Updates in ICU

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My ICU Round
Airway
Breathing
Circulation
Disability/Neuro
Exposure: Temperature and Sepsis
Feeding, Fluid balance, Renal Function
GI and Abdomen
Labs
Lines
Medications
FASTHUG
Family
Airway
Breathing
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FASTHUG
Family
Airway
What do you prefer?

• CMAC
• Glidescope
• Handheld Videoscope
Delayed sequence induction

Preoxygenation

Haemodynamic stability
Cricoid Pressure
Do you use Cricoid Pressure?

- Yes
- No
- Sometimes

Results
High Flow Nasal Oxygen during Intubation

“O’s in the Nose”

Emerging data to support its use
Check Lists

Human factors
Infrequent, complex task with risk
### Out of Theatre Intubation Checklist

#### Team
- In hours, ED Senior Dr aware of RSI?
- Out-of-hours, if difficulty anticipated, anaesthetics contacted?
- All members introduced by name & role and each briefed in turn by TL
- Difficult intubation plan briefed?
- Difficult airway trolley at hand?
- Anticipated problems – does anyone have questions or concerns?

#### Patient
- Pre-oxygenation optimal?
  - Add nasal prongs or NIV
- Patient position optimal?
- Patient haemodynamics optimal?
  - Fluid bolus?
  - Pressor?
- Does it look like it might be difficult:
  - Difficult BVM?
  - Difficult laryngoscopy?
  - Difficult supraglottic airway?
  - Difficult cricothyroidotomy?
- Cervical spine instability?

#### IVI/Drugs
- Fluids connected, runs easily?
- Suction IVC?
- RSI drugs drawn up, doses chosen?
- Post-intubation anaesthesia plan - drugs drawn up?
- Drug C/I or allergies considered

#### Equipment
- Suction working?
- Adequate Oxygen
- BVM with ETCO2 connected?
- OPA and NPA available?
- 2 x laryngoscopes working? Correct blade size?
- Magill's Forceps
- Tubes chosen, cuff tested
- Bougie or stylet in tube?
- Tube tie or tapes ready?
- Stethoscope available
- Ventilator circuit attached?
- LMA sized & available?
- Surgical airway equipment available?

*Version 1.4
Developed by T Fogg, D Boers, J Kennedy and J Vassiliadis, RNSH ED 01/02/2014*
Airway

**Breathing**

Circulation

Disability/Neuro

Exposure: Temperature and Sepsis

Feeding, Fluid balance, Renal Function

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FASTHUG

Family
Breathing
High Flow Nasal Oxygen for respiratory failure
2L/kg

Can go higher...

...but prepare to use NIV or intubate
Evidence for HFNO?

Emerging but not overwhelming
FlorALI – NEJM 2015

Acute Hypoxaemic Resp Failure – Does HFNP vs Facial O2 (standard care) vs NIV prevent intubation?

23 French ICUs – n = 310

Intubation – 38% vs 47% vs 50% (p=0.18)

90 Day Mortality (Hazard Ratio)  
- 2.01 HFNP vs standard (p<0.046)  
- 2.50 NIV vs HFNP (p<0.006)

Didn’t change intubation rate but did change mortality at 90 days
Extubation to BiPAP
Shown to decrease extubation failure, in those that are high risk extubations.
Tittrated vs Uncontrolled O2
MI

Out of hospital cardiac arrest

COPD

Harm
Airway
Breathing
**Circulation**
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Circulation
Crystalloids
Which Crystalloid should we use for Volume Resuscitation?

