Anaesthesia for Burns

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Lead for Burn Anaesthesia

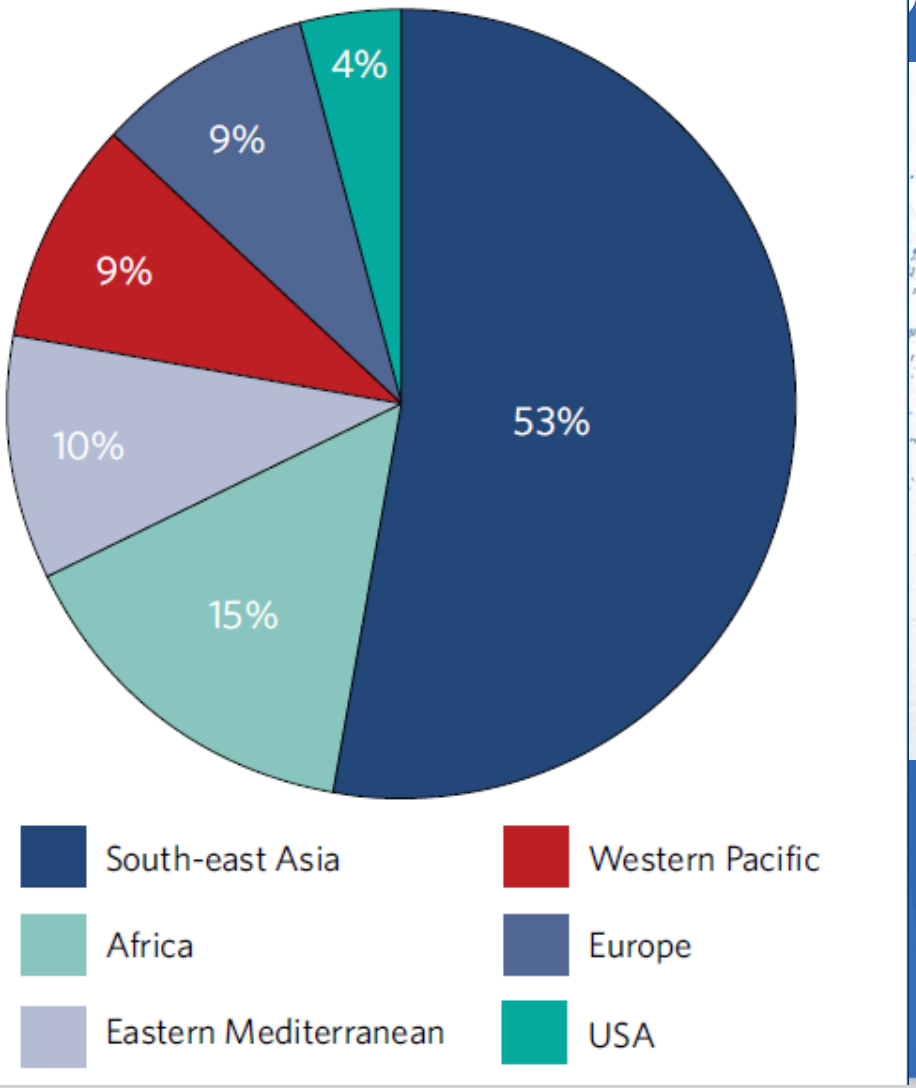
Midlands Burn Centre, QEHB

Birmingham

Objectives

- Initial assessment and management of major burn injury
- Management of immediate causes of death
- Anaesthetic challenges
- Pain management
- Sedation/anaesthesia for dressing changes

FIGURE 1: Regional distribution of fire-related mortality[6]



f Burn Injury

- A global crisis affecting nearly 6.6 million a year
- Most burn injuries involves women and children
- Majority of burn victims are in developing countries

Prevalence of Burn in UK

- 250,000 Burn injuries a year in UK
- 175,000 will attend ED
- 13,000 will get admitted
- Nearly 1000 pt a year need fluid resuscitation
- Nearly 300 deaths a year in UK

www.britishburnassociation.org/downloads/NBCR2001.pdf

Management of Burn in UK

- Burn Operational and Delivery Network
  - Burn facility
  - Burn unit
  - Burn centre

www.britishburnassociation.org/downloads/NBCR2001.pdf

Birmingham Burn Centre

- Over last five years:
  - Total admissions: 2049
  - ITU admissions : 212(10%)
  - Resus patients : 247 (12%)
  - Mortality : 117 (5.7%)

