EMET ED Airway Management RSI

Learning Objectives

- 1. You will understand the essential elements of RSI.
- 2. You will understand the Indications for RSI.
- 3. You will understand risk assessment for RSI.
- 4. You will be able to discuss the essential steps of the process for RSI.
- 5. You will understand basic ventilation strategies.

RSI – RAPID SEQUENCE INDUCTION

- RSI is an airway management technique that induces immediate unresponsiveness (induction agent) and paralysis (neuromuscular blocking agent) as the fastest and most effective means of placing an endotracheal tube.
- Avoidance of bag-mask ventilation minimizes the inflation of air into the stomach, which might otherwise provoke regurgitation and aspiration.



RSI Risk

• The cessation of spontaneous ventilation with paralysis involves considerable risk if the provider does not intubate and ventilate the patient in a timely manner.



- Complications of Tracheal Intubation/Ventilation include:
 - Oesophageal intubation (tube in wrong place)
 - Accidental extubation (tube fell out)
 - Endobronchial intubation (tube in too far)
 - High airway pressures (blowing the ventilator or bagging too hard!!)
 - Hypotension (several reasons usually too much drugs)

Indications for RSI

- 1. Obtain and maintain the airway (e.g. in the presence of an irreversible obstructed airway from any cause).
- **2. Correct** abnormalities of gas exchange i.e. maintain or improve oxygenation and ventilation.
- **3. Protect** the airway (e.g. against aspiration of gastric contents or blood).
- **4. Secure** the airway early in the face of predicted clinical deterioration (in one of the previous three situations).
- 5. Combative patient

Indications for RSI

Urgency

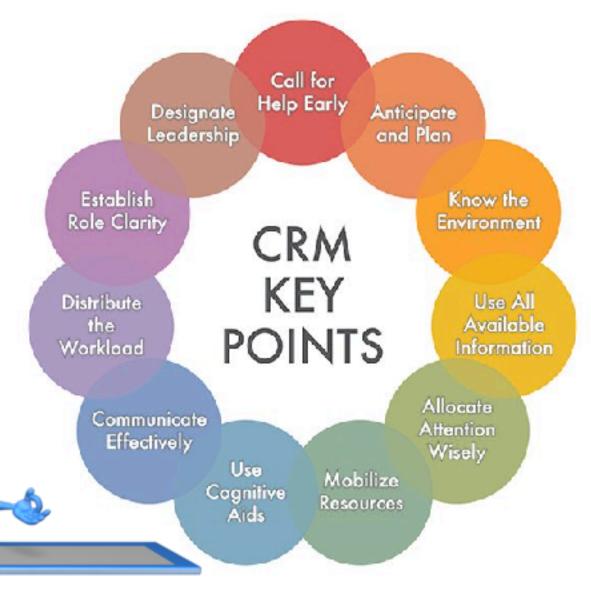
• "Indications" for RSI are rarely absolute, and the imperative to obtain a definitive airway will be determined by the acuity/urgency of the indication, balanced against patient (e.g. difficult anatomy/physiology) and provider (e.g. inexperience) factors.



