



Organisation of emergency IR services in the UK

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Declarations

- Research funding-Boston Scientific
- Speaker-Shockwave medical

Geography

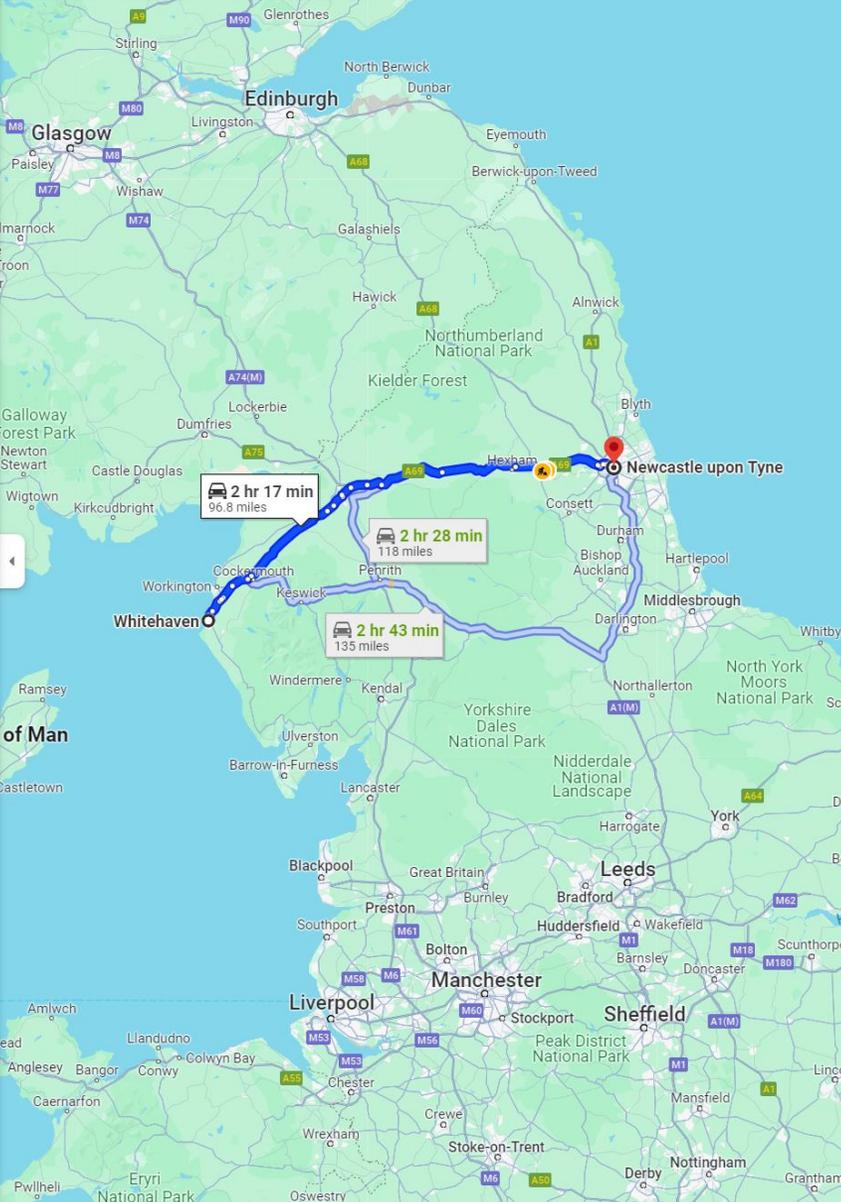
Leave now ▾ Options

Send directions to your phone Copy link

| | |
|---|----------------------------------|
|  via A595 and A69 Fastest route, the usual traffic Details | 2 hr 17 min 96.8 miles |
|  via A66 and A69 | 2 hr 28 min 118 miles |
|  via A66 and A1(M) | 2 hr 43 min 135 miles |

Explore Newcastle upon Tyne

-  Restaurants
-  Hotels
-  Petrol stations
-  Car Places
-  More



The need for change

Trauma

- Poorly organised
- Lacked senior involvement
- Avoidable deaths

Vascular unit reconfiguration

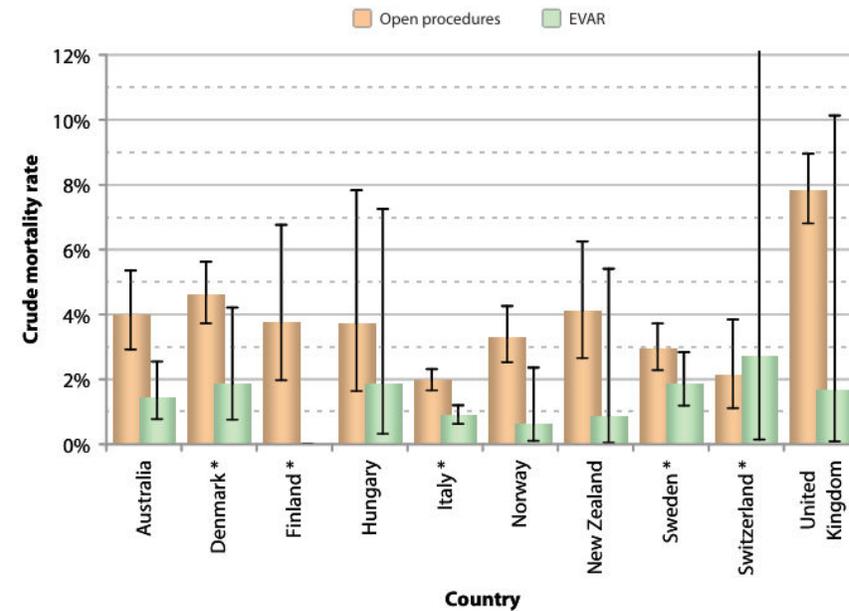
GI bleeding

- Increasing role for IR



VASCUNET (on behalf of the ESVS) Second Annual Vascular Surgery Database Report 2008

AAA surgery: Crude mortality and country for intact aneurysms (n=25,773)