- Normal Saline
- Hartmans
- Plasmalyte

Results
## SPLIT Trial

**Fluid therapy**  
(Plasmalyte vs Normal Saline)  
JAMA last week! –  
Multi-centre cluster RCT - NZ  
\( n = 2278 \)

<table>
<thead>
<tr>
<th></th>
<th>PLASMA-LYTE</th>
<th>SALINE</th>
</tr>
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<tbody>
<tr>
<td>Na+</td>
<td>140</td>
<td>154</td>
</tr>
<tr>
<td>Cl-</td>
<td>98</td>
<td>154</td>
</tr>
<tr>
<td>K+</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Ca++</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mg++</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Lactate</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Acetate</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>Gluconate</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>OSMO</td>
<td>280 mOsm/L</td>
<td>308 mOsm/L</td>
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</tbody>
</table>
SPLIT Trial - Outcomes

RIFLE AKI - 9.6% vs 9.2% (p=0.77)

Difference in Serum Creatinine - 0.21mg/dl vs 0.18mg/dl (NS)

RRT 3.3% vs 3.4%

MV 68.6% (15.3hrs) vs 67.7% (14.2hrs)

LoS ICU/ Hospital - 1.5/7.45 days vs 1.47/7.33 days

ICU/Hospital Mortality - 6.6%/7.6% vs 7.2%/8.6%
SPLIT Trial

Feasibility Study

- Sample size and power calculations not possible
Colloids
Albumin

vs

Starches

vs

Gelatine

vs

Blood
FEAST Trial

NEJM - 2011
Multi-center RCT - Africa
n = 3141

Albumin bolus vs N/S bolus vs Maintenance
Cumulative probability of death

48 hours

28 days
FEAST Trial

Study halted!

Could a fluid bolus really cause death?

But, lots of criticism in terms of generalisability
CHEST Study

Compared – Voluven vs N/S

7000 ICU Patients

- Mortality - 18% vs 17%
- LOS (ICU or Hospital)
- ↑RRT - 7% vs 5.8% (RR 1.21)
- ↑Pruritis / Rash / Hepatic Failure
Albumin
TBI
(SAFE trial – NEJM 2004)

Sepsis
(ALBiOS – NEJM 2014)
Sepsis
(ALBiOS – NEJM 2014)
ALBiOS

Does 20% HAS vs Crystalloid alone reduce 28 day mortality in Severe Sepsis?

n = 1818 in 100 Italian ICUs

**Intervention**

- 300ml 20% HAS daily $\rightarrow$ Albumin $\geq 30$g/l
- Crystalloid as clinically indicated
- Median Fluid 3738ml vs 3825ml ($p=0.1$) for first 7 days
ALBiOS

Outcomes = no change in mortality

Pragmatic Study

Low loss to Follow up (1.6%)

Open-Label study

Under-powered - 45% mortality used in power calc.

Protocol Violations?

- 37% in control received albumin
- Violation of albumin admin in 42% of intervention group
Blood
Blood

Old vs New

(TRANSFUSE)
Airway
Breathing
Circulation
**Disability/Neuro**
Exposure: Temperature and Sepsis
Feeding, Fluid balance, Renal Function
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Family
Disability/Neuro
Cardiac Arrest

TTM

T 32-34 vs 36°C
Sedation

Nothing really new

Dexmedetomidine
Airway
Breathing
Circulation
Disability/Neuro

Exposure: Temperature and Sepsis
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Exposure:

Temperature and Sepsis
Fever and Sepsis
What has a worse prognosis?

- Sepsis and Fever
- Sepsis and Hypothermia

Results
HEAT Trial

Paracetamol vs Placebo in the Septic ICU Patient
NEJM (last week)
Multi-centre RCT - Australasia
n = 700

No difference in ICU free days or mortality
Early Goal Directed Therapy in Sepsis
<table>
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<tr>
<th></th>
<th>Rivers et al</th>
<th>ProMISe</th>
<th>ProCESS</th>
<th>ARISE</th>
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<tr>
<td>Location</td>
<td>US</td>
<td>UK</td>
<td>US</td>
<td>Australasia</td>
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<tr>
<td>Population</td>
<td>263</td>
<td>1260</td>
<td>1351</td>
<td>1600</td>
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<tr>
<td>APACHE II (approx)</td>
<td>20</td>
<td>18</td>
<td>21</td>
<td>15</td>
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**Sepsis Definition**

