



Stavanger Universitetssjukehus
Helse Stavanger HF

Intubasjon av intensivpasienter

Kristian Strand

Overlege PhD

Intensivavdelingen

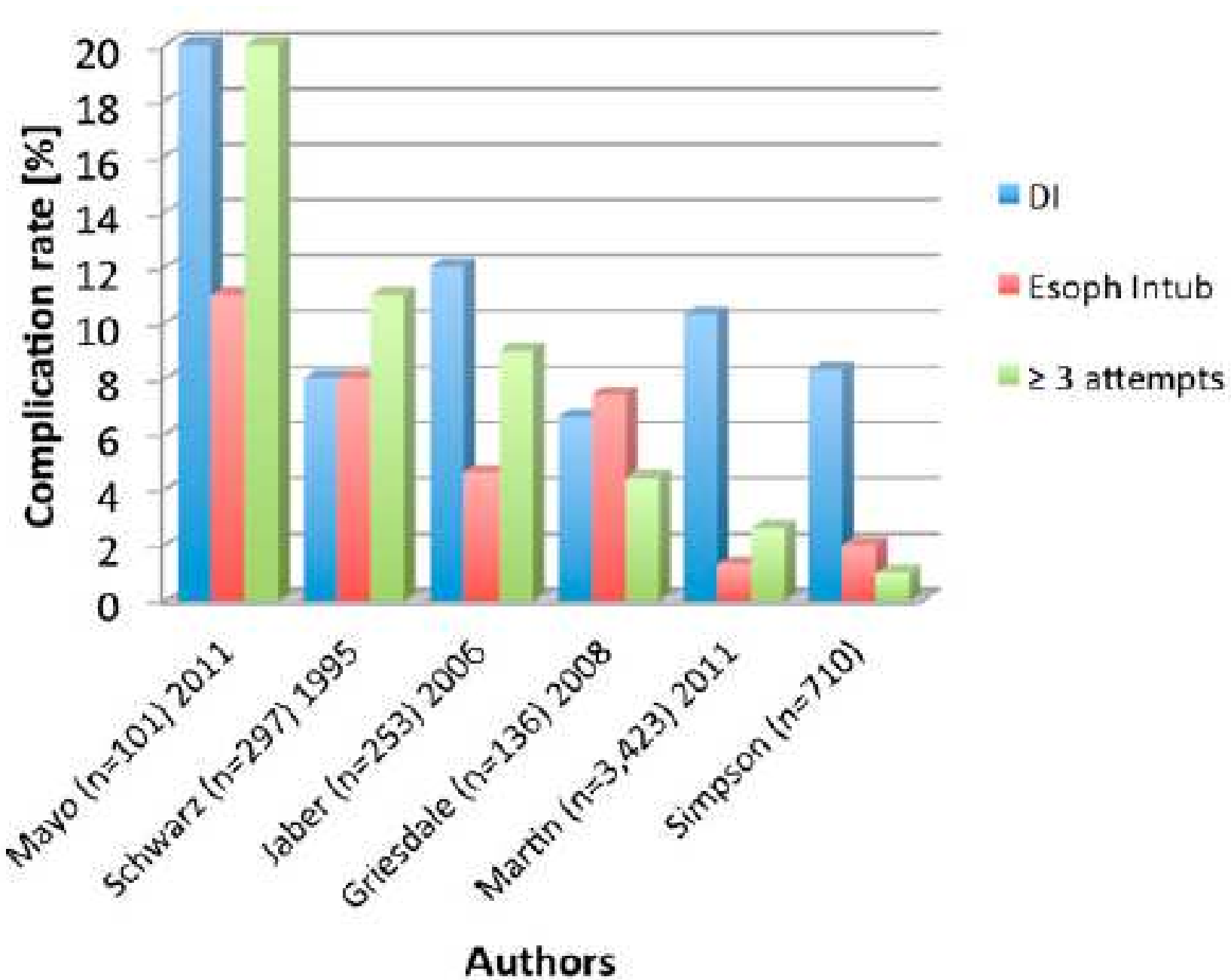
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Point: Should an Anesthesiologist Be the Specialist of Choice in Managing the Difficult Airway in the ICU? Yes