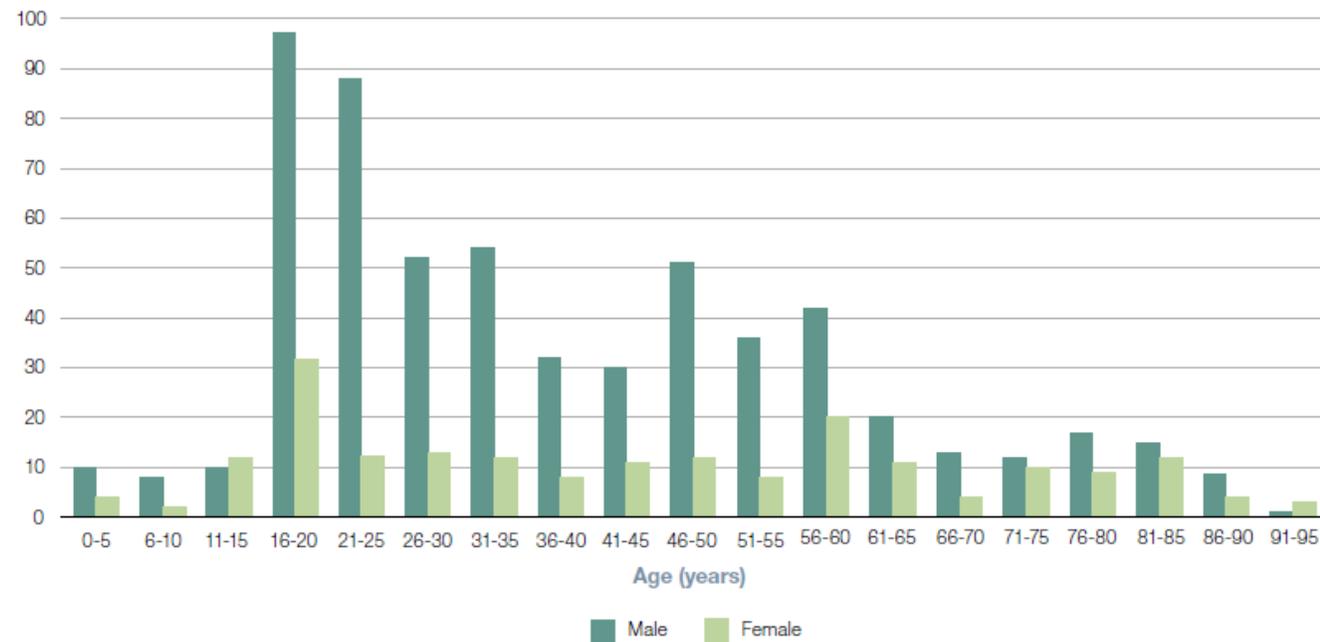
Countries with an asterisk suffix report 30-day mortality, others report in-hospital mortality

Who?

Figure 3

Trauma patients by age and gender

Number of patients



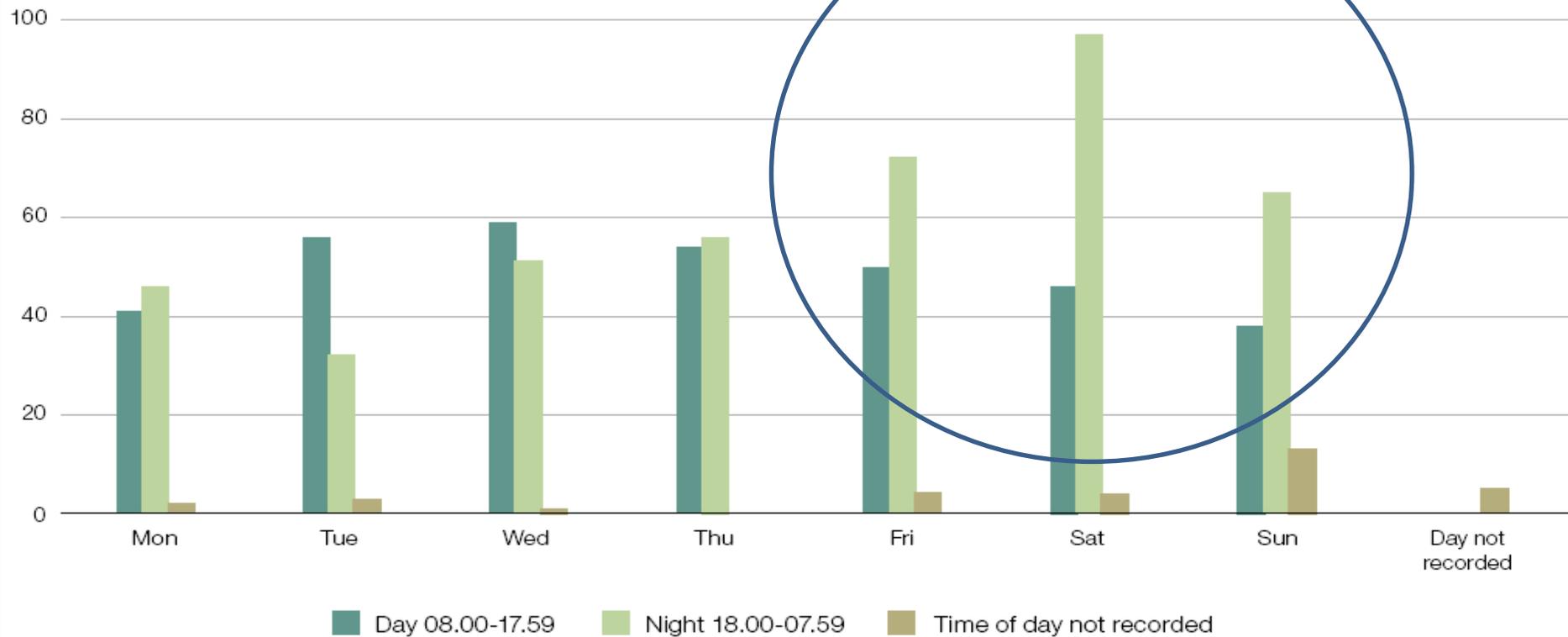
Source: *The National Confidential Enquiry into Patient Outcome and Death (2007). Trauma: Who cares?*

When?

