Practice-changing updates in Emergency Medicine

Therapeutic Hypothermia after OHCA

- Therapeutic hypothermia is the current standard of care for patients who remain unconscious after cardiac arrest:
  - reduced mortality
  - improved neurologic function
- The optimal target temperature (typically between 32°C and 35°C) has been unclear.

Nielsen N et al. *N Engl J Med* 2013 Nov 17

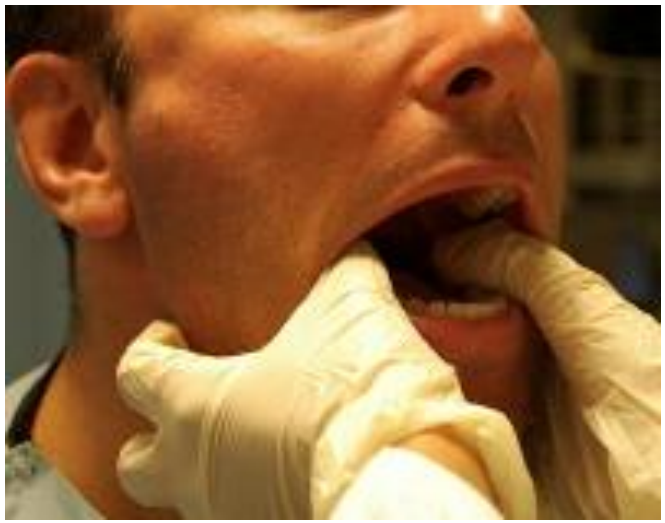
- 950 patients in 36 European and Australian ICUs
- Randomised to 33°C or 36°C, to determine which might be more effective.

Result:

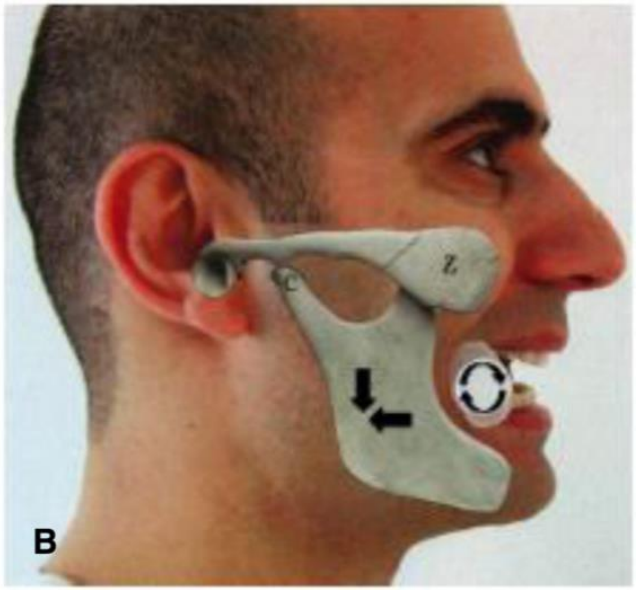
- Patients cooled to 33°C fared no better than those cooled to 36°C.
- Outcomes in both groups better than historical outcomes without therapeutic hypothermia

Active temperature regulation / prevention of hyperthermia is of great benefit in these patients.

TMJ dislocations



OLD METHOD



NEW METHOD

Prehospital adrenaline in OHCA

Study 1: Hagihara et al. *JAMA*. 2012;307(11):1161-1168.

- Japanese registry study.
- 417 188 OHCAs occurring in 2005-2008 in Japan in which patients aged 18 years or older had an OHCA before arrival of emergency medical service
- Use of prehospital adrenaline was significantly associated with:
  - increased chance of ROSC before hospital arrival
  - decreased chance of survival and good functional outcomes 1 month after the event.

Prehospital adrenaline in OHCA

Study 2: Dumas et al. *J Am Coll Cardiol*. 2014;64(22):2360-2367.

- Retrospective review of 1,556 patients with OHCA admitted to a "cardiac arrest center" in Paris, France.
- Evaluating cerebral performance outcomes
  - Adrenaline group - 17% ultimately had good outcome.
  - No adrenaline - 63% ultimately had good outcome.
  - Dose-dependent worsening outcomes for adrenaline administration.

