>
<tr>
<td>Death or Moderate to Severe Neurodevelopmental Impairment</td>
<td>89%</td>
<td>85%</td>
</tr>
</tbody>
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* These estimates are based on standardized assessments of outcomes at 18 to 22 months of infants born at NRN centers between 1998 and 2003. Infants were 22 to 25 weeks, between 401 and 1,000 grams at birth, infants not born at a Network center and infants with a major congenital anomaly were excluded. The first column of estimates is based on findings for all 4446 infants in the study. The second column of estimates is based only on the 3,704 infants who received intensive care. The rate of a given outcome had intensive care been attempted for all infants is likely to be intermediate between these two estimates. Sonographic estimates of fetal weight may be used in anticipating birth weight, while assessing the minimum and maximum likely birth weight consistent with the potential score of sonographic estimates.

NICHD gestational age calculator
Survival and survival without major morbidity

Gestational Age (Best Obstetric Estimate in Completed Weeks):
- 22 weeks

Birth Weight (401 Grams to 1,000 Grams):
- 500 grams

Sex:
- Female

Singleton Birth:
- Yes

Antenatal Corticosteroids (Within Seven Days Before Delivery):
- Yes

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<td>5%</td>
<td>14%</td>
</tr>
<tr>
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<td>3%</td>
<td>9%</td>
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<td>91%</td>
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<td>86%</td>
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Source: NICHD website.
Limitations to using NICHD calculators

- Models do not keep up with advancing medical care.
- Provides a point estimate based on population averages but not individualized to a specific fetus.
- Dating might be inaccurate.
- Does not differentiate between a fetus at 23 0/7 wks. and 23 6/7 wks.
- Newborn weight can only be estimated.
- Parental values on outcomes like NDI, death or severe morbidity varies widely and is not factored in.
- Response of an individual neonate to resuscitation can never be foreseen.

Obstetric Care consensus 2016.
Survival of periviable infants – ACOG summary 2016
Survival with Neurodevelopmental impairment – ACOG summary 2016
## Table 3. General Guidance Regarding Obstetric Interventions for Threatened and Imminent Perivable Birth by Best Estimate of Gestational Age* 2, 3

<table>
<thead>
<tr>
<th>Parameter</th>
<th>20 0/7 weeks to 21 6/7 weeks</th>
<th>22 0/7 weeks to 22 6/7 weeks</th>
<th>23 0/7 weeks to 23 6/7 weeks</th>
<th>24 0/7 weeks to 24 6/7 weeks</th>
<th>25 0/7 weeks to 25 6/7 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal assessment for resuscitation* 1A</td>
<td>Not recommended</td>
<td>Consider</td>
<td>Consider</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Antenatal corticosteroids 1A</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Consider</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Tocolysis for preterm labor to allow for antenatal corticosteroid 1A administration</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Consider</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Magnesium sulfate for neuroprotection 2A</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Consider</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Antibiotics to prolong latency during expectant management of preterm PROM if delivery is not considered imminent 1B</td>
<td>Consider</td>
<td>Consider</td>
<td>Consider</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Intrapartum antibiotics for group B streptococci prophylaxis 1B</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Consider</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>Cesarean delivery for fetal indication 1B</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Consider</td>
<td>Consider</td>
<td>Recommended</td>
</tr>
</tbody>
</table>

Abbreviation: PROM, premature rupture of membranes.

*Survival of infants born in the perivable period is dependent on resuscitation and support. Between 22 weeks and 25 weeks of gestation, there may be factors in addition to gestational age that will affect the potential for survival and the determination of viability. Importantly, some families, concordant with their values and preferences, may choose to forgo such resuscitation and support. Many of the other decisions on this table will be linked to decisions regarding resuscitation and support and should be considered in that context.

1Group B streptococci carrier, or carrier status unknown

2For example, persistently abnormal fetal heart rate patterns or biophysical testing, malpresentation
Basis for recommendations

- ACS (antenatal corticosteroids): Eunice Kennedy Shriver NICHD study at 23 NRN centers (JAMA 2011)

  Death or NDI at 18-22 mths of age, hospital death, IVH or PVL. Death or NEC and death occurred less significantly at 23, 24 and 25 wks. but not at 22 wks. Recommendation to consider ACS for Gestations with impending delivery at 23 wks.

  The only morbidity improved at 22 wks. was death or NEC.

- Magnesium Sulfate for neuroprotection: Meta-analysis (Constantine and Weiner for NICHD and MFMU)

  Exposure < 30 wks. (as low as 24 wks.) in neuroprotection trials reduced the primary outcome of death or CP. NNT to prevent one case of CP amongst survivors at 18-22 mths was 46.
Prophylactic ABX for Pregnancy prolongation after Preterm labor or PROM (Cochrane database of systemic reviews, 2013).