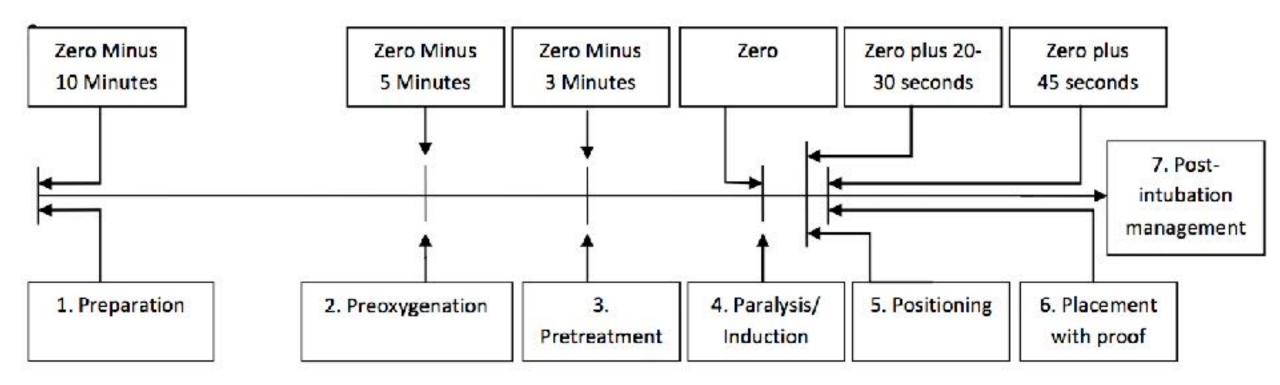
CRISIS RESOURCE MANAGEMENT

RSI Team

- There should be a minimum of 3 people: an airway proceduralist, an airway assistant and a drug administrator.
- Ideally the team leader should be free of the above roles, so they can devote their attention to monitoring the clinical situation

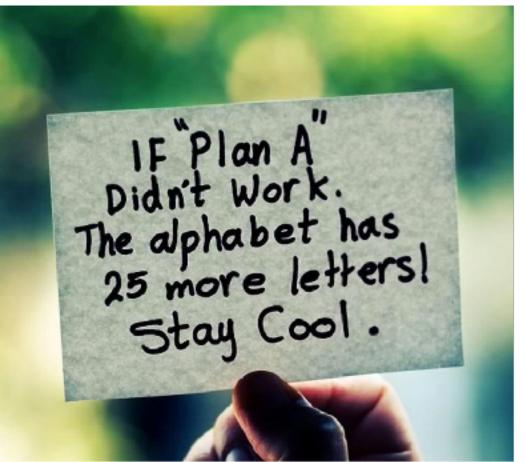


Process of RSI

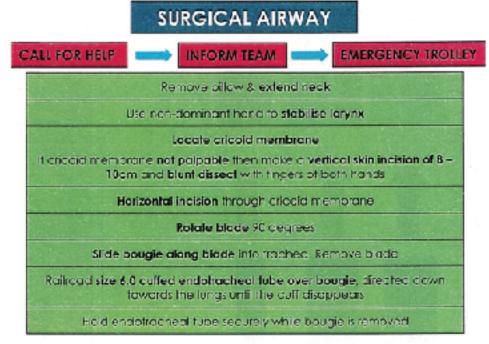


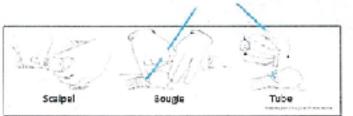
Preparation

- The goal is to maximise the chance of intubation on the first attempt.
- Failure to identify difficult intubation or ventilation is one of the main causes of failed airway management.
- Even in a normal looking airway, there must be a backup plan for unanticipated difficult airway management.
- The airway plan, including backup plans, need to be clearly articulated to the team.



Southern NSW Local Health District Airway Algorithm Most senior MO to perform Verify tracheal PLAN A Maximum 2 attempts in 2 mins Direct Re-oxygenate if SpO₂ < 90% Initial tracheal SUCCESS intubation laryngoscopy 2 person BVM + OPA + NPA intubation plan with EtCO₂ Call for help if PLAN A fails OR PLAN B Change technique / adjunct aids Verify tracheal Video Maximum 2 attempts in 2 mins Secondary tracheal intubation laryngoscopy Re-oxygenate if SpO₂ < 90% intubation plan with EtCO₂ PLAN C Maximum 2 attempts in 2 mins Get HELP Maintenance of LMA PLAN D if SpO₂ < 75% oxygenation / urgently ventilation PLAN D **Rescue techniques** for "Can't Intubate, Cricothyroidotomy Can't Ventilate" situation Scalpel Bougie Tube working have a second to the up of a Aeromedical Retrieval: Southcare Retrieval: NETS: Local Help:





Ventilation Guidelines*

- Commence FiO₂ 100% but wearing quickly to around 60% to aim for a SpD₂ of 90 95%
- Set tidal volume to 6ml/kg AND try to keep peak pressure below 35 cm HpC
- PEEP 5 cm initially
- Initial respiratory rate 16-20/min
- Once airway is secure ensure adequate analgesia and sedation and if vanilation remains difficult consider orgoing neuromuscular blockade to aid relexation
- If owgenation is not the primary reason for intubation, commence FiD₂ at 60% and titrate against SpO₂
- It is appropriate to allow hypercapitia to avoid excessive alrway pressures being used, except in head injury
- Beware the patient with a high respiratory rate and tidal volume pre-intubation (eg. severe DKA), where you need a high respiratory and increased tidal volume post intubation to replace the existing high minute volume (eg. 30 breaths/min and TV 10-15ml/kg).
- "ASTHMA require PEP = D as autoPEP often present, longer expiratory phase IS ratio of at least 14. RR 6 - 10 bpm
- CAUTION when ventilating patients with PNEUMOTHORAX

Out of Theatre Intubation Checklist – SNSWLHD

Complete for all intubations as part of the patient record

Team	Equipment	Prepare patient	Post intubation
Team Leader to clarify roles: Airway Proceduralist Airway assistant • External laryngeal manipulation • Drugs / circulation • Drugs / circulation • Scribe / monitoring • Manual in-line stabilisation required? (trauma patients) State airway plan: • Difficult airway likely? (see airway algorithm) Yes No	 Resus bag & mask with end-tidal CO₂, connect & zero Oro and nasopharyngeal airway & LMA available Prepare: Suction 2 ET tubes 2 laryngoscopes Bougie Check video- laryngoscope (charged & working) Oxylog or ventilator circuit 	 Optimise patient position, eg: 'ramping' for obese Ear to sternal notch Apply manual in-line stabilisation if indicated Commence effective mask pre-oxygenation 15L nasal oxygen (consider continuing NIV or using HFNC if available) 3 mins via NRB mask or at least 8 breaths via BVM Haemodynamics IV fluid bolus 	Verbally confirm ETT placement: EtCO ₂ monitoring Bilateral & symmetrical chest movement Bilateral air entry on auscultation Secure ETT – state length to teeth OGT / NGT (prior to CXI Ventilator settings confirmed
Plan B	(with HME & corrugated adaptor)	Blood products Vasopressor	CXR to confirm position
Plan C	D Allergies?	Patient Monitoring EtCO2	ABG attended
Plan D	Prepare relevant drugs (paralytic, sedation & vasopressors)	NiBP	Oxygenation maintaine



Intubation Record

For further assistance contact:

NETS:

Aercmedical Retrieval: 1800 650 004 Southcare Retrieval: 1300 873 711

1300 362 500

Date:

Medication administered

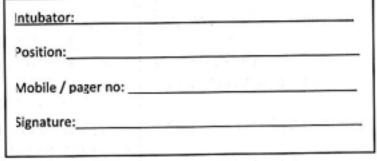
Medication	Route	Dose	Prescriber Signature + Print name	Given by	Time given
	CALIFORNIA PROFESSION	10,4580	THE TREE	er synattical	100.010
	ushin ba galafar	12552124			
and the second	en an These	104		2. 19.40 ····	

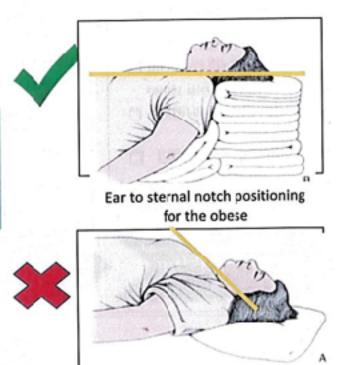
Type of induction:	Awake 🗆	RSI	[
Manual inline stabilisa	ation used? Yes		No		
Endctracheal tube:	Size at	cm	at te	eth / g	gums

irade I	Grade I	Grode III	Groce IZ
T.			\sim

Bougie Other:		McCoy blade		Video laryngoscopy	ilma	
	lifficu	It intubation etc	:):			