Prehospital adrenaline in OHCA

Study 3: Nakahara S et al. BMJ 2013 Dec 10.

- Japanese registry study
- Prehospital epinephrine was associated with better neurological outcomes only in patients with non-shockable rhythms.

Shoulder dislocation

https://www.youtube.com/watch?feature=player_embedded&v=jIVjVRXo79w

Fluid boluses in septic children: FEAST trial

Maitland et al. N Engl J Med 2011; 364:2483-2495

Fluid boluses for shock are an international standard of practice. For a febrile child in shock first-hour fluid resuscitation (60 ml/kg of isotonic fluid within 15 minutes of shock diagnosis) is recommended.

- 6 African hospitals, 3,141 children over 60 days old with severe febrile illness and impaired perfusion randomised to one of three arms:
  - 20 to 40 ml/kg of 5% albumin boluses
  - 0.9% saline boluses
  - no bolus at all

Results:

- 48 hour mortality was 10.6% (albumin), 10.5% (saline) and 7.3% (no bolus).
- 4 week mortality rates were 12.2% (albumin), 12.0% (saline) and 8.7% (no bolus)
- Most deaths (87%) occurred before 24 hours.

Trial stopped early. “We could not identify any subgroup in which fluid resuscitation was beneficial”

NOACs – the Dagibatran scandal

- Dagibatran seemed like an elegant solution to rat poison.
- We were lied to.
- Boeringer-Ingelheim, the first mover into a lucrative market, downplayed patient safety concerns by selectively reporting only the most favorable aspects.
- Adverse effects of Dabigatran:
  - Increased cardiovascular adverse events.
  - Inability to reverse effect in major bleeding.
  - Lack of dosing options for patients with renal impairment.
  - Substantial inter-patient variability in efficacy and bleeding risk which means it actually does require routine monitoring.

Endovascular therapy in Stroke

- MR-CLEAN
- ESCAPE
- EXTEND-IA
- SWIFT-PRIME

- The key take-home is endovascular therapy for acute stroke has probably finally arrived.
- After a decade-and-a-half of generally failed trials, it seems the devices and patient selection have finally improved to the point of clinical utility.
- For patients with collateral flow and accessible lesions, it seems clear this therapy should be provided – and neither time of onset or tPA use matter as much as viable brain tissue.
- The obvious key, as shown in MR-CLEAN, is patient selection

CRASH-2 study

- Tranexamic acid (1g IV load then 1g over 8 hours) significantly improves mortality when given to potentially bleeding trauma patients within 8 hrs of injury.

- ?generalisability to areas with developed trauma systems.

- PATCH-Trauma study pending

The case against cricoid pressure

- Never validated as a manouvre - what is the correct force to apply?
- Ineffective
  - never been shown to reduce the risk of aspiration
  - esophagus is lateral to the cricoid cartilage 90% of the time
  - aspiration despite cricoid pressure is well documented in anesthestic and EM literature
- Often poorly performed, and the assistant may get tired over time
- Compresses the airway 80% of the time and displaces the larynx laterally 67% of the time
  - obscures laryngoscopic view potentially making intubation more difficult
  - makes bag-mask ventilation and LMA ventilation more difficult
  - may block tube passage into the trachea
- Can be harmful
  - excessive force may cause airway obstruction - 11% of patients have complete airway occlusion
  - if the patient vomits there is the risk of oesophageal rupture, so cricoid pressure must be immediately released
  - cricoid pressure decreases lower esophageal sphincter tone
  - can be uncomfortable for patient if applied before the patient is adequately sedated
  - may trigger coughing or vomiting
- Adds complexity, increases cognitive load on the intubator and may lead to distraction from other priorities
  - requires an additional assistant
  - may interfere with bimanual laryngoscopy
  - requires additional commands from the intubator (when to apply, when to release)

PECARN study

Kuppermann et al. Lancet. 2009 Oct 3;374(9696):1160-70.