Use of broad spectrum ABX during expectant management of preterm PROM has been shown to be effective in latency and reduce newborn infections. Currently, recommendations is to consider latency ABX at 24 wks. of gestation and above in presence of PROM.

In contrast, use of latency ABX in preterm labor with intact membranes does not prolong pregnancy or improve neonatal outcomes. There is some evidence that Augmentin in the presence of preterm labor and intact membranes may worsen neonatal outcomes.

Tocolytic therapy for Preterm labor (Cochrane database of systemic reviews, 2013)

Use of nifedipine and indomethacin in women with preterm labor with intact membranes might delay delivery between 48-72 hrs. after 26 wks., but no strong evidence of any benefit < 26 wks..

Presently, no strong or specific recommendation for or against tocolysis in the periviable period.
Basis for recommendations

- **C sections**: Cochrane database of systemic reviews, 2013.

  RCT's comparing vaginal vs C sections in the periviable period have not been done. But, delivery by C sections have not shown any reduction of mortality or IVH in the periviable period.

  There might be some limited evidence of delivery by C section in presence of malpresentations but implications for increased maternal morbidity has to be considered including need for a vertical incision and increased risk of uterine rupture in subsequent pregnancies (some evidence that the same might be increased even with LTCS in the periviable period).
Trends in Care Practices, Morbidity and Mortality in the last 2 decades.

- Prospective registry of 34636 infants between 22-28 wks., BW of 401-1500 gms in 26 NRN centers between 1993-2012.
- ACS use increased (24% to 87%).
- Delivery by C section increased (44% to 64%).
- Delivery room intubation decreased (80% to 65%).
- Postnatal use of steroids has decreased substantially the last decade as compared to the 90`s.
- Survival for 23 wks. (27% to 33%) and for 24 wks. (63% to 65%) increased between 2009-2012. Increases beyond 25 wks. were relatively smaller.
- Survival without major morbidity increased 2% for each GA between 25 to 28 wks. but remained unchanged between 22-24 wks..

Stoll et al, JAMA 2015

Adjusted RR (95% CI), change per year
2009-2012: 1.06 (0.89-1.25)

Adjusted RR (95% CI), change per year
2009-2012: 1.09 (1.05-1.14)

Adjusted RR (95% CI), change per year
2009-2012: 1.05 (1.03-1.07)

Adjusted RR (95% CI), change per year
2009-2012: 1.02 (1.01-1.03)

Adjusted RR (95% CI), change per year
2009-2012: 1.00 (0.996-1.015)

Adjusted RR (95% CI), change per year
2009-2012: 1.01 (1.002-1.016)

Adjusted RR (95% CI), change per year
2009-2012: 1.00 (0.998-1.011)
Variations in care in the periviable gestational period


- 4987 Infants in 24 hospitals of the NRN between April 06 and March 11.

- < 27 wks. (no congenital or known recognized syndromes).

- 4329 (86.8%) received active treatment (surfactant with intubation, ventilatory support, chest compressions, epinephrine, TPN)

- 5 / 24 hospitals provided active treatment to all infants born at 22 to 26 wks..

- 4704 children followed at 18-22 mths of age for NDI (Bayley III scale)

- ACS use varied from 10% at 22 wks. to about 60-65% at 26 wks.
Figure 1. Rates of Active Treatment by Gestational Age at Birth. Point values represent the mean percentage, across all hospitals, of infants born at a given gestational age (in weeks and days) who received active treatment. Vertical bars represent 95% confidence intervals. Blue dashed lines indicate the mean rate of active treatment among infants born during a given week of gestation, and blue dotted lines indicate 95% confidence intervals.

Issue: Volume 372(19), 7 May 2015, p 1801–1811
<table>
<thead>
<tr>
<th></th>
<th>All infants (%)</th>
<th>Infants who were treated (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>22 wks.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>5.1</td>
<td>23.1</td>
</tr>
<tr>
<td>Survival without severe impairment</td>
<td>3.4</td>
<td>15.4</td>
</tr>
<tr>
<td>Survival without severe or moderate impairment</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td><strong>23 wks.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>23.6</td>
<td>33.3</td>
</tr>
<tr>
<td><strong>Survival without severe or moderate impairment</strong></td>
<td><strong>11.3</strong></td>
<td><strong>16</strong></td>
</tr>
<tr>
<td></td>
<td>All infants (%)</td>
<td>Treated infants (%)</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>24 wks.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>54.9</td>
<td>56.6</td>
</tr>
<tr>
<td>Survival without severe impairment</td>
<td>44.7</td>
<td>46.1</td>
</tr>
<tr>
<td>Survival without moderate or severe impairment</td>
<td>30</td>
<td>30.9</td>
</tr>
<tr>
<td><strong>25 wks.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>72</td>
<td>72.3</td>
</tr>
<tr>
<td>Survival without severe impairment</td>
<td>61.1</td>
<td>61.4</td>
</tr>
<tr>
<td>Survival without moderate or severe impairment</td>
<td>44.3</td>
<td>44.5</td>
</tr>
</tbody>
</table>

