A + B = Intubation and Chest Tube

*Can we make it safer?*

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We all say we do it...

Repeatedly:

- Primary survey
- Skills session
  - Animal labs, mannequin, other simulation
- Exam

Maybe we don’t need a refresher.
So why the gaps in application?

• Infrequent procedures
  • Individual providers
  • Institutional teams
• Safety concerns
• Discomfort
How do we get comfortable being uncomfortable?

- Preparation/Standardization
- Equipment
- Checklists
- Additional Training
- Telemedicine
- Cognitive Aids
Case

• 27 year old male
• Head on collision

• Blood in airway
• GCS 7
• SpO2 88% on 15 L NRB

Time for a plan?
Standardization

- Medication boxes
- Protocols/PMGs
- Equipment standardization
- Preassigned jobs
- Trauma Team Practice

Routine → Safer practices
Can we make it safer?

Checklists

• Standardized, team effort
• Routine – do it out loud every time
• Permanently attached to the airway cart
A Preprocedural Checklist Improves the Safety of Emergency Department Intubation of Trauma Patients

Kurt A. Smith, MD, Kevin High, RN, MPH, Sean P. Collins, MD, MSc, and Wesley H. Self, MD, MPH

- Before and after study
- Intubation complications reduced from 9.2% to 1.5%
- Faster paralysis to tube time
- Better safety measure adherence
Simple and no cost.

Data Supplement 1. A standardized pre-procedural checklist for intubating trauma patients.

The checklist has two components: 1) pre-arrival checklist to be completed before the patient arrives in the resuscitation bay, and 2) pre-induction checklist to be completed after the decision to intubate and before rapid sequence intubation medications are administered.

1) Pre-Arrival Checklist

<table>
<thead>
<tr>
<th>All items must be verbalized by physician responsible for intubation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oxygen mask and nasal cannula available and connected to oxygen</td>
</tr>
<tr>
<td>2. Oral airway available</td>
</tr>
<tr>
<td>3. Suction available and running</td>
</tr>
<tr>
<td>4. Laryngoscope blade and handle available and functional</td>
</tr>
<tr>
<td>5. Tube/stylet available and shaped appropriately</td>
</tr>
<tr>
<td>6. Extra tubes and stylet available</td>
</tr>
<tr>
<td>7. Bougie available</td>
</tr>
<tr>
<td>8. Backup devices available (including laryngeal mask airway, King Airway System, cricothyrotomy kit)</td>
</tr>
<tr>
<td>9. Monitors and video laryngoscope screen positioned appropriately</td>
</tr>
<tr>
<td>10. Bag-valve mask with ETCO\textsubscript{2} attachment available</td>
</tr>
<tr>
<td>11. IV fluid available</td>
</tr>
<tr>
<td>12. Individual designated to hold cervical spine stabilization</td>
</tr>
<tr>
<td>13. Airway plan verbalized</td>
</tr>
</tbody>
</table>

2) Pre-Induction Checklist

<table>
<thead>
<tr>
<th>All items must be verbalized by the Nurse Scribe and confirmed by the physician responsible for intubation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-arrival checklist completed</td>
</tr>
<tr>
<td>2. Airway plan confirmed between Trauma and ED attending physicians</td>
</tr>
<tr>
<td>3. IV line functioning</td>
</tr>
<tr>
<td>4. Rapid sequence intubation medication and doses confirmed and drawn up</td>
</tr>
<tr>
<td>5. Cervical spine inline stabilization initiated (if necessary)</td>
</tr>
<tr>
<td>6. Pre-oxygenation underway with mask at 15 liters/min and nasal cannula at 5 liters/min</td>
</tr>
<tr>
<td>7. Patient positioning optimized</td>
</tr>
<tr>
<td>8. Blood pressure cuff placed on opposite arm of IV line and pulse oximetry probe</td>
</tr>
</tbody>
</table>
• Staff, trainees, med students
• Templates and checklists
• Improvements in intubation times with elimination of errors/omissions
Cognitive aids + Checklists

Table 2: Errors of omission, combined errors of omission and using, and time taken for emergency airway preparation by study group.

<table>
<thead>
<tr>
<th></th>
<th>Errors of omission (%)</th>
<th>Error of omission and using (%)</th>
<th>Median time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checklist</td>
<td>10 [5-15]</td>
<td>&lt;0.05</td>
<td>15 [10-30]</td>
</tr>
<tr>
<td>Template</td>
<td>10 [5-20]</td>
<td>&lt;0.05</td>
<td>15 [10-30]</td>
</tr>
</tbody>
</table>

*p-values were calculated by comparing the checklist or template group with the control group.

Conclusion

Standardised airway equipment preparation using a cognitive aid may make emergency intubation a safer procedure. Further studies might examine the impact of standardised preparation on patient-centred outcomes.
Equipment

Video Laryngoscopes

Improved success in difficult airways

Team participation

Becoming the standard

LMA

Laryngeal mask airway as a rescue device for failed endotracheal intubation during scene-to-hospital air transport of combat casualties

Itai Shavit\textsuperscript{a}, Eliad Aviram\textsuperscript{b}, Yoav Hoffmann\textsuperscript{c.d}, Oded Biton\textsuperscript{b} and Elon Glassberg\textsuperscript{b,d,e}

Conclusion The findings of this study suggest that in the event of failed ETI, combat casualties can be treated effectively with LMA during a short scene-to-hospital transport time. *European Journal of Emergency Medicine* 25:366–371 Copyright © 2018 Wolters Kluwer Health, Inc. All rights reserved.

Case: Now he’s intubated

27 year old male MVC

• Following successful intubation, the patient now develops hypotension, SQ emphysema, and has absent breath sounds on the left.
Chest trauma

• 25% of trauma deaths are due to thoracic injuries

• Most thoracic injuries requiring intervention are treated with a chest tube

• Tension pneumothorax:
  • Requires timely intervention
  • Clinical diagnosis
Chest tube training gaps

Chest tube complications: How well are we training our residents?

Chad G. Ball, MD; Jason Lord, MD; Kevin B. Laupland, MD; Scott Grmara, MD; Robert H. Mullay, MD; Alex K. Ng, MD; Colin Schleman, MD; Andrew W. Kirkpatrick, MD

How do we make it safer?

- Telemedicine
- Additional training
  - Skills labs
  - Mobile sim units
  - Direct mentorship
- Transport team availability
  - Flight nurses and medics are trained and validated regularly
Cognitive tools

RCT 128 trainees

- 69% had no live experience
- Improvements in objective safety technique with brief video on a tablet/mobile device
Cognitive tools

Fig. 1 – Screen shot of the chest tube mobile learning module.

Fig. 5 – Chest tube insertion scores as stratified by experience placing chest tubes on human patients (includes all subjects).
Future Directions

• Outreach:
  • Checklists
  • Medication cards/dosing
  • Videos and other cognitive tools

• Simulation and more standardized training

• Education: RTTDC, ATLS

• Facility driven standardization
  • Provider variance
  • Equipment
Questions?