Initial assessment: *@ site of incident*

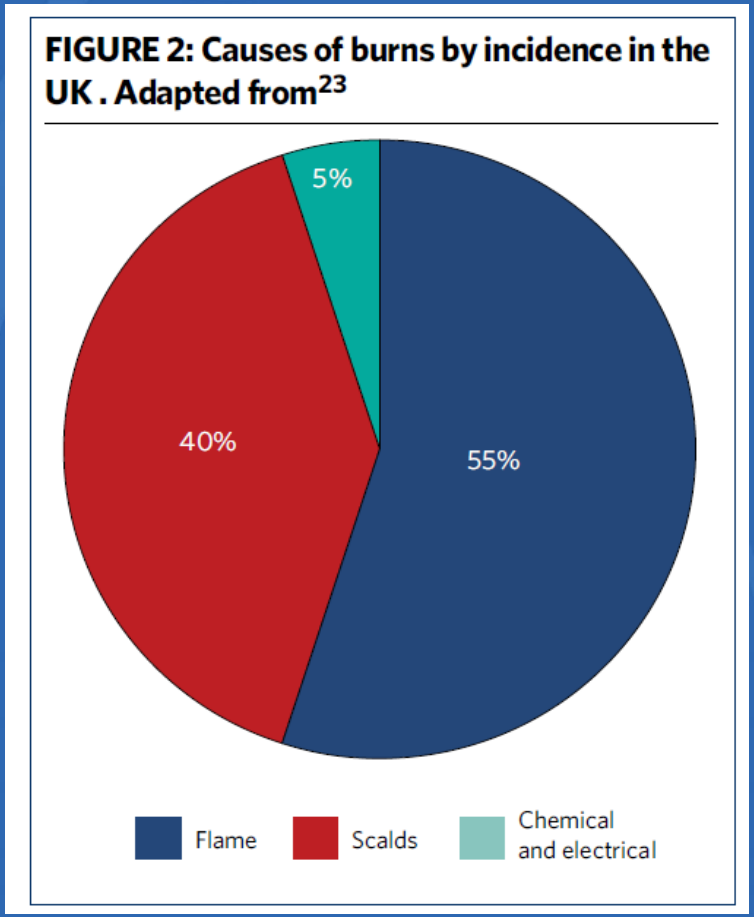
- Mechanism
- Type of burn
- Associated incidents
- Other casualties
- Damage to the site

Initial assessment: *@ site of incident*

- Mechanism:
  - Accidental
  - Self Inflicted
  - Contact burn
  - Associated trauma(high speed/blast/fall)
  - Indoor/outdoor
  - Mass casualty scenarios

Initial assessment: *@ site of incident*

- Type of burn:
  - Flame/Thermal
  - Scald
  - Electrical
  - Chemical
  - Radiation
  - Cold



Initial assessment: *@ site of incident*

- Associated incidents:
  - *Collapse of house, arson, explosion*
- Indoor/Outdoor:
  - *Associated with inhalation injuries*
- Mass casualties:
  - *Usually have other injuries*
  - *Resource allocation*

Initial Management:
First Aid

- Stop the burning process
  - Remove the person from source of burn
  - Extinguish fire with water/Stop, drop, roll
  - Isolate electrical power source, avoid chemical cross contamination
  - Remove clothes/jewellery
- Cool the burn
  - Running tap water for 20 minutes within 3 hours
  - If limited water, then cover with wet lint free cloth
  - If no water, apply longitudinal cling film
- Prevent hypothermia
- Immediate transfer to medical facility/Burn centre

https://www.britishburnassociation.org/wp-content/uploads/2017/06/BBA-First-Aid-Guideline-24.9.18.pdf

