**EMSSA Emergency Medicine in the Developing World 2011 – Very rough notes**

**Day 1 – 15 November 2011**

**Forgive typographical and grammatical errors!**

## Stroke – Josh Goldstein

- Time is brain
- It is the combination of decreased cerebral blood flow AND time that leads to lasting brain injury
- Mimics of stroke : conversion disorder, complicated migraine, hypoglycaemia, hypertensive encephalopathy, seizure.
- Don't forget the ECG – arrhythmias are relatively common.
- Normoxia is important, but hyperoxia may be harmful
- Neuro-imaging: AHA goal is door-to-CT in 25 minutes (non-contrast CT)
- Thrombolytics
    - Controversial! One trial showed advantage (NINDS), many showed harm
    - Meta-analysis (Lancet 2004): odds of a good outcome decrease steadily from time of onset.
    - ECASS3 showed improved outcomes out to 4.5 hours
    - ICH is increased in tPA groups, but there is little difference in mortality
    - More patients in treatment group in ECASS-3 had no symptoms after treatment rather than placebo
    - Benefit of throbolytics is thus CRITICALLY time related.
- Are outcomes worse in community vs, academic hospitals? A training and QI program is essential.
- SITS-MOST (European registry) seems to indicate that these protocols can be applied successfully in the 'real world'
- A busy ED is a significant factor in increasing door-to-needle time
- Giving tPA to patients that don't have a stroke doesn't seem to cause bleeds.
- Multidisciplinary commitment is needed to make a program work

## The Crashing Asthmatic – Sa'ad Lahri

- Signs of impending doom: increased WOB, diaphoresis, agitation, hypoxia, quiet…
- Not everything that wheezes is asthma – never let asthmatics diagnose themselves
- Peak flow does not have a role in the severe asthma event
- Intubation in the crashing asthmatic is a clinical decision – serial blood gasses take time and simply cause delay. EtCO2 is more useful
- Serum potassium is a vital test (beta-2 agonists -> hypokalaemia ->torsades)
- Dangerous/not useful – theophylline/inhaled lignocaine/inhaled furosemide

- IV salbutamol appears to offer no clinical benefit, but can be useful if there is no inline nebuliser
- Mucus plugging prevents B2's from working
- Adrenaline is useful in near-fatal asthma – alpha and beta effects
- Steroids in severe asthma – give it IV
- MgSO4 given IV (2g over 30min)
- NIV – Jury is still out. Perhaps as part of the 'delayed sequence intubation' with administration of ketamine
- Intubation should be taken very seriously. It DOES NOT treat air trapping or bronchoconstriction.
- Intubation should be by most experienced intubator with the largest tube possiblt
- Mechanical ventilation – low tidal volume with low respiratory rate, Pplat <30. Allow permissive hypocapnea
- Try to avoid post-intubation paralysis
- Chest squeeze and ICDs when needed

**Life-Threatening Anaphylaxis – No Time for Rash Decisions - Walther Kloek**

- Can happen to anyone at any time , without any prior indication or history
- Skin contact/injection/inhlation/ingestion
- Most common - insects, drugs (esp antibiotics, contrast, NSAIDs, nuts, latex
- No allergen identified in 5-30% of cases
- Anaphylactoid reaction does not require prior sensitivity – manifestations and management is identical
- Mechanisms, however, vary, as do course, organ involvement, and severity
- No randomised trials are available
- Severity is proportional to speed of onset – can be fatal in 10-15 minutes
- B-blockers antagonate response to adrenaline and increase incidence and severity
- Diagnosis requires invoivement of at least two organ systems (upper airway, lower airway, CVS, GIT, skin)
- There is only one treatment in the initial stages of anaphylaxis – ADRENALINE!
- Adrenaline is ubiquitous, cheap, and easy to use by IM injection – it should be available everywhere.
- 'EpiPens' are a viable alternative but are *very* expensive (especially from a developing world context)
- 20% of patients will need a second dose of adrenaline
- Adrenaline infusion only if unresponsive to IM adrenaline and aggressive fluid therapy (use 1mg in 200ml via 60 dropper at one drop per second)
- Nebulised salbutamol and ipratropium for ongoing wheezing (no evidence for nebuslised adrenaline)
- Controversies – H2 receptor antagonists, glucagon (if on beta blockers)
- Confirm diagnosis with mast cell tryptase (immediate/2hrs/24hrs)

**CT Head under Scarce Resources – When Guidelines Might Not Apply - Andrew Kessler**

- Most published guidelines stem from well-resourced environments (US, Canada, Australia, Europe, etc)
- Guidelines are context and resource dependant
- We need to consider guidelines for low income countries (LIC's)
- Consider routine colonoscopy vs, IMCI
- CT is a very scarce resource in the developing world
- Canadian Head CT Rules proven to be quite effective in their setting.
- What about the situation (more common in the developing context) of patients presenting DAYS after injury, who no have no neurological findings?
- Consider which conditions have expectant management vs surgery
- Meningitis epidemiology in Botswana – 15% crypto, 3% bacterial, 77-82% no pathogen, 5% TB (likely underdetecting, especially compared to SA and Zimbabwe)
- Rational guidelines are best if made on the local epidemiological evidence.
- Generate your own evidence-based guidelines!

**Keynote – Global Approach to Teaching EM in the 21st Century – Rob Rogers (Maryland)**

- How to teach without teaching – being a good role model
- Role modelling = how to be a good doctor
- "Example is not the main thing in influencing others – it is the only thing" (Albert Schweitzer)
- Internationally, we all have the same goal – to teach how to take great care of patients
- Globally, differences in educational methods are highly influenced by the availability of tools, technology, and the differences in burden of disease.
- We are all busy in the ED, and formal teaching takes a lot of time. Being a good role model is something you can do all the time.
- Learners are watching their teachers _all the time_ - make sure your behaviour is worth learning!
- EM specialises in taking care of the undifferentiated patient, ruling out the worst case scenario, managing the airway, doing procedures, taking care of trauma patients, resuscitating patients, supervising EMS
- Role modelling: TALK principle and WALK principle– Think out loud, Activate the learner, Listen smart, Keep it simple. (See: Reilly – Inconvenient truths about effective clinical teaching, Lancet 2007)
- Two take-home messages and a challenge:
    - Traditional teaching modalities are vitally important… but they are not the whole picture
    - Example is on the main thing – it is the only thing
    - Challenge: Think about what others are seeing in you as you work your next shift

**Keynote – Implementing locally appropriate guidelines and training to improve care of serious illness in children in Kenyan hospitals – Mike English**

- Training courses alone do not significantly change medical practices – they must be part of a consistent approach
- Rural hospitals are often crowded and disorganised
- Care is often provided by clinicians with minimal clinical training, especially in paediatrics and most particularly in neonatal care.
- We have to be able to measure to effect a change.
- Taking ownership of a problem/process/solution is essential
- ETAT – Emergency Triage. Assessment and Treatment
- Specific focus on 10 lifesaving therapies – CPR, oxygen, fluids for shock, anticonvulsants, parenteral glucose, bronchodilators, blood transfusion, antimalarial, nutritional support, parenteral glucose.
- ETAT+ adds admission care - Planning the first 24-48 hours treatment
- Self-assessment is a critical part of the learning process – performed *in the hospital they are working in.*