- Head injury in children – to CT or not to CT?
- Decision rules for <2y and >2y groups
- Recent systematic review shows the PECARN rules outperform CHALICE and other decision rules

Decision Rules for Avoiding CT in Children with Head Trauma

<2 Years	≥2 Years
• Normal mental status	• Normal mental status
• No scalp hematoma except frontal	• No loss of consciousness
• Loss of consciousness for <5 seconds	• No vomiting
• Nonsevere injury mechanism*	• Nonsevere injury mechanism*
• No palpable skull fracture	• No signs of basilar skull fracture
• Normal behavior	• No severe headache

**Severe injury mechanism was defined as motor vehicle crash with patient ejection, death of a passenger, or rollover; pedestrian or bicyclist without helmet struck by a motorized vehicle; fall of >1.5 m for children ≥2 years and >0.9 m for children <2 years; or head struck by high-impact object.*

Conservative Mx for appendicitis

- Evidence is accumulating.
- NOTA Study (Non Operative Treatment for Acute Appendicitis) *Di Saverio S et al. Ann Surg 2014 Mar 18*
- 159 patients without serious illness or complicated appendicitis were admitted for short term observation and started on amoxicillin-clavulanate.
- Patients who failed to improve or worsened went to the OR. Others were discharged and re-examined at 5-7 days as an outpatient, and, again, those without significant improvement went to the OR.
- Within 7 days, there were 19 (12%) treatment failures;
  - 17 of 19 were acute appendicitis
  - 2 were tubo-ovarian abscess with secondary appendiceal inflammation.
- Over the 2 year follow-up, 22 (13.8%) patients had recurrent appendicitis
  - 14 of which were managed with antibiotics without complication.
  - 8 went to the OR, 6 of which were confirmed as acute appendicitis.

CT scans and cancer in Australia

Matthews et al. *BMJ* 2013; 346: f2360

- Used data from Medicare to identify all Australians aged <19 at 1985 and those born until the end of 2005.
  - 680,000 had a CT
  - 10.3 million did not

- 16% increase in cancer incidence rate ratio per scan. This effect was greatest for younger children and occurred over a wide range of malignancies.

- The background risk for the non-exposed was 1 in 178 (0.56%) over a mean of 17 years of follow up.

- For those scanned, overall risk of 1 in 154 (0.65%)

Urine pregnancy test, without urine

- Most urine pregnancy test kits are approved for both urine and serum
- Whole blood pregnancy test
  - Sensitivity 95.8%
  - Specificity 100%
  - NPV 97.9%
  - PPV 100%
- Not fingerprick blood.
- Wait at least 5 minutes before reading result.

Sepsis

- Early recognition and intervention is the cornerstone of ED management.
- Early recognition is still problematic.
- Strict adherence to monitoring protocols (e.g. EGDT with CVP and ScvO2 monitoring) are probably not that important.
- But timely interventions are extremely important
- Principles of management:
  - Early antibiotics
  - Source-of-infection control
  - Fluids: patients with septic shock should be given as much isotonic crystalloid as they can tolerate, fast, under close attention by a vigilant physician
  - Lung-protective ventilation strategies

Age-specific D-dimer cutoffs to rule out PE

Righini M et al. JAMA 2014 Mar 19.

D-dimer cutoffs:

