RSI
A Successful RSI Program

- Requires understanding of:
  - Indications
  - Contraindications
  - Limitations

- Requires knowledge of:
  - Physiology
  - Pharmacology
  - Airway techniques
Goals of RSI

- Success rates comparable with in-hospital rates
- Limiting multiple (traumatic?) attempts
- Early recognition of misplaced ET tubes
- Avoidance of:
  - Hypoxia
  - Hyperventilation
  - Hypotension
Studies on RSI

- Multiple studies with inconsistent results

- Use in air medical programs appears to be successful
  - Better training?
  - Better medical control?

- Special case – “the head trauma patient”
  - Worse outcomes
  - Possibilities
    - Prolonged scene times
    - Event-related hypoxia
    - Post-event hyperventilation
Recommendations for a Successful Program

- Monitor the rate of success
- Pay attention to oxygenation
- Pay attention to post-intubation ventilation
- Monitor outcomes
RSI Training

- Lectures
  - RSI introduction & overview
  - RSI procedure & protocol
  - RSI drugs
  - Rescue devices

- Documentation & QA

- Multiple choice exam
Purpose

Some patients require a “definitive” airway due to respiratory distress

- Airway patency
- Ventilation
- Oxygenation

Options

- Airway manipulation
- Intubation
  - Endotracheal
  - Alternative adjunct (“rescue device”)
- Cricothyrotomy
Rapid Sequence Intubation

- Advantages of RSI
  - rapid control of the airway
  - minimizes risk of aspiration
  - highest success rates
  - lowest complication rates
  - optimal intubating conditions
  - adaptable to patient condition
Rapid Sequence Intubation

- Disadvantages
  - you assume complete responsibility for:
    - oxygenation
    - ventilation
    - airway patency
  - irreversible commitment
    - Burnt bridges?
  - adverse effects of medications
Airway Compromise

- Signs of threatened patency
  - stridor
  - snoring
  - gurgling
  - hoarseness
  - paradoxical chest wall movement
  - tracheal tugging
  - airway edema
Airway Compromise

- Contributing factors
  - altered mental status
  - facial & neck injuries
  - co-morbid illnesses

Anything that jeopardizes airway protection!
Indications

- RSI may be considered in any patient that requires urgent or emergent endotracheal intubation BUT shows evidence of incomplete relaxation, or a patient who demonstrates a high probability of airway compromise during transport.

  - This includes:
    - Hypoventilation (or ineffective ventilation)
    - Impending respiratory failure or airway obstruction
    - Depressed level of consciousness
    - Combativeness in a seriously injured or ill patient who cannot be otherwise managed without serious risk of injury to patient or crew
Absolute Contraindications

- Anticipated difficulty ventilating with BVM
- Suspected hyperkalemia
- Known neuromuscular disease
- Age < 18 years
- Actively entrapped patients with inadequate access to airway
- Unstable or dangerous environment
Relative Contraindications

- Severe upper airway trauma
- Stridor or upper airway obstruction
- Morbid obesity
- Penetrating eye injuries
- Renal failure
- History of malignant hyperthermia
- Small mouth, large tongue, or short neck
Rapid Sequence Intubation

- The 7 P’s of RSI
  - P reparation
  - P reoxygeonation
  - P retreatment
  - P ut down & P analysis
  - P rotection
  - P lacement
  - P ost-intubation management
Preparation

- Assess airway difficulty
  - LEMON
- Plan your approach
- Assemble drugs & equipment
  - Have your rescue device handy
- Establish IV access & initiate fluid bolus
- Establish monitoring
Preparation

- **LEMON** *(Difficult to intubate)*
  - Look externally
  - Evaluate 3–3–2 (number of fingerbreadths)
    - opening of mouth
    - chin to hyoid
    - floor of mouth to thyroid
  - Mallampati
  - Obstruction?
  - Neck mobility
Preoxygenation

- 100% oxygen for 3-5 minutes or...
- 8 vital capacity breaths
- Provides essential apnea time by causing a “nitrogen washout”
Pretreatment

- Multiple drugs used in different situations
- Lidocaine will be the only one needed in prehospital RSI
Lidocaine

- **Indication**
  - to suppress the cough reflex
  - to prevent increase in ICP in head injured patients

- **Evidence**
  - no high quality evidence to show efficacy

- **Conclusion**
  - no good argument for consistent use
  - still widely done during RSI