Figure 4

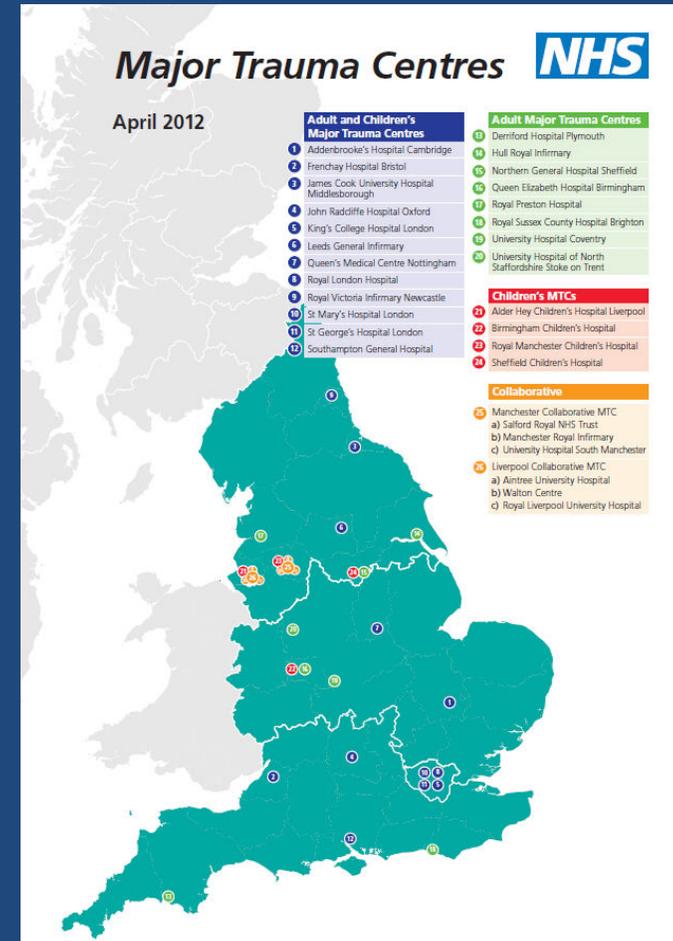
Trauma patients' time of arrival at hospital

Number of patients



Source: The National Confidential Enquiry into Patient Outcome and Death (2007). Trauma: Who cares?

Progress



Incentives

II. Major trauma networks in England

Table 2
The major trauma best practice tariff uses the ISS to assign one of the two levels of tariff based on ISS>8 or >15

| | |
|------------------------|--|
| Level 1 (ISS>8) £1515 | Patient treated in a Major Trauma Centre TARN data completed and submitted within 40 days of discharge Rehabilitation prescription completed for each patient and recorded on TARN Coroner's cases flagged within TARN as being subject to delay to allow later payment Tranexamic acid should be administered within 3 h of injury for those patients receiving blood and or blood products within 6 h of admission |
| Level 2 (ISS>15) £2913 | Level 1 criteria met Patient received by a trauma team led by a consultant (who must be present within 5 min for those with full MTC implementation) or Patient transferred as a non-emergency must be admitted to the MTC within 2 calendar days of referral |

- Medium sized DGH
- 600 beds
- Accident and Emergency
- General Surgery/Vascular surgery/Critical care on site
- Tertiary care transfer to Newcastle (3 miles)



Pre 2012

- 2 IR Consultants ad hoc (and on call for general radiology)
- 24/7 Onsite CT radiographer
- **No IR trained Radiographer rota**
- **No IR Nurse rota**
- Anaesthetics/critical care
- Trauma team



Time to intervention

- On a good day
 - 45 minutes from referral
- On a bad day
 - “Don’t know, I’ll phone around and get back to you”
 - Not available!
 - Not referred.



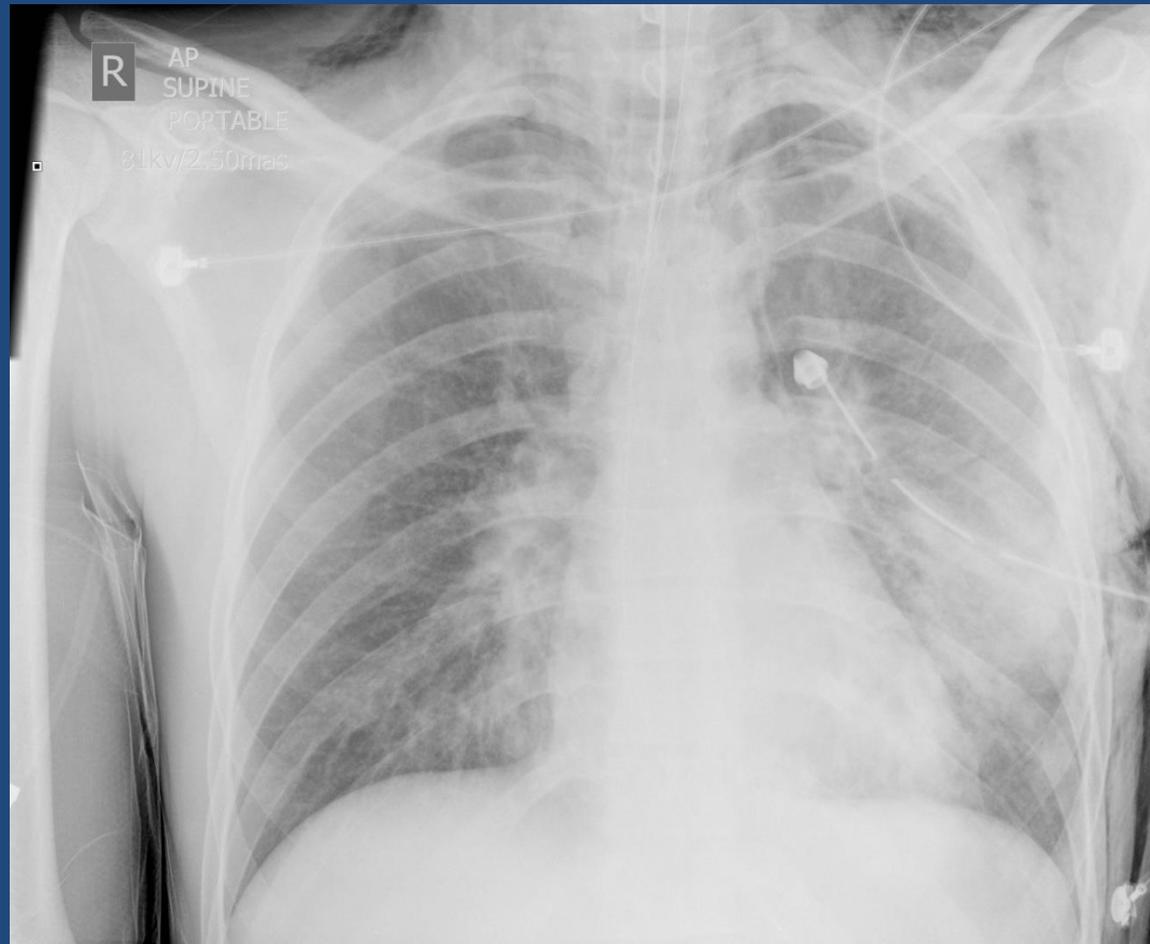
November 2009

- 19 year old male
- Crashed stolen motorbike
 - No helmet
 - Estimated speed 90km/hr