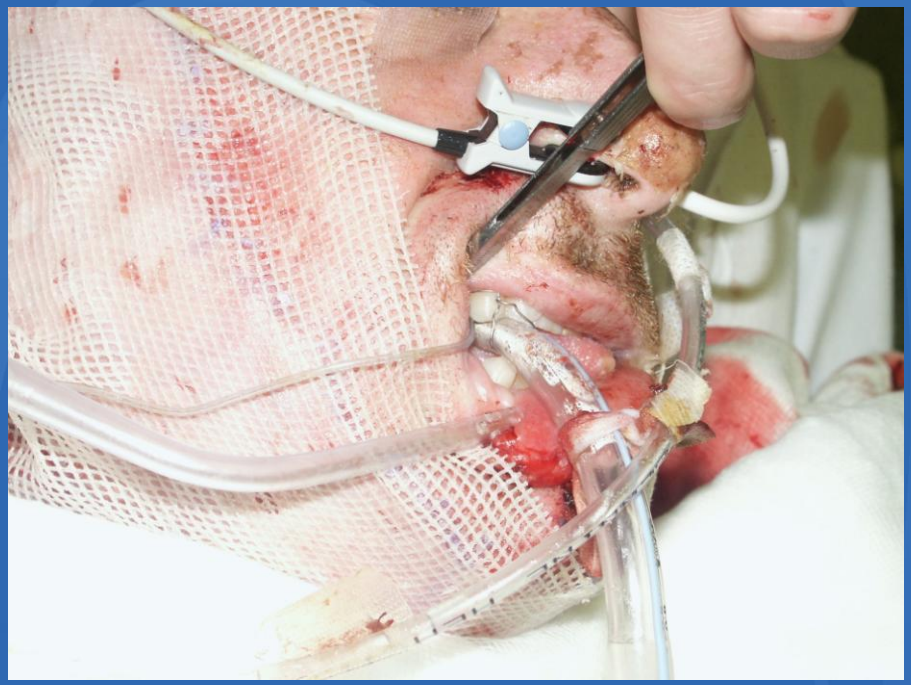
Management in ED

- ATLS Principles
- Treat immediate life threatening conditions
  - Hypoxia (airway obstruction, CO/Cyanide poisoning)
  - Shock (hypovolemia, tension pneumothorax, cardiac tamponade etc)
- Secure airway
- Fluid resuscitation
- Lines/Catheter
- Keep the patient warm!

http://www.midlandsburnnetwork.nhs.uk/website/X00001/files/3%20WoundInternationalBestPracticeGuidelinesNonComplex.pdf

Airway management

- Endotracheal Intubation at the earliest opportunity
- Secure the ETT well
- No reinforced tube
- *DO NOT CUT THE TUBE*



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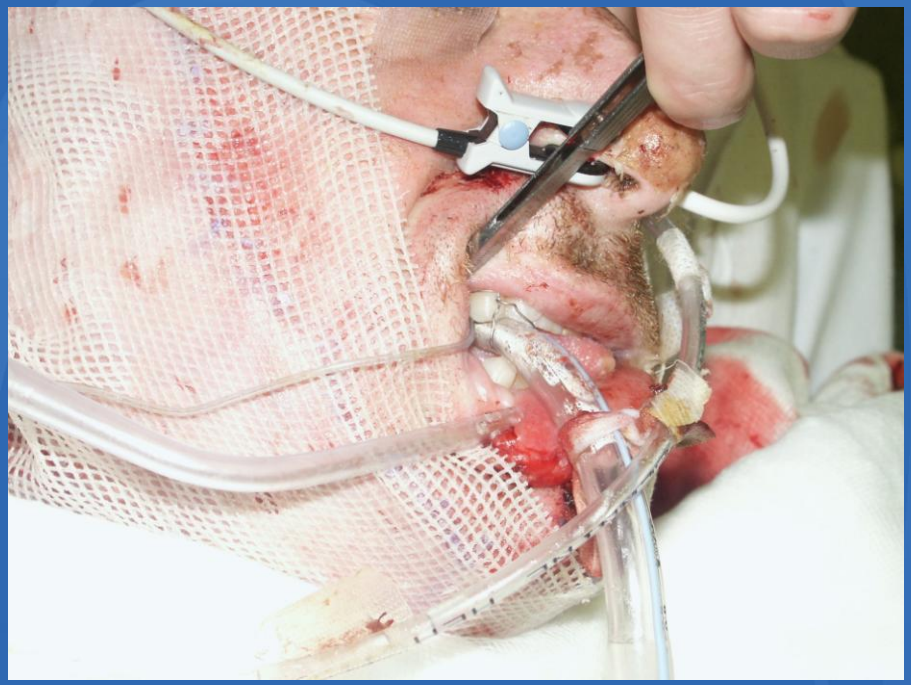

Airway

Early intubation if;

- altered consciousness
- burned face/oropharynx
- hoarseness/stridor
- soot in nostrils/sputum
- expiratory rhonchi
- dysphagia or dribbling

Criteria for Intubation

Table 1 – ABA and traditional indications for intubation of the patient with thermal burns.

