Year in Review: Critical Care Medicine

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Why I Selected These Studies...

• High quality studies
• They answer a commonly encountered clinical question
• They move care from anecdote to evidence

Question 1:

What is the best way to ventilate patients with moderate to severe ARDS?
2 RCTS Evaluate High Frequency Oscillatory Ventilation in ARDS

- **OSCAR** – NEJM Feb 2013, Young et al
  - Multicenter RCT: 29 Centers, UK
  - Enrolled 795 patients, P/F < 200 for >2 days
  - Randomized to Low Tidal Volume vs. HFOV (R100)

- **OSCILLATE** Trial - NEJM Feb 2013, Ferguson et al
  - Multicenter RCT: 39 Centers, 5 Countries
  - Planned to enroll 1200 (stopped at 548)
  - Entry: new-onset ARDS with P/F < 200
  - Randomized to Low Tidal Volume vs. HFOV (3100B)

No Benefit, Potential Harm with HFOV in Moderate-Severe ARDS
Question 2:
Should I use low-tidal volume ventilation for all patients?

Background
- Strong evidence supports the use of lung-protective ventilation for patients with ARDS (NEJM 2000)

- HOWEVER, could patients benefit from lung-protective ventilation if they are at risk for ARDS? Might they benefit even if there is no clear risk factor for ARDS?

Association Between Use of Lung-Protective Ventilation With Lower Tidal Volumes and Clinical Outcomes Among Patients Without Acute Respiratory Distress Syndrome
A Meta-analysis

- Study Design
  - Meta-Analysis
    - 20 studies with a total of 2822 patients
    - Studies performed in the OR, MICU, SICU, NICU
    - Primary reason for intubation was schedule surgery
    - Included 15 RCTs, 5 were cross-sectional or cohort studies
    - Average Tidal Volume
      - Protective 6.45 ml/kg vs. Conventional 10.60 ml/kg (P<0.001)
    - Follow: 3hrs->10 days
    - Outcomes: Lung Injury, Mortality, Pulmonary Infection, Atelectasis
Question 2:

Should I use low-tidal volume ventilation for all patients?

Answer: Yes, unless there is a compelling contraindication.

Question 3:

Should I rush to start TPN on my patient who cannot tolerate enteral feeds?

Early versus Late Parenteral Nutrition in Critically Ill Adults

- Study Design
  - Randomized Multicenter Trial in Belgium
  - 4600 patients at nutritional risk who were not chronically malnourished
    - (majority were surgical patients)
  - Randomized to early (<48 h) vs. late (1 wk) TPN to meet nutritional needs in at risk patients
  - Compared guidelines in Europe (early) vs. N. America (late)
Early versus Late Parenteral Nutrition in Critically Ill Adults


<table>
<thead>
<tr>
<th>Data Point</th>
<th>Late-Initiation</th>
<th>Early-Initiation</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death at 90 Days</td>
<td>11.2%</td>
<td>11.2%</td>
<td>1.00</td>
</tr>
<tr>
<td>Discharge Alive from ICU within 8 days</td>
<td>75.2 %</td>
<td>71.7 %</td>
<td>0.007</td>
</tr>
<tr>
<td>Duration of ICU Stay (days)</td>
<td>3 (2-7)</td>
<td>4 (2-9)</td>
<td>0.02</td>
</tr>
<tr>
<td>Duration of hospital stay (median)</td>
<td>14 (9-27)</td>
<td>16 (9-29)</td>
<td>0.004</td>
</tr>
<tr>
<td>New Infection</td>
<td>22.8</td>
<td>26.2</td>
<td>0.008</td>
</tr>
<tr>
<td>Median duration of RRT (days)</td>
<td>7 (3-6)</td>
<td>10 (5-23)</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean total incremental health care cost</td>
<td>16,863</td>
<td>17,973</td>
<td>0.04</td>
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- Multicenter RCT in Australia/New Zealand
- Enrolled 1372 patients with relative contraindications to early enteral nutrition who were expected to be in the ICU > 2 days
- Randomized to standard practice vs. TPN w/in 24 hours of ICU admission
- Super Early TPN
Question 3:

Should I start TPN on my patient who can’t tolerate enteral feeds?

Answer: No need to provide super early or early TPN, but try to feed enterally as soon as possible

**Background**

- 1999 NEJM TRICC trial
  - Liberal Transfusion
    - Trigger Hb of 10 g/dl
    - Goal Hb 10-12 g/dl
  - Restrictive Transfusion
    - Trigger Hb 7 g/dl
    - Goal Hb 7-9 g/dl
- These patients were euvoletic
- ACTIVELY BLEEDING PATIENTS WERE EXCLUDED
- What do we do with actively bleeding patients?
Transfusion Strategies for Acute Upper Gastrointestinal Bleeding

- RCT single center in Spain
- Enrolled 921 patients with UGIB
- Randomized to:
  - Transfusion trigger of Hb 7 g/dl vs. 9 g/dl
  - Stratified by presence of cirrhosis
- Primary outcome was 45 day survival
- Secondary outcomes: further bleeding

Villanueva C et al. NEJM, 2013;368:11-21

<table>
<thead>
<tr>
<th></th>
<th>Restrictive</th>
<th>Liberal</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death at 45 Days</td>
<td>5%</td>
<td>9%</td>
<td>0.02</td>
</tr>
<tr>
<td>Further Bleeding</td>
<td>10%</td>
<td>16%</td>
<td>0.01</td>
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<tr>
<td>Number of days in hospital</td>
<td>9.6</td>
<td>11.5</td>
<td>0.01</td>
</tr>
<tr>
<td>Adverse events (any)</td>
<td>40%</td>
<td>48%</td>
<td>0.02</td>
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<tr>
<td>Transfusion associated cardiac overload</td>
<td>&lt;1</td>
<td>4</td>
<td>0.001</td>
</tr>
<tr>
<td>Cardiac Complications</td>
<td>11%</td>
<td>16%</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Question 4:
In actively bleeding patients, what is a reasonable transfusion threshold?

Answer:
FOR UPPER GIB
Utilize a threshold of Hb < 7

Transfusion Strategies for Acute Upper Gastrointestinal Bleeding

Trigger = Hb <7

Trigger = Hb <9

Villanueva C et al. NEJM, 2013;368:11-21
Based on these 6 papers...

- HFOV should be eliminated from the treatment algorithm for moderate-severe ARDS
- Lung protective ventilation can be widely employed in the ICU
- Initiation of TPN in patients who are at nutritional risk can be “delayed”
- In actively bleeding patients with UGIB a transfusion trigger of Hb < 7 can be used

Questions?