Counterpoint: Should an Anesthesiologist Be the Specialist of Choice in Managing the Difficult Airway in the ICU? Not Necessarily





Author/Year	Severe Hypoxemia (SpO ₂ < 80%), %	Severe Hypotension, %
Schwartz et al ¹⁵ /1995	NR	NR
Mort ⁹ /2004	4.7 (SpO ₂ < 70%)	NR
Jaber et al ¹¹ /2006	26	25
Griesdale et al ¹³ /2008	19.1	9.6
Mayo et al ⁷ /2011	14	6
Martin et al ⁸ /2011	NR	NR
Simpson et al ¹² /2012	22	10

	ICU (<i>n</i>=87)	ED (<i>n</i>=52)
Death	1 (1)	3 (6)
Non-fatal cardiac arrest	0	2 (4)
Significant hypoxaemia	12 (14)	3 (6)
Significant hypotension	23 (26)	6 (12)
Dysrhythmia requiring treatment	2 (2)	3 (6)
Challenging intubation	8 (9)	2 (4)
Oesophageal intubation	1 (1)	1 (2)
Aspiration of gastric contents	4 (5)	0
Dental injury	1 (1)	0
Dangerous agitation	2 (2)	0

Bowles TM, BJA, 2011

- **Hypoksi**
- **Hypotensjon**
- **Acidose**



Mål for intubasjon av kritisk syke

- Maksimere «first-pass» suksess
- Unngå hypoksi
- Unngå hypotensjon eller dysrytmi
- Unngå «awareness»



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Audrey De Jong, Nicolas Molinari, Nicolas Terzi, Nicolas Mongardon, Jean-Michel Arnal, Christophe Guitton, Bernard Allaouchiche, Catherine Paugam-Burtz, Jean-Michel Constantin, Jean-Yves Lefrant, Marc Leone, Laurent Papazian, Karim Asehnoune, Nicolas Maziers, Elie Azoulay, Gael Pradel, Boris Jung, Samir Jaber, and AzuRéa Network for the Frida-Réa Study Group "Early Identification of Patients at Risk for Difficult Intubation in the Intensive Care Unit", *American Journal of Respiratory and Critical Care Medicine*, Vol. 187, No. 8 (2013), pp. 832-839.

doi: [10.1164/rccm.201210-1851OC](https://doi.org/10.1164/rccm.201210-1851OC)

Early Identification of Patients at Risk for Difficult Intubation in the Intensive Care Unit

Development and Validation of the MACOCHA Score in a Multicenter Cohort Study



MACOCHA score calculation worksheet

	Points
<hr/>	
Factors related to patient	
Mallampati score III or IV	5
Obstructive apnea syndrome	2
Reduced mobility of cervical spine	1
Limited mouth opening <3 cm	1
Factors related to pathology	
Coma	1
Severe hypoxemia (<80%)	1
Factor related to operator	
Non-anaesthesiologist	1
Total	12

Cutoff ≥ 3
PPV 36%
NPV 98%



Kasus

- 66 år gammel kvinne med kjent KOLS gr 3 og pneumoni. Tilsett på MIO pga økende acidose på NIV. pH < 7,1. FiO2 0,4. Ekstremt obstruktiv. Totalt utslitt. Åpenbar intubasjonsindikasjon.
- I DIPS: Anført vanskelig intubasjon ved relativt uerfaren ass.lege ved tidligere narkose. McCormack-Lehane gr 3. Intubert vha Fast-Track og utstyrt med vanskelig luftveiskort.
- Hva nå?



Videolaryngoskopi?



