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Another #FOAMEd production by

MOUNTAIN MEDICINE
BANGOR EMERGENCY DEPT

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#FOAMEd

Highlights from

RETRIEVAL 2015

UK's National Prehospital & Critical Care Transfer Conference

Day One

An unofficial report by

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Introduction: Day One

Ever heard your colleagues talking about fantastic conferences they've been to, and wished you could have gone too? So have we!

These unofficial conference reports originated from Bangor ED, where we encourage our staff to make notes at conferences and to share them on their return. From there it has been a short step to deciding we'd like to share our notes with others: you can find the full collection at www.scribd.com/BangorED.

For this report - Retrieval 2015 - our own Clinical Fellow Dr Niki Boyer (Day One) is joined by Jim Walmsley from South East Coast Ambulance Service for Day Two - (in production & coming soon!)

We must make an important disclaimer. Whilst our reporters make their notes as accurate as possible, this whole publication is based upon *notes made during the lectures* with all the attendant distractions and possibility of mis-recording the words of individual speakers.

Whilst we have cross-checked data were possible, and included links to some studies mentioned during lecture, we can accept no responsibility for any errors or omissions we have made (or that the speakers made and we may have inadvertently propagated).

You should never change your clinical practice based solely on a report like this, but, we hope it will provide you with a springboard for learning.

Linda
(Designer & Editor-in-Chief of the Bangor ED Conference Reports)
Niki & Jim (Reporters)

Running a conference?
Want a report like this?

Talk to us... depending on how it fits with our study leave quota, we may be able to attend your EM/EMS/PHEM/ Critical Care event & produce a report for you.

Unless we were planning to attend anyway in funded Study Leave, we'd need to have our costs covered, but even these *unofficial* conference reports get 1000-3000 hits: imagine what a bespoke *official* report could do to spread your message further.

Please contact Linda.Dykes@wales.nhs.uk to discuss.

Reflection for your CPD

Some of the topics we report here are ripe for your CPD folder. We've flagged up those that are particularly juicy with these snazzy green boxes, and included links to relevant papers, abstracts and websites.

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Please help us support Tusk Trust!

We created this report because we're passionate about FOAMed, and wanted to share what we'd learned. If you enjoy it and find it useful, could you consider making a donation to the Tusk Trust? This wonderful charity is dedicated to protecting rhino and elephant populations endangered by the greed for rhino horn and ivory - but also education and supporting communities in Africa.

If readers of the 2014 report had given just £1/$1 each, we would have raised over $3000 (they didn't, by the way, you stingy lot!)

Please visit our Just Giving page by clicking HERE to donate

HEMS Safety in the USA - Mike Abernethy MD

Mike Abernethy will be well known to many people via his Twitter handle @FLTDOC1. Based in Wisconsin USA, he is a Chief Flight Physician and Associate Professor of Emergency Medicine... and as a flying doctor he is somewhat of a rarity in the USA, where HEMS services are more usually staffed by paramedics & flight nurses.

The problem...

HEMS services in the USA have grown massively since inception in 1973, but this growth has been uncontrolled, unregulated, and not related to patient need. There are no quality metrics or pre-qualification requirements for HEMS services, and in 2002, the Centers for Medicare and Medicaid Services (CMS) increased reimbursement for helicopter transport by 434%.

To make matters worse, 40% of HEMS services in the USA are "for profit", which Mike feels is a recipe for a conflict of interest between safety & returning a profit for share-holders.

HEMS in the USA:

1. Hospital based: a way of ensuring patients come to *your* hospital (business is £)
2. Not for profit
3. For profit (40% of the industry)
4. Public/dual purpose

Many US HEMS aircraft are refurbished, small, old machines used to reduce the set-up costs & EMS dispatchers (one per ambulance services... so thousands of dispatch centres) 'court' fire services to request HEMS back-up, thus driving inappropriate tasking of HEMS assets, resulting in patients being flown to ED despite lack of clinical need - which results in a large bill for the patient even though they didn't need the expensive helicopter trip!

"Gravity is a law *not a suggestion*"

And the human cost...

Between 2000-2014 there were 47 fatal crashes in US HEMS. 46% were due to adverse weather conditions, and 22% were due to controlled flight into terrain (CFIT) - when an airworthy aircraft is inadvertently flown into the ground/water by a pilot unaware of danger

Overall, 68% were due to inadvertent instrumental meteorological conditions (IIMC) - see box (below).

Night flying - are you sure you *really* want to?

Night-flying has become the next goal of some UK HEMS services, but Mike's USA perspective may sound a word of caution: in the USA, only 25% of HEMS *flights* occur at night... but 75% of HEMS *crashes* occur at night.

Only 60% of US HEMS services use night vision goggles (NVG), and then only in last 5-6 years

IIMC: When weather becomes an emergency...

The vast majority of US HEMS (like UK HEMS) is flown under 'Visual Flight Rules' (VFR) - fewer than 7% of US HEMS services are certified to use Instrument Flight Rules (IFR) which enables flying in poorer visibility conditions. This means that if poor weather hampers visibility, then 'inadvertent instrumental meteorological conditions' (IIMC) occurs... the cause of 68% of US HEMS crashes.

HEMS Safety in the USA - Mike Abernethy MD

What about the regulators?

The National Transport Safety Board (NTSB) is independent but has no regulatory powers, whereas the Federal Aviation Authority (FAA) is both regulator and legislator, but is "heavily lobbied by corporate HEMS".

However, in March 2015 the FAA issued an advisory (following 9 crashes between December 2007 and October 2008 in which 36 lives were lost) recommending a name-change to 'Helicopter Air Ambulance', IIMC training (and avoiding going IIMC!) but still no requirement for IFR, autopilot or NVG

Mike's solutions...

Mike feels that reimbursement by CMS must be linked to medical and aviation quality metrics & appropriate utilisation.

Presumably, HEMS services (especially the for-profit services) would be far less enthusiastic about dashing off to every fender-bender in borderline weather conditions if they wouldn't be paid for it!

Just as we were compiling this report, another US HEMS crash occurred. Screenshot from Fox13 news website - click here.