- <50 years: 500 µg/mL
- >50 years: age x 10 µg/mL

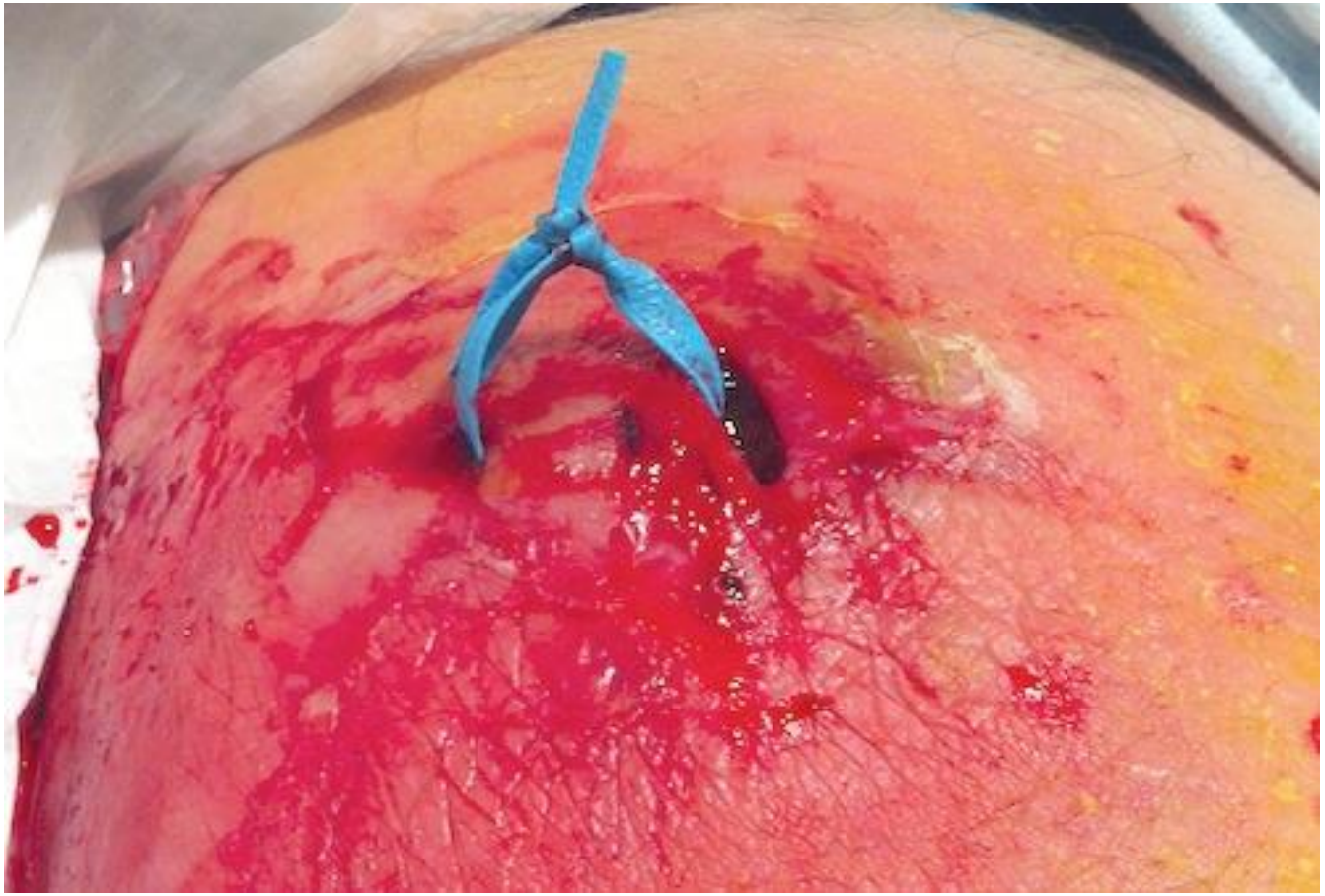
- 2898 patients with low or moderate clinical probability for PE
- Patients with a positive result underwent CTPA.
- All patients were followed for 3 months.
  - 12% absolute decrease and a 41% relative decrease in the proportion of positive D-dimer results.
  - Of 331 patients 50 and older with D-dimer levels between 500 µg/mL and their age-adjusted cutoff, only one (0.3%) was found to have PE during follow-up.

Customizing the cutoff for “normal” according to the patient's age can reduce the number of patients requiring CT-PA without sacrificing sensitivity.

Abscess management

- No need to pack abscesses
- Primary closure non-inferior to leaving open
  - but no difference to patient satisfaction
  - and more work
- Bedside ultrasound significantly improved the ability to identify pus in paediatric abscesses.

