Extubations:

Pediatric Patients Should NOT Be Extubated 24/7

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Medical Director PCVICU
“After Hour” Extubations

• Why are we discussing this?
• What is the “standard of care”
• What is the data?
Would you extubate this patient “after hours?”

- 16 yo with history of MVC
- Appears to be active / coughing
- Somewhat agitated
- Passes “ERT”
Would you extubate this patient “after hours?”

- 7 mos RSV
- Ventilated 3 days
- Passed ERT
Would you extubate this patient “after hours?”

- 6 mos AVSD
- Planned extubation in OR..
- Bleeding stopped
- 6-12 hrs post CPB
Would you extubate this patient “after hours?”

- POD # 6 for 3 week old stage 1 palliation
- Chest closed 48 hrs ago
- On “low” dose inotropes “holding for extubation”
- Surgeon wants pt extubated
Theoretical Advantages of: “after hours extubations”

- Decrease LOV, LOS
- Decrease “costs”
- Decreased Sedation
- Decreased M & M
The Medical “Standard of care”

The “medical standard of care” is defined as the level and type of care that a reasonably competent and skilled health care professional, with a similar background and in the same medical community, should provide to a specific medical condition.

Is the day time the same as after hours with respect to “same medical community?”
Extubation Failure in Neonates After Cardiac Surgery: Prevalence, Etiology, and Risk Factors

- 16% extubation failures (EF)
- EF: respiratory dysfunction (16), CV(4), upper airway disease (4)
- EF: airway diseases and MV
- EF: 50% required surgery
- Data supports more diligent approaches
12% extubation failures @ 7.5 hrs

EF: uncuffed ETT, Open chest > 4 days
Variation in extubation failure rates after neonatal congenital heart surgery across Pediatric Cardiac Critical Care Consortium hospitals

J TCVS 2017

- EF rates: 5-22%
Variation in extubation failure rates after neonatal congenital heart surgery across Pediatric Cardiac Critical Care Consortium hospitals

- EF = worse outcomes

* = P<0.002
Extubation Failure in Brain-injured Patients: Risk Factors and Development of a Prediction Score in a Preliminary Prospective Cohort Study. Anesth 2017

Mortality, LOV, LOS (ICU/Total) all <.0001 EF vs Success
Accuracy of an Extubation Readiness Test in Predicting Successful Extubation in Children With Acute Respiratory Failure From Lower Respiratory Tract Disease (RESTORE) Crit Care Med 2017;

Figure 1. Flow diagram for patients in the primary cohort. ERT = extubation readiness test.
Association Between Overnight Extubations and Outcomes in the Intensive Care Unit


- 97,844 patients
- 20.1% of patients underwent overnight extubation (AE)
- AE decreased over time: 23.3% in 2000-2001 vs 18.8% in 2009; \( P = .001 \).
Association Between Overnight Extubations and Outcomes in the Intensive Care Unit


Table 2. Outcomes of Propensity-Matched Pairs

<table>
<thead>
<tr>
<th>Outcome</th>
<th>MV Duration &lt;12 h</th>
<th></th>
<th></th>
<th>MV Duration ≥12 h</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Daytime Extubation</td>
<td>Overnight Extubation</td>
<td>P Value</td>
<td>Daytime Extubation</td>
<td>Overnight Extubation</td>
<td>P Value</td>
</tr>
<tr>
<td>No. of matched patients</td>
<td>4518</td>
<td>4518</td>
<td>NA</td>
<td>5761</td>
<td>5761</td>
<td>NA</td>
</tr>
<tr>
<td>Reintubation, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever</td>
<td>5.6</td>
<td>5.9</td>
<td>.50</td>
<td>12.4</td>
<td>14.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Within 24 h</td>
<td>3.5</td>
<td>3.7</td>
<td>.65</td>
<td>7.6</td>
<td>9.8</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Within 48 h</td>
<td>4.5</td>
<td>4.5</td>
<td>.96</td>
<td>9.5</td>
<td>11.9</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Within 96 h</td>
<td>5.2</td>
<td>5.5</td>
<td>.48</td>
<td>11.3</td>
<td>13.6</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mortality, %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU</td>
<td>4.6</td>
<td>5.6</td>
<td>.03</td>
<td>6.1</td>
<td>11.2</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Hospital</td>
<td>7.0</td>
<td>8.3</td>
<td>.01</td>
<td>11.1</td>
<td>16.0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>LOS, median (IQR), d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICU</td>
<td>1.4 (0.9-2.5)</td>
<td>1.1 (0.8-2.3)</td>
<td>&lt;.001</td>
<td>4.9 (2.6-10.1)</td>
<td>4.9 (2.5-10.1)</td>
<td>.09</td>
</tr>
<tr>
<td>Hospital</td>
<td>7.0 (3.0-12.0)</td>
<td>7.0 (4.0-12.0)</td>
<td>.03</td>
<td>13.0 (7.0-23.0)</td>
<td>13.0 (7.0-23.5)</td>
<td>.51</td>
</tr>
</tbody>
</table>