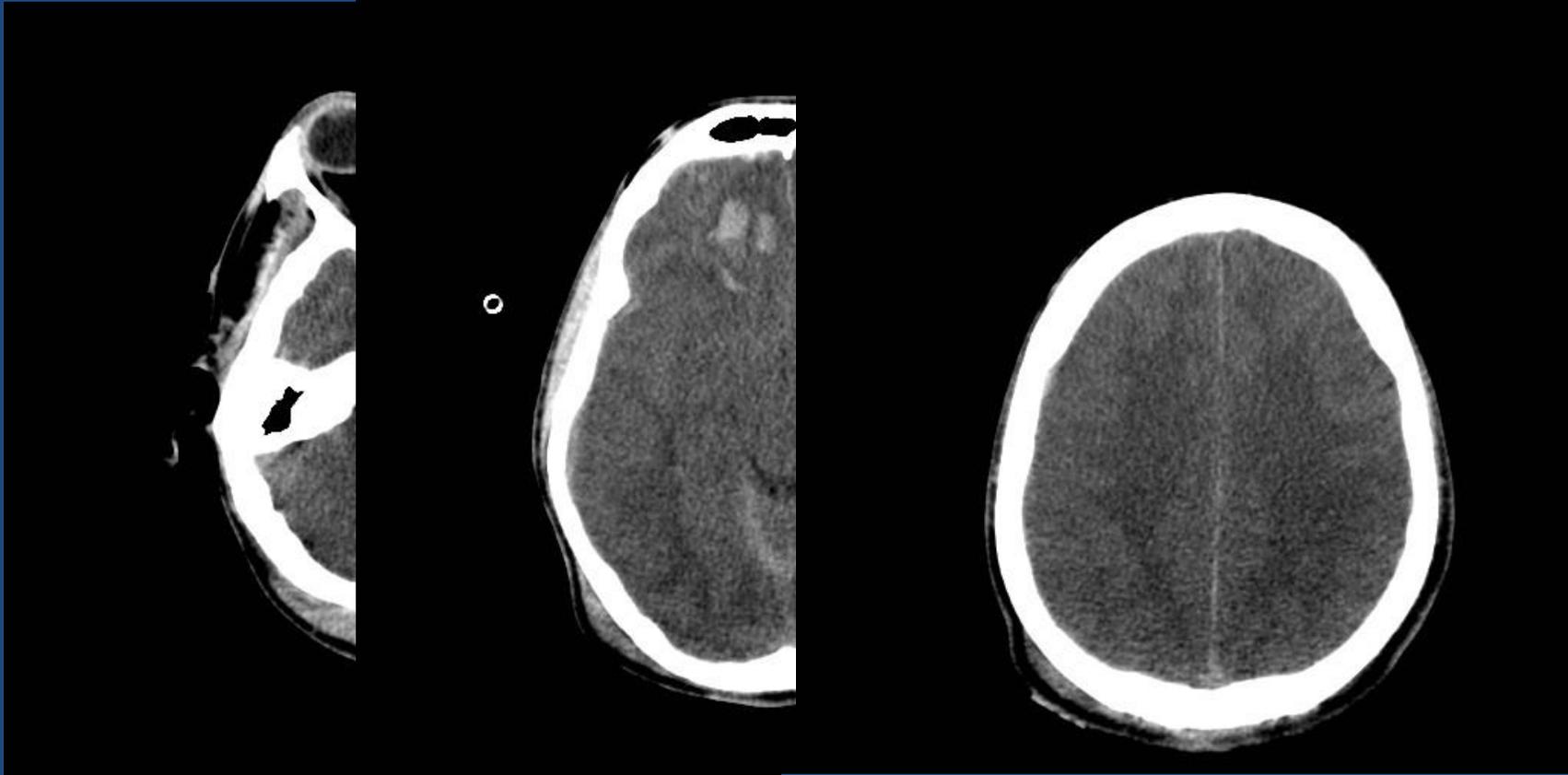
Clinical findings/management

- Threatened airway
 - Profuse oral bleeding and debris
- Respiratory rate 30/min
- HR 125/min
- BP 100/70
- GCS 5
- ET tube and oral packing
- Chest drains