Incision and loop drainage



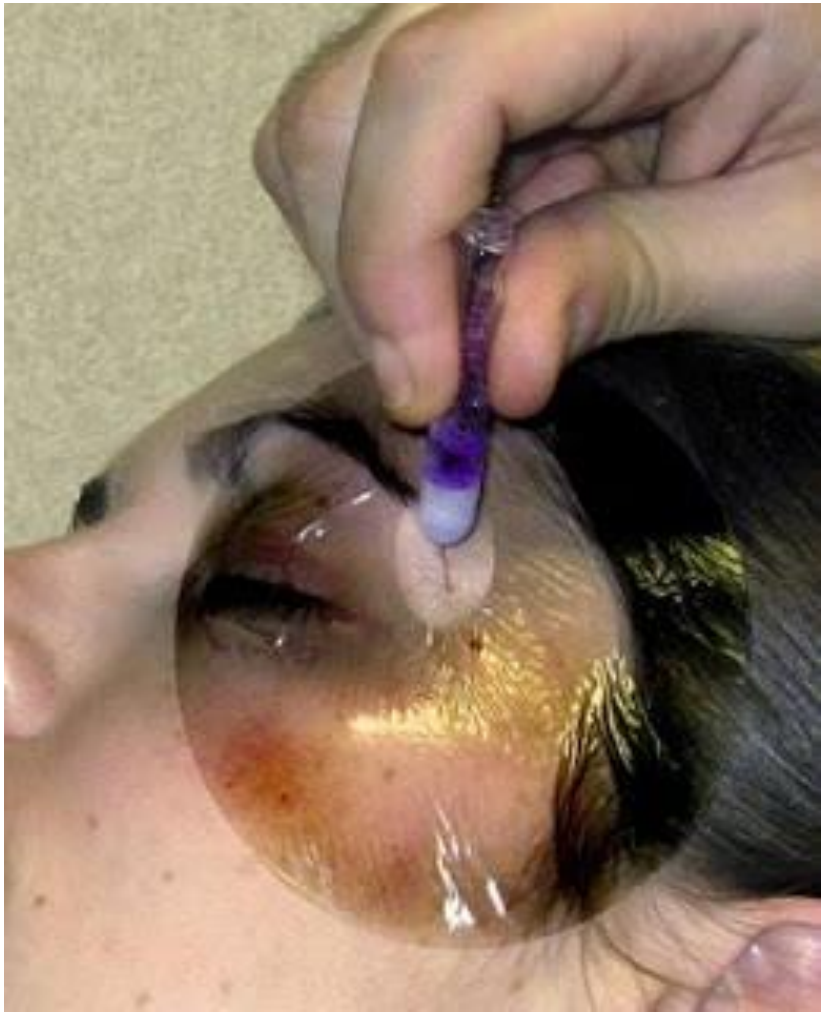
Incision and loop drainage

- https://www.youtube.com/watch?v=gw7tA1B9Aos

Wound management

- It is OK to irrigate wounds with tap water
- Probably OK to use non-sterile gloves during closure.
- Simple lacs on the fingers <1cm don't need primary closure.
- OK to do primary closure on wounds with delayed presentation.
- Diabetes, laceration size, site, and degree of contamination are associated with wound infections, but there is no evidence to support the routine use of prophylactic antibiotics.
- Debridement of devitalized tissue, removal of foreign bodies, and large-volume properly performed irrigation are the most important factors in preventing wound infections.

Using tissue adhesive near the eye



The 5 best ways to reduce emergency care costs.

JAMA Intern Med 2014 Feb 17

1. Do not order CT of the cervical spine for patients who do not meet the NEXUS criteria or the Canadian C-Spine Rule.
2. Do not order CTPA to diagnose PE without first risk stratifying by determining pretest probability and measuring d-dimer in low-risk patients.
3. Do not order MRI of the lumbar spine for patients with low back pain without high-risk features.
4. Do not order CT head for adult patients with mild traumatic head injury who do not meet the New Orleans Criteria or the Canadian CT Head Rule.
5. Do not order coagulation studies for patients without hemorrhage or suspected coagulopathy

Use of antibiotics in COPD exacerbations

- Patients with severe chronic obstructive pulmonary disease (COPD) exacerbations are treated with antibiotics, but do patients with less-severe disease also need them?

- Am J Respir Crit Care Med 2012; 186:716.
  - Amoxicillin/clavulanate v. placebo
  - 80% of 152 placebo patients had satisfactory outcomes

- Miravitlles et al. Chest 2013 Nov.
  - Examined the data from the placebo group.
  - The two best predictors of potential benefit from antibiotics were:
    - purulent sputum
    - CRP >40 mg/L.

Bronchiolitis simplified

Ineffective, or of inadequate risk/benefit, treatments:

- A trial of bronchodilators (salbutamol)
- Nebulized adrenaline.
- Nebulized hypertonic saline (except possibly those requiring hospitalization)
- Systemic or inhaled corticosteroids.
- Chest physiotherapy.