**Trauma Plenary**

**Guidelines and Controversies in the Management of the Adult Patient with Traumatic Brain Injury**

- Brain Trauma Foundation (BTF) Guidelines first published in 1995 and now in third (2007) edition – consequent 50% reduction in mortality (?evidence?)
- Primary injury is potentially preventable but irreversible
- Secondary injury is our focus
- BP and oxygenation –
    - maintain SBP>90mmHg (level II)
    - single episodes od hypotension double the mortality
    - hypertonic fluids decrease fluid requirements and increase BP, but there is no morbidity/mortality outcome improvement
    - Maintain PaO2>60mmHg or SpO2>90% (Level III)
- Hyperosmolar therapy (eg mannitol)
    - is effective for improving ICP, CPP, CBF (Level III)
    - Mannitol should be restricted to patients who have intracranial pressure monitoring, or those with signs of progressive deterioration or transtentorial herniation
    - Can buy time waiting for CT/OT
    - 3 studies showed that hypertonic saline improved ICP in patients refractory to mannitol
- Prophylactic Hypothermia
    - Patients are more likely to have favourable neurological outcomes (level III)
    - Longer duration (3-5 days) looks better

    - Eurotherm3235 Trial will hopefully answer the remaining questions
- Infection prophylaxis
    - Increased incidence of infections with invasive ventilation and monitoring
    - Prophlactic antibiotics DO NOT reduce infections
    - More resistant infections emerge with prophlaxis
- DVT prophylaxis
    - Increased incidence of DVT in TBI
    - Intermittent pneumatic stockings in combination with anticoagulation are indicated (level III)
    - Anticoagulation only instituted 24 hours post injury/surgery
- ICP monitoring
    - Useful in predicting outcomes and guiding therapy
    - ICP>20mmHg is an indication for treatment (Level II)
    - ICP should be monitored in all patients with GCS<9 or abnormal CT
    - Prophylactic treatment (barbiturates/hypoventilation/paralysis/etc) of ICP without monitoring is not without risk
    - CPP target = 50-70mmHg
    - CPP < 50mmHg is assosciated with high mortality (level III)
- Anaesthetics/analgesics/sedatives
    - No real difference in outcomes either way
    - Pain, agitation, etc can raise ICP
    - Barbiturates have cerebroprotective effects, but cause hypotension if used injudiciously
    - No significant difference between propofol and benzodiazepines
    - Morphine is good for analgesia, but has little sedative effect (duh)
    - Beware rebound ICP with reversal of morphine with naloxone
- Post-traumatic seizures
    - Multiple risk factors
    - Anticonvulsants are indicated to decrease the incidence of early PTS (level II)
    - Early PTS does not indicate worse outcomes
    - Valproate may be associated with higher mortality
- Hyperventilation
    - Prophylactic hyperventilation NOT recommended (level III)
    - Temporising measure only (to buy time)
    - If hyperventilation is used, SjO2 or PbrO2 monitoring should also be employed
- Steroids – NO ROLE.  High dose steroids have INCREASED MORTALITY
- Decompressive craniotomy
    - Associated with improved outcomes in selected patients
    - Early CT scan and neurosurgery consult is imperative
- In practice
    - Head up 30 degrees
    - Maintain SBP > 90mmHg
    - PaO2 > 60mmHg
    - Early ICP monitoring

- No hyperventilation
- PaCO2 35-40mmHg
- Manage pain and anxiety
- Antiseizure prophylaxis
- Keep an eye on therapeutic hypothermia
- Decompressive craniotomy where indicated and skills allow

**CRASH2 – Tim Coats**

- Mortality risk ratio 0.91 with tranexamic acid (9% reduction in deaths)
- No increased thromboembolic complications (less!)
- Indication in the results that time is important – the earlier the better
- Possible trend towards harm if given after 3 hours
- TXA is cheap ($2 per patient), has a long shelf life, and is heat stable
- Potential to save 150 000 lives per year.
- Problem – research not led by a drug company – very difficult to get the drug relicensed worldwide because the drug companies can't make a good profit.
- Now included in WHO Essential Drugs List

**Implementing CRASH2 in the developing world –**

- Delayed presentation after trauma is a common problem in the third world
- Often evacuation to hospital to private cars is often effective where ambulance services are overwhelmed
- Getting drug on ambulances and into peripheral hospitals very important
- Re-registration of the drug is required – political, professional and public pressure needs to be consistent

**New Advances in Airway Management – Michael Abraham**

- Plan A for airways should always be direct laryngoscopy – all should be familiar with the standard equipment and RSI medication
- Disposable flexible fiberoptic scope – Ambu A-scope. Useful for assisted intubation and nasoendoscopy. Always available (as the you throw away the flexible portion and only keep the screen).
- King Laryngoscope – guided ET; interchangeable (disposable) blades
- Glidescope – use well established
- Storz Video Laryngoscope – interchangeable systems (flexible scopes versus laryngoscopes etc)
- Capnography for procedural sedation

- Ultrasonography – longitudinal midline US shows membranes nicely. Transverse position just lateral to thyroid shows trachea well.

**Trauma Resuscitation Pitfalls – Tim Hardcastle**

- In SA, 14% of the burden of disease is trauma. Our ratio of penetrating:blunt is much higher than most of the world.
- Handover – listen to the mechanism of injury, time course, and listen to the EMS crew. Always assume that there is more to find.
- Severity of energy transfer is important, not velocity. Don't underestimate minor overall injury with focussed transfer (eg. handlebar).
- Get the patient off the spineboard quickly
- Use a team! Ideal size depends on context. Use allied staff.
- Not following protocols leads to missed steps in the pathways of care. Deviations should be justified. Protocols enable the whole team to be on the same page for each patient, and allow for audit and QI. They should be standardised across an entire system.
- Airway – still kills the fastest after massive haemorrhage. Assume that it will get worse. Other pitfalls – not removing the c-collar. Securing OPA in the mouth. Intubating too deep. Not having a plan for RSI.
- Breathing – Chest trauma kills 25% of trauma patients. Penetrating injuries are easier to manage. Blunt chest trauma needs a thorough search for occult injury. Remember that lung contusion causes decreased air entry in the absence of haemo/pneumothorax. Chest tubes: NO TROCHARS. Don't ever clamp. Use lung protective ventilation.
- More pitfalls in chest trauma – beware missing anterior pneumothorax or posterior hemothorax with supine CXR's. Do a CT if in doubt. Blunt cardiac injury is best screened for using Troponin I and ECHO. Missed oesophageal injury is catastrophic and easy to miss – do early liberal contrast swallows.
- Ventilate using the right method. If the chest involves more than 25% (volumetric) lung contusion, use invasive ventilation early.
- Circulation – it is essential to have a massive transfusion policy. Try to use fresh blood. Less crystalloid, more colloid. Use haemostatic resuscitation whenever possible (1:1:1 is a target). MARCH ahead to victory! Don't forget to examine closely for occult vascular injury. Tourniquets certainly have a place. Haemostatic dressings are good, but need to be regulated.
- Plan for autotransfusion! Use suitable chest drain devices or get a cell-saver in larger units.
- Disability – Resuscitate, manage ABC, scan early.
- Exposure/Environment – cold kills. Warm patients actively.
- Pitfall – not calling the surgeon early.
- Don't miss the subtle markers of chaos:
    - Lactate (or base excess if you don't have lactate)
    - PCT may be useful later
    - TEG or ROTEM is better than INR/PTT
    - DEFG: Don't ever forget glucose
    - Low Hb on arrival is a bad sign
    - Watch ionised calcium on ABG
- Imaging – penetrating trauma needs little imaging and lots of cutting. Stable blunt trauma is exactly the opposite. Unstable blunt trauma: use FAST (and get better in the process).