CPD activity

This thought-provoking blog post by Mike gives more information about the problems faced by US HEMS services. This is an excellent JEMS article, and even dire warnings about a shortage of appropriately-trained pilots to support the burgeoning industry.

What they said on Twitter...

Machines seem to fall out of the sky a bit more than they really ought to in the States - @Malcolm_999

"Common sense is so uncommon these days it's a super power. Great comment @FLTDOC1" - @Gasdoc2857

HEMS were *[originally? - Ed]* a loss leader, hospitals made their money back-billing for the services delivered once the pt arrived - @ross71521

Nurses and paramedics delivered first prehospital RSIs in USA - @johnboy237

[and] still do majority of prehosp RSI in USA - @ketaminh

75% crashes at Night.... Think.. Do you really need to fly? - @jamestooley

The difficult subject of flying a patient with no health insurance – you could bankrupt someone by your decision - @jamestooley

I am blown away that it's the no.1 cause of bankruptcy in the US - @DrHillyHazel

[To put this in context, a single HEMS ride will result in a bill of $12,000-$25,000 and only 60% of US insurers will pay the full cost of it... some will pay only a few hundred dollars. Our US readers may need to enlighten those of us in UK/ Aus/NZ as to whether Obamacare has any impact on this? We are very hazy about such things! - Ed]

EMRS Hypothermia & Avalanche Capability - Mr Graham Percival

Graham Percival is currently a critical care practioner working with EMRS Scotland . Previously he was a Regular Nursing Officer in the RAF working as a Team Leader in the Critical Care Support Team to transport patients back to the UK. Graham continues to be involved with mountain rescue and has an interest in training mountain rescue search dogs.

Graham opened his much-anticipated talk with a great one-liner "...in Scotland there are two seasons – winter and July" and continued to build the argument for the need for an evidence-base and SOPs for the treatment of avalanche victims.

Despite 1119 'events' (i.e. recorded avalanches) resulting in 15 fatalities in the last 15 years in the UK, there is still a lack of UK data.

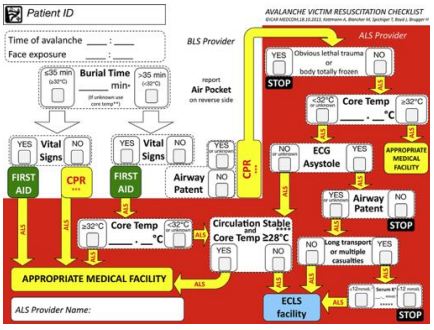
This is because only avalanches with fatalities tend to be reported, not all incidents attended by MRT are recorded, and no data is kept on snow characteristics (the significance of which we will explain in a moment!) at the time of an avalanche.

So what do we know already?

The available data comes mainly from North America and the European Alps, from where the International Commission for Mountain Emergency Medicine (ICAR MEDCOM) devise their recommendations.

Graham told us that there are three main causes of mortality. In 70-80% of cases, death is caused by asphyxia. This is immediately understandable when you learn that snow has a mass of ±600kg/m^3, and as the average burial depth is 1m, this is the weight over the victim's chest. However, the weight of snow does vary depending on snow profile – maritime (& UK) snow is wet and heavy, whereas alpine snow is lighter and fluffy.

Trauma accounts for around 20% of deaths, with the vast majority of the reminder being due to hypothermia.There are two main predictors of outcome – burial 'grade' (partial/complete) and duration of burial.



This is the ICAR MEDCOM triage/ treatment tool for avalanche victims, (the algorithm that EMRS Scotland currently uses). You can find it here.

Swiss data shows that 80% of victims found at 18 min survive, whereas only 32% found at 30 min will be as fortunate. The key to survival therefore is to be dug out by your buddy, or found extremely quickly by MRT.

Less significant predictors of outcome include:

- snow profile
- severity of injuries sustained
- presence of an air pocket or clear airway
- oesophageal temperature
- initial ECG rhythm
- serum K^+ (see box below)

Hyperkalaemia, hypothermia & iStat

Survival has been recorded with serum K^+ >10mmol/L in severely hypothermic patients, so in very cold patients, severe hyperkaelaemia does not help with decisions to cease or withhold ALS unless the serum K^+ exceeds 12mmol/L (see ICAR algorithm, below left).

Those using an i-Stat should be aware the device currently only reads K^+<9mmol/L.

EMRS Scotland has a plan

The first priority is to get the correct team and required kit to the patient as quickly as possible. This alone can present a challenge as transport shortage may mean a decision has to be made between getting "boots on the hill" to search for the victims versus transporting the medical team and their 40kg avalanche box. On arrival the medical team uses the algorithm to triage the victim into viable/non-viable.

For viable victims immediately necessary interventions are performed in the nearest place of safety prior to urgent transfer to the most appropriate facility – Aberdeen is the only major trauma centre in Scotland also capable of offering extra-corporeal life support (ECLS).

EMRS Hypothermia & Avalanche Capability - Mr Graham Percival

In summary..

Graham ended his talk by emphasising four lessons:

- The most important mission for transport is getting rescue teams searching for the victim (because of the rapid decline in survival with elapsing time)
- There is an urgent need for prospective UK avalanche data
- More trauma centres need to have ECLS capabilities
- Avalanche SOPs may be applicable to other causes of hypothermia.

Tyke - Graham's own trainee avalanche search dog.

The Avalanche box

Unsurprising really - considering Graham's training of mountain rescue dogs - his personal number one avalanche rescue device is a border collie!

However, the box itself actually contains full trauma kit, oesophageal thermometer, i-Stat, fluid warmer, autopulse®, VHF radio and a Gore-Tex® shelter = 40kg.

CPD activity

Denmark already has a national system for ECMO (=ECLS) in profoundly hypothermic patients, who are taken to a local unit at which they can rendezvous with the ECMO team (who then retrieve the patient back to their base hospital). In a series 2004-2013 they reported 118 from 251 profoundly hypothermia cardiac arrest victims survived (**NB - these were not avalanche victims**... their chief problem was 'just' being extremely cold!).

Furthermore the technique is not new: Walpoth *et al* reported almost 50% survival with ECMO for profound hypothermia in a 1997 NEJM paper. The key author to search for on PubMed is Kjaergaard - you can see a conference poster by his team here - do take a look, it's really interesting!