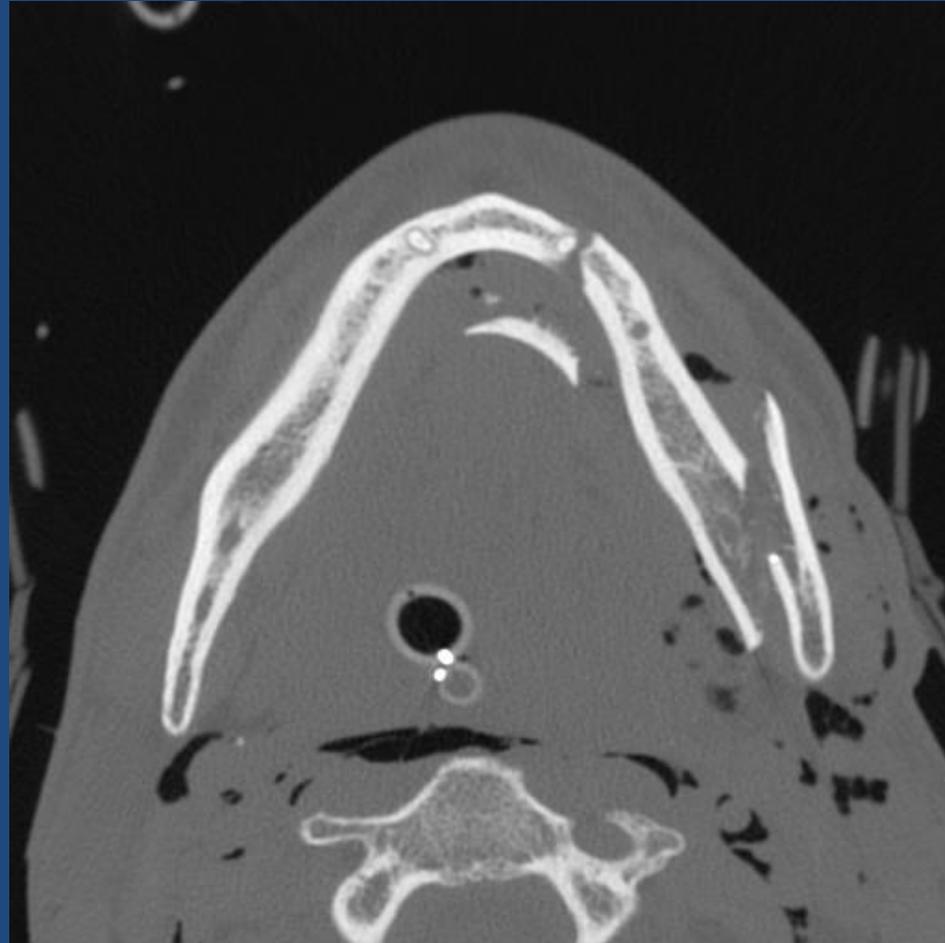
Imaging



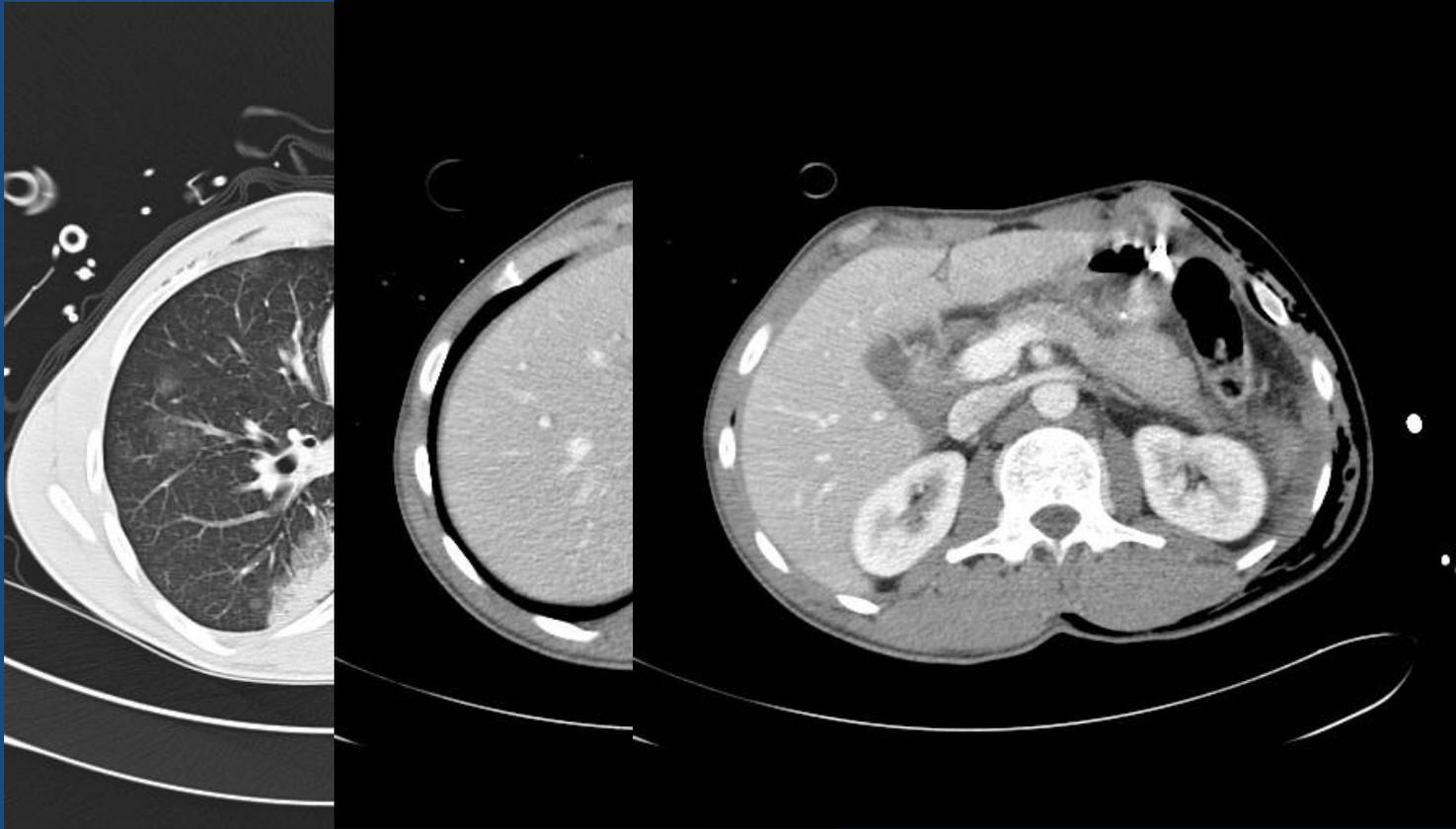
CT Head



CT Cervical spine



But no spinal fracture

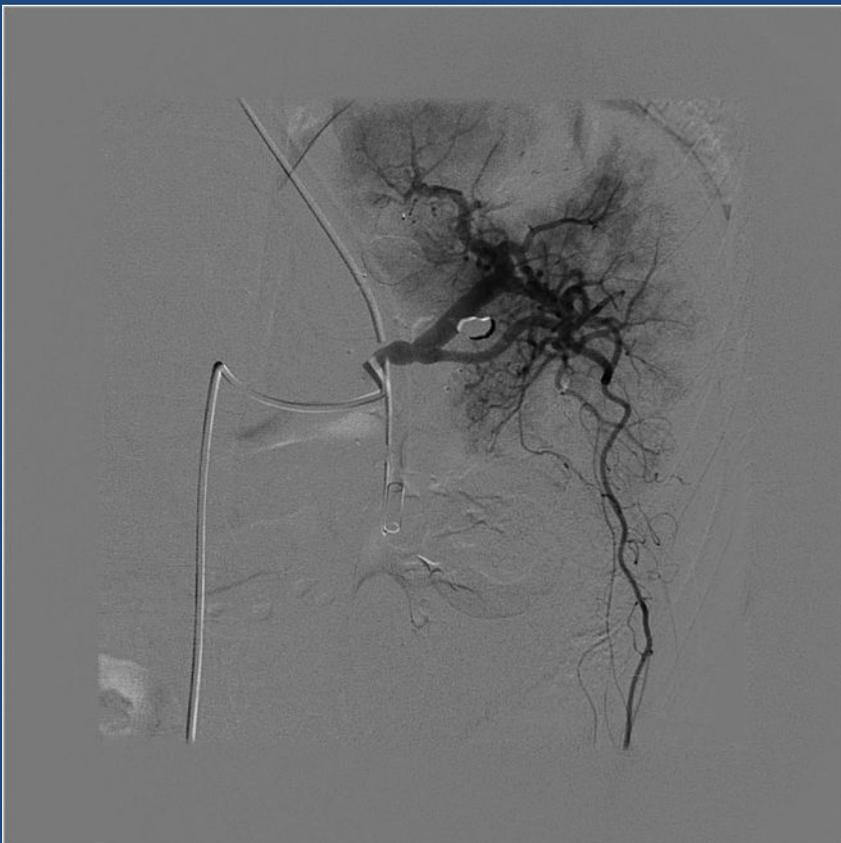


Diagnoses

- Head injury-cerebral contusions
- Fractured mandible
- Lung contusions
- Bilateral pneumothorax
- Splenic laceration

