“A” IS FOR...
Aims

1. Review current airway thinking
   - Algorithms
   - “Difficult” airway
   - How not to @#$% it up

2. A rant
Disclaimer

1. Be cautious using what I am about to say
   ...in exams or in real life

2. I have no objection to anaesthetists per se
   ...just don’t think they have a role in ED

3. I have no financial interests of any sort
   ...if I did, I wouldn’t be working in a shithole like this
Problems

• Algorithms
  – Too complicated and not ED-specific
• Faith in prediction of difficulty
• Inadequate approach to safe apnoea time
• Crappy laryngoscopy
• Too many rescue choices; deployed too late
ED airways are different

• They are urgent

  • Usually for airway +/- breathing failure
    – Has to happen NOW
    – If you can do a Mallampati, you probably don’t need intubation!

  – Alternatives work poorly in time available
Emergency Airways

Feasibility of airway assessment

Feasibility of awake techniques

High
Low

High
Low

Need for immediate airway

Where we practice...
ASA Algorithm

1. Assess the likelihood and clinical impact of basic management problems:
   A. Difficult Ventilation
   B. Difficult Intubation
   C. Difficulty with Patient Cooperation or Consent
   D. Difficult Tracheostomy

2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.

3. Consider the relative merits and feasibility of basic management choices:
   A. Awake Intubation vs. Intubation Attempts After Induction of General Anesthesia
   B. Non-Invasive Techniques for Initial Approach to Intubation vs. Invasive Technique for Initial Approach to Intubation
   C. Preservation of Spontaneous Ventilation vs. Ablation of Spontaneous Ventilation

4. Develop primary and alternative strategies:
   A. AWAKE INTUBATION
      - Airway Approached by Non-Invasive Intubation
      - Invasive Airway Access
      - Success vs. Failure
      - Cancel Case vs. Consider Feasibility of Other Options
   B. INTUBATION ATTEMPTS AFTER INDUCTION OF GENERAL ANESTHESIA
      - Initial Intubation Attempts Successful
      - Initial Intubation Attempts UNSUCCESSFUL
      - From this point onwards consider:
        1. Calling for Help
        2. Returning to Spontaneous Ventilation
        3. Awakening the Patient

   - Face Mask Ventilation Adequate
   - Face Mask Ventilation NOT Adequate
     - Consider / Attempt LMA
     - LMA Adequate
     - LMA NOT Adequate

- Designed for OR
- Not emergency
- Return to spontaneous ventilation
- Awaken the patient

Difficulty with patient cooperation
Airway screening in ED

  - 944 cases
    - 53% couldn’t follow simple command; 44% in collar
    - Less than a third able to have standard difficulty assessment
    - 3 RSI failures, no deaths

  - 366 patients
    - Used “LEON” (LEMON without Mallapati
    - Found only the thyroid-to-hyoid < 2 fingers predicted difficulty

- Reed et al, Eur J Emerg Med, 2004
  - 100 patients
    - Found only Look, Obstruction & Neck mobility useful
...same in Gas Land


“...we believe that attempts at prediction are much less important than knowing what to do when difficulty is encountered...the clinical value of these bedside screening tests for predicting difficult intubation remains limited.”
Screening tests designed to have high sensitivity but RSI failure is rare (figures rubbery)

High sensitivity + low prevalence = poor PPV
Most “positives” are false positives

How many times have you “called anaesthetics”?

And where will you be working when you’re grown up?
So...

• Difficulty screening is poorly applicable in ED
• Even if it is applicable has poor S/S/N/P
• And what are you gonna do anyway??!

Better to focus on what you’ll do...
Solutions

• ED-appropriate assessment & algorithms

• Meticulous preparation

• *Proper* laryngoscopy

• Plan B (and C & D...)...deployed automatically
Own the Airway
ED-appropriate assessment & algorithms

...to some extent it’s an “eyeball”

(Use *The Force*)
Is the oral route impossible?

Is there a laryngo-tracheal problem?

Is it clearly a difficult laryngoscopy?
Is the oral route impossible?
→ fiberoptic nasal or surgical
Is there a laryngo-tracheal problem?