'ECLS': *not* a new life support course (in case you were wondering!)

First of all, you are not the only one unfamiliar with this term - several delegates were frantically googling when Graham mentioned the need for more ECLS sites in the UK! It actually just means ECMO (extra corporeal membrane oxygenation), a technique more often used for severe lung injury where conventional ventilation in ITU is insufficient. There's a good introduction to ECMO here.

And from Twitter...

Could we provide pre-hosp ECLS for avalanche victims?" - @drrichardlyon

Yes why not? Prehospital ECLS is the next big thing in prehosp ACLS!" - @airdoc

ECMO for @EMRSscotland? could be UK leader - @nickpheath

This question generated a lively Twitter conversation, the consensus from which seemed to be that it would be feasible, and advisable, for the ECLS team to meet the victim at the nearest healthcare facility to establish ECLS prior to transfer to Aberdeen (currently the only Scottish ECMO centre that also accepts major trauma, and has received avalanche victims).

A personal thank you from Bangor ED

Avalanche medicine is something that several of us in Team Bangor ED still find difficult to talk about: our friend and colleague Sqn Ldr Rimon Than was one of three people killed in the Chalamain Gap avalanche in Scotland in 2013. Graham, who gave this talk, had worked with Rimon in the past, too.

We still miss Rimon, but we'd like to take this opportunity to thank our friends in RAF/RN SAR, EMRS & Aberdeen for all their efforts to try to help him, and the other victims. We welcome all efforts to promote optimal care of avalanche victims - we're sorry we haven't engaged much in the debate over the past two years, despite being invited to do so. Now you know why, we hope you'll understand.

Linda (Editor)

Penetrating trauma on the streets of London - Lessons learned - Dr John Ferris @999jdf

John, who is a specialist in Emergency Medicine and Pre-hospital care and currently works for EMRS Scotland, ended the first day at Retrieval 2015 talking about his time with London HEMS (@LDNairamb) and sharing his seven key lessons learned.

Dr Linda Dykes (@mmbangor), ED consultant in Bangor, North Wales has infamously told delegates at many conferences that, when it comes to mountain trauma casualties in Snowdonia "they're either f**ked or fine". However, when it comes to penetrating trauma in London, John described three categories: exceedingly well, dead, or "the buggers in the middle you don't know what to do with"! London HEMS treats 2000 seriously injured patients a year, 25% of which are penetrating trauma, so John has had plenty of experience on which to base his seven lessons...

Lesson #1: From the start, ask yourself - how will this end?

Whilst en-route to the patient, John would prepare plans A & B (sometimes C) but soon discovered his paramedic buddy had at least five alternate plans, and had mentally mapped ambulance locations, kit required and considered an exit strategy if the situation got nasty (always a possibility if perpetrators are still on/near scene in a penetrating trauma).

He soon learned to continually ask himself 'what if' and mentally rehearse multiple interventions and their possible outcomes before arriving on scene. This allowed him to get into the "right mental space" prior to arrival, decreasing the bandwidth required on scene, and reducing the chance of cognitive overload.

Lesson #2: Beware the "well" patient

Patients who sustain penetrating trauma often appear very well until they become exceedingly unwell. This is due to less widespread tissue damage [cf. blunt trauma] resulting in a delayed and smaller systemic response.

In addition stabbed patients may describe being "punched", therefore the attending team should always be suspicious and search thoroughly for injuries.

Once found always consider the site of the injury and whether it has occurred in a 'danger zone' – a very small puncture wound in the cardiac area may have penetrated leading to a late pericardial tamponade.

Lesson #3: Increase your bandwidth

At the scene of a major trauma it is very easy to get 'sucked in' and become hands-on resulting in fixation on the patient resulting in perceptual narrowing.

Try at all times to stand back and delegate tasks allowing yourself time and space to think, as well as maintaining situational awareness and over-all control. *Only become hands-on if you are the only person that can perform the required procedure.*

Lesson #4: Back a horse

It is vital to decide early on what is killing your patient. Once you have done this you can decide what needs to be done to keep them alive until they arrive in hospital.

Share your mental model, allowing team members to "get on board" with the plan.

Indecision kills patients.

Penetrating trauma on the streets of London - Dr John Ferris

Lesson #5: Dying patients need bold management

Sometimes the hospital is too far, even if it is only 10 min away, and critical interventions must be performed on-scene.

John related the case of a young patient having sustained a stab wound to the left chest. Although he was still conscious his physiology was severely altered and he was deteriorating fast. John knew that without immediate treatment this patient would arrest – following which he would need to be intubated and John would have to perform a thoracotomy. Instead of waiting for the inevitable, the team RSI'd the patient, immediately following which John performed the required thoracotomy – allowing him to relieve the pericardial tamponade and preventi the patient from arresting.

Lesson #6: Eyes up & eyes down

When performing a procedure your bandwidth narrows, situational awareness is lost and cognitive overload will ensue if you try to continue to control the scene as well.

Control of the scene *must therefore be delegated to the most appropriate person*. This allows one person to be "eyes down" on the patient and the procedure, while the other person is "eyes up" maintaining situational awareness – controlling the scene and watching the monitors.

Lesson #7: Only the lucky survive

This is not entirely true...

"World class interventions in a system that takes trauma seriously" *does* make a difference

CPD activity

C'mon, it's not often someone suggests you should watch telly and count it as CPD... but we would recommend watching **"An Hour To Save Your Life"**, BBC2, Series 2: episodes 1 & 3 illustrate points 4-7 beautifully.

And from Twitter...