Management

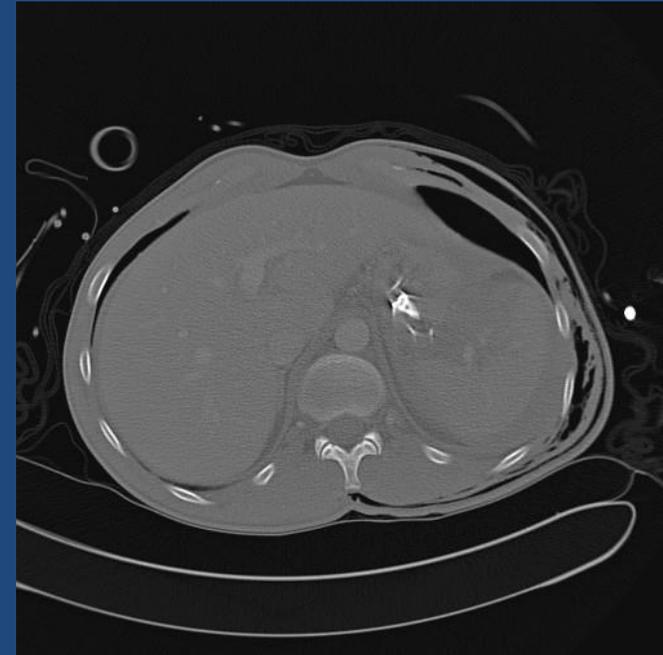
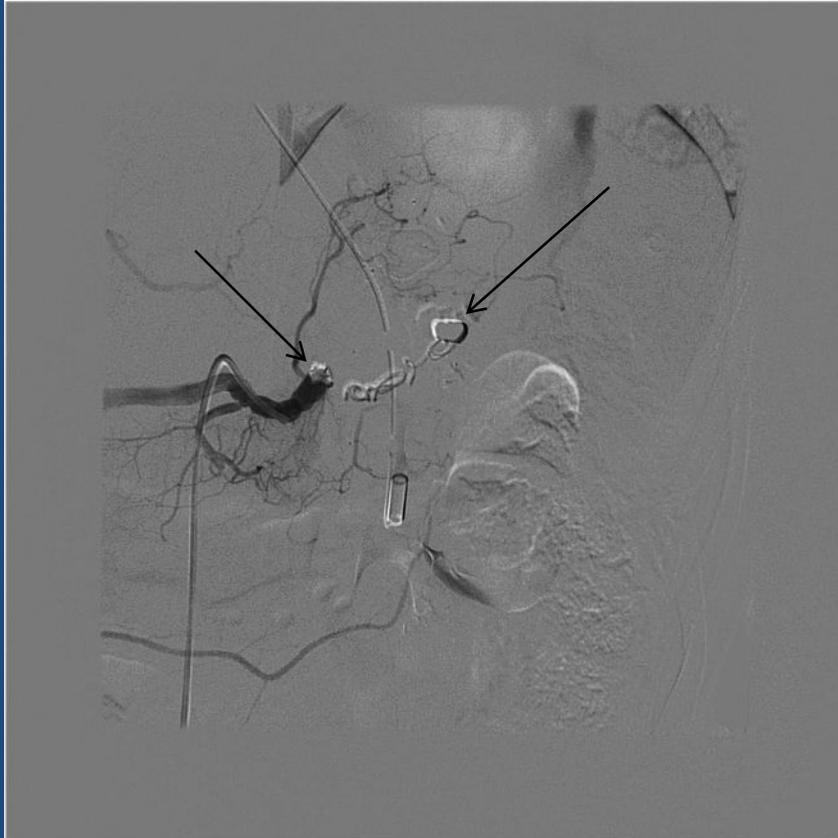
- Discussion with Neurosurgery (another site)
 - Stabilise splenic injury before transfer to Neurosurgical unit
- Referred for embolization



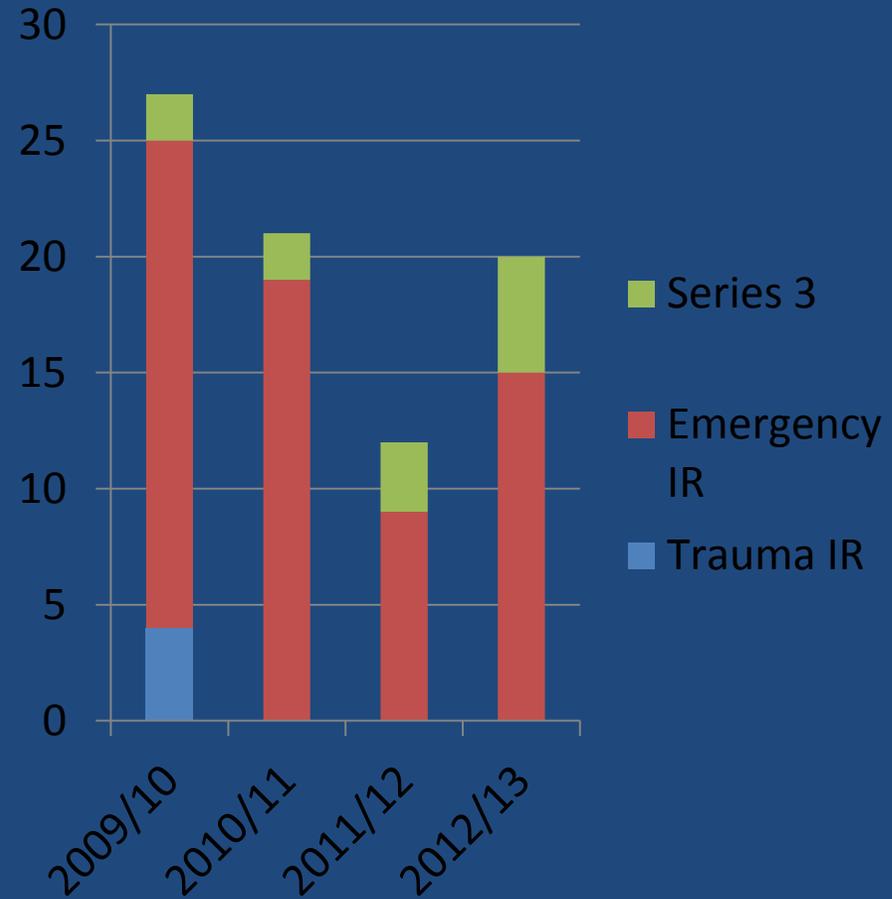
Follow up

- Transferred to Neurosurgery
- Head injury managed non-operatively
- Facial fracture fixation
- Neuro-rehabilitation with excellent recovery

What is this?