Indications for intubation

2011 ABA guidelines	Traditional
• Full thickness facial burns	• Suspected smoke inhalation
• Stridor	• Oropharynx soot
• Respiratory distress	• Hoarseness
• Swelling on laryngoscopy	• Dysphagia
• Upper airway trauma	• Singed facial hair
• Altered mentation	• Oral edema
• Hypoxia/hypercarbia	• Oral burn
• Hemodynamic instability	• Non-full thickness facial burn

Cyanide Poisoning

- Common in house fires with burning of plastic/leather
- Associated with inhalation injury
- Diagnosis by ruling out other causes of unconsciousness
- Unexplained LOC with significant un responsive acidosis
- Specific management: Cynokit

L MacLennan, N Moiemen: *Management of cyanide toxicity in patients with burns injury. Burns 41(2015) 18-24*

Breathing

- Humidified high concentration Oxygen for IPPV
- Lung protective ventilation
- Early bronchoscopy and bronchial lavage
- Mucolytic nebulisations
- Chest physiotherapy
- Chest wall restriction
-

Review

The diagnosis and management of inhalation injury: An evidence based approach

C.J. Deutsch [a,*], A. Tan [a,b], S. Smailes [a], P. Dziewulski [a,b]

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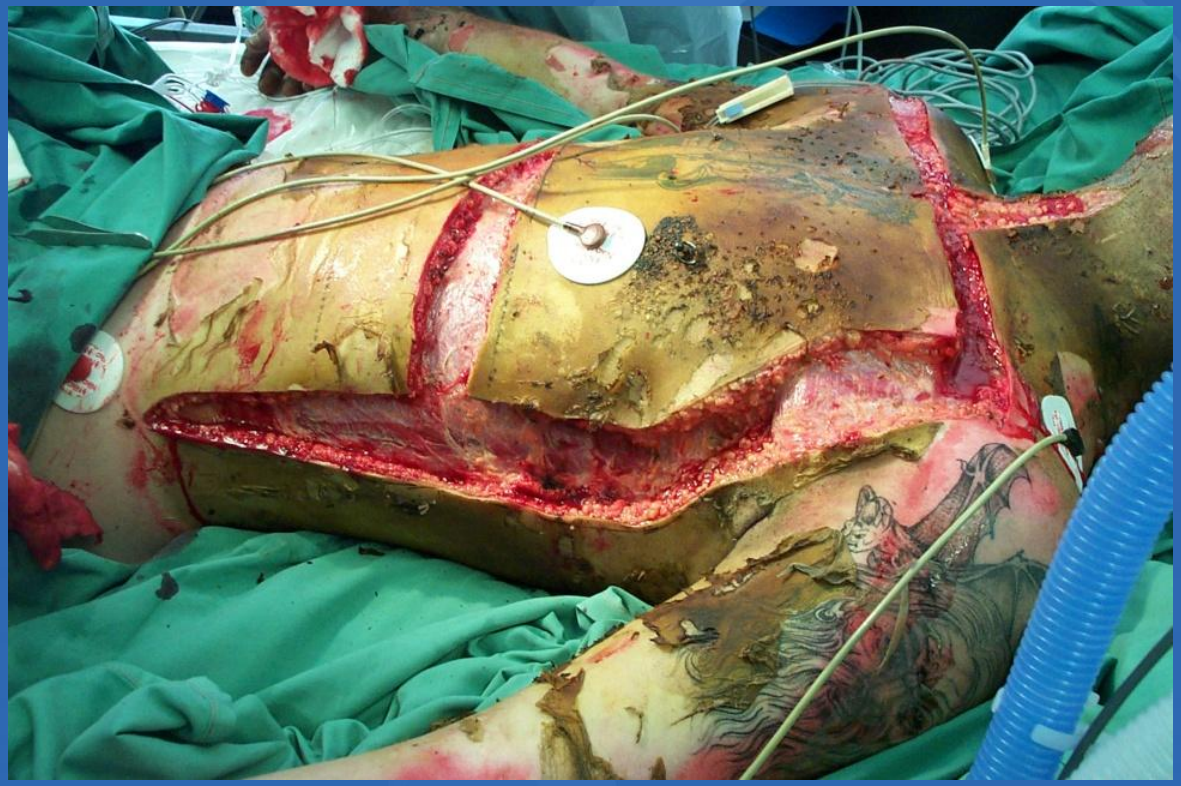
[b] StAAR Research Unit, Faculty of Medical Sciences, Anglia Ruskin University, 1-2 Bishop Hall Lane, CM1 1SQ, Chelmsford, United Kingdom