Dr John Ferris – "had a cracking 6 months in London HEMS" – I suspect literally! - @jamestooley

Successful scene management: from the start ask "how will this end?" - @Medibrat

I feel a Bosh, crack chest etc etc coming on!! - @jamestooley

Need to prioritise improving bandwidth esp. Remote & Rural Scotland to improve rural care & education - @FoxtrotMike999

@999jdf "Scotland – take trauma seriously – create the systems & provide funding" #hearhear - @Curlytoes12

@Curlytoes12 @999jdf and we need this commitment across ALL of Scotland - @Gasdoc2857

Management of Traumatic Cardiac Arrest (TCA)

Much more familiar to many delegates than even one or two years ago, the current management of TCA is different to 'medical' cardiac arrest (and still causes raised eyebrows to non-resuscitationists!). Instead of conventional CPR, adrenaline (epinephrine) +/- defibrillation, TCA requires three principal interventions:

1. Secure airway to treat hypoxia
2. Bilateral thoracostomies (relieves tension pneumothorax and can be converted to a clam-shell thoracotomy if required) - forget needle decompression if you are authorised to do open thoracostomies - needles aren't reliable.
3. Blood, blood, blood - the system is empty due to haemorrhage and unless filled, the patient will die.

This video of Dr Gareth Davies talking about the management of TCA at the London Cardiac Arrest symposium is well worth a watch, plus the late Dr John Hind's fantastic talk from SMACC-US 2015 "Crack the chest. Get Crucified".

Paediatric Trauma Pitfalls: taking control

- Dr James Tooley @jamestooley

James has been a Consultant Paediatrician for about 11 years. He currently works full-time with the Bristol-based NEST (Newborn Emergency Stabilisation & Transport Team) team. He also does a few shifts a month with the Great Western Air Ambulance as a critical care doctor.

James opened his talk by reminding the audience that when taking care of sick children, you "need to keep control of yourself" - a point raised by Hazel in the other paeds talk... definitely a theme emerging to the listening audience, many of whom are not routinely involved in paediatric or neonatal transfers.

To emphasize his point, James discussed the three possible responses to cognitive overload – fight, flight or freeze – and suggested some basic coping strategies, as well as reminding us of the physiological reaction to increasing heart rate (see table, bottom right).

Cognitive overload: coping strategies

1. Recognise it is happening
2. Deal with it (breathing exercises)
3. Train to prevent it (paeds sims)
4. Treat as a small adult if needed

To reduce the possibility of cognitive overload on scene, use the time while travelling wisely:

- Calculate WETFAG if you know the child's age
- Alternatively, get the formulas out ready for arrival
- Use available paediatric apps, local SOPs and 'aide memoires'

On arrival:

- Read the scene to allow you to determine the mechanism of injury (this must be done in the context of the child's size & age)
- Ensure children are not missed (under cars, in footwells etc.)
- Always consider the possibility of NAI
- *Then* start management working from A-C

Heart rate	Physiological Reaction	How you feel
60		
80	Normal resting HR	
90		Shaky hands
115	Fine motor skills deteriorate	
120		Jelly Legs
140	Complex motor skills deteriorate	
150		Lose it
175	Cognitive processing deteriorates. Loss of peripheral vision (tunnel vision) Loss of depth perception - Loss of near vision Auditory exclusion	
>175	Irrational fight or flight Freezing Submissive behaviour Voiding of bladder & bowel	S**t yourself

Ref (table, left):

On Combat, 2nd Edition
Lt. Col. Dave Grossman with Lorwen W Christensen
Available from Amazon UK marketplace. or Amazon.com in USA

Paediatric Trauma Pitfalls: taking control - Dr James Tooley

The Paediatric CABC (and always remember analgesia – intra-nasal diamorphine/fentanyl!)

<C>

- Tourniquets
- Celox™

A with C-Spine

- Ensure appropriate kit available
- Paeds RSI checklist
- Apnoeic oxygenation
- Immobilise *without* collar

B

- Cannot do finger thoracostomies – use needle decompression
- NG tube

Genius!

C

- EZ-IO®
- Blood/fluid in 5ml/kg bolus (targeting brachial & radial pulse)
- Tranexamic acid 15mg/kg (same as paracetamol)
- Remember pelvic binder & Kendrick Traction Device (KTD)

And from Twitter...

Sympathetic effects of fear and overload explained. All the way to incontinence - @rallydoc

If the car is on the baby, pretty simple environmental challenge: get the car off the baby! - @Medibrat

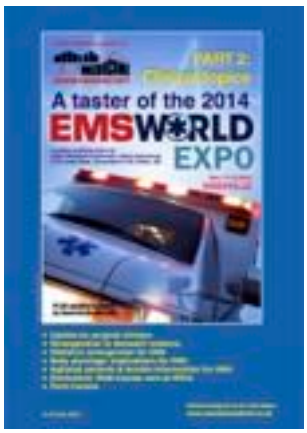
Another passionate and inspiring talk from @jamestooley – shouts out to checklists, apnoeic oxygentation, votex approach - @_retrieval

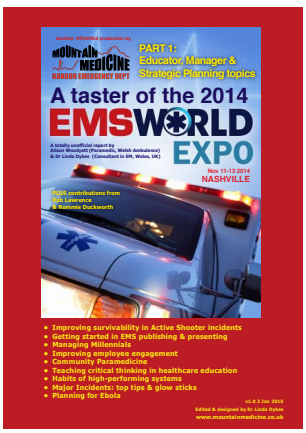
Great and fun talk by @jamestooley with amazingly only one swearword - @drsgrier

CPD activity

First off, if you aren't yet familiar with System One and System Two thinking, where have you been for the past couple of years? Get yourself a copy of "Thinking, Fast & Slow" (brace yourself - it's very heavy going) or Pat Croskerry's book, and in the meantime, take a quick look at this basic introduction.

One of the reasons we are so terrified by Paeds emergencies is because few of us see enough to be able to run them on "System One" - but there are tricks you can do to help. Peter Antevy - a PEM doctor from the USA - has built up a business devising solutions to help move as much paeds resus into clinicians' System One thinking. Here's a video of his own kids calculating drugs doses (!) and he's also the man behind the hands - right:





If you're interested in EM or EMS, check out our EMS Expo reports from 2013 & 2014 at the Bangor ED Conference Report Collection

Come & work with the team who made this report!

Snowdonia's ER

Bangor, North Wales:
Where EM is still fun!

Clinical Fellows - unique post-ACCS posts, 6-12 months

We might be able to squeeze in another person for 2015/16, but we are also happy to take enquiries about August 2015/2017 starts

Our acclaimed **Clinical Fellow** posts, primarily designed for post-ACCS trainees wanting a productive "year out" from formal training posts, were the first to offer **20% Pre-Hospital Emergency Medicine** in the job plan.