Patient ID





SNSW LHD: Out of Theatre Intubation Record V19

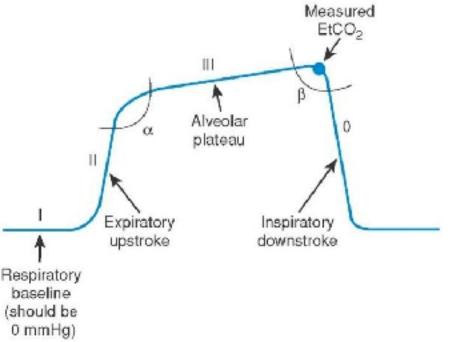
Please complete QARS cuuit & IAA COPY to TOLI JIOU

Preparation

- Suction at least one working suction, placed securely at head of bed
- Oxygen NRFM and BVM attached to 15 LPM of O2 with nasal prongs for apneic oxygenation
- Airways 7.0 ETT for smaller females, 8.0 for larger males, 7.5 for most patients. Lubed stylet in tube, straight to cuff and bent 35 degrees from proximal end of cuff.
- Pre-oxygenate the patient.
- Prepare equipment = check laryngoscope light and have backups ready (bougie, VL, LMA, surgical cric kit)

Preparation for RSI

- Monitoring Equipment cardiac monitor, sats, BP cuff opposite arm with IV
- Medications induction agent, paralytic, vasopressor drawn up. Patient bolused with crystalloid.
- End tidal CO2



Induction Agents

- Midazolam:
 - Dose: 0.3 mg/kg IV TBW
 - Onset 60 90 sec
 - Duration: 15 30 min
 - Use: not usually recommended for RSI
 - Drawbacks: respiratory depression, apnea, hypotension, paradoxical agitation, slow onset, variable response



Induction Agents

- Fentanyl
 - Short acting narcotic
 - 100mcg = 10mg morphine =75mg pethidine
 - 50-100mcg induction dose (less in elderly)
 - Cardiac depression if used with nitrous
 - May cause severe hypotension if used with beat or calcium channel blockers
 - Avoid with MAOIs



Induction Agents

- Ketamine:
 - Dose: 1-1.5 mg/kg IV (4 mg/kg IN
 - Onset: 60 90 sec
 - Duration: 10 20 min



- Especially in hemodynamically unstable, TBI, reactive airways disease (causes bronchodilation)
- Caution in CV diseases (HTN, tachycardia), laryngospasm rarely, raised intraocular pressure.

Induction Agent:

- Propofol:
 - Dose: 1.5 2.5 mg/kg TBW
 - ONSET: 15 45 secs
 - Duration: 5 10 min



- Use: haemodynamically stable patients, reactive airways disease, status epilepticus
- Drawbacks: hypotension, myocardial depression, reduced cerebral perfusion, pain on injection, variable response, very short acting.

Paralytic Agents

- Suxamethonium (succinylcholine):
 - Dose: 1.5 mg/kg IV and 4 mg/kg IM (in extremis)
 - Onset: 45 60 sec
 - Duration: 6 10 min
 - Use: widely used unless contraindicated
 - Drawbacks: hyperkalemia, malignant hyperthermia, bradycardia, fasciculations, elevated intra-ocular pressure.
 - N.B. Will not wear off fast enough to prevent harm in CICV situations



Paralytic Ager

- Rocuronium:
 - Dose: 1.2 mg/kg
 - Onset: 45 60 sec
 - Duration: 90 min



• Use: rocuronium appears to have longer safe apnoea times than suxamethonium and has no significant contraindications.

Preoxygenation

- Preoxygenation is the most important component of RSI, especially in a compromised patient.
- Patients who require RSI are often critically ill and will be at high risk of desaturation during induction/ intubation due to factors such as underlying lung pathology, reduced FRC, and high metabolic requirements.
- Ideally, all patients in the ED who require intubation should continue to receive high flow oxygen.