Intensive Care Med. 2013 Dec;39(12):2144-52. doi: 10.1007/s00134-013-3099-1. Epub 2013 Sep 18.

Implementation of a combo videolaryngoscope for intubation in critically ill patients: a before-after comparative study.

De Jong A¹, Clavieras N, Conseil M, Coisel Y, Moury PH, Pouzeratte Y, Cisse M, Belafia F, Jung B, Chanques G, Molinari N, Jaber S.



Preoksygenering



Preoksygenering

Preoksygenering med NIV (oftest) bedre enn preoksygenering med Bag-Maske

CPAP ASB PEEP 5-10, Vt 6-8 ml/kg, FiO₂ 1,0

Behold masken på til pasienten slutter å puste evt kjevetak

Alternativt Bag-Maske med PEEP ventil

(NODESAT – peri-intubation high flow nasal oksygenation)



Forberedelser



Forberedelser - team

- Deltagere: Antall leger, sykepleiere? Erfaring, kompetanse?
- Briefing? Sjekkliste? Retningslinjer?
- Hvem har ansvar for hva?
- Simulering?



Forberedelser - utstyr

- Gå gjennom utstyret – sjekklister?
- Hva glemmer jeg? EtCO₂, sug, mandreng, cuff-sprøyte
- Velfungerende veneflon med pågående væskeinfusjon
- Pressor?
- Vanskelig luftveisbord?



<p>1</p>	<p>MEDIKAMENTER Trukket opp, kontrollert og merket</p> <p>Sedativa Analgetika Muskelrelaksantia Vasoaktive medikament ? Volum pågående Lokalanestesi spray</p>	<p>3</p>	<p>PASIENT / SENGEENHET</p> <p>Sug, sjekket Sugekateter i korrekt størrelse Stetoskop Lærdalsbag m/peep ventil og maske Monitorering (tilstrekkelig) Venøse tilganger (tilstrekkelig) Ventrikkel tømt Tannproteser fjernet</p>
<p>2</p>	<p>UTSTYR KLARGJORT</p> <p>Tube Mandreg Laryngoscop, sjekket Magils tang Svelgtube Capnograf Tubefikseringstape</p>	<p>4</p>	<p>TILGJENGELIG</p> <p>Akuttbord Glidescop Alternative tuber Alternative laryngoscopblad</p>

Medikamenter



Anaesthesia

Journal of the Association of Anaesthetists of Great Britain and Ireland

Anaesthesia, 2009, 64, pages 532–539

doi:10.1111/j.1365-2044.2008.05835.x

REVIEW ARTICLE

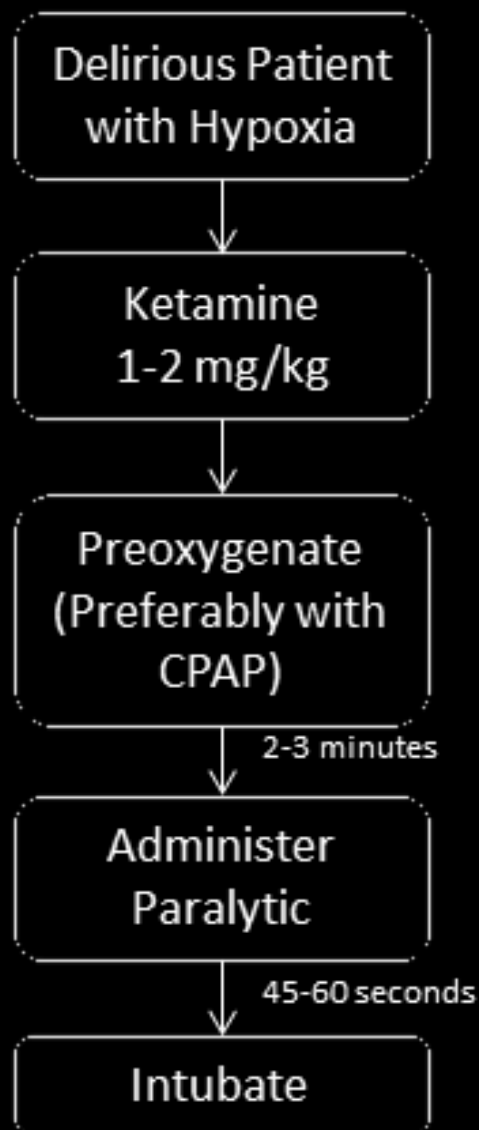
Anaesthesia in haemodynamically compromised emergency patients: does ketamine represent the best choice of induction agent?