- The perfect "prep school" for PHEM sub-specialty training, we welcome PHEM beginners
- PHEM shifts are undertaken with Welsh Ambulance (ground assets & Helimed) - plus we can introduce you to the world of Mountain Rescue/Search & Rescue medicine
- 6 to 12 months posts available: flexible start dates between now & August 2016
- Come before HST or an OOPE

NEW for 2015/2016:-

- Two new variants of our popular Clinical Fellow posts: **20% Medical Education/Simulation** or **Medical Management & Quality Improvement**
- Both options include relevant courses (e.g. PGCertMedEd) and unusual opportunities. For example, MedEd options include paramedic training, and MMQI posts provide insights into the very heart of NHS Wales, at regional & national level.

Email, call or visit us to find out more!

Main adverts are in Jan/Feb each year on NHS Jobs. To find out more (or for full Person Specification/Job Descriptions) visit mountainmedicine.co.uk, email Linda.Dykes@wales.nhs.uk or Rob.Perry@wales.nhs.uk (ED Consultants), tweet us @rvmbangor, or if all else fails, call our secretary on 01248 384503 and ask her to track one of us down!

Specialty doctor? Sessional work? ST4-6 interested in OOPT/OOPE?

Please contact us if interested in any of the above. We can offer OOPT in rural EM, OOPE in the Clinical Fellow posts, and well-supported middle grade posts for Specialty Doctors and sessional doctors. We also enjoy supporting returners to medicine.

Where is Bangor?

Sandwiched between the outdoor playground of Snowdonia National Park and the beautiful coastline of Anglesey in North West Wales, this is the place to live and work if you like the outdoors, with everything from rock-climbing to kite-surfing on the doorstep. We are one hour by road to Chester/M6, 3 hours from London by train, or a quick ferry ride to Dublin.

www.mountainmedicine.co.uk

Complex neonatal presentations in remote & rural areas - Dr Hazel Talbot @DrHillyHazel

Visit the EMBRACE website or follow on Twitter: @Embrace_SCH

Hazel works for Embrace, a South-Yorkshire based paediatric retrieval service covering a population of 1.2 million children and receiving around 3000 referrals/ year, of which >60% are neonates. Despite this (and sounding something rather like the presenters of Crimewatch) she reassured us that really scary stories are very rare! This reassurance was much appreciated as the conditions described were, er, terrifying!

Perhaps sensing the trepidation of her audience she reminded us that "children and neonates are not little aliens" and advised us to "take a deep breath and treat the patient." In situations of cognitive overload *[NB: do not repeat this on an APLS course- Ed]* children *can* be treated as small adults, however "babies are not small children" and respond very differently. The neonatal response to any stressor is to stop breathing, but whereas neonates are not stressed by hypoxia (they are used to the hypoxic intra-uterine environment) they *are* stressed by acidosis.

"Children & neonates are *not little aliens...*"

Gastroschisis

These neonates generally have well developed lungs and very good lung function. However they suffer exceptionally high fluid losses, leading to acidosis and stress if not corrected promptly. To prevent further fluid losses the bowel should be covered with cling film, which will also protect the bowel loops. Fluid should be given following which urgent transfer to a specialist surgical centre is required.

...and just remind me what is Gastroschisis ?

It's a congenital defect (usually small) of the anterior abdominal wall through which intestinal contents protrude without any covering of peritoneum.

Congenital diaphragmatic hernia

These neonates are easily identified by a "scaphoid abdomen" *[scooped-out abdominal shape - Ed]*. Due to the bowel within the chest cavity the lungs are poorly developed and following delivery pulmonary hypertension is very common. The neonate's stomach must be decompressed urgently (any further restriction of lung expansion may rapidly lead to cardiac arrest). These babies will need to be intubated as a matter of urgency, however, do not try to achieve perfect ventilation. Get them "as good as possible" then transfer with extreme urgency.

Blue baby – *congenital cardiac lesion until proven otherwise*

As already stated, neonates are used to hypoxia therefore this alone should not cause undue concern. However if *acidosis* develops too, rapid deterioration can be expected and must therefore be reversed urgently.

These neonates are dependent on a time critical transfer to a centre where an urgent echo and septostomy can be performed on arrival.

While awaiting the transfer give prostin to keep the PDA open.

Complex neonatal presentations in remote & rural areas - Dr Hazel Talbot

Oesophageal atresia

A crying baby that sounds as though it is gargling has oesophageal atresia.

These are often associated with a gastro-tracheal fistula *therefore intubation and ventilation must be avoided*: positive pressure ventilation is likely to fill the stomach and may result in 'compressive' cardiac arrest.

If the neonate is already intubated then the transfer becomes time critical. These neonates need continuous suction, ideally achieved with a Replogle tube, however a micro-suction catheter can be used if a Reploge tube *[how on earth do you pronounce that? - Ed]* is not available.

However, the suction catheter must be flushed every 10 min to prevent blockage. Mild acidosis can be tolerated for the transfer, provided this is completed expeditiously.

With her unique mixture of calm and dynamic enthusiasm, Hazel's talk ended with myself, and I suspect many of the other participants feeling much better able to handle any of these emergencies, provided we had the four essentials (see box, below) to hand....

Four essentials for neonatal emergencies

1. Communication device
2. Cling Film
3. Replogle tube/ microsuction device
4. Prostin

[Can we add maybe @DrHillyHazel herself? - Ed]

And from Twitter...

Babies use all their lungs with no reserve when things go wrong. Muscles fatiguable – get big sick big quick - @neilahughes

The importance of your local Spar in neonatal resuscitation. You learn great things at #Retrieval2015 - @Gasdoc2857

@DrHillyHazel giving survival tips: constant communication with those who can give advice - @drsgrier

Great chat from Hazel Talbot – neonates for dummies – brilliant enthusiasm and simplicity - @euan_mcintosh

CPD activity

For those who want further information about the four conditions mentioned above (and for those of us whose embroyology is a little rusty!) here are some links!

- Gastoschisis
- Congenital diaphragmatic hernia
- Congenital cardiac lesion
- Oesophageal atresia

Enjoying this report?