→ fibreoptic or tracheostomy
Is it likely to be a difficult laryngoscopy?
→ optimise Plan A, prep Plan B & C...
Preparation

Oxygenation

Positioning
Pre-oxygenation

100...99...97...94...86...boop boop boop...
Apnoeic Oxygenation

  - Pharyngeal O2 during apnoea adds 3 minutes

  - 30 patients, BMI 31+, half with O2 by NP in apnoea
  - spO2 >95: 5.3 min versus 3.5 min

- Taha et al, *Anaesthesia*, 2006
  - 30 Patients, half with O2 by NP in apnoea
  - Control sats < 95 in mean 3.6 min
  - NP O2 group 100% to 6 min

**Table 1. Duration of Apnea (i.e., Time from Cessation of Ventilation Until Either (1) SaO2 fell to 92%, or (2) 10 Min had Elapsed) and Minimum Observed SaO2 With and Without Pharyngeal Oxygen Insufflation. Values are Means ± SE**

<table>
<thead>
<tr>
<th></th>
<th>O2 Insufflation</th>
<th>No O2 Insufflation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First trial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of apnea</td>
<td>10.0 ± 0</td>
<td>7.1 ± 0.6*</td>
</tr>
<tr>
<td>Minimum SaO2 (%)</td>
<td>98 ± 1</td>
<td>92 ± 1*</td>
</tr>
<tr>
<td>Pre-apnea SaO2 (%)</td>
<td>99 ± 1</td>
<td>99 ± 1</td>
</tr>
<tr>
<td>Pre-apnea FET-O2 (%)</td>
<td>87 ± 1</td>
<td>88 ± 2</td>
</tr>
<tr>
<td>Pre-apnea PET-CO2 (mmHg)</td>
<td>26 ± 2</td>
<td>22 ± 2</td>
</tr>
<tr>
<td>N</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

| **Second trial**     |                 |                     |
| Duration of apnea    | 10.0 ± 0        | 6.6 ± 0.9*          |
| Minimum SaO2 (%)     | 99 ± 1          | 91 ± 1*             |
| Pre-apnea SaO2 (%)   | 99 ± 1          | 99 ± 1              |
| Pre-apnea FET-O2 (%) | 90 ± 1          | 92 ± 1              |
| Pre-apnea PET-CO2 (mmHg) | 27 ± 1   | 28 ± 2             |
| N                   | 6               | 6                   |

| **Combined**         |                 |                     |
| Duration of apnea    | 10.0 ± 0        | 6.8 ± 0.6†          |
| Minimum SaO2 (%)     | 98 ± 1          | 91 ± 1†             |
| Pre-apnea SaO2 (%)   | 99 ± 1          | 99 ± 1              |
| Pre-apnea FET-O2 (%) | 88 ± 1          | 90 ± 1              |
| Pre-apnea PET-CO2 (mmHg) | 27 ± 1   | 25 ± 1             |
| N                   | 12              | 12                  |

* P < 0.01 compared with oxygen insufflation (same trial).
† P < 0.001 compared with oxygen insufflation.
Apnoeic Oxygenation
So...

- Add NP 5L/min in pre-oxygenation
- Crank it to 10-15 L/min in apnoea

- It costs little
- Probably buys time...evidence is accumulating
Positioning

Ear-to-sternal notch
Face parallel to ceiling
External auditory meatus–sternal notch relationship in adults in the sniffing position: a magnetic resonance imaging study


A: External auditory meatus
B: Clivus
C: Nasopharynx
D: Glottis
E: Sternal notch
Big in Big People, too!

  - 100 extra seconds to drop < 95% in head-up group

- Lane, *Anaesthesia*, 2005
  - 100 extra seconds to drop < 95% in head-up group
Neck stuff

Cricoid
ELM
“Bimanual laryngoscopy”
Cricoid Pressure

• Is on it’s way out

  – Poor evidence that it does any good
    • Never validated; aspiration occurs with/without
    • Universally performed inadequately
    • Tends to displace (not occlude) oesophagus

  – Good evidence it causes problems
    • Difficult BVM
    • Poor laryngoscopic views

  – Now demoted in guidelines

• If you feel you must do it?
  • Abandon early & move to ELM if any problems
ELM


- View during laryngoscopy: Cricoid vs BURP vs bimanual laryngoscopy. 1500 events.