- Secondary Survey – undress completely. Log-roll to both sides. Check small bones of hands and feet.
- Kids hide injury well, until they crash
- The elderly break so easily they get untreated.
- Don't miss injuries of abuse.
- To be a Trauma Centre requires more than just an Emergency Centre

**The Need for Trauma Surgeons in the Emergency Room – Mike Wells**

**(Controversial!)**

- First 30 minutes of resus in trauma = damage control (arrest haemorrhage, limit hypothermia, acidosis and coagulopathy, and maintain the balance between organ perfusion and exacerbating haemorrhage). CABCDE. The first 30 minutes of resuscitation can be accomplished by any expert in resus (EM, surgery, etc)
- Within the first 60 minutes – damage control surgery, ATLS secondary survey, appropriate radiological interventions.
- The trauma surgeon is clearly needed/better…
    - When urgent surgery is required
    - When the decision to operate is a challenge
    - When the patient needs to bypass the ED and go straight to the OT!
- When is a surgeon clearly not better?
    - Routine procedures
    - ED thoracotomy
    - Severely injured children
    - Patients with co-morbidities
- Nay HR & Wells M – Need for trauma surgeon presence in the ED. Very heavily skewed towards blunt vs. penetrating trauma (more applicable to the first world rather than SA!).
- Ultimately – team approach is best. Trauma surgery should be available within 30 minutes.

**Myonephropathic Syndrome – Tim Hardcastle**

- Myolgobinuric acute renal dysfunction which is the secondary result of muscle breakdown, whatever the mechanism (massive trauma, crush injury, community justice, etc)
- Pathophysiology:
    - two types – aerobic vs. anaerobic
    - Muscle cell ischaemia -> cellular oedema -> may lead to compartmental pressure increase
    - Reperfusion -> release of cellular breakdown/metabolic products
    - Relative hypocalcaemia – moving into cells
    - Myoglobin is nephrosedimentary
    - Potassium build-up -> cardiotoxicity
    - Obstructive nephropathy combined with ATN = DILEMMA!

- Causes – entrapment, compartment syndrome, community beatings, alcoholic rhabdomyolysis, exhaustion rhabdomyolysis, electrical and other burns (lightning!), cytotoxic snakebites
- Laboratory diagnosis
    - High index of suscpicion
    - Raised K, urea, creatinine
    - Venous bicarb <17 is a poor prognosticator
    - ABG: avoid acidosis and hypoxia
    - CPK – indicator of extent of muscle injury (>8000)
    - Urine dipsticks and microscopy – blood positive but no cells (myoglobin!)
- SA Study – linear correlation between %BSA and renal failure. Risk was reversed by a good saline flush. Mortality 5%. Risk of ARF 83%; RRT needed in 17%. Bicarb and mannitol had NO effect on reducing the need for RRT.
- Treatment: Prophylaxis
    - Think of the diagnosis and start fluids early
    - Normal saline or lactated Ringers – 500ml/hr (beware hyperkalaemia)
    - Maintian urine output above 1ml/kg/hr
    - Use CaCl2 in preference to CaGluconate
    - If oligo-anuric- fluid restrict to equal output and get RRT (usually a good and rapid response, averaging 5 sessions). Can use peritoneal dialysis if there has been no abdominal surgery
    - Keep up with losses if the patient becomes polyuric, or you will suffer a second hit.

**Distracted Driving – A Preventable Trauma - Jeffrey Sankoff**

I didn't get many notes, as I was answering emails on my iPhone (heh heh heh)…

- Not just phones – eating, makeup, reading maps, using a GPS, watching a video, tweaking the radio…
- 2009 NHTSA data: roughly 5500 deaths and 448000 injuries in 2009 due to distracted driving. About 30% of all accidents. Trends from 2005-2009 showed 6% increase. Under 20's is the biggest age group, followed by 20-29.
- South Africa Data: 2009 alone had 10 857 fatalities (up 5% from 2007). 83% of crashes are attributable to human factors. Excessive speed and alcohol are large contributors.
- Cell phone use in SA: 2005 – 10.2 million South Africans had cell phones. Observational study by the AA showed 7% using phone while driving.
- Drews & Strayer (Utah) compared driver error when talking on a phone vs talking to a passenger. Talking on a cell phone dramatically increased errors.
- Now a preponderance of data that taking on the phone (rather than just holding it) worsens driving performance DRAMATICALLY. Decreased reaction times, slower decision making, increased navigation errors. (23 studies in meta-analysis).
- Comparison of cell phone use compared to alcohol consumption: Intoxicated drivers tend to drive more aggressively, but the cell phone users have MORE collisions.

- Text messaging caused divers to take their eyes off the road 400% more, and tend to wander around the road, causing 28% more lane excursions.
- Reducing the risk:
    - Turn off the phones!
    - During the Blackberry crash, the rate of road traffic accidents in Dubai and Abu Dhabi fell by 20 and 40% respectively.
    - Regulatory efforts in combination with media campaigns do create a measurable effect, but whether this can be maintained is still to be seen.
    - Educational programs mostly aimed at new drivers (highest cell phone and especially text message use, highest rate of crashes, etc). Success of education still has to be determined.
    - Effective technologies – voice-activated phones? (Not really solving the problem)
    - Phone software – eg. CellControl – disabling phone when moving faster than a certain speed.