You can read our report of the 2014 Retrieval conference at www.scribd.com/BangorED

(plus a host of other EM & EMS conferences - just click on the "Conference report" collection. They're all free.)

Resuscitation, stabilisation & transfer of the paediatric burns patient - Dr Amber Young

Amber is a consultant paediatric anaesthetist, the Clinical Lead at Bristol Children's Burns Centre, the SW UK Burn Care Network Paediatric Trauma Lead & chairman of the British Burns Association - in other words, a highly credible, hands-on speaker.

With expectations of cling-film making an appearance again at Retrieval 2015, Amber started her talk with some basic, and scary, burns statistics.

38,000 children suffer burns every year in England and Wales. Of those 75% are under the age of 5 years, and 95% occur in the home. A staggering 60% of burns in children are due to scalds (most of these being due to hot drinks), while 30% are contact burns. Amber reminded all delegates that "safeguarding is everybody's responsibility": we should *always* be thinking of the possibility of NAI when attending children with burns.

All burns should receive immediate first aid:

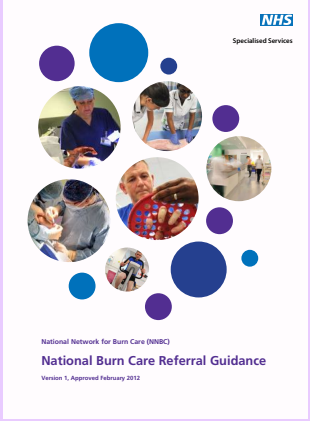
- Remove all clothing and jewellery in the vicinity or distal to the burn, even if the clothing is stuck to the skin.
- Run cold water over the burn area for a minimum of 20min (ensure the child does not become hypothermic)
- Then cover the burn with cling film (we knew it would turn up sooner or later!). The first 20cm of the cling film should be discarded as this is not sterile, and the cling film should be cut into strips and placed over the burn (not wrapped circumferentially around a limb or torso, as swelling could then lead to constriction).

British Burn Association

National Burn Care Referral Guidance

Transfer to a Burns Centre if;

- >30% body surface area (BSA)
- >20% full thickness
- >10% BSA in <1yr old
- Arrival at burns centre within 4hrs (urban) or 6hrs (rural) of incident



For the complete guidelines and definitions please refer to the full document - click here for link

The importance of an accurate BSA

Management of burns starts with calculating the BSA, a crucial step. Studies have shown that BSA is generally over-estimated, the consequences of which will become clear shortly. Where the BSA exceeds 15% fluid resuscitation should be started urgently using the Parkland Formula, the most significant contributor to mortality in massive burns being delayed fluid resuscitation.

How to calculate BSA in children: top tips

- Never use the "Rule of 9s"
- Best tool available is the Browder & Lund chart
- If this isn't available, then the palmar surface of the patient's hand is 0.8% BSA (the Mersey Burns App, pictured right, also has good reviews)
- When calculating BSA, superficial burns should be excluded, but partial & full-thickness should be calculated together

Resuscitation, stabilisation & transfer of the paediatric burns patient

- Dr Amber Young

It is crucial that children are not fluid overloaded as this increases the rate of abdominal compartment syndrome, can cause pulmonary oedema and also causes tissue oedema which may increase the burn depth and lead to an increased rate of escharotomy. Resuscitation should be guided by organ perfusion, but remember that low urine output is likely due to release of ADH.

The Parkland formula

24-hour fluid resuscitation (ml) = 4 x weight in kg x %BSA
Half given in the first 8 hours

Studies have shown that *hypervolaemia* in burns is worse than *hypovolaemia*

There is increased morbidity and mortality in children who are intubated in the absence of inhalation injury, therefore if in doubt do *not* intubate.

Escharotomy can wait for a few hours and should only be done in an appropriate burns theatre.

As with any other paediatric trauma always ensure adequate analgesia, given IN/IV (through burn if necessary)/ IO. Adequate analgesia has been shown to reduce PTSD.

To tube or not to tube?

Children should only be intubated if there is a risk of inhalation injury (see box), circumferential burns to neck/chest or the presence of other significant injuries.

Indicators of inhalation injury

- Facial burns
- Soot in airway
- Singed facial hair
- Fire in enclosed space
- ↑CO
- ↓GCS

CPD activity

For further reading on escharotomy, see the BMJ's ABC of Burns, although note that some of this article - in particular discussion regarding choice of fluids - is now 11 years old.

And from Twitter...

Do we need dedicated paeds burn transfer teams in the UK? Data says yes, feasibility says...? - @JoelSymonds999

#ClingFilm is trending - @Gasdoc2857

Calculating paed burn size very important in burns management – destination and volume of fluid given - @jamestooley

Safeguarding children – everybody's concern! - @Anya_HeliDoc

Burns fluid resus status not necessarily measured well by urine output – despite what they might tell you for the FRCA - @ali1m

Myocardial depression and overzealous fluid management in burns leads to pulmonary oedema, compartment syndrome, death - @jamestooley

Amber Young: need to strike a cautious balance with fluid resuscitation in burns. Only 2 cases of renal failure in 16 years. - @PaedsRetrieval

CEM 2014 Conference

Didn't make it to the (now-Royal!) College of Emergency Medicine conference last September? Catch up with a Bangor ED conference report!

- Day One
- Day Two & Three

Paediatric Surgical Airways

- Dr Mary-Louise Montague

Consultant Paediatric Otolaryngologist, Royal Hospital for Sick Children, Edinburgh... in her own words, "... not just a grommet merchant and nose picker but also a super-hero")

Mary-Louise started her talk with a history lesson; the earliest tracheostomy documented in print was in 1649.

Paediatric tracheostomy is an infrequently required but crucial skill. Airway problems should always be anticipated early to allow a management plan to be formulated which *avoids* tracheostomy (using basic airway adjuncts and airway manoeuvres), and to allow the [ENT] specialist to be contacted *before* it becomes an emergency.