- **Dose**
  - 1 mg/kg IV
Put Down

- Induction of anesthesia/sedation

- Choices
  - etomidate
  - ketamine
  - versed
Etomidate

Amidate®

- Non-barbituate sedative/hypnotic
- Very little effect on CV hemodynamics
  - safe for “sick” patients
  - some decrease in ICP w/o affecting CPP
- Dose = 0.3 mg/kg IV
- Myoclonus reported but significance?
- Transient adrenocortical depression
  - “probably” not clinically significant
Paralysis

- Types of drugs used
  - Depolarizing neuromuscular blocker
  - Non-depolarizing neuromuscular blocker

- Action
  - Blocks transmission of acetylcholine at motor endplate
  - Prevents muscular contraction
Paralysis

- Neuromuscular blockers
  - depolarizing
    - succinylcholine *Anectine®*
  - non-depolarizing
    - vecuronium *Norcuron®*
    - pancuronium *Pavulon®*
    - rocuronium *Zemuron®*
Succinylcholine

Anectine®

- Only depolarizing NMB
  - saturates acetylcholine receptors, causing persistent depolarization of motor endplate
  - deactivated by plasma cholinesterases

- Here comes dinner....
  - causes increase in gastric pressure
  - increase in fasciculations
  - increase in vomiting

- Take home message
  - give defasciculating dose of non-depolarizing NMB
Succinylcholine

Anectine®

- **Dose**
  - 1 – 1.5 mg/kg IV

- **Onset**
  - 60 seconds

- **Duration**
  - 5 – 10 minutes
Succinylcholine

- **Adverse effects**
  - hyperkalemia
  - muscle fasciculations, elevated IGP*
  - increased ICP*
  - increased IOP*
  - bradycardia, tachycardia
  - malignant hyperthermia
    - * avoidable with use of appropriate pretreatments
Succinylcholine

- Contraindications
  - hyperkalemia
  - neuromuscular disease
  - extensive burns / crush injuries
  - malignant hyperthermia
  - pseudocholinesterase deficiency
  - organophosphate poisoning
**Protection & Placement**

- Prevention of aspiration
  - Sellick’s maneuver
  - “BURP”
    - Backwards – Upwards – Right - Pressure

- Placement (Intubation)
  - Sniffing position
  - Maintain in-line stabilization
  - Pass the tube
  - Confirm placement
Confirming Placement

- Absolutely essential in all cases

- “I think I saw the cords” – not good enough

- Options
  - direct laryngoscopy
  - chest auscultation
  - EtCO$_2$ detector
The Trauma Patient

» Head injury
  » concomitant neck injury
    » positioning
    » in-line stabilization

» desire to prevent increase in ICP
  » adequate pretreatment
  » avoid succinylcholine?
  » hyperventilation
The Trauma Patient

- Maxillofacial trauma
  - distorted anatomy / obstruction
    - suction
    - surgical airway
    - nasotracheal intubation
      - should NOT be attempted
The Trauma Patient

- Thoracic trauma
  - respiratory distress
    - don’t miss tension pneumothorax!

- Burns
  - warning signs
    - stridor / hoarseness
    - wheezing
    - carbonaceous sputum
Signs of Failure

- Bradycardia
  - Hypoxia

- Desaturation
  - Displaced tube
  - Obstruction
  - Pneumothorax
  - Equipment failure

- Hypotension
  - Pneumothorax
  - Auto-PEEP
  - Induction agents
Failed Intubation

- Take a deep breath
- Good BVM technique is a must
- Change your approach
- Consider alternative airway technique
- Call for help
Alternate Airway Management Techniques

- Airway manipulation & BVM ventilation
  - w/ or w/o adjunct

- Rescue device
  - Combitube
  - LMA
  - King LT

- Cricothyrotomy
Practical Thoughts

- Am I close to the hospital?
- Can the patient be adequately treated WITHOUT endotracheal intubation?
- Is the risk worth the procedure?
- Is there any disease state that I can treat to reverse the condition without intubation?
Documentation

- Indication for RSI
- ETT size
- O₂ saturation pre- & post-procedure
- Condition of airway during attempt
- Presence of bilateral breath sounds AND absence of epigastric sounds
- Method of confirmation of correct ETT placement
A Final Note

- RSI is **NOT** intended for patients who are uncooperative or intoxicated but have NO clinical indication for emergent intubation.

- RSI is not a procedure to do during transport; if the decision is made to perform RSI it should be done at the scene prior to transport.