Chest wall restriction



Circulation

- Significant fluid loss (evaporation)
- Base deficit/Haematocrit
- Sticky blood, increased risk of thrombosis
- More than 15% in adult and 10% in children will need fluid resuscitation
- The fluid resuscitation should start as early possible

Parkland Formula 1968

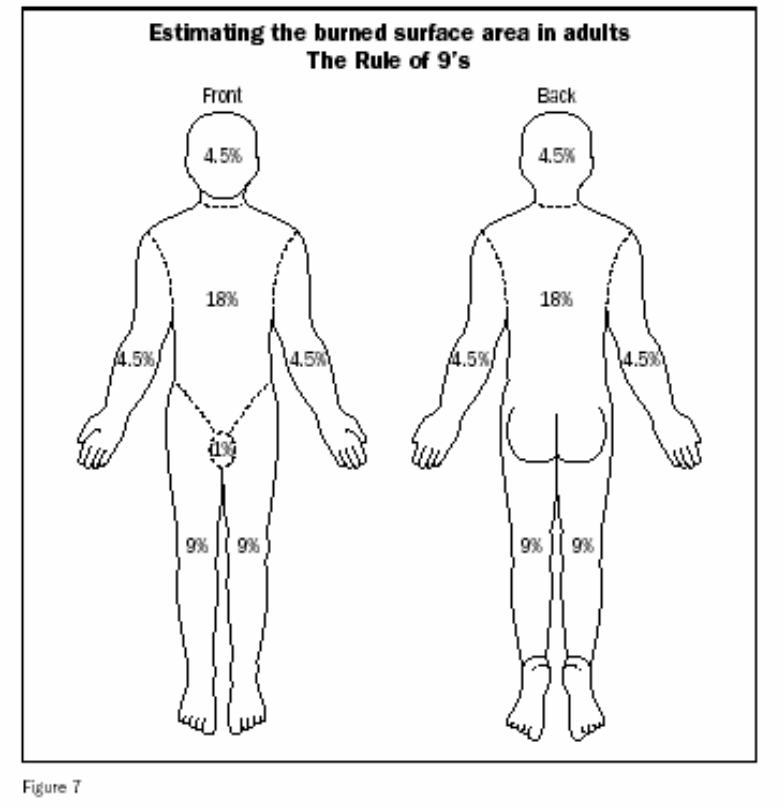
Hartmann's volume for 24 hrs:

%TBSA x Wt (Kg) x 4

1/2 given in the 1st 8 hrs

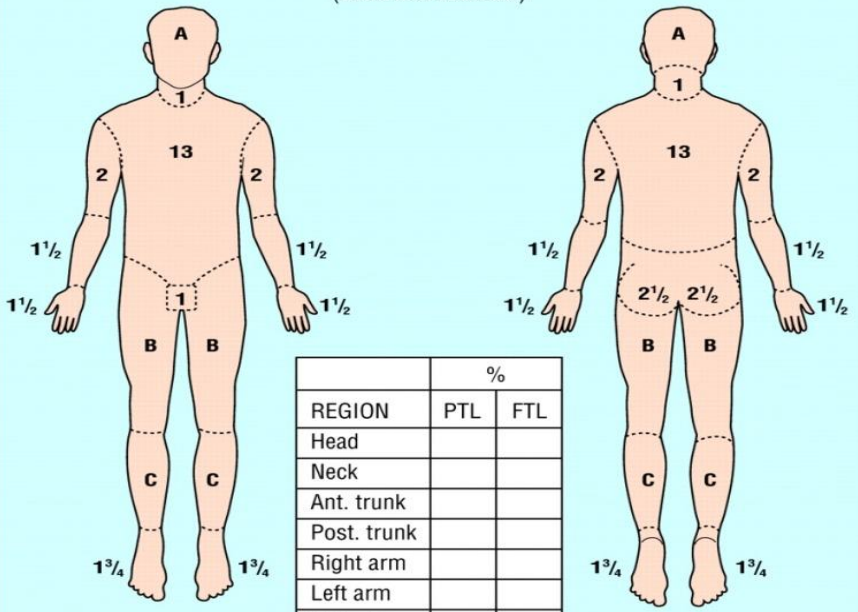
1st Period = 8 hrs
2nd Period = 16 hrs

Estimation of surface area



% Total Body Surface Area Burn

Be clear and accurate, and do not include erythema
(Lund and Browder)