Needle cricothyroidotomy is very dangerous in paediatrics, as the membrane is very small and difficult to identify. In case series there is up to 42% rate of posterior wall perforation and in experiments with rabbits there was only a 60% success rate. In addition the obstruction may be distal to the cricothyroid membrane. For all these reasons, needle cricothyroidotomy should be avoided in paediatrics.

Mary-Louise went on to describe the process of positioning and performing a tracheostomy on a paediatric patient. Given that the complication rate is 2-3x that in adults, I think the majority of the audience was glad that this was for interest only and that hopefully none of us would need to put her instructions into practice!

All paediatric tracheostomies should be cared for in NICU until the first change and the stay sutures are removed, around 5-7 days after surgery.

Indicators for paediatric tracheostomy

- Long-term ventilation
- Tracheomalacia
- Upper Airway Obstruction
- Trauma

... but it is at the bottom of the list of management options

And from Twitter...

Thought of emergency tracheostomy in prems makes my palms sweat - @euan_mcintosh

@euan_mcintosh you're not alone - @drsgrier

Nice to see a run-through of ENT doing paeds tracheostomy but def #notforprehospital - @neilahughes

Needle cric doesn't work in babies. Or children. Or adults - @rallydoc

If not in an tertiary centre for paeds ENT v. little options for paeds surgical airway. Focus on recognition and prevention - @neilahughes

And now for two retrieval cases...

The middle two talks of the last session were both complex retrieval cases from which some very useful, and unexpected (!) advice was dispensed...

First up was **A Complex Retrieval Case,** narrated by Mr Ben Stanton, a Critical Care Practitioner with MedSTAR, Australia (@MedSTAR_SA).

MEDSTAR is a specialist division of the South Australian Ambulance Service (SAAS). Launched in 2009, it covers adults, paediatrics and neonates, performing pre-hospital retrieval and inter-hospital transfer. The services is co-ordinated centrally, covering Southern Australia and performing 2500 missions per year.

Ben's case was the retrieval of a motorcyclist from the centre of the Southern Australian Desert, who was 1200km from Adelaide and having seizures. The retrieval took 14 hours to co-ordinate and it was 19 hours from call to patient side. This fascinating, and dramatic story demonstrated that whatever @EMRSscotland may think, retrieval distances in the UK are tiny!

The biggest learning point from the talk? In desperate situations innovate. The patient's brother was instructed to administer fluids to the patient rectally, using a CamelBak!

"Give rectal fluids *via CamelBak...*"

Next up was **Trans-Atlantic Transfer – Just another CPAP transfer** narrated by Dr Jon McCormack Consultant in Paediatric Anaesthesia and Retrieval Medicine - @jonmcck.

This was the story of transferring an infant with a cleft oesophagus and complex tracheal abnormalities from Edinburgh to Cincinnati. Jon soon discovered that the most complex part of the transfer was the logistics and paperwork required prior to leaving.

Most important learning point? Once you arrive on American soil you are not medically covered to treat your patient.

Jon's tips for international transfers

- Communication
- Consent
- A-Z planning
- Equipment
- Aircraft
- Crew
- Utilise everyone's experience
- Ensure kit familiarity
- Have back up plans for everything

And from Twitter...

Now there's Scotland remote & rural and Australian remote & rural - @Gasdoc2857

Fluid by rectal Camelbak – welcome to Australia! - @neilahughes

Travelling to the USA had numerous administrative hurdles, visas, workers permit, lack of MPS support overseas - @jamestooley

@jonmcck with @PaedsRetrieval and their meticulous planning for transatlantic retrieval! Phenomenal work guys! - @Curlytoes12

Remote & Rural Surgery in Scotland -
Mr David Sedgwick

Delegates who thought "Viking Surgeons" were something from the history books of the Nordic invaders a millenia ago were in for a bit of a surprise! David is a consultant "Viking" Surgeon at Belford Hospital in Fort William.

Ever wondered how surgical services are organised in the back of beyond? Most surgeons in rural Scottish hospitals are 2-2.5 hours away from a major centre, and must be able to cover general, obstetric, gynaecological and neurosurgical emergencies.

"David Sedgwick - legendary surgeon. Doesn't do Twitter but *dances to Prodigy in his shorts* - @_retrieval"

However, the risks posed by solitary (or "Viking") practice has been recognised for decades - since 1973, single-handed surgeons have worked with others to both mentor and be mentored

Deciding what to do with particular patients requires good networks and networking – "phone a friend", or use video conferencing to inform decision of "stay and play or pack and go".

David stressed the need for rural surgeons to spend time in urban centres working with specialist colleagues to both gain training in that specialty, but also ensuring your supportive specialist 'friend' has knowledge of & confidence in your surgical abilities... "we need to encourage super-specialists to collaborate for patient benefit, not just defend territory..."

The training dilemma

Most surgical training is urban-based and structured around training to be a specialist surgeon, whereas for remote surgical practice, one needs to be a generalist.

The solutions are already in place... rural surgical fellowships undertaken for 18-months post-CCT, and at the other end, unique one-year medical student attachments offered to Aberdeen students in their 4th year

And from Twitter...

Distances across Scotland for care are so different to what we're used to in England. Fascinating - @drsgrier

Remote CT for trauma cases invaluable in rural areas - @jamestooley

Challenges of rural surgery: geography, transport, increasing complexity of care, shortened training time, skill retention - @drsgrier

Interesting addition to MDT decision-making – not just what the diagnosis is, what the treatment should be, but *where* as well - @drsgrier

Evidence tells us much better decisions made re whether to stay & play or pack & go if the patient is seen on VC - @FoxtrotMike999

Comparing the Beeching railway reorganisation with hospital service reorganisation (worrying impact on remote areas) - @jamestooley

Intracranial haematomas in remote/rural settings - Mr Gordon McFarlane

Another "Viking Surgeon", Gordon described himself as a "Moonlighting Neurosurgeon" and held the audience mesmerized as he explained that sometimes you just can't wait for transfer to a neurosurgical centre... he works at the Gilbert Bain Hospital in the Shetland Isles.

Gordon started his talk with a quick revision of neuroanatomy and extra-axial versus intra-axial bleeds. He went on to outline the management of extra-axial bleeds in his practice. The audience were waiting breathlessly for the line "it's not exactly brain surgery" and were only mildly disappointed!