… which basically covers everything.

Bronchiolitis simplified

- Supportive care:
  - Nasal saline
  - Oxygen prn
- Set 90% as an acceptable oxygen saturation.
- It is reasonable not to perform continuous oximetry on infants and children with bronchiolitis
- Avoid routine CXR
  - abnormalities are common in bronchiolitis, leading to ineffective/harmful antibiotic administration.

Low dose Ketamine for ED pain

Beaudoin et al. Acad Emerg Med. 2014 Nov;21(11):1193-202.

Morphine 0.1mg/kg + placebo

vs

Morphine 0.1mg/kg + Ketamine 0.15-0.3mg/kg

- Improved pain scores and less need for rescue drug in Ketamine group.
- More unpleasant effects (half of patients) in higher dose ketamine group.

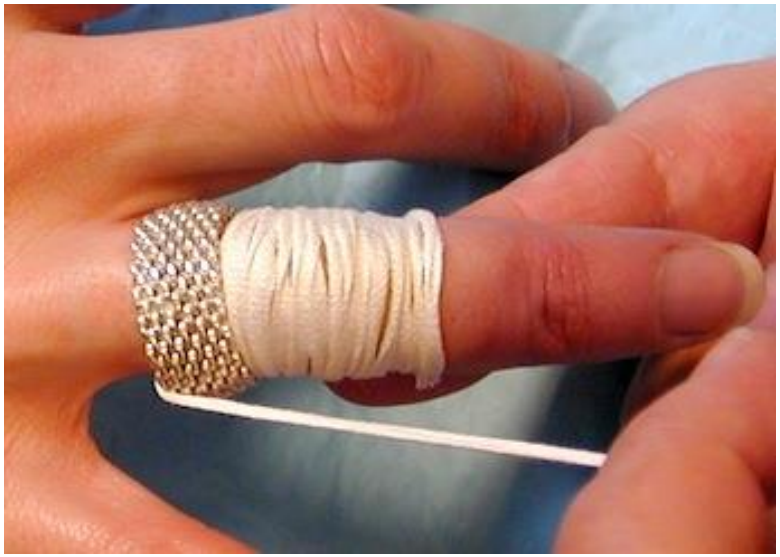
Transfusion

- Using a value-based transfusion target (eg 80g/L) creates higher mortality.

- Asymptomatic patients do not necessarily need acute transfusion. Consider iron infusion etc.

Ring removal

- Winding technique:



- But using the elastic strap from a hudson mask.

IV lines that we don't use

Limm EI et al. Ann Emerg Med 2013 Apr 23.

- Half of all IV cannulae placed in an Australian emergency department were never used to infuse fluids or medications.

Chest compressions – change operator more frequently

Badaki-Makun O et al. Pediatrics 2013 Mar.

- In a simulation study, percent adequate chest compressions performed by in-hospital providers fell below 70% within 120 seconds in child and adult manikins.

Chest compressions – man vs machine

Autopsy studies of non-survivors.

	Manual CPR	Mechanical CPR
Multiple rib fractures	57%	65%
Sternal fractures	54%	58%
Intrathoracic bleeding	36%	49%
Cardiac injuries	7%	15%
Liver injuries	4%	7%

The reality: CPR is a brutal, violent intervention.

Clean catch urine in neonate

Herreros-Fernandez ML et al. *Arch. Dis. Child.* 2013; 98: 27–9

- Pre-procedure:
  - Feed the child
  - Wait 25 min
  - clean the genitals with soap and water
  - apply non-pharmacological analgesia (dummy or sucrose syrup).

- Procedure:
  - The baby is then held up by the armpits
  - A second person taps the suprapubic region for 30 secs
  - Then massages the lumbar paravertebral region for 30 s.
  - This is repeated until micturition occurs.

- Success was defined as urine collected within 5 min and this was achieved in 86% children.
- Median time of 45 secs.

Procedural sedation using one doctor/one nurse model – safe for orthopaedic procedures

Vinson DR and Hoehn C. West J Emerg Med 2013 Feb.

- This supports the recent change in US recommendations reducing the number of physicians required for procedural sedation from two to one

Smelly Feet

- 30ml of antacid (Mylanta) into each disposable boot