Risk Stratification

Risk category	PreO2 period	Onset of muscle relaxation	Apnoeic period during intubation
Low risk SpO ₂ 96–100%	NRB mask with max O ₂ flow rate	NRB mask and nasal O ₂ at 15L/min	Nasal O ₂ at 15L/min
High risk SpO ₂ 91–95%	NRB mask or CPAP or BVM with PEEP valve	NRB mask, CPAP, or BVM with PEEP and nasal O ₂ at 15L/min	Nasal O ₂ at 15L/min
Hypoxemic SpO ₂ <90%	CPAP or BVM with PEEP	CPAP or BVM with PEEP and nasal O ₂ at 15L/min	Nasal O ₂ at 15L/min

Weingart SD and Levitan RM: Ann Emerg Med 2011

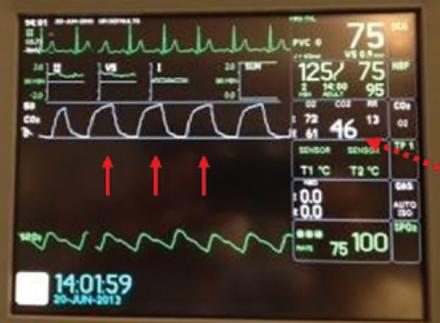
Pretreatment

- Most patients in the ED requiring intubation will benefit from a bolus of IV crystalloid.
- Traditionally, pretreatment included drugs such as atropine, lignocaine, fentanyl and a defasciculating dose of NMB. There is little evidence that any of these are beneficial clinically and they should not be a routine part of clinical practice.



Confirmation of successful intubation

- The most reliable affirmation of intubation is seeing the ETT tip Pass between the vocal cords.
- All endotracheal intubations must be confirmed with quantitative wave-form capnography.



Postintubation

- 1. Inflate cuff and remove stylet
- 2. Ensure the ETT is in the trachea at an appropriate depth.
- 3. BVM ventilation and check ETCO2. (Set up the ventilator)
- 4. Recheck vital signs. Post-intubation hypotension is common, and if significant, should be treated with intravenous fluid administration and vasopressor medications.
- 5. Secure the ETT.
- 6. CXR to locate the ETT tip in relation to the carina.
- 7. Paralysis may be initiated, or continued after intubation, if indicated.
- 8. Appropriate sedative-hypnotic and analgesia must be maintained.
- 9. ETT cuff pressure can be adjusted to a "minimum leak" position.

George Douros "Owning the Oxylog 3000" video

GUIDE FOR INITIAL SETTINGS FOR PRESSURE CONTROLLED VENTILATION FOR DRAEGER OXYLOG 3000 PLUS

Assumes patient is apposic from sedation & numed at 30° to minimise aspiration. Recommended for all UNITITED takes

	LUNG PROTECTIVE STRATEGY (all other periods)	ORSTRUCTIVE STRATEGY (Introductive/arthena)		
Made	PCDWA	PC SIMA		
vt	mar'l air set is PC aude, sne Roan	variable seller fill moder see Roop		
 see draw then there to normal 30.02/per 		(1/2 scena w) tes dust tres summe concerts converts interest states, Φ Φ 18 to further 20% permissive typeraphere (prP 2.2)		
President	Sty 12 alleves, Sellers instrument detand	212 (2 allowing production bracking		
HR	TOTALS CONSTRUCT AND A CONTRACT OF THE ADDR TOTAL AND ADDR ON TOTAL ADDR ON TOTAL ADDR	manmal > C_1 for 19/2, 18 43 N		
PEP	NP 1 1 1 3 2 2 1 0 N 3	s Wefsuiki		
Pins .	starter Mithen Sinte in VT (And/5g BAG) see chart	Mart at 20 threads are to VT (Area/og 204), one often		
18	1.1.5 (default)	21.4		
1kpr	Lindards	File for approxy few rate)		
Other	Trigh 2005 south in § 92, goal tools & incompanious paying Bill as per when The southerna, and the patient activities, take contraction, in when is assigned when the REFERENCE ADDRESS AND ADDRESS AND ADDRESS ADDRE	todata www.publicongping.com/syste if 4-4gr- estimate anyonizing, discussion rule & allow to except installation anyonizing fillum, element advects for perform advection field the same perform table for table for Adda MARGUNE model table for a performance and table for table model table.com/stable performance model table performance model table performance model table performance model table model table model table model table model table model model		