Neurosurgery, according to this Moonlighting Neurosurgeon, is "not that difficult: you just need an old-fashioned Hudson Brace and Gigli Saw to open the skull....": certainly a different view from city-based practice, but when you are this remote, a "tension pneumothorax of the brain" cannot wait for transfer.

Gordon's home hospital is Gilbert Bain on Shetland, which is the furthest outpost for Retrieval Scotland, 350 miles from EMRS Scotland's base. Their neurosurgical centre for advice/retrieval is Aberdeen - a 200 mile trip which is a minimum of 4-hour turn-around time by fixed wing aircraft... a trip often precluded by inclement weather such as fog/wind.

If the fixed wing is unable to reach the Gilbert Bain Hospital, then transfers include a 90-minute ferry journey (see photo on our front cover).

Between August 2013 – November 2014, there were five extradurals in patients aged 10 months – 40yrs, three of whom were operated on prior to retrieval to a neurosurgical centre.

> "An Extradural haemorrhage is a *tension pneumothorax* of the brain"

Another example of how rural surgeons have to be trained to manage the entirely predictable emergencies that inconveniently arise far from specialist help - including craniotomies!

There have been survivors from amateur neurosurgery for the past 5,500 years: this skull of a Neolithic girl from c3500 BC shows healing around the man-made trepanation hole!

Intracranial haemorrhages: a revision

Intracranial haemorrhages are divided into **intra-axial** (within the substance of the brain) and **extra-axial** bleeds. There are three types of extra-axial bleeds:

1. **Extradural haematoma** ("epidural" haematoma in USA) is a bleed occurring between the skull and dura (first meningeal layer), usually from damage to the middle meningeal artery.
2. **Subdural haematoma** is caused by bleeding between the dura & arachnoid resulting from tearing of bridging veins crossing this potential space.
3. **Subarachnoid haemorrhages** are bleeds occurring between the arachnoid layer and surface of the brain

350 miles? That's just down the road here in Oz - @ketaminh

Brilliant combination of understatement and quiet confidence from Gordon McFarlane talking about R&R craniotomy - @rallydoc

"Craniotomy not that difficult" I'm waiting for Mr McFarlane to use the actual phrase "it's not exactly brain surgery" - @Malcolm_999

Presentations from Bangor ED

Did you spot our logo on the front cover of this report? Bangor Emergency Department - who produced this conference report - are possibly the most MRT/SAR-friendly department in the UK. We took two presentations to Retrieval 2015, and because we've put many hours of effort into preparing this conference report for you, we decided to indulge ourselves and show them here.

If you'd like to read them in full, you can view/download the full-size PDFs (alongside a selection of our other mountain medicine related posters) at www.scribd.com/BangorED

This poster analyzed the time taken from initial call for help to arrival at hospital of almost 1000 casualties from Snowdonia who required the assistance of MRT and/or RAF SAR.

The mean interval was 145 minutes, with a range of 17 minutes to 864 minutes. Rapid arrival at hospital was (according to contemporaneous rescuer reports) associated with benign weather conditions, aircraft availability, casualty in known location & casualty pre-packaged by MRT.

Background photos for both posters courtesy of RAF SARF HQ/MOD.

Many people assume that the bulk of UK Search & Rescue helicopter taskings are to seriously ill and injured people... some have even suggested that these aircraft should carry doctors or critical care paramedics. We don't agree.

Using data from two existing databases, we estimate that only 2-3% of all UK SAR helicopter taskings are primary missions to seriously ill/injured casualties. Our former medical student Dr Mari Thomas presented this work as a Free Paper on Day One of Retrieval 2015 (the poster seen here was from Traumacare 2015 earlier in the week).

The last page...

We would like to thank the many people who reported this conference on Twitter - some of their contributions are included in this report. Do please follow them on Twitter - you will find them by their @Twitterusername!!

Running a conference?
Want a report like this?

Talk to us... depending on how it fits with our study leave quota, we may be able to attend your EM/EMS/PHEM/Critical Care event & produce a report for you.

Unless we were planning to attend anyway in funded Study Leave, we'd need to have our costs covered, but even these *unofficial* conference reports get 1000-3000 hits, so imagine what a bespoke *official* report could do to spread your message further.

Please contact Linda.Dykes@wales.nhs.uk to discuss.

Day One was brought to you by...

Dr Niki Boyer

(@NikiLBoyer) joined Team Bangor ED as a Clinical Fellow in EM/PHEM in February 2015 and took less than three weeks to decide to increase her stay with us from 6 to 18 months!

Niki trained in South Africa, and came to the UK for ACCS training in London - she's unusual in having done both ACCS EM & CT1-2 anaesthetics, putting herself through MCEM & Primary FRCA. She commenced her Expedition Medicine career with six months of exotic travelling immediately prior to coming to Bangor, where she is very much enjoying her PHEM shifts with Welsh Ambulance & Helimed. Niki is being introduced to all the leisure pursuits on offer in Snowdonia by our other Fellows.

This is her medical reporting debut, and we very much hope that she will continue!

Dr Linda Dykes

(@mmbangor) came up with the idea of reporting conferences like this, and compiles, edits, & designs the Bangor ED Conference reports.

Linda graduated from Newcastle Medical School in 1996. Trained in both EM & General Practice, she has been a Consultant in Bangor ED since 2005 and also works with the Welsh Ambulance Service at the Health Board/EMS interface one day a week, bringing her a small step closer to her ideal portfolio career combining EM plus EMS/primary care interface, and teaching.

Her research interest is Mountain Medicine (she maintains a database of all mountain casualties from Snowdonia brought to her hospital) & she particularly enjoys teaching medical students & paramedics.

THE END

Please tell us what you thought of this report: we are always trying to improve our conference reports and we also need to know if we have any corrections to make!

Please send any feedback/suggestions to Linda.Dykes@wales.nhs.uk or via Twitter to @mmbangor.

Please feel free to share this document widely, in the spirit of #FOAMEd, but it may not be used for commercial purposes without our express consent. Many thanks to the organisers of Retrieval 2015 for permission to use the conference logo.

PS - Please, please make a donation to Tusk Trust!