C. Morris,¹ A. Perris,² J. Klein¹ and P. Mahoney³



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DELAYED SEQUENCE INTUBATION (DSI)



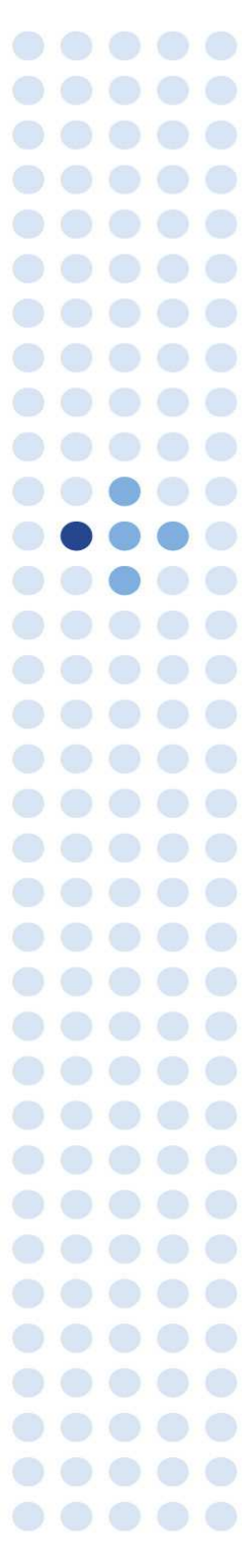
Muskelrelaksantia



Curacit 1 mg/kg

Esmeron 1,2-1,4 mg/kg





When you
can use

Succinylcholine

NEVER USE

(Causes K⁺ release)

Malignant Hyperthermia
Motor Neuron Disease
Muscular Dystrophies (e.g. Duchenne's)
Myotonic Dystrophy
Guillain Barré Syndrome
Severe Burns (After 24hrs)
Spinal cord damage (>1wk)
Old CVA with Residual Paresis

GIVE LESS

Organophosphates
Eaton-Lambert
Syndrome
Hypothyroidism

GIVE MORE

Myasthenia
Gravis
(Need more but lasts
longer)

NO PROBLEMO

Parkinson's Disease
Epilepsy
Acute CVA

Adapted from Oxy's Log





Samir Jaber
Boris Jung
Philippe Corne
Mustapha Sebbane
Laurent Muller
Gerald Chanques
Daniel Verzilli
Olivier Jonquet
Jean-Jacques Eledjam
Jean-Yves Lefrant