**EMSSA Emergency Medicine in the Developing World 2011**

**Day 2 – Ross' Very Rough Notes**

**These are typed on the fly, from the sessions I have attended, and are therefore not perfect nor grammatically complete ;) Please excuse any errors, omissions, etc. Profs Lee Wallis and Joe Lex have made provision for audio of these talks to be made available on freeemergencytalks.net in the near future.**

**Blood Transfusion Alternatives – Eric Hodgson (Breakfast Symposium)**

- Increase in demand for blood transfusion products but decreasing supply
- African HIV epidemic straining supplies
- Acute resus – Hb > 10g/dL probably required
- ICU/longer term – Hb >7 g/dL should be sufficient unless background illness
- Tissue oxygenation is what counts, not Hb (DO2 is the most important)
- DO2 requires absolute minimum Hb 3 g/dL
- Extraction reserve from Hb 25-75% (1-3 molecules 'extra' under normal conditions)
- Increase a-v CO2 gradient implies patient is nearing limit of reserve
- ScvO2 use paired with ABG can thus be used as a guide (ala Rivers EGDT)
- Lactate increase follows after decrease in ScvO2
- ScvO2 >70% and/or lactate >8 may be a good triage criterion
- Patient's blood is best – keep it in!
- Maintain normothermia – one litre of room-air fluid can drop core temperature by 0.5-1 degree C
- Blood conservation in trauma – permissive hypotension where it is not contra-indicated. In SA with long delays (>90 minutes) need some more resus – aim for SBP>100/MAP>60. Vasopressin being researched.

- Hemopure:
    - 3 year shelf life
    - Bovine haemoglobin
    - Functions as a colloid – no clotting factors
    - Hypertension with rapid administration (due to NO binding)
    - Bridge to transfusion/neosynthesis of blood (Iron available in the Hemopure; increased EPO due to decreased red cell mass)
- HBBS given a bad name by a very flawed meta-analysis
- Potential uses of blood substitutes are legion
- Blood conservation – intraoperative cell salvage (Takagi Arch Surg 2007). Can be used with a fresh bowel perforation
- Anticoagulation:
    - Platelets effective in 4hrs after aspirin and 12 hrs after clopidogrel
    - Warfarin can be reversed in minutes with PCC(Haemosolvex), hours with FFP and days with Vitamin K
    - Best assessed with TEG if available.
    - Aim for
        - Platelets >50 (if bleeding)
        - PTT <2x control
        - Fibrinogen <1 -> cryoprecipitate
        - Fibrinogen 1-2 -> 1-2u plasma
        - Fibrinogen >2 -> possible error; consider tranexamic acid

**Haemopure – An Alternative to Acute Anaemia Management for the Developing World – Colin Mackenzie (Breakfast Symposium)**

**Conflicts of interest declared.**

- UMD Shock Trauma – about 70% of trauma patients need no more than 2-3 units of packed red blood cells
- HBOC vs RBC – Bovine Hb vs human, higher O2 carrying capacity, much less viscosity, much shorter half-life; long shelf life. (Similar oncotic pressure etc).
- Hemopure:
    - No cross-match/typing needed
    - Ready-to-use
    - No know disease transmission
    - Can be stored at 4-30 degrees for 3 years
    - Carries O2 and treats hypovolaemia
    - No known immune effects
    - Rheological advantage
- Fewer resources and less infrastructure required to maintain a supply of HBOC rather than blood.
- Transfusion errors are not an issue due to lack of cross-match requirement.
- Testing blood for transmitted diseases now accounts for 50% of the cost of a unit.
- Is Hemopure safe and efficacious?

    - HEM-115 study (n=688) – no mortality difference
    - Moderate needs (<3u) side effects and mortality identical
    - No MI's in patients receiving <10u in Hemopure arm and one in RBC arm
- Several case studies presented
- Best use = when blood is not available or accessible.
- JAMA meta-analysis (May 2008) – 5 different HBOC's analysed as one group, 2 of which had already been withdrawn more than a decade before the meta-analysis was done. Removing 1 of these would change the result to positive!

**Emergency Management of Acute Intracerebral Haemorrhage – Joshua Goldstein**

- Talk focus: primary intraparencymal/intracerebral haemorrhage
- Constitutes 10-15% of strokes with mortality between 35 and 52%
- Locations: brainstem, cerebellum, thalamus, basal ganglia, lobar.
- Initial diagnosis: abrupt headache, vomiting, seizure, altered mental state, any focal or generalised neurological symptoms, and otherwise the same for acute stroke.
- EMS evaluation: ABCs, cardiac monitoring, IV access, O2 if hypoxic, NPO, alert and transfer
- Initial care: as per 'suspected stroke'. Balance risk of loss of airway against loss of neuro exam. CT head ASAP whenever available.
- Major predictors of outcome: Initial GCS and ICH volume
- Factors associated with poor outcome that we can treat:
    - Hematoma expansion – 38% of patients presenting within 3 hours of onset have significant haematoma growth .
        - Blood pressure control is controversial – minimal literature available (most of it intra-operative from neurosurgery). 'Resetting' of CBF autoregulation to a higher-than-normal level is a concern. INTERACT study (SBP<180 vs SBP<140): 36% decreased risk of haematoma expansion, but no effect on outcome. INTERACT2 (specifically powered to measure outcome effect) is currently underway. AHA guidelines exist (all class C) advising a moderate decrease in BP
        - Anticoagulation reversal – FFP use to reverse warfarin (contains factors II, VII, IX and X required) can require 10u (2000ml) to reverse INR. This can be a problem in patients with background of cardiac disease (for which they get the warfarin…). Time to reversal varies in studies: 7-32 hours due to practical considerations. PCC (prothrombin complex concentrate) has rapid action (about 20 minutes) with minimum volume required, but they are expensive and carry a risk of thrombotic complications and DIC. IV Vitamin K has an effect as early as 4 hours, and can reverse the INR as early as 8 hours. Risks include anaphylaxis (rare). Factor VIIa also reverses the INR within minutes, but once again there is a risk of increased thrombotic complication.
    - Hyperglycaemia

        - Associated with poor outcome, even in the absence of diabetes. Hyperglycaemia is neurotoxic.
        - GIST trial – n=933 (12% ICH), intensive insulin vs. sliding scale: No difference in outcome
        - QASC trial – n=1696 (5% ICH), glucose control vs. none (intervention group also had swallow screen and paracetamol for fever): Poor outcome 42 vs 58%
    - Large haematoma: surgical evacuation
        - STICH trial – n=477+505: OR 0.89 (CI 0.66-1.19) therefore no benefit to urgent evacuation
        - EVD placement for intraventricular blood – never been studied and probably never will be, as most people presume drainage of obstructive hydrocephalus is obvious.
- Clinical seizures should be treated with anti-epileptics; routine prophylaxis is not indicated.