REGION	% PTL	% FTL
Head		
Neck		
Ant. trunk		
Post. trunk		
Right arm		
Left arm		
Buttocks		
Genitalia		
Right leg		
Left leg		
Total burn		

AREA	Age 0	1	5	10	15	Adult
A = ½ OF HEAD	9½	8½	6½	5½	4½	3½
B = ½ OF ONE THIGH	2¾	3¼	4	4½	4½	4¾
C = ½ OF ONE LOWER LEG	2½	2½	2¾	3	3¼	3½

Circulation:
Burns Resuscitation
Which Fluid?

- Crystalloids
- Colloids
- Albumin (Plasma Protein Solution)
- Plasma Substitutes

Role of Albumin in Burns

- Two Meta-analysis in the past two years
- Both considered small number of studies
- Heterogeneity in the patient groups
- No conclusive evidence in support of albumin

Role of Albumin in Burns

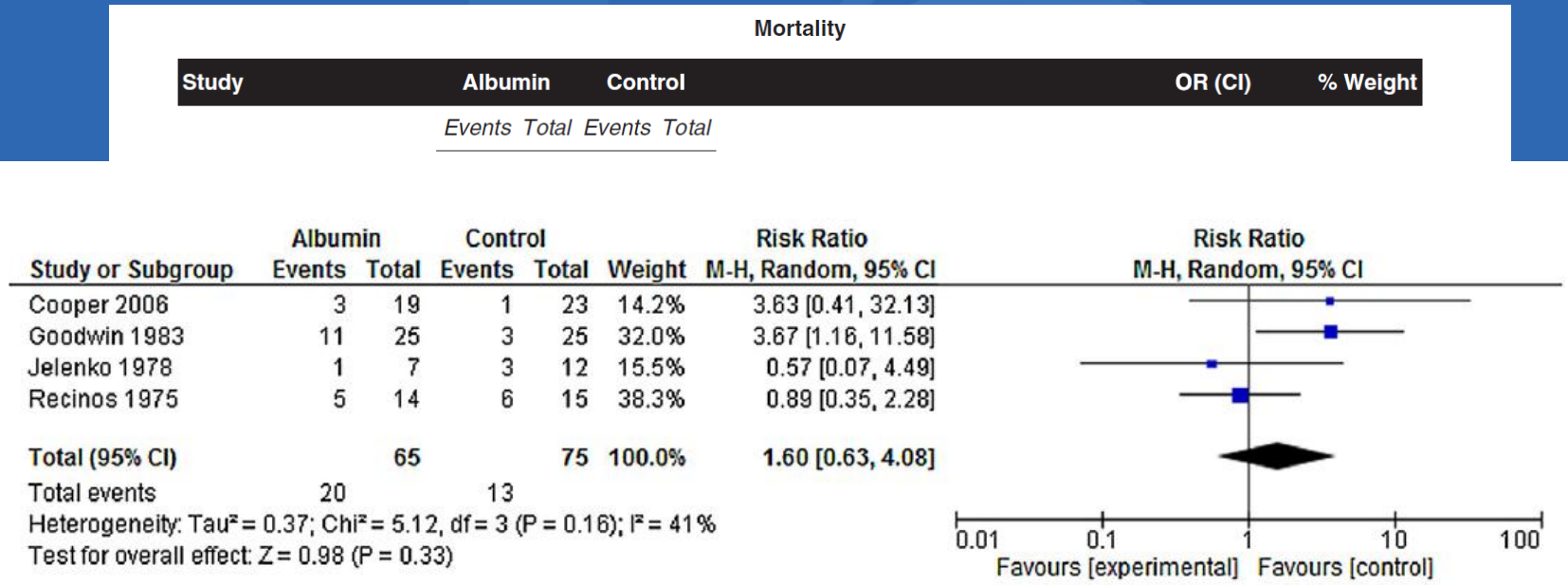


Fig. 2 – Effect of albumin administration on mortality.

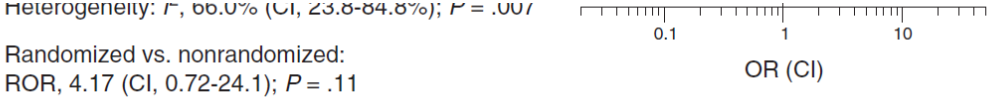


Figure 2. Mortality after burn shock resuscitation with albumin infusion. Data points for individual studies scaled in proportion to meta-analytic weight. Error bars depict CI. *CI*, 95% confidence interval; *OR*, odds ratio; *ROR*, ratio of odds ratios.