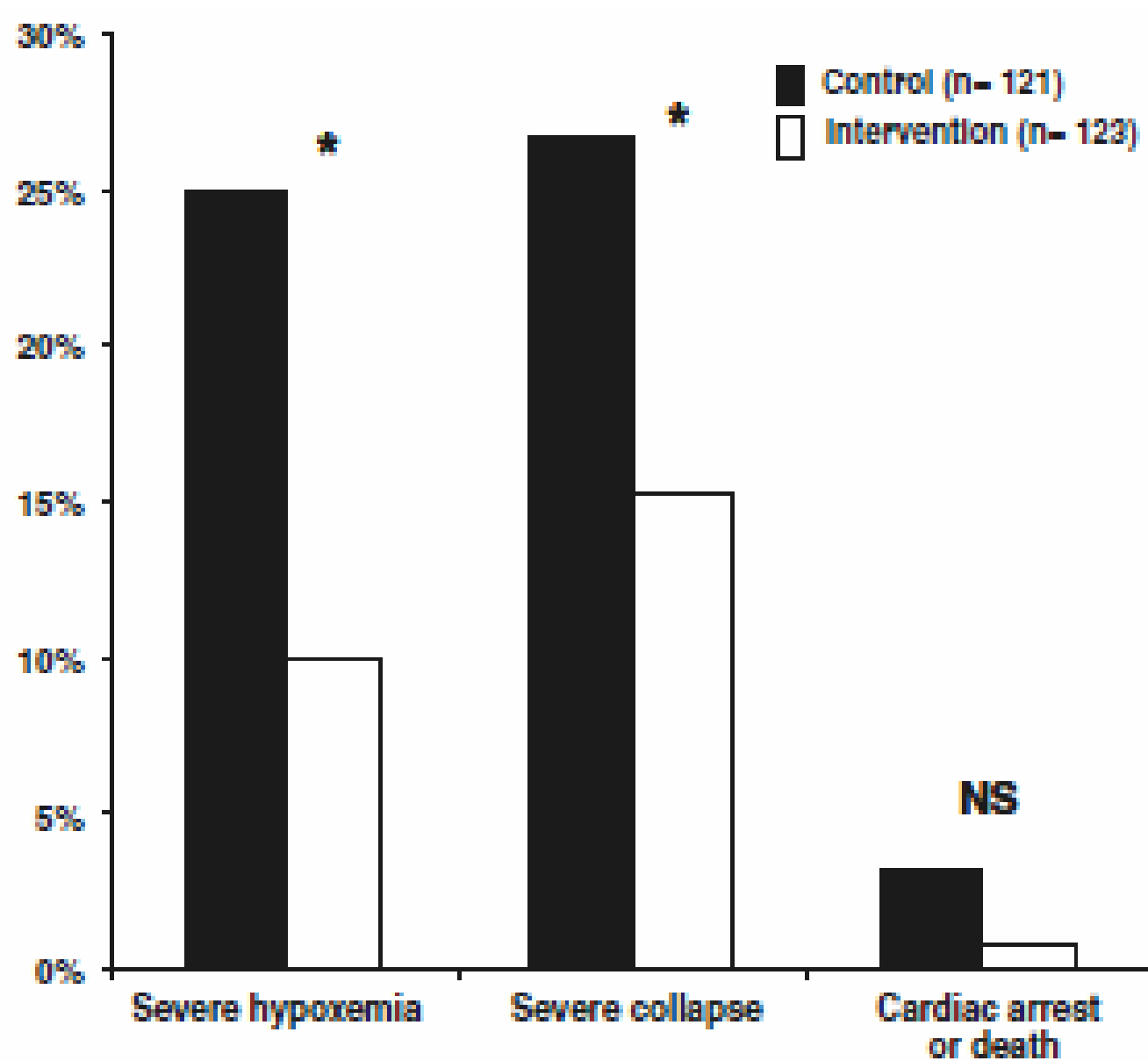
**An intervention to decrease complications
related to endotracheal intubation
in the intensive care unit: a prospective,
multiple-center study**



Montpellier ICU intubation bundle

- 1. To intubatører
- 2. Væskebolus 500 ml
- 3. Forberede sedasjon
- 4. NIV med FiO₂ 1.0 i 3 min.
- 5. RSI
- 6. Etomidate eller ketamin
- 7. Curacit/Esmeron
- 8. Tubeplassering-kapnografi
- 9. Noradrenalin hvis diastolisk trykk < 35
- 10. Lungeprotektiv ventilasjon