**Intubation: Preventing the Clean Kill – Sa'ad Lahri**

- Most discuss the anatomically difficult airway – what about the physiologically difficult airway?
- Pre-oxygenation vs. denitrogenation
- Patients who are not breathing adequately cannot pre-oxygenate adequately!
- Most patients needing intubation have some degree of physiological shunt
- Overcoming shunt relies on increasing the mean airway pressure
- BVM pre-oxygenation relies on assisted ventilation and a good mask seal… and you NEED A PEEP VALVE
- NIV (CPAP) can be used for pre-oxygenation in the ED
- Concept – using nasal oxygen while performing intubation to allow continued insufflation
- Patient position for intubation (ear to sternal notch) assists 'apnoeic oxygenation'
- "Delayed Sequence Intuabtion" for the delirious patient using ketamine (or dexmedetomidine or fentanyl & midaz titrated).
- Bicarb to buy time in severe acidosis?
- 'Push dose' pressors for pre-emptive control of drop in BP on induction – phenylephrine
- Induction agents – ketamine or etomidate, but beware patients with maximum sympathetic stimulation – decrease dose.
- Beware hypoventilation post intubation – measure ABG and watch pCO2

**Dysrhythmia Management: The Fast, the Furious and the Feeble – Walther Kloek**

- ABCDE approach as a basis
- E = ECG – get a rhythm strip as a minimum, 12 lead ECG by preference
- The Feeble – Bradycardia:
    - Signs of instability: hypotension, altered mental state, signs of shock, ischaemic pain/discomfort, acute heart failure.
    - Before giving atropine, exclude: hypoxia, hypothermia and head injury. Be cautious in head injury, hyperkalaemia and heart transplant.
    - If atropine is unsuccessful, consider adrenaline, dopamine, glucagon (beta- or Ca-channel blockage OD) or pacing
- The Fast – Narrow Complex Tachycardia
    - HR>150 with QRS<0.12sec
    - If stable:
        - Vagal manoeuvres – Valsalva, facial application of ice water, carotid sinus massage
        - Drugs: Amiodarone, Beta-blockers, Ca-channel blockers, Digoxin
    - If unstable: Cardiovert!
- The Furious – Wide Complex Tachycardia
    - Usually unstable, but if stable, consider adenosine but amiodarone is the drug of choice
    - Cardiovert if unstable

**Current Management of Heart Failure – Doug Ander**

- Diagnosis is difficult based on common variables – limited sensitivity of physical examination, ECG and CXR (normal in 20%)
- BNP >100pg/ml is more accurate than clinical criteria for diagnosis, but cannot be used alone. Greatest value is for the 'intermediate' patients. May be lower than expected in flash pulmonary oedema. Mild elevation can be found in cor pulmonale, PE and COPD. Inverse relationship with BMI and higher with renal failure.
- Ultrasound for "lung comets" has proven to have good sensitivity in initial studies
- ASCEND-HF clinical decision pathway useful in hypertensives
- Morphine has gone out of favour – not good evidence. Perhaps good if intubation is inevitable
- Nitrates very effective in controlling BP and reducing afterload
- ACE-I may work – small studies showed decreased intubation rates
- Furosemide helpful in the acute setting but nitrates better
- NIV excellent
- Hypotensive patients – fluid bolus if intravascularly depleted, then inotropes
- Don't forget to consider palliative care in the correct cases.
- Ultrafiltration can be useful if it is available (although it is expensive and time intensive)

**Keynote: A Skeptic's Guide to Reading the Medical Literature - Joe Lex**

- See freeemergencytalks.net for talks – everything from this conference will also be there soon!
- Be a skeptic, not a cynic
- There are now more than 10 000 medical journals (a logarithmic increase!)
- Remember that journals need to make money to survive. They have no fiduciary relationship with patients!
- Peer review is the best we have – but it is a "flawed process at the heart of science" (in the words of the editor of the BMJ). It is prone to bias and abuse, and hopeless at spotting fraud and error. "Like poetry, love or justice". "If peer review was a drug, it would never get onto the market."
- Publishing negative results, despite the quality of the study, is unpopular with readers and journal editors alike. However, consistent bias in reporting positive findings only skews the statistics when meta-analysis is done.
- Peer review misses things – demonstrated in studies (see Baxt WB et al 1998)
- Looking at articles, watch out for independent predictors, strong associations, citation bias, amplification, invention, work-up bias, spectrum bias, referral bias and so on
- Least favourite statistic – Negative Predictive Value. If disease prevalence is low, the NPV will OF COURSE be low.
- Citation bias – citing only articles that support our hypothesis
- Beware multiple hypotheses!

- Absolute vs relative risk reductions (eg. statins – JUPITER trial). Absolute risk from 0.7% to 0.4% is a 43% relative risk reduction…
- Beware surrogate and composite endpoints!
- Full slideset available from Prof Lex via email (as are the references)

**Keynote: An integrated, ethically-driven environmental model of clinical decision making - Lisa Wolf**

- 119 million patients seen in ED's in USA in 2009
- Who drives patient care in emergency settings? Doctors, nurses, hospitalists, patients?
- Ethnographic study of acuity assignation (2010)
    - Sample of emergency nurses, ethnographic approach, 12 participants, 150 initial patient encounters over 3 months
    - Patients reported acuity to be a function of patient presentation, complain, duration of symptoms and body habitus. Acuity was also influenced by environmental and contextual challenges: language barriers, patient volume, unit leadership, communication with patients and providers, and length of time in waiting room prior to triage.
    - "Who's in the back?" Phenomenon – some nurses made decisions about acuity, further assessment and initial diagnostic tests *based solely* on the physician was.
    - Physiologic data was not rigorously collected nor considered as a primary determinant of acuity.
    - Moral reasoning and drive surfaced as an important factor.
- Investigation of triage competency (2011)
    - Lack of understanding around critical cues – the signs, symptoms and history that send the provider down one path and away from another.
    - Intuitive vs hypothetico-deductive thinking – the former is efficient but inaccurate, where the latter is accurate but time-consuming
- Core, intermediate and influential elements need to be considered in an integrative model for clinical decision making
- Unit leadership is the best surrogate for (the almost impossible to teach concept of) moral reasoning
- Proclivity for high moral reasoning is the factor that closes the loop in critical thinking; it inspires us to ask the questions "Am I right?" and "Is there a way I can be wrong?"
- Important elements to consider:
    - Knowledge base
    - Moral reasoning
    - Drive to act
    - Environmental structure:
        - Standards
        - Communication
        - Teamwork
        - Autonomy of practice

- "The end result of critical thinking is not thought: it is action"

**Difficult Airway Management: Case Studies – Chuck Pozner**

- Preparation and practice are key to being ready to manage difficult airways
- Four important questions:
    - Is the airway difficult - Anatomic concerns?
    - Is the patient compromised - Physiologic concerns?
    - What is your primary approach?
    - What is your rescue approach?
- Difficult airway situations to anticipate:
    - Difficult DL – LEMON – Look externally, Evaluate 3-3-2, Mallampati, Obstruction & Obesity, Neck movements
    - Difficult facemask – MOANS – Mask seal (anatomical abnormality, wounds, beards, etc), Obstruction & Obesity, Age (extremes), No teeth, Stiff (difficult ventilation)
    - Difficult EGD (Extraglottic device) – RODS – Restricted mouth opening, Obstruction & Obesity, Distortion, Stiff lungs or c-Spine
    - Difficult cric – SHORT – Surgery or disrupted airway, Haematoma (or other mass), Obstruction & Obesity, Radiation therapy, Tumour
- Difficult airway principles:
    - Patients need oxygen… not necessarily and ETT
    - Patients with multiple difficult airway attributes may be unsafe for paralytics
    - "One-shot" airways may need paralysis if you're forced to act
    - Always have a backup plan
- Primary Airway Management Plan?
    - RSI?
    - Sedated, awake intubation?
    - Primary surgical airway?
    - One always needs an airway rescue plan: Double set-up, extraglottic, or something else?
- Airway rescue plan?
    - RSI?
    - Rescue surgical airway?
    - Alternative airway device
        - Blind insertion device?
        - Optical stylet?
        - Video laryngoscopy?
        - Flexible fiberoptic?
- Case 1: Angio-oedema (68yr female, just started on ACE-I)
    - Good plan – Awake intubation, flexible fiberoptic if possible, surgical airway as ultimate backup.
    - Dry and anaesthetise the airway – atomised and nebulised lignocaine. Nasal approach with flexible fiberscope. Judicious sedation or none at all. Surgical airway if precipitous failure.

