Decision to Incision Timing: Is the 30-minute rule valid?

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Overview

- 30 minute rule?
  - History
- Biology / pathophysiology
- Epidemiology
- Quality Improvement
- Management

Disclosures

- No financial disclosures related to this talk
- Medical Advisor to Ariosa, Cellscape, Mindchild
- Bob’s Red Mill
How long would it take to achieve delivery?

A. 10 minutes or less
B. 15 minutes
C. 20 minutes
D. 30 minutes
E. Longer

Minimum time until injury?

A. 10 minutes or less
B. 15 minutes
C. 20 minutes
D. 30 minutes
E. Longer

Disconnect?

- If injury occurs faster than we can intervene, then why a 30-minute rule?
- Should it be shorter?

The 30 minute rule

- Established as a time threshold for cesarean delivery to occur – 1980s
- ACOG, RCOG, etc
- Became a more prominent rule of the land in the late 1990s

Tuffnell et al. BMJ 2001;322:1330–3
Prolonged decelerations

The time required to extract an infant from a hostile in utero environment is a frequent issue in medical negligence cases. The American College of Obstetricians and Gynecologists and the American Academy of Pediatrics suggest a **time guideline of 30 minutes** from decision for Cesarean delivery to the beginning (incision) of the procedure. This time frame is **based on survey data** from hospitals throughout the United States and is **not based on clinical outcomes or the pathophysiology of obstetric events**.


What time threshold?

- **What outcomes are we interested in?**
  - Mortality
    - Short-term (neonatal)
    - Long-term (infant and beyond)
  - Morbidity
    - HIE / CP
    - Seizures?
    - Apgars?
    - Cord gases

Why 30 minutes?

- Improving outcomes?
- Feasibility?
- Whim?
Prolonged decelerations

- 238 neonates w/ UA pH < 7.1
- Primary outcome – seizures from HIE
- Examined all gas features
  - pO2; pCO2; base excess, pH
- pH < 7.0 only was associated in MV model

Obstet Gynecol. 2002 Sep;100(3):557-60.
The correlation of seizures in newborn infants with significant acidosis at birth with umbilical artery cord gas values.
Williams KP, Singh A.

How long?

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Total No. of Patients</th>
<th>No. of Neonates with a Primary Adverse Outcome*</th>
<th>Proportion</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 or less</td>
<td>6</td>
<td>1</td>
<td>0.167</td>
<td>0.004-0.641</td>
</tr>
<tr>
<td>11-30</td>
<td>24</td>
<td>7</td>
<td>0.292</td>
<td>0.126-0.531</td>
</tr>
<tr>
<td>More than 30</td>
<td>6</td>
<td>5</td>
<td>0.833</td>
<td>0.359-0.996</td>
</tr>
</tbody>
</table>

CI, confidence interval.
* Abnormal umbilical artery pH level less than 7.0 or 5-minute Apgar score less than 7.

Only Time?

- Are there other features that matter?
- Leung et al – decelerations
- Variability?
- Etiology – uterine rupture, abruption, etc.
- Heart rate?

Variability

Decreased variability before bradycardia

Combined with no recovery of the bradycardia
mean pH 6.83 +/- 0.16
78% incidence of significant acidosis

Heart Rate

<table>
<thead>
<tr>
<th>FHR 80s</th>
<th>Time until acidemia</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25 mins</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>FHR 70s</td>
<td>13 mins</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>FHR 60s</td>
<td>8 mins</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>FHR 50s</td>
<td>6 mins</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>FHR 40s</td>
<td>5 mins</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>


Variability

Decreased variability before bradycardia

Combined with no recovery of the bradycardia
mean pH 6.83 +/- 0.16
78% incidence of significant acidosis

Fetal heart rate parameters predictive of neonatal outcome in the presence of a prolonged deceleration.

What threshold?

- Given the data, what approach?
- Should there be a set time?
- Should the standard time differ?
  - Hospital size
  - Local geography / population
  - Level

What to do?

Is it a bradycardia?
What to do?

Is it a bradycardia?

What to do?

Is it a bradycardia?

What to do?

Is it a bradycardia?

What to do?

- What is the Baseline status?
- What is the Etiology?
- What needs to be done to achieve Delivery?
- BED
What to do?

- What is the Baseline status?
  - Decels
  - Variability
  - Meconium
  - Chorioamnionitis
  - Compromised mother or fetus?
    - Htn disorder; fetal anomaly; preterm

What to do?

- What is the Etiology?
  - Abruptio
  - Tachysystole/Tetany
  - Cord prolapse
  - Uterine rupture
  - Maternal
    - Hypotension (AFE); hypoxic (PE)
  - Fetal
    - Oligo; arrhythmia; rapid descent

What to do?

- What needs to be done to achieve Delivery?
  - What is the exam? Include position
  - Parity and prior OB Hx
  - Patient BMI
  - EFW
  - Anesthesia?
  - OR / staff?

What to do?