- 4 years prospective data collection
- All life/limb-threatening IR
- 14 splenectomy/splenic repairs
 - 1 gunshot
 - others potentially suitable for IR.



Mid 2013

- Numbers decreasing
- Ambulance trauma bypass protocols
- Lack of referrer confidence
- No prospect of improvement
- Time to go!

- Major trauma centre
 - Adult and paediatric
- 1 of 12 in UK
- 1000 trauma calls/year
- 24/7 Onsite Trauma Consultant



The venues

- 2 hospitals
 - RVI (City centre)
 - 1 new IR suite
 - Back up in Neuro IR suite
 - Mobile procedures in Obstetrics
 - Freeman
 - 4 miles away
 - 2 IR suites
 - 6 Cath labs
 - 1 Endovascular theatre



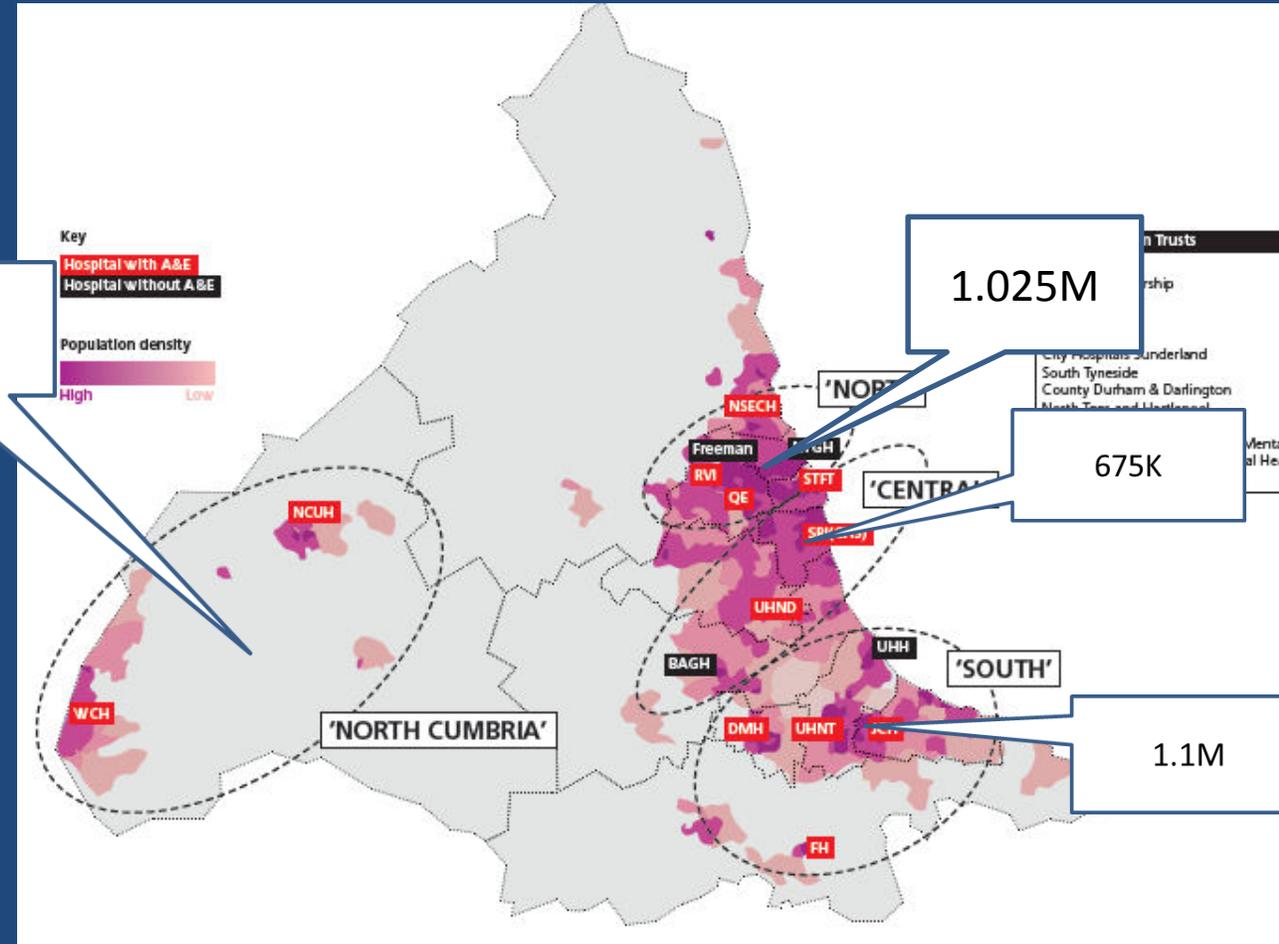
The IR team

- 8 Consultants IR only
- IR trainee (~60% of on call)
- IR Nurse rota
 - 1 rostered (but compensatory rest affects daytime availability)
 - On call competency assessment and shadowing for new nurses
- Radiographers
 - 24/7 onsite-one site
 - On call (and shared with CT) other site
- Anaesthetics/critical care
- Trauma team



The service model

- 24/7 IR for large teaching hospital (2 sites)
- Contracted network cover for 2 x nearby hospitals
- Non contracted backstop for region (including other large trusts)
- Patient moves rather than team*
- IR has no inpatient beds (needs a parent team)



(*1 exception in last 10 years)

Core procedures

- Control of sepsis
- Bleeding
- EVAR / TEVAR
- TIPS
- Either paid or compensatory time back



What do we do?

- Telephone advice +++
- Urology
 - Nephrostomies / ureteric stenting
- Vascular surgery
 - EVAR / TEVAR
 - Acute limb ischaemia
- GI bleeding
 - Upper GI
 - Scope first
 - Lower GI largely conservative
- Hepatobiliary
 - Pancreatitis / splenic artery pseudoaneurysm
 - Biliary obstruction / sepsis
 - Complications of surgery / liver transplantation
 - Islet cell transplantation
- Trauma
- Obstetric-mostly planned / SOP
- Paediatric-very rare

What can wait?