Albumin

- Reduced ventilation days
- Reduced mortality
- But, the authors still conclude that further studies are required!!
- Certainly reduces the abdominal compartment syndrome
- Our unit…not aggressive albumin user!

Fluid Resuscitation

- Parkland's formula is still most commonly used
- Inaccurate
- Burn shock
- Burn SIRS
- Aim for urine output
- ?Invasive monitoring

How Anaesthetists are Involved

- Initial Resuscitation
- Transfers
- Intensive Care
- Theatre
- Dressing Changes
- Analgesia
- Reconstruction

Initial Theatre Visit

- Mostly for:
  - Thorough assessment
  - Airway-wiring ETT
  - Breathing- Bronchoscopy
  - Circulation- lines, NG tube, catheter
  - Disability and exposure: Escharotomies, good cleaning, mind the temperature

Anaesthetic Challenges

- Monitoring:
  - Most reliable are arterial BP, UO, ABGs
- Secure tubes/lines:
- Blood loss
- Temperature

Repeat theatre trips

- Prolonged surgery
- Blood loss
- Temperature control
- Positioning
- Monitoring
- Usually done by week day burn teams

Reconstruction

- Airway
- Venous access
- Suxamethonium
- Pain management
- Use of Regional anaesthesia

Dressing Changes

- Problems
  - Anxiety
  - Venous access
  - Pain
  - Nutrition
  - Post procedure sedation

Dressings changes

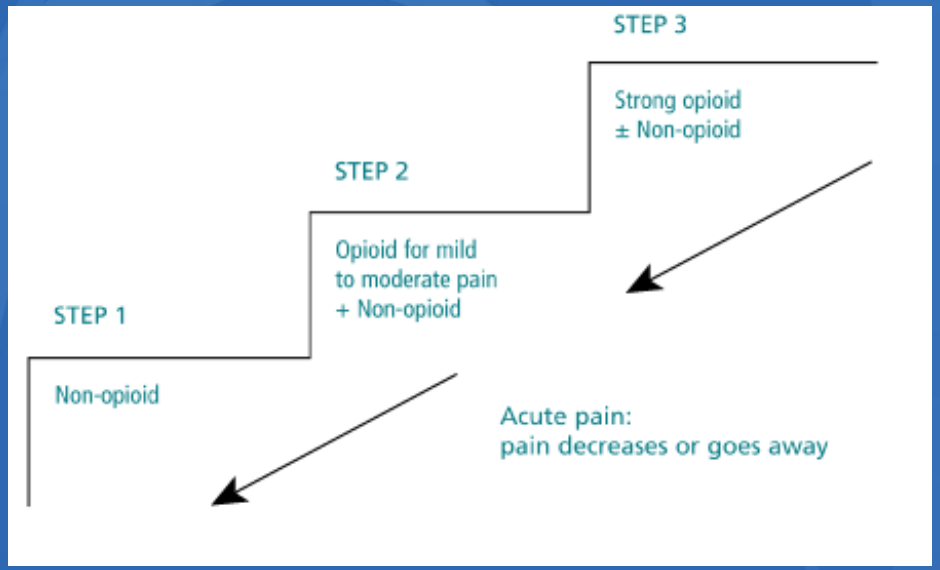
- Done either in theatre, ITU or ward
- Most often involve shower
- Monitoring and IV access concerns

Dressing changes

- Options
  - Ketamine Midazolam
  - GA
  - Opioids
  - Entonox
  - Propofol Remifentanil
  - Grin and bear it!

Pain management

- Mainly Opioid based in acute stages
- Regular paracetamol
- Early use of Pregabalin/Gabapentin
- Careful consideration if NSAIDs to be used
- Pruritis contributes to acute/chronic pain



MDT

- One of the core standard set up by ISBI
- Team includes almost everyone responsible for “functional resuscitation and rehabilitation” of burns patient
- QEHB: Once week
- Network meetings: Four times a year

Summary

- Identify and treat immediate life threatening conditions
- Low threshold for definitive airway
- Fluid resuscitation with crystalloids
- Multi disciplinary team approach during acute phase helps functional resuscitation and rehabilation