Reduksjon i livstruende hendelser:
34% → 21%

RAPID SEQUENCE INDUCTION CHECKLIST

Pre-RSI ASSESSMENT

- PREDICTED DIFFICULT LARYNGOSCOPY? YES/NO
(CALL SENIOR HELP EARLY. Difficult airway trolley at bed space. Awake technique considered)
- PREDICTED DIFFICULT FACE MASK VENTILATION? YES/NO
(OPA, NPA and LMA prepared. Second person available for face mask ventilation)
- PREDICTED DIFFICULT SURGICAL AIRWAY? YES/NO
(Cricothyroid membrane palpated, and marking considered. Surgical help considered)

PATIENT POSITION

- OPTIMISED FOR LARYNGOSCOPY AND FRC (HEAD-UP/RAMPED AND 'SNIFFING' POSITION) CHECK

PHYSIOLOGY OPTIMISATION

- NASOGASTRIC TUBE ASPIRATED CHECK
- PREOXYGENATION OPTIMISED WITH MAPLESON-C BREATHING CIRCUIT CHECK
- NASAL CANNULA O₂ (15L/min) CONNECTED FOR APNOEIC OXYGENATION CHECK
- NON-INVASIVE VENTILATION FOR PREOXYGENATION AND RECRUITMENT IF SpO₂ <97% CHECK
- IF AGITATED, CONSIDER KETAMINE 0.25-0.5mg/kg TO FACILITATE PREOXYGENATION CHECK
- INTRAVASCULAR VOLUME, CARDIAC OUTPUT AND SVR OPTIMISED CHECK

MONITORING

- ECG, SpO₂ AND NIBP (ON CONTRALATERAL ARM TO FLUIDS/SpO₂ AND 1-3 MINUTE CYCLES) CHECK
- WAVEFORM ETCO₂ WORKING AND CONNECTED TO CIRCUIT CHECK
- PRE-INDUCTION INVASIVE ARTERIAL LINE CONSIDERED CHECK

EQUIPMENT (USE RSI KIT DUMP SHEET)

- OXYGEN SOURCES x2 CHECK
- SUCTION WORKING AND UNDER THE PATIENT'S PILLOW CHECK
- OPA x2, NPA x2 AND LMA CHECK
- LARYNGOSCOPES x2, ETTs x2 AND LUBRICATION CHECK
- BOUGIE, SYRINGE AND TUBE TIE CHECK
- SURGICAL CRICOTHYROIDOTOMY (SCAPEL, 10F BOUGIE, 6.0 COETT) OR MELKER CHECK

DRUGS

- WORKING IV ACCESS x2 (CONSIDER INTRAOSSEOUS) CHECK
- INDUCTION DRUG (KETAMINE 1-2mg/kg IF SHOCKED OR SBP<100mmHg, AVOID PROPOFOL) CHECK
- CO-INDUCTION (OPIOID) IF SIGNIFICANT RISK OF HYPERTENSIVE RESPONSE CHECK
- PARALYSIS (ROCURONIUM 1.2-1.5mg/kg PREFERRED) CHECK
- EMERGENCY DRUGS (ATROPINE, EPINEPHRINE, METARAMINOL, FLUIDS) CHECK
- POST-INTUBATION SEDATION, ANALGESIA AND VASOPRESSOR/INOTROPES CHECK

BRIEF- DELEGATE ROLES, MILS?, CRICOID?, PLAN A/B/C/D VERBALISED, TEAM QUESTIONS/CONCERNS



Referanser:

De Jong A, et al, Early Identifiacation of Patients at Risk for Difficult Intubation in the Intensive Care Unit, Am J of Resp Crit Med, 2013

Jaber S, et al, An intervention to decrease complications related to intubation in the intensive care unit: a prospective multiple-center study. Intensiv Care Med, 2010

De Jong A, et al, Intubation in the ICU: we could improve our practice. Critical Care, 2014

Sherren PB, et al, Development of a standard operating procedure and checklist for rapid sequence induction in the critically ill, Scand Journal of Trauma, Resc and Emergency Med, 2014

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