Management of Preterm Deliveries at the Borderline of Viability.

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I have absolutely nothing to disclose!!!!
Historical Perspective

- Developments in modern neonatal intensive care have produced a steady improvement in survival rates.

- These improvements have resulted in what has been considered to be "the borderline of viability = gestational age with $\leq 50\%$ chance of survival" decreasing by approximately one week every decade over the past 40 years.

- Borderline viability has always been associated with the presence of disabilities in a proportion of survivors.
Current Definition of the Periviable Period.

- Periviable birth is defined as delivery occurring from 20 0/7 weeks to 25 6/7 weeks of gestation.

- This definition comes from a joint workshop including the Society for Maternal-Fetal Medicine, NICHD, the Section on Perinatal Pediatrics of the AAP and ACOG.

- Gestational age in weeks of gestation refers to the completed week of gestation and the next 6 days.
Factors Affecting Outcomes of Periviable Births.

- **Nonmodifiable Factors** –
  - gestational age at birth
  - fetal sex
  - weight
  - race
  - plurality.

- **Modifiable Factors** –
  - location of delivery
  - intent to intervene by C/S for fetal well-being or malpresentation
  - administration of antenatal corticosteroids, antibiotics and MgSO4
  - **postnatal management** – practices regarding the initiation of active treatment.
Differences in Postnatal Management

- Recommendations of professional organizations
- Institutional policies
- Attitudes and biases of individual physicians
- Family wishes – based on informed consent including discussions of morbidity and mortality, as well as the associated uncertainty of these estimates.
Guidelines for delivery room care of extremely low gestational age infants were identified from a search targeting 47 highly developed countries.

Wide variation of recommendations between 23-24 weeks’ GA.

Infants with congenital anomalies were excluded.

Active treatment was defined as any potentially lifesaving intervention administered after birth.

Survival and neurodevelopmental impairment at 18-22 months were assessed.
Between Hospital Variation in Treatment and Outcomes in Extremely Preterm Infants.


- 4987 infants were studied

- Survival and neurodevelopmental impairment at 18-22 months was able to be assessed in 4704 children (94%)

- Active treatment
  - 22 weeks – 22.1%
  - 23 weeks – 71.8%
  - 24 weeks – 97.1%
  - 25 weeks – 99.6%
  - 26 weeks – 99.8%

- All rates of active treatment were higher among infants born on the last 2 days of the gestational week.

Inset: Percentage of infants who received active treatment by gestational week.
Maternal and infant characteristics were compared in those who did receive active treatment and those who did not.

- 62% of infants who received active care at 22 weeks were Black non-Hispanic compared with only 37.1% of those who did not.
- Infants were less likely to receive active treatment at 22 weeks if they were white, had private insurance, were SGA, had no exposure to antenatal steroids or were not delivered by C/S.
- Initiation of active treatment clustered at the hospital level.
Interquartile Range
Hospital rates of active treatment varied widely.

- 5/24 hospitals provided active treatment to all infants born at ≥ 22 weeks of gestation and 4/24 hospitals did not resuscitate any infants born at 22 weeks of gestation.

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Interquartile ranges for hospital rates of active treatment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>7.7 – 100%</td>
</tr>
<tr>
<td>23</td>
<td>52.5 - 96.5%</td>
</tr>
<tr>
<td>24</td>
<td>95.2 – 100%</td>
</tr>
<tr>
<td>25</td>
<td>100%</td>
</tr>
<tr>
<td>26</td>
<td>100%</td>
</tr>
</tbody>
</table>
For classification of neurodevelopmental impairment the following definitions were used:

- **Severe** – cognitive or motor core in the Bayley-III of <70, severe CP, a Gross Motor Function Classification System (GMFCS) level of 4 or 5 (0=normal), bilateral blindness or severe hearing impairment that cannot be corrected with amplification.

- **Moderate** – Bayley-III cognitive or motor score of 70-84, moderate CP or a GMFCS level of 2 or 3.
### Between Hospital Variation in Treatment and Outcomes in Extremely Preterm Infants.


<table>
<thead>
<tr>
<th></th>
<th>22 weeks (All/Active)</th>
<th>23 weeks (All/Active)</th>
<th>24 weeks (All/Active)</th>
<th>25 weeks (All/Active)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival</td>
<td>5.1 /23.1%</td>
<td>23.6/33.3%</td>
<td>54.9/56.6%</td>
<td>72.0/72.3%</td>
</tr>
<tr>
<td>Survival w/o severe NDI</td>
<td>3.4 /15.4%</td>
<td>17.9/25.2%</td>
<td>44.7/46.1%</td>
<td>61.1/61.4%</td>
</tr>
<tr>
<td>Survival w/o moderate or severe NDI</td>
<td>2.0/ 9.0%</td>
<td>11.3/16.0%</td>
<td>30.0/30.9%</td>
<td>44.3/44.5%</td>
</tr>
</tbody>
</table>
Looking at hospital rates of survival at 22 and 23 weeks in those infants who received active treatment

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Interquartile Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>22 weeks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>21.1</td>
<td>0-50%</td>
</tr>
<tr>
<td>Survival w/o severe NDI</td>
<td>5.0</td>
<td>0-33%</td>
</tr>
<tr>
<td>Survival w/o moderate or severe NDI</td>
<td>0</td>
<td>0-15%</td>
</tr>
<tr>
<td><strong>23 weeks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival</td>
<td>30.8</td>
<td>24-37%</td>
</tr>
<tr>
<td>Survival w/o severe NDI</td>
<td>25.0</td>
<td>15-28%</td>
</tr>
<tr>
<td>Survival w/o moderate or severe NDI</td>
<td>14.2</td>
<td>7-19%</td>
</tr>
</tbody>
</table>
Survival with Moderate or Severe Impairment
Between Hospital Variation in Treatment and Outcomes in Extremely Preterm Infants.