- POGO (% glottic opening)
  - Improved 25% with ELM (versus about 5%)
  - View often worse with BURP or cricoid
So...

- Ear-to-sternal notch
- Face parallel to ceiling
- ELM
- Skip cricoid
Optimal Laryngoscopy

Get it in 1\textsuperscript{st} time
Emergency Tracheal Intubation: Complications Associated with Repeat Laryngoscopy


2833 patients, 1 hospital, 10 years

<table>
<thead>
<tr>
<th>Complication</th>
<th>2 or less attempts</th>
<th>&gt;2 attempts</th>
<th>Relative risk &gt;2 attempts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoxemia</td>
<td>10.5%</td>
<td>70%</td>
<td>9X</td>
</tr>
<tr>
<td>Severe hypoxemia</td>
<td>1.9%</td>
<td>28%</td>
<td>14X</td>
</tr>
<tr>
<td>Esophageal intubation</td>
<td>4.8%</td>
<td>51.4%</td>
<td>6X</td>
</tr>
<tr>
<td>Regurgitation</td>
<td>1.9%</td>
<td>22%</td>
<td>7X</td>
</tr>
<tr>
<td>Aspiration</td>
<td>0.8%</td>
<td>13%</td>
<td>4X</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>1.6%</td>
<td>18.5%</td>
<td>4X</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>0.7%</td>
<td>11%</td>
<td>7X</td>
</tr>
</tbody>
</table>
**Epiglottoscopy...The difference between novices and experts?**

Delson NJ, et. al. Anesth Analg 2002; 94; S-123

**Novices:**
- 109 cm tip travel
- 36 sec time
- 3.4 Nm torque
- 63 N max force

**Experts**
- 52 cm tip travel
- 12 sec time
- 2.8 Nm torque
- 66 N max force
Epiglottoscopy
...not laryngoscopy

• Find the epiglottis
  – The only horizontal structure

• Slowly down tongue; midline

• Control the tongue
  – Keep right side open
Tube delivery

- Use a stylet (or bougie)
- Straight to cuff then 35°
- Keep tube below sight line
- Too much curvature =

  Mid-tube occupies sight line
  Minor rotation → big movement
  Tip catches on anterior rings
Tube delivery

• Can’t deliver?
  – “Hung up” on aryepiglottic folds
  – Turn to release “catch”
  – Direction depends on bevel direction
Epiglottoscopy
- face parallel to ceiling, roll blade down the tongue
- mid-line if necessary; beware of camouflage

Maximizing laryngeal exposure
- tongue control to open right side for tube delivery

- bimanual laryngoscopy
- increase head elevation if needed

Tube delivery - straight-to-cuff < 35 degrees
- Use right corner of mouth (right lateral dental arch)
- insert tube from behind maxilla
- come up from below line of sight, move tip over notch
- bougie - optical stylet for epiglottis only views
Failed Intubation

...a bad day at the office
Plan B

• Rescue devices

  – There are too many choices
    • Choose two weapons and work with them

  – Deployed too late
    • Don’t keep trying the primary parachute!
      – Algorithms should automatically deploy the reserve
Plan B

• Optical stylet

• LMA

• Optical stylet thru LMA?

• (Surgical)
Optical stylets

- Fibreoptics are tricky
- Lack of familiarity
- Goop is the enemy
- Clarus/Levitan vs Bonfils
Surgical Airways
...pink death?
Surgical Airways

- Seldinger/Melker
- Knife-bougie-tube
- Trach hooks & spreaders & nonsense...
...SO

- ED-appropriate assessment & algorithms
- NP pre-and-apnoeic oxygenation
- Ear-to-sternal notch, face parallel to ceiling
- ELM; Skip cricoid
- Use a stylet (or bougie)
- Straight to cuff then $35^0$
- Keep tube below sight line
- Think about your Plan B(s); deploy automatically
Questions?