Further medifications depends on hourly ADGs and helemodysemics

App/ IEW	RR (clastructive RR)	VT (6mi/kg)	Systolic BP
Tem/35a	40-63113-120	20m	E 20
) months/ skg	00-60(10-10)	30m	2 10
5 menths/ Sig	30-30110-130	45m	2.50
Type://tilig	3040(10-15)	60m	4.65
2 years/ Like	23.82 7.91	78m	g 48.
Streamy Ling	20(5)	926	5.10
a reasony strategy	39.01	320#1	2.05
Breamy ISkg	34 (3)	250mi	2.10
ingent/idig	36()}	and in the second	2.45
12 years/140kg	14 (5)	340m1	2.95
higeway/Adlig	36 (5)	300m3	X.M
Types / 20g	14 (73	400m1	8.00

Other patients ii.e. modifications from LUNG PROCTECTIVE STRATEGY.

- HEAD INSURVE too much FEEP can \$#P and thus \$ personal perfusion pressure. PEEP-Sydebult, is Ob. 50° head up. Aim for low-roomal CO.
- METABOLIC ACIDOSIS: FIT + patient achieved, ETCU, < petient achieved, Lighton pedacien to allow patient to add. additional breachs as received-add pressure support (drapp=1), Trigger-2, to there breaths as patient thed.

If patient is crashing

- Take the ventilator out of the equation-bag the patient to feel how they are to ventilate.
- · Check the tube-displaced/dislodged/obstructed
- Check the patient- pneumothorax-bedside US/COI and needle/finger thoracostomy
- Check the ventilator

GUIDE FOR INITIAL SETTINGS FOR VOLUME CONTROLLED VENTILATION FOR DRAEGER OXYLOG 3000 PLUS

	(all other patients + Sys II earlies table)	(asthma/CUPU if other tax)		
Mode	SIMV (Sigburd)	inury polytoxy		
. yr	doil/Sgildeal tooly satight-see chart	Briddy ideal body weight- see chart		
	LE-LE breathainin than titrata to normal oB3-fail.	6-8 bearts, into the exercise DPNHTOFF Redw DATWES. If broads visions, #100 beins 4 bearths/rein(permissive hypertegenese (pro 2.5)		
Branghalor m/	gald ff alsoning period instruments ballough	più ji simm, joine temestes teinuj		
HQ)	1000 00 00 00 00 00 00 00 00 00 00 00 00	annun 21 1-01, für 14/01, 33 44 9.		
PEEP	746, 46 43 46 46 46 49 10 10 16 66 7427 3 8 8 8 22 22 27 27 12 18 14 24	8		
18	1-55 Stephends	284		
AUGORIAN DIN	Steet: Stolewill	Siege: J His fast implicitory flow rate)		
004	 If high Falls recurs in WeP, give fluids L waterook topping www.edi (in: paed only water, check that) If P_{man}shares, she with a patient agtistics (labor she with a in the theorem, perform Set (\$100 mics) (with the ini- she with 100 mics) (with the init of the theorem initial of the set (Set), it is followed (with the initial theorem). 	 ANDIA HAMA, ANDIA DARGANG SATURATION AND A SATURATION AND A SATURATION AND AND A SATURATION AND		

									anny 186au
VT assesser (And/Ag 8080)	379	214	. 190	140	681	\$15	140	#10	250
vi man (vini, kg tilm)	105	312	190	210	405	940	- 400	15/7	630

Other patients (La. modifications from EUNG PROCESCEIVE STRATEGY)

- ■EAD NURP: inc much PEP car 45P and thus 4 conduct participation pressure PEP-Stagiout() b 04. 30" need up. Arm fer lew hormal CD.
- MCIA6DUC ACIOCSIS: RF:> patient schieved, CICD₂ patient actieved. Lighter, redation to slice patient to add additional breache as weg, ined -add pressure support (deepp-10, "rigger-2) to these breache as patient deed.
- INTERFENSIVE ADC: Net DESINGD and registly Broke up while residy Broking I/ DDN for SEPy148.
- CARDIOGENICSHOCK photo high-level PEEP as can \$ 9P.
- PRECHANKY: left lateral position. TV: Smillig ideal bootware pht. RB 15-29bpm aim for low/normal pC0,5 hormal pill.

f petient is crisibing ...