- Drainages- done by diagnostic / rarely with IR support
- Venous lysis-within core hours
- Vascular access-within core hours
- Thrombin-within core hours
- CLI-within core hours (but increasing pressure)

Benefits

- Good environment to provide non-operative management
 - Splenic injuries
 - Low grade aortic injuries
 - Rectus sheath bleeding
- Better visibility of emergency activity
 - Daily handover document
- Increasing responsibilities for senior trainees
- A 7 in 8 not on call rota!

| Patient | Referrer | Clinical | Diagnosis | Plan/Procedure |
|---------|------------------|---|---|---|
| | | NSECH patient Abdominal pain and collapse. Mild dysphasia from previous stroke | AAA rupture | Infrarenal EVAR performed 27.04.2024 |
| | | Multiple comorbidities, already on Aspirin GP raised concern from CTA report incidental finding of descending aortic mural thrombus. Being investigated for GI symptoms | Mural thrombus, no significant aortic stenosis or acute lesion | Conservative management, continue with antiplatelet |
| | | HOP tumour, failed ERCP in North Tees with possible iatrogenic injury to GDA. Had GDA embolisation in ***** and transferred to FRH for management of biliary obstruction | Sepsis with ascending cholangitis | PTC and int/ext drain placement 27.04.2024; Upsized to 12 Fr and thrombin injection along tract 28.04.2024 |
| | Outside Hospital | 58, normally F+W Fall this morning and left abdominal/hip pain, investigated for aortic syndrome; Haemodynamically unstable at presentation, Hb 68, resus and 1xRBC, 1xFFP; Concerned re: left leg appearing more venously ischaemic from DVT on POCUS | CTA: acute haemorrhage into pelvis presumed from left rectus, incidental moderate PEs | Vascular surgeon seen patient, unable to offer treatment due to risks of being on anticoagulation; requested for IVC filter insertion. ITU transfer to FRH for IVC filter insertion early w/c 29/04/2024 |
| | | patient, known to vascular with TBAD; 3 rd presentation of chest pain; hypertensive on admission; palpable pulses, soft abdomen, no neurology; asked to review imaging | Stable TBAD extension up to proximal left EIA similar to Feb 2024; false lumen supply to right kidney | Imaging reviewed (reporting radiologist unable to compare with previous CTA) |
| | | ST patient, chest pain, reported as aneurysmal ascending thoracic aorta 4.3 cm; asked to review imaging | 4.0 cm ascending aortic diameter | No acute aortic syndrome |

Pending Procedures: IVC Filter insertion

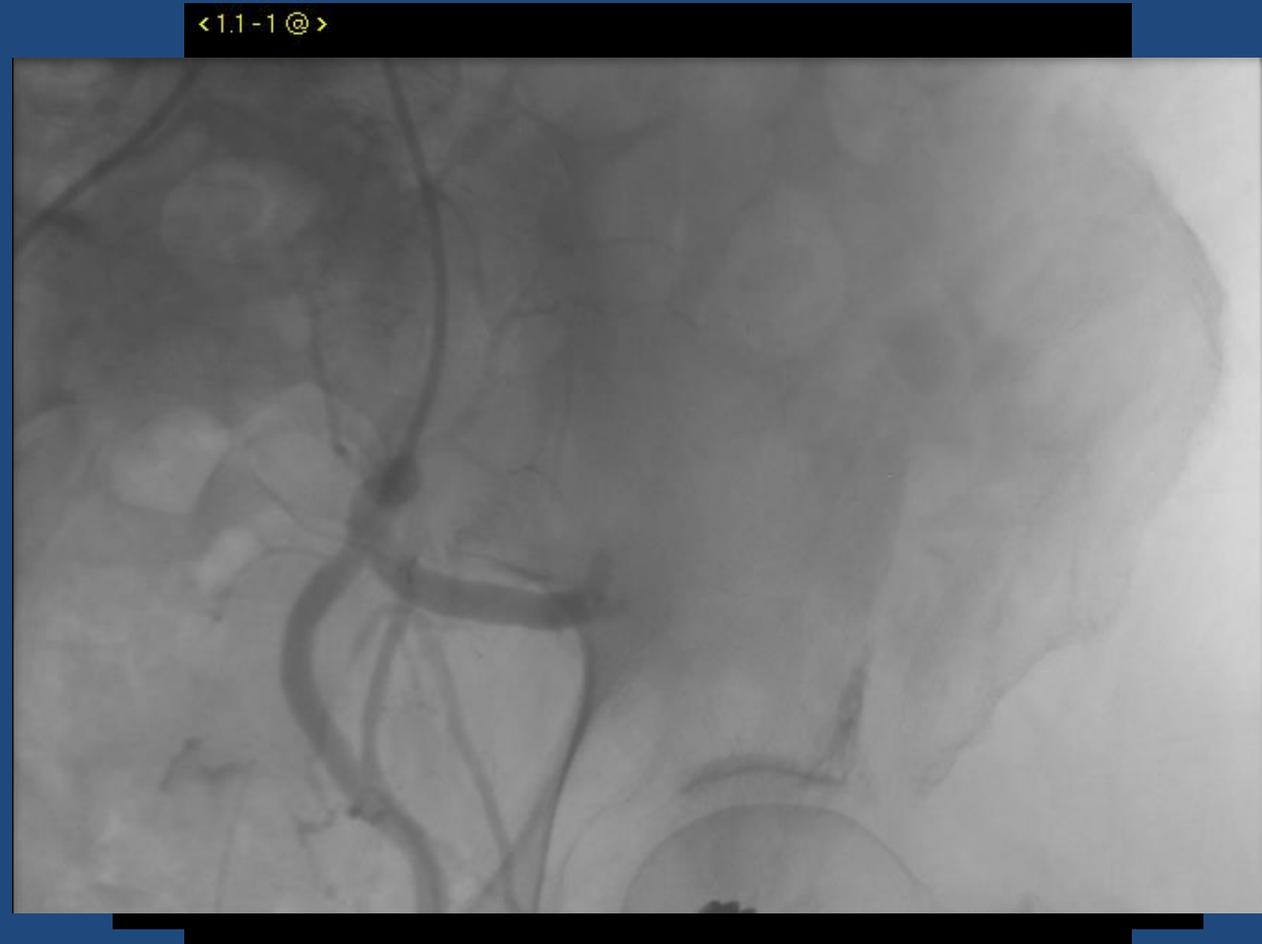
Challenges

- Impact of compensatory rest on daytime service
- Mission creep
 - CLI
 - Venous lysis
 - Vascular access
- Repatriation to base hospitals
- Matching equipment / devices to venues
- RCR Census 2022
 - Nearly half (48%) of trusts and health boards have inadequate IR services
 - 1/3 (34%) of clinical directors felt they had enough interventional radiologists to deliver safe and effective patient care.