Abbreviations: ICU, intensive care unit; IQR, interquartile range; LOS, length of stay; MV, mechanical ventilation; NA, not applicable.

Matching was available for 5761 of 5763 patients with overnight extubation for pairs with MV of less than 12 hours and for 3 patients with daytime extubation and 4 patients with overnight extubation for pairs with MV of at least 12 hours.
Cardiac Arrests Associated With Tracheal Intubations in PICUs: A Multicenter Cohort Study
Crit Care Med 2016

- > 5,000 patients in 25 PICUs
- 87 of 5,232 TIs (1.7%) were associated with a CA
- This is > 100x rate in OR
- 80 of 87 (92%) had at least one of four potentially actionable high-risk factors
  - oxygenation failure
  - Hemodynamic
  - History of difficult airway
  - Cardiac disease
- TIs by more highly trained providers (fellows or attendings vs residents) not lower risk of TI-associated CA
Increased Occurrence of Tracheal Intubation–Associated Events During Nights and Weekends in the PICU  

CCM Journal 2016

- > 5,000 patients in 25 PICUs
- 2,702 intubation courses (53%) during nights & weekends

### Status

<table>
<thead>
<tr>
<th>Outcome or Provider Condition</th>
<th>All Intubations (n = 5,096)</th>
<th>Nonemergent Intubations (n = 940)</th>
<th>Emergent Intubations (n = 4,156)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weekday (n = 2,394) (%)</td>
<td>Night and Weekend (n = 2,702) (%)</td>
<td>Weekday (n = 1,844) (%)</td>
</tr>
<tr>
<td>Outcomes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any TIAE&lt;sup&gt;a&lt;/sup&gt;</td>
<td>387 (16)</td>
<td>511 (19)</td>
<td>314 (17)</td>
</tr>
<tr>
<td>Severe TIAE</td>
<td>133 (6)</td>
<td>186 (7)</td>
<td>121 (7)</td>
</tr>
<tr>
<td>Nonsevere TIAE</td>
<td>285 (12)</td>
<td>367 (14)</td>
<td>219 (12)</td>
</tr>
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### Provider

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<tr>
<td>Attending present</td>
<td>2,197 (92)</td>
<td>2,279 (84)</td>
<td>1,682 (91)</td>
</tr>
<tr>
<td>Attending first attempt&lt;sup&gt;b&lt;/sup&gt;</td>
<td>260 (11)</td>
<td>316 (12)</td>
<td>233 (13)</td>
</tr>
<tr>
<td>Resident first attempt&lt;sup&gt;c&lt;/sup&gt;</td>
<td>432 (18)</td>
<td>592 (22)</td>
<td>322 (17)</td>
</tr>
</tbody>
</table>
Unplanned Extubations in Children: Impact on Hospital Cost and Length of Stay PCCM 2015

- Increased cost of $36,692/pt
- Increased length of stay (6.5 d/pt)
- Estimates based on 15% unplanned extubations
- What are the costs with reintubation? CA?
“After Hour Extubations: Final thoughts

• Extubation failure has been associated with longer intensive care unit (ICU) stays, increased rates of complications, and greater mortality
• Standard of care is different with “after hours” extubations
• Costs of failed extubations ($$$ & Lives) far outweigh savings
• Would you want your child to have an elective T & A at 2 A.M.? If not why elective extubation?
Day Time Team
After Hours
Glad You’re My Dad!

My dad is so great! He is 90 years old. My dad is really good at making my brother and being nice to us. I love to clean the car with him. His favorite sport is football. He loves to eat chicken. My dad is really smart! He knows how to spell words. I think my dad is special because he always helps me. I love my dad more than anything, even more than hugs. I think he is a hero because he goes to work and comes back. He is the best dad in the whole wide world!

Here is my SUPER dad.