- Individual level – BED
- Hospital level
  - Establish benchmarks
  - Environment (Geography; Populations)
  - Engineering (Internal and External)
- Societal level
  - Encourage collaboration
  - Public Health
Can we reduce the length of time?

**Table 1** Times between decision to deliver and delivery, by year. Values are number (percentage) of cases

<table>
<thead>
<tr>
<th>Year</th>
<th>1997 (n=193)</th>
<th>1998 (n=241)</th>
<th>1999 (n=287)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered in 30 minutes</td>
<td>120 (62)</td>
<td>166 (68)</td>
<td>192 (67)</td>
</tr>
<tr>
<td>Delivered in 40 minutes</td>
<td>163 (84.5)</td>
<td>213 (88)</td>
<td>261 (91)*</td>
</tr>
<tr>
<td>Delivered in &gt;50 minutes</td>
<td>12 (6.2)</td>
<td>7 (3.2)</td>
<td>10 (3.5)</td>
</tr>
</tbody>
</table>

**Theatre in 10 minutes:**
- Delivered in 30 minutes: 98/120 (82) vs. 137/163 (84) vs. 174/217 (80)
- Delivered in 40 minutes: 114/120 (95) vs. 157/163 (96) vs. 214/217 (99)

**Theatre in >10 minutes:**
- Delivered in 30 minutes: 22/73 (30)** vs. 27/78 (37)** vs. 18/70 (25)**
- Delivered in 40 minutes: 45/73 (67)** vs. 56/78 (71)** vs. 47/70 (67)**

*P<0.05 compared with 1997.
**P<0.001 compared with group to theatre in 10 minutes.

Tuffnell et al. BMJ 2001;322:1330–3

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Can we reduce the length of time?

**Table 2** DDIs before (P1) and after (P2) program implementation

<table>
<thead>
<tr>
<th>Variable</th>
<th>P1 n = 292</th>
<th>P2 n = 301</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean DDI, min</td>
<td>21.7 ± 9.1 (7–62)</td>
<td>12.3 ± 3.8 (5–30)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>ECS within DDI &lt;30 min</td>
<td>241 (82.5)</td>
<td>299 (99.3)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>ECS within DDI &lt;20 min</td>
<td>166 (56.8)</td>
<td>282 (93.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mean surgery duration, min</td>
<td>35.3 ± 11.8 (16–105)</td>
<td>34.6 ± 18.9 (16–120)</td>
<td>.609</td>
</tr>
</tbody>
</table>

All data are shown as number (%) or mean ± standard deviation (range). Mean surgery duration (min) defined as the time interval from incision to skin closure.

DDI, decision-to-delivery interval; ECS, emergency cesarean section.


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Can we reduce the length of time?

**Table 4** Neonatal outcome before (P1) and after (P2) program implementation

<table>
<thead>
<tr>
<th>Variable</th>
<th>P1 n = 292</th>
<th>P2 n = 301</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal hospitalization time, d</td>
<td>7.4 ± 11.1</td>
<td>6.6 ± 8.3</td>
<td>.290</td>
</tr>
<tr>
<td>NICU admission</td>
<td>86 (29.5)</td>
<td>78 (25.9)</td>
<td>.350</td>
</tr>
<tr>
<td>Umbilical cord pH ≤7.1</td>
<td>31 (10.7)</td>
<td>16 (5.3)</td>
<td>.016</td>
</tr>
<tr>
<td>5-min Apgar score ≤7</td>
<td>17 (5.8)</td>
<td>7 (2.3)</td>
<td>.031</td>
</tr>
<tr>
<td>Respiratory morbidity</td>
<td>35 (12)</td>
<td>18 (6.0)</td>
<td>.01</td>
</tr>
<tr>
<td>Cerebral morbidity</td>
<td>4 (1.4)</td>
<td>3 (1)</td>
<td>.721</td>
</tr>
<tr>
<td>Neonatal sepsis</td>
<td>11 (3.8)</td>
<td>3 (1)</td>
<td>.026</td>
</tr>
<tr>
<td>Necrotizing enterocolitis</td>
<td>1 (0.4)</td>
<td>0 (0)</td>
<td>.492</td>
</tr>
<tr>
<td>Blood transfusions</td>
<td>10 (3.4)</td>
<td>4 (1.3)</td>
<td>.093</td>
</tr>
<tr>
<td>Phototherapy</td>
<td>30 (10.3)</td>
<td>15 (5)</td>
<td>.015</td>
</tr>
<tr>
<td>Neonatal death</td>
<td>3 (1)</td>
<td>4 (1.3)</td>
<td>.734</td>
</tr>
<tr>
<td>Composite of adverse neonatal outcome</td>
<td>94 (32.2)</td>
<td>47 (15.6)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

What should be done?

- Gather together leadership to discuss
  - OB providers (MFM, OB, CNM, FM)
- Measure the outcomes – report the data
- Potentially use QI methods
  - Institutionally based (e.g. Lean)
- Establish standards / standard behaviors

What time goal?

A. 30 minutes?
B. 20 minutes?
C. 15 minutes?
D. 10 minutes?

As fast as possible!!!