- Take the ventilator out of the equation bag the patient to feel how they are to ventilate
- Check the tube- displaced/ dislodged/ obstructed
- Check the patient- pheumothorax -bedkide US/CXR and needle/finger thorepostomy.
- · Check the ventilator



Mode of Ventilation

- Pressure Control Ventilation (PC SIMV+)
 - i.e. Set pressure / Monitor Volumes
- Volume Control Ventilation (SIMV)
 - i.e. Set Volume / Monitor Pressures

Adjustables on the Ventilator

- Mode usually SIMV / sometimes PCV
- Tidal Volume (VT) (only in volume control)
- Respiratory (RR)
- FiO2
- PEEP
- P insp (only in pressure control mode)
- Pmax
- Slope/inspiratory flow rate -Patient Comfort

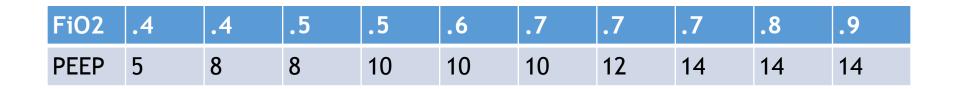
Ventilation Strategies

- Lung Protection Strategy
 - i.e. all patients that are not obstructive
- Obstructive Strategy
 - asthmatics

Lung Protection Strategy

- Mode Usually SIMV
- VT 6-8 ml/kg
- RR 16-18
- Pmax (< or =40)
- FiO2 and PEEP use peep table for stats 88-95%
- Pinsp (pressure control mode only start at 20)
- I:E Ratio 1:1.5 (default)
- Slope/inspiratory flow rate -*default*

Keep Saturations 88-95% using the PEEP Table

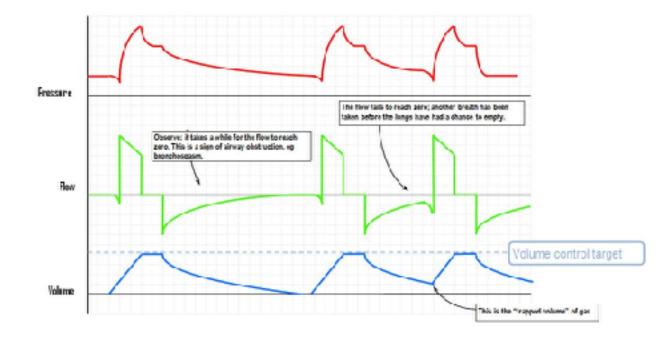


"the strategy helps keeps the alveoli just at the point where recruitment is maintained and avoids barotrauma"

Obstructive Strategy

- Mode Usually SIMV
- VT 6-8 ml/kg
- RR 6 10
- Pmax (< or =40)
- FiO2 to maintain sats of 88-95%
- Zero PEEP ("ZEEP")
- Pinsp (pressure control mode only start at 20)
- I:E Ratio 1:4 or 1:5
- Slope/inspiratory flow rate *fast*

- Look for gas trapping / auto peep / breath stacking
 - Watch flow waves
 - Check plateau pressure (if <30 not likely)



• IF PATIENT IS CRASHING.....

- TAKE OFF THE VENTILATOR AND HAND BAG
- CHECK TUBE
- CHECK PATIENT

.....then check ventilator

Summary

- 1. RSI offers the best chance of success for most airway challenges.
- 2. The indications and risks of RSI must be understood.
- 3. Proper preparation is the best way to reduce risk in RSI.
- 4. RSI is delivered by a team and CRM principles can optimize team performance in high risk situations.
- 5. Post intubation management is essential.