- When outcomes were risk-adjusted to account for differences in infant demographic and clinical characteristics, the hospital rate of active treatment accounted for the majority of the between hospital variation in outcomes among infants born at 22 or 23 weeks of gestation.

- If local outcome data are alone used to counsel families, and that data is influenced by local approaches negative to the initiation of care, or if data is presented with outcomes including those not actively treated, a bias to forgo treatment is introduced and a self-fulfilling prognosis created.
Current Crouse Approach

- Comfort care at 22 weeks of gestation
- Antenatal steroids starting at 23 5/7 weeks.
- Active care at 23 weeks if infant is relatively vigorous and parents request intervention after consultation with discussion of outcome data.
## Crouse Outcome Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Survival</th>
<th>23 weeks (All/NICU)</th>
<th>24 weeks (All/NICU)</th>
<th>25 weeks (All/NICU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>Survival</td>
<td>16.7/25%</td>
<td>53.8/58.3%</td>
<td>92.0/92.0%</td>
</tr>
<tr>
<td></td>
<td>w/o moderate -severe NDI</td>
<td>16.7/25%</td>
<td>38.5/41.7%</td>
<td>84.0/84.0%</td>
</tr>
<tr>
<td>2014</td>
<td>Survival</td>
<td>26.7/33.3%</td>
<td>81.8/90.0%</td>
<td>85.7/92.3%</td>
</tr>
<tr>
<td></td>
<td>w/o moderate-severe NDI</td>
<td>13.3/16.7%</td>
<td>63.6/70.0%</td>
<td>57.1/61.5%</td>
</tr>
<tr>
<td>2015</td>
<td>Survival</td>
<td>11.7/16.7%</td>
<td>72.7/72.7%</td>
<td>93.8/100%</td>
</tr>
<tr>
<td></td>
<td>w/o moderate-severe NDI</td>
<td>11.7/16.7%</td>
<td>72.7/72.7%</td>
<td>87.5/93.8%</td>
</tr>
</tbody>
</table>
Costs of Intervention

- The burdens of extreme prematurity on the individual, on the family and ultimately on society–
  - **Direct medical costs** - hospital and physician costs (it is not unusual for costs to top $1 million for a prolonged stay), medications, devices, home care....
  - **Direct non-medical costs** – transportation, accommodations, adaptation to the home or vehicle, special education...
  - **Indirect costs** – income loss related to the change in work status of parents, missed work days, limited ability of the infant to work because of disability...
  - **Intangible costs** – quality of life issues for both the patient and family related to the physical and emotional burden of dealing with chronic illness and disability.
Role of Physician Preference

- Neonatologists have been shown to have significant variation in approach to their interpretation of risk for extremely preterm infants.

- These differences in approach exist even in the setting of national guidelines. A study published this year in Eur J Pediatr demonstrated that, despite a 2010 Dutch guideline offering active care from 24 0/7 weeks of gestation, neonatologists and obstetricians had significantly varied views in perceived lowest limits for different interventions (C/S, chest compressions, use of epinephrine...).

- Variations in interpretation of risk and perceptions of disability can have major impact on how families are counseled and can affect if active treatment is initiated and ultimate treatment outcomes.
Perceptions of Disability

- In discussing outcomes with families there is a risk of lumping all disabled extremely premature infants as worst case scenarios, as if every impairment/disability is less preferable than death.

- Studies indicate that most people with disabilities express high satisfaction with their quality of life.

- While most of us would not choose to have a disabled child, once that child becomes a reality few would truly wish that child away.
A recommendation regarding assessment for resuscitation is not meant to indicate that resuscitation should always be undertaken or that every possible intervention be offered. A decision to proceed with resuscitation should be based on specific clinical data (EFW, GA), family wishes and ongoing assessment of fetal/neonatal condition.

<table>
<thead>
<tr>
<th>Table 3, General Guidance Regarding Obstetric Interventions for Threatened and Imminent Perivable Birth by Best Estimate of Gestational Age*</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 0/7 weeks to 21 6/7 weeks</td>
</tr>
<tr>
<td>Neonatal assessment for resuscitation*</td>
</tr>
<tr>
<td>Antenatal corticosteroids</td>
</tr>
<tr>
<td>Tocolysis for preterm labor to allow for antenatal corticosteroid administration</td>
</tr>
<tr>
<td>Magnesium sulfate for neuroprotection</td>
</tr>
<tr>
<td>Antibiotics to prolong latency during expectant management of preterm PROM if delivery is not considered imminent</td>
</tr>
<tr>
<td>Intrapartum antibiotics for group B streptococci prophylaxis1</td>
</tr>
<tr>
<td>Cesarean delivery for fetal indication1</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.
1* Group B streptococci carrier, or carrier status unknown
2* For example, persistently abnormal fetal heart rate patterns or biophysical testing, malpresentation
Facilitation of Family Decision Making

- Counseling by MFM and neonatology teams should occur simultaneously or with prior communication to avoid provision of conflicting information.

- The family should be counseled regarding anticipated short and long term consequences and this counseling should be carried out using accurate and unbiased information.

- The family should be prepared that additional clinical information as it evolves may change recommendations and decisions.

- It should be emphasized that decisions to withhold or redirect care do not mean that all care is eliminated, but rather the focus becomes palliative care and bereavement.
The END