- Case 2: Aspirated foreign body (62yr male, “choking”, collapses in ED)
    - Good plan – “crash airway” -> immediate DL, remove foreign body if seen, intubate and ventilate if possible.
    - If obstruction is infraglottic, use ETT to push it all the way down into a bronchus, retract ETT and try again to ventilate.
- Case 3: Severe Asthmatic (25yr female, tachycardic & tachypnoeic, beginning to desaturate)
    - Rapid RSI; EGD as backup; cric if complete failure
    - Lignocain nebusised if time to reduce reactive airways
    - Ketamine good
- Summary:  All in the evaluation
- Know your pneumonics
- Always have a plan B
- Remember some nuacnces of specific cases
- Practice practice

**Care in Austere Circumstances - Theo Ligthelm**

- 1:2:4 principle
    - most casualties on the battlefield still bleed to death
    - Emergency care/ ALS within 1 hour
    - Surgical resuscitation within 2 hours
    - Definitive care within 4 hours
- Level 1 resuscitation post as close to the battlefield as possible
- Forward surgical capabilities near the battlefield
- Rapid evacuation to definitive care at field hospital care on land/rail/sea and even in the air.
- Caring for patients under the special circumstances such as chem/bio/nuke threats
- Military fatality rates – major death in <5min and 11-30min time brackets.  <5 usually fatally wounded; focus on the 11-30min bracket
- 78% of injuries now are blast injuries rather than gunshots in modern warfare
- Potentially survivable deaths – 85% due to haemorrhage!  Of this, 31% is compressible haemorrhage…
- Algorithm starts with a C – Catastrophic Haemorrhage Control
- Tourniquets save lives and red blood cells
- Combat ready clamp for femoral artery and abdominal aorta tourniquet (inflatable wedge)
- Internal Compression tourniquet especially useful in “junctional trauma” (shoulder and groin)
- Extensive use of topical hemostatic agents (haemostatic bandages and combat guaze)
- Tranexamic acid extensively supported in military literature
- 10-15% of preventable deaths due to airway obstruction
- NPA useful and well tolerated in semi-conscious patients and is extensively used
- Endotracheal intubation in the battlefield is not the answer (1 survival out of 492 cases)
- Surgical airway is the **first and last resort**

- Tension pneumothorax is a common cause of preventable death – bilateral needle decompression performed before calling death
- Hemopure for blood substitute
- Hypotensive resuscitation used
- Intra-osseous lines in sternum and tibia very useful
- Focus on resuscitation with blood products early
- "In combat settings, casualties without head injury who are of normal mental status with a palpable radial pulse should not receive fluid resuscitation"
- 1:1:1 resus (or even higher ratios – 2:3
- Body warming bags and fluid warmers in vehicles
- Damage control surgery very well adopted
- Low threshold for early damage control
- Ethical challenges:
    - Law of war (especially peace missions)
    - Civilian casualties
    - Own vs. enemy forces
    - Iraq – 93% of casualties are non-combatants, 34% under 14 years of age
    - Patients full of explosives… children with explosive belts… incubators with babies booby-trapped with explosives…
    - Prisoners of war
- Paradigm challenges
    - Triage is fighting force orientated – get the healthiest fighting again fast
    - Quality compassionate care is possible under austere conditions
    - Unique approaches are required.

**HPCSA EMS Protocols – Martin Botha**

- Consensus – mutually acceptable agreement that integrates interests of all parties, but does not require unanimous consent. All parties should be committed to its implementation.
- Consensus on science is the most important.
- Consensus on treatment recommendations is desirable, but only if there is good agreement
- We need professionals with good research skills to develop evidence-based guidelines for SA EMS
- (ILCOR process for analysing evidence and presenting it to consensus meeting demonstrated)
- GRADE approach is becoming the standard assessment tool
- HPCSA has begun the processes to review and develop protocols along these lines.
- Questions and debates:
    - What is the role of protocols for independent practitioners in SA?
    - What is the role of protocols for EMS Professionals?
    - Varying levels of experience, training, scope of practice, clinical governance, models and self-regulation.
    - How to integrate changes quickly into guidelines to reflect current best evidence?

**EMSSA Emergency Medicine in the Developing World 2011**

**Day 3 - Ross's Very Rough Notes**

**Due to my wilderness/rescue interests, most of the presentations I attended during the day have this flavour! Please note that these are transcribed in real-time and are thus there are potentially many errors or omissions. Please excuse spelling and typographical errors.**

## High Altitude Swim – Nepal Expedition 2010 – Sean Gottschalk (Breakfast Symposium)

- Extensive training and acclimatisation in ice pools (in fish refrigerator)
- Full ALS kit taken, but this is questionable if there is not excellent backup
- Severe gastro from the local water (Rx cipro & metronidazole) for the foreigners
- Mind-set is exceptionally important for acclimatisation
- Multiple strategies for dealing with acute mountain sickness (AMS)
- Insight of guides very valuable
- Diamox only after symptom onset (125mg BD)
- Dehydration leads very rapidly to illness
- Dryness and dust a problem above the treeline
- Very rapid changes in weather at high altitude
- Trekking poles ubiquitous
- Telemetric thermometer – measuring "pill" with transmitter to handheld device.
- One medevac – ankle ligamentous injury
- Anticipatory thermogenesis – Lewis Pugh can raise his body temperature in *anticipation* of a swim to about 38.4 degrees C through mental preparation
- Test swim a complete failure – usual aggressive tactic failed through hypoxia
- Telemetric temperature dropped to 35 degrees during swim
- "Sauna Tent" used to warm swimmer after swim
- Water temp around 5 degrees
- Medical conditions on the trip: altitude sickness, gastroenteritis, hypothermia, ankle sprains, conjunctivitis (irritant from dust), LRTI, conjunctivitis, facial cellulitis, sun exposure, rash.

## Wilderness Search and Rescue – It's all about the Patient – Cleeve Robertson

- The busiest of our wilderness areas is right in the middle of the city – Table Mountain
- Lack of appreciation for the rapidly changing weather conditions is a key cause of wilderness injury and illness even in our more 'benign' context
- Vehicular accidents in mountain passes are a common source of 'wilderness' rescues
- 20 years ago it took around 18 hours to reach, access, treat, carry and belay a patient off the mountain to definitive care. The focus was on the mountaineering required.
- The advent of regular use of helicopters changed the focus; more critically ill patients were reached in time, and the medical treatment of the patient has become paramount.