<table>
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<th></th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Suspected / Actual Infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SIRS criteria ≥ 2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Refractory lBP or lactate &gt; 4 mmol/l</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Protocol**

<table>
<thead>
<tr>
<th></th>
<th>20–30 ml/kg</th>
<th>&gt; 1000 ml</th>
<th>~20–30 ml/kg</th>
<th>&gt; 1000 ml</th>
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</thead>
<tbody>
<tr>
<td>Fluid before randomisation</td>
<td></td>
<td></td>
<td>Changed during study</td>
<td></td>
</tr>
<tr>
<td>Recruitment</td>
<td>not specified</td>
<td>&lt;6h from ED arrival &amp; &lt;2h from shock criteria</td>
<td>&lt;12h from ED arrival &amp; &lt;2h from shock criteria</td>
<td>&lt;6h from ED arrival &amp; &lt;2h from shock criteria</td>
</tr>
<tr>
<td>Intervention</td>
<td>EGDT 6 hours</td>
<td>EGDT 6 hours</td>
<td>EGDT 6 hours</td>
<td>EGDT 6 hours</td>
</tr>
<tr>
<td>Control</td>
<td>Usual therapy</td>
<td>Usual therapy</td>
<td>1) Protocol usual therapy 2) Usual therapy</td>
<td>Usual therapy</td>
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<tr>
<td>Primary outcome</td>
<td>In-hospital mortality</td>
<td>90-day mortality</td>
<td>60-day mortality</td>
<td>90-day mortality</td>
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**Primary Outcome**

<table>
<thead>
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<th></th>
<th>Intervention</th>
<th>Control</th>
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<tbody>
<tr>
<td></td>
<td>30.5%</td>
<td>46.5%</td>
</tr>
<tr>
<td>Intervention</td>
<td>29.5%</td>
<td>29.2%</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21.0%</td>
<td>18.2%</td>
</tr>
<tr>
<td></td>
<td>18.6%</td>
<td>18.9%</td>
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</tbody>
</table>
Airway
Breathing
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Disability/Neuro
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FASTHUG
Family
Feeding, Fluid Balance and Renal Function
Feeding

Nothing new
Fluid Balance

*If we give fluid, you gotta get it back at some point*
Renal Function/Protection
Avoid nephrotoxics

‘Normal’ MAP – under investigation

Avoid dehydration

Unobstruct
Airway
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GI and Abdomen
Nothing new
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Lab Tests
Dysnatraemia

Under investigation
Airway
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Lines
US guidance for lateral SC/Axillary vein
Out of plane

CV
AV
AA
P
SC vs IJ vs Femoral

Checking for complications/position with U/S
Airway
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**Medications**
FASTHUG
Family
Medications
Steroids in Sepsis
(ADRENAL study)

Vitamins and Hormone Replacement
Airway
Breathing
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Medications
FASTHUG
Family
FASTHUG
Feeding

**Analgesia** – more Ketamine, less regional anaesthesia

**Sedation**

**Thromboprophylaxis** – Enoxaparin rather than Heparin (PROTECT)

**Head up**

**Ulcer prophylaxis** – if feeds established don’t need PPI

**Glucose control** – gentle control rather than tight (NICE)
Airway
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Family
In the room **during** CPR

In the room **during** rounds (privacy)

Discharge planning and Handover critical
Geriatric ICU
Emerging Data

Very difficult to predict who is going to do well

The ability to predict the functional outcome imperative
Take home messages
ICU is developing in many areas.
The resuscitation gear you use in OT may be in the ICU.
Although we drink a lot of coffee, we do have a lot of outreach and research to do!
Thank you
Questions?
References
Most references from Life in the Fast Lane
Delayed Sequence Induction References


**Cricoid Pressure**


High Flow Nasal Oxygen