Rysavy et al, NEJM 2015
Variations in care

*Infants receiving non treatment* were more likely to be
- SGA status
- APGAR`s < 3 at 1 minute
- Less exposure to ACS
- Less likely to be delivered by C section.

*Treatment at 22 and 23 wks.* was more likely if
- Mother <= 19 y/o age
- Less likely to have private insurance
- More likely to be African American
- More likely to opt for a C section.
- More likely to be born on the last 2 days of the gestational week

Rysavy et al, NEJM 2015.
Does having a planned approach to manage 22-24 weeks infants improve care for older gestations??

- Smith et al (Pediatrics, June 2012)
- Infants between 22 0/7 wks. to 27 6/7 wks.. Stratified into two groups – 22-24 wks. and higher GA groups.
- 20 centers involved in the Eunice Kennedy Shriver NICHD research network.
- 3631 infants between 22-24 wks. and 5227 higher GA infants.
- Resuscitation in the 22-24 wks. group varied from 30-100%, C section rates varied from 13-65% and ACS use varied from 28-100%.
- Having a more aggressive approach in the lower GA group (like use of ACS) improved outcomes for 25-27 wks. including mortality, death and severe ROP, death or NEC, death or late-onset sepsis or death and NDI (neurodevelopmental impairment)
Are there recommendations or guidelines???

- Guillen et al (Pediatrics, Aug 2015)
- They looked for recommendations in 47 highly developed nations.
- 34 guidelines from 23 countries and 4 international groups identified.
- 3 did not state management guidelines.
- Of the 31, 21 (68%) supported comfort care at 22 wks. while 20 (65%) supported active treatment at 25 wks.
Specifically, the NRP states that if the responsible physicians believe that there is no chance of survival, the initiation of resuscitation offers no benefit to the infant and should not be offered. Examples may include confirmed age of gestation of < 22 wks. or severe congenital or chromosomal anomalies.

Humane, compassionate and culturally sensitive palliative care focused on ensuring the infant’s comfort is the ethically and medically appropriate care at that time.

Again, NRP does not make any specific mention or provides a clear guideline on fetuses at 22 wks. but does provide some recommendations on periviable fetuses < 22 wks..
The Nuffield Council on Bioethics (UK based independent panel on bioethics) recommends that resuscitation and intensive care should not be provided to infants at a gestational age of less than or equal to 22 weeks unless the "informed" parent requests it and clinicians agree it is likely in the best interest of the infant.

For infants at 23 weeks, they recommend allowing the parents to choose whether to resuscitate, but the medical team is not required to resuscitate or provide intensive care if they feel it does not benefit the infant.

At 24 weeks, resuscitation and intensive care should be provided but may be withheld based on the infant's condition and if both the parents and medical team agree it is not in the infant's best interest. At 25 weeks or more, it is recommended that intensive care be provided.
Making a decision after evaluation

22 Weeks Gestational Age

23 Weeks Gestational Age
The NICU experience from the Parents perspective

Article in PEDIATRICS (Sept 16`) – authored by 25 neonatologists, Obstetricians, clinical and bioethical ethicists and nurses, all of whom had children or grandchildren who spent time in the NICU. Their perspectives due to the impact from the NICU experience led to some suggestions...

- Parents do experience both positive and negative impacts. Hence, communication should be balanced.
- Humility is the key ... Avoid sentences like `parents do not understand` or `If i were in a similar situation, i would not` ....
- Understand and do not foster parental guilt... `there is nothing you could have done to prevent this` and that the infant is very fortunate to have caring and loving parents like them.

Spitzer et al, Pediatrics, Sept 2016.
Positive transformations are possible and the roller coaster of the NICU will finally become a train with some destination. That one day, it will be better and stronger.

Temper discussions of risk with the positives.

Help parents recognize what they can and cannot control... sometimes they have to `let go`.

Physicians have a choice of being there for the parents at tough times or avoid them. BE THERE!!!
It's a long journey, but they get there....
Sometimes the smallest things take up the most room in your heart.

- A.A. Milne

THANK YOU!!!