- An unforeseen consequence of this has been the decline of ground missions and thereby the deterioration of skills.
- The other technological revolution in Search and Rescue has been the use of the cell-phone – lost walkers can be "talked off the mountain", or National Parks rangers can be dispatched to walk them off the mountain. GPS-equipped phones now enable dispatch directly to co-ordinates of injured patients.
- Suicide remains the highest proportion of fatal injuries.
- Other key areas are search, technical rescue, logistics, communications, etc.

**Cold Injury: Hypothermia & Frostbite – Amit Chandra**

- Hypothermia: Accidental or Intentional; Primary or Secondary
- Accidental hypothermia – cold water immersion, cold weather sports, stranded motorists, intoxication, etc
- Intentional hypothermia – therapeutic and neuroprotective. Cardiac arrest, heart, head and spinal cord surgery, anaesthesia, etc
- Secondary hypothermia: sepsis, trauma, uremia, drugs (beta-blockers, clonidine, merepidine, neuroleptics, general anaesthetics), etc
- Mild (32-35), Moderate (30-32), Severe (<30)
- Temperature regulation: thalamic control, physical factors (conduction, convection, radiation, evaporation)
- Sequalae: refractory bradycardia, J or Osbourne waves, decreased LOC, shivering, diuresis
- Prehospital management: dry, warm environment, heat packs to axilla and groin, etc
- Dysrhythmias: atropine, lignocaine, pacing, defib ineffective below 30C
- Perfusing rhythm: external warming, warm infusion, monitor
- Non-perfusing rhythm: CPR with invasive warming. <30C: single defib if VF/VT, hold medications, focus on active warming. 30-34: defib as needed, double time between medications, continue warming. >34: follow normal protocols, continue warming.
- IV warm normal saline – 42-45C (use a microwave with a predetermined fluid chart)
- Warmed humidified O2 (intubation may be required)
- Bladder and pleural lavage with warm NS
- Monitor K+ and glucose
- A-V continuous counter-current lavage if available
- Complications: sepsis, aspiration, pulmonary oedema, rhabdomyolysios, arrhythmia, renal failure, seizure, neurological deficit
- Beware afterdrop
- See "Accidental Hypothermia…." Van der Ploeg et al, Resuscitation, 2010
- Frostbite: soft tissue injury through freeze-warming cycle (more complex than just freezing of tissue)
- Treatment of frostbite – rewarming, fluid rehydration, prophylactic antibiotics (controversial!), tetanus toxoid, analgesia
- "Trench foot" – non-freezing, immersion injury

**Horn of Africa Crisis – Zeyn Mohammed**

- Famine affecting 13 million people on the background of a civil war spanning 20 years.
- World Food Programme has withdrawn support to much of the region due to militant activities. Death rate now 7 per 10 000 per day.
- Gift of the Givers Foundation is now the largest humanitarian organisation in Africa
- 11 flights, 4 feeding and medical centres established
- An improvement in mortality rates has been seen in the limited areas to which assistance has been given
- Operating services were established with equipment flown in from SA
- Key medical functions established by the team – obstetric, paediatric, general medicine, orthopaedics, surgery
- True focus of disaster intervention should be on recovery and rebuilding services

**Ice Swimming Africa - Sean Gottschalk**

- Growing sporting phenomenon
- Ice Swimming Association – promoting the sport, encouraging research, exploring the unknown (and finding new places to swim)
- Swim only in speedo, cap and goggles (no wetsuits)
- Definition of an ice swim: 1 mile in <5C water
- Fraserberg Speedo Ice Swim in midwinter in SA. Endurance swim = 600m, Ice swim = 1 mile
- Screening process: Robben Island Swimmers, then Silvermine training (8-10 degrees for 20 minutes)
- I&J (Fish) Factory ice baths – 5 min for endurance swim, 10 minutes for the mile
- Pre-swim medicals including ECGs – often very “abnormal” baseline in fit individuals!
- Entire medical setup (including mobile ICU kit) taken to Fraserberg (no significant local resources)
- Heated medical tent (gas heaters), doctor with lifeguards on water and another in tent, stretcher for every swimmer.
- Buddy system for swimmers, boats, canoes and stand-up paddlers as backup.
- Exit assistance on coming out the water (orthostatic hypotension prevalent on exit)
- Rescue diver and swift-water rescuers on the water
- Pre-swim marking of veins in case of later need of IV access
- All swimmers exit to tent
- Electric heaters better than gas, but power is a problem
- Tympanic temperatures used for routine measurements, rectal for patients in extremis
- Afterdrop clinically relevant in ALL patients, but temperature measurements 10 minutes apart didn’t show this clearly
- Most exited with GCS14-15 (difficulty speaking)
- Skin hyperaemia common
- The greatest discomfort for the swimmers is in the rewarming process
- Dam temperatures 4.5-4.9C

- Average time in the water 28' (23-35 min range)
- Mean exit temperature (tympanic) 30.2 (range 25.8-33.9)
- Mean recovery time 42 minutes
- Knowing the true difference and pattern of variation between tympanic and core temperature would be very helpful.

**Keynote: Global HIV, PEPFAR, and the Implications for Emergency Medicine Development - Joe O'Neal**

- Sense of passion, energy and commitment is palpable in the emergency medicine fraternity
- Personal memories of the beginnings of the HIV epidemic
    - Before the HIV epidemic, we had _no_ effective antiviral therapy
    - In the space of three decades, we have developed effective treatments, and have discovered cures to some other illnesses along the way (cf. Hep C)
    - PEPFAR alone is now providing treatment to more than 3.5 million people today
    - The fact that it took so long is also a legacy…
- Bush tasked O'Neal with finding a solution to the African AIDS epidemic… initially he requested 15 billion USD
- This was granted and passed into law in less than 5 months – a victory for passion and drive
- Lessons:
    - Get tough on disease…or die
    - Soft diplomacy works (focus on service)
- Health system strengthening is essential to providing anything more than episodic assistance.
- St Francis: "Start by doing what is necessary, then what is possible, and soon you will be doing the impossible."
- Think differently about emergency medicine: think in terms of acute care
- Political leadership needs to be educated on health issues

**Keynote: Putting Humanity Back into Healthcare - Pierre van de Spuy**

- "I would like to live life like a river, carried by the surprise of its own unfolding."
- What does it mean to be human?
- Six values of humanity:
    - Temperance
    - Courage
    - Wisdom/knowledge
    - Love/compassion
    - Justice
    - Transcendence
- We can view the world in reality or as special or hurt children… and we all change our view based on our mood/experience

- Start NURSEing yourself:
    - **N**utrition – eat good food
    - **U**nderstanding – find people who can understand and empathise with you
    - **R**elaxation – take the time to refresh
    - **S**pirituality – go out and seek the good in life
    - **E**xercise – but have fun doing it
- To be a good ER doc, think of ER DOC:
    - **E**motional orientation – recognise that patients arrive in emotional insecurity
    - **R**ight brain – engage with the patient's eyes, use body language, listen.
    - **D**igits on the patient
    - **O**ther patient (the family in the waiting room)
    - **C**ollegiality
- One of the greatest human needs is to have emotional validation

**USAR: Quo Vadis? – Trevor Glass**

- "…a specialist technical rescue capability…"
- USAR = natural (eg. earthquake) vs technological (eg. terrorist incident)
- 5 key components: management, logistics, search, rescue, medical
- INSARAG – International (Urban) Search and Rescue Advisory Group
- Total number of patients rescued/managed by USAR is very small compared to the number of teams deployed (almost no live saves except for Haiti)
- Cost to save a life in Haiti from USAR perspective 100x greater than a medical/surgical team deployed to the same disaster (GBP 250 000 vs GBP 2500)
- However, can we compare the cost of a fire department to a hospital? Does it make sense to compare USAR to medical response?
- Role of USAR:
    - Save lives
    - Support the affected country -> body recoveries
    - "Beyond the Rubble" – Haiti has taught us that we need to be more involved in infrastructure assessments and recreation, re-establishing services, and supporting medical services.
    - Augmentation of *existing* emergency services
    - Limiting the period of time that the focus remains on the possibility of finding viable survivors through a very competent *search* function
- Disasters are becoming more complex – 50% urban, increased reliance on technology, increased population density, etc
- Four principles of humanitarian response: Humanity, Neutrality, Impartiality, Operational Independence
- Medical response – embedded or added

**USAR – Ensuring Medical Competencies – Donna Barleycorn**

- One studies revealed that 1.6 rescuers died for every victim saved
- No current international consensus on medical training for USAR teams
- INSARAG guidelines are not an authoritative instruction, but rather a recommendation
- Preparedness is an important mandate
- Medical component of INSARAG guidelines: provide care to USAR team members, care for victims encountered during the efforts, and care for search dogs.
- UK selection process explained – good standard, including requirement for EM/ATLS/PHTLS for all team members
- Regular clinical competence training
- Deployment of the pregnant woman where there is radiation risk:
    - Two types of risk – deterministic (foetal death, malformation and mental retardation. Threshold is 100mGy) and stochastic (ie. Cancer) risk. For every mGy the foetus receives is a 6 in10 000 increase in risk of malignancy (ie. 25x greater risk than normal foetus).
    - Pre-deployment urine testing for female team members is thus advised
- Review of national disaster competencies
    - Hundreds! They lack consensus and clarity
    - Crossover of terminology, roles and functions
- Challenges to developing competencies – disasters occur infrequently; conditions tend to be worse in poor countries; multiple professions are involved; multiple roles and tasks are required.
- Mental health preparation is important
- Potential recommendations:
    - International training course
    - Detailed medical competencies
    - Programme governance
    - International collaboration
    - International certification by INSARAG
    - Framework for regulation
    - Peer review

**Ethical Considerations in Disaster Medical Response – Olivier Hagon**

- Haiti – sentinel event in disaster response medical ethics
- Levels of response:
    - 1 – daily work
    - 2 – mass casualty (within normal frame of reference)
    - 3 – disaster (completely different environment)
- We must define what is acceptable and what is unacceptable within the framework of the disaster setting. Drawing this line is a challenge.
- Ethical management of large numbers of bodies (taking into account forensic needs) can be difficult.

- Beware the “CNN effect” … and the “VIP/Politician effect”
- Cf. International Red Cross/Red Crescent guidelines for humanitarian aid, and especially the code of conduct (492 organisations have committed to these values).
- The focus shifts quickly from disaster medicine to the provision of normal medical services (communicable disease, chronic disease, obstetric services, mental health services, etc) in an area without services due to disaster damage.
- Keep the focus at all times on the beneficiaries of care
- The most challenging decision is when to do nothing.

**Earthquakes: Time to Survivability - Anthony Macintyre**

- “Hey Doc… do you think anyone could still be alive in there?”
- Relevance:
    - Accountability for the missing can be hard to obtain
    - All communities expect some level of effort directed at SAR
    - SAR does ‘compete’ with other priorities
    - Ending the SAR phase can be a difficult decision
- The decision to terminate SAR efforts is usually made by the politicians, but they need input from our services
- The level of available data is extremely poor
- Prior thoughts: Golden 48 hours (based on limited data); Rule of Fours (anecdotal)
- Medical literature: Most collected retrospectively; hospital based parameters; sometimes difficult to determine if the patient was even entrapped in the first place.
- Almost no studies examine factors contributing to survival
- The media is beginning to do a very good job of documenting what we are doing, but details are often highly variable and difficult to assess
- Sample data points:
    - Tangshan (1976): 13 days
    - Armenia (1998): 13-19 days ?
    - Phillippines (1990): 14 days (meticulously confirmed)
- Data published in 2006 – 18 earthquakes from 1985-2003. Examined factors influencing survival; study not completed as well as the authors would have liked.
- Several late rescues – max day 14, but 50% by day 5/6.
- Challenges with data:
    - “Crawl back” phenomena – people trapped in secondary collapses after venturing back into the rubble can cause false expectations
    - Misapplication of the data – 14 days being regarded as an “absolute” limit (cf. Haiti at Hotel Montana).
- New research:2010-2011
    - Re-examination of the data
    - Included engineering literature
    - Findings – majority of rescues done by 5-6 days
    - Limited medical data

    - Questions are often tied to structure type
- Examples of potential factors influencing survivability:
    - Victim injuries
    - Victim pre-existing conditions
    - Survivor behaviour
    - Micro-climate (air, temperature, ability to move)
    - Access to food/water (many fascinating anecdotes)
    - Availability of medical care during/after extraction (NB crush syndrome, infections, delayed management of traumatic injuries, etc)
    - Structure tendency to form voids (*only factor which carries significant evidence*)
- Age does NOT seem to be a factor that affects survival (many infants and elderly rescued)
- Void space formation:
    - Biggest determinant of survival
    - Construction of buildings makes the biggest difference
    - Location in the structure plays a role as well
- USAR community strategy:  Occupancy of structure and potential for void space formation
- Summary:
    - All communities expect an effort
    - There is no universal time constant
    - Void space formation is the strongest predictor of survival (with other factors considered where appropriate)
- Implications:
    - Multidisciplinary approach to formulating an answer (engineering/medical/SAR/etc)
    - SAR strategy should not be based on a time constant
    - Phased approach rather than all-or-nothing
    - Guidance to the authorities/media must be presented in an understandable fashion.
    - Data collection must continue and improve

**Closing – Lee Wallis**

- Prizes, thanks, etc.
- AFEM's first congress next year – 30 Oct-1 Nov 2012 – www.afcem2012.com
- African Journal of Emergency Medicine – AFJEM – www.afjem.com – keenly soliciting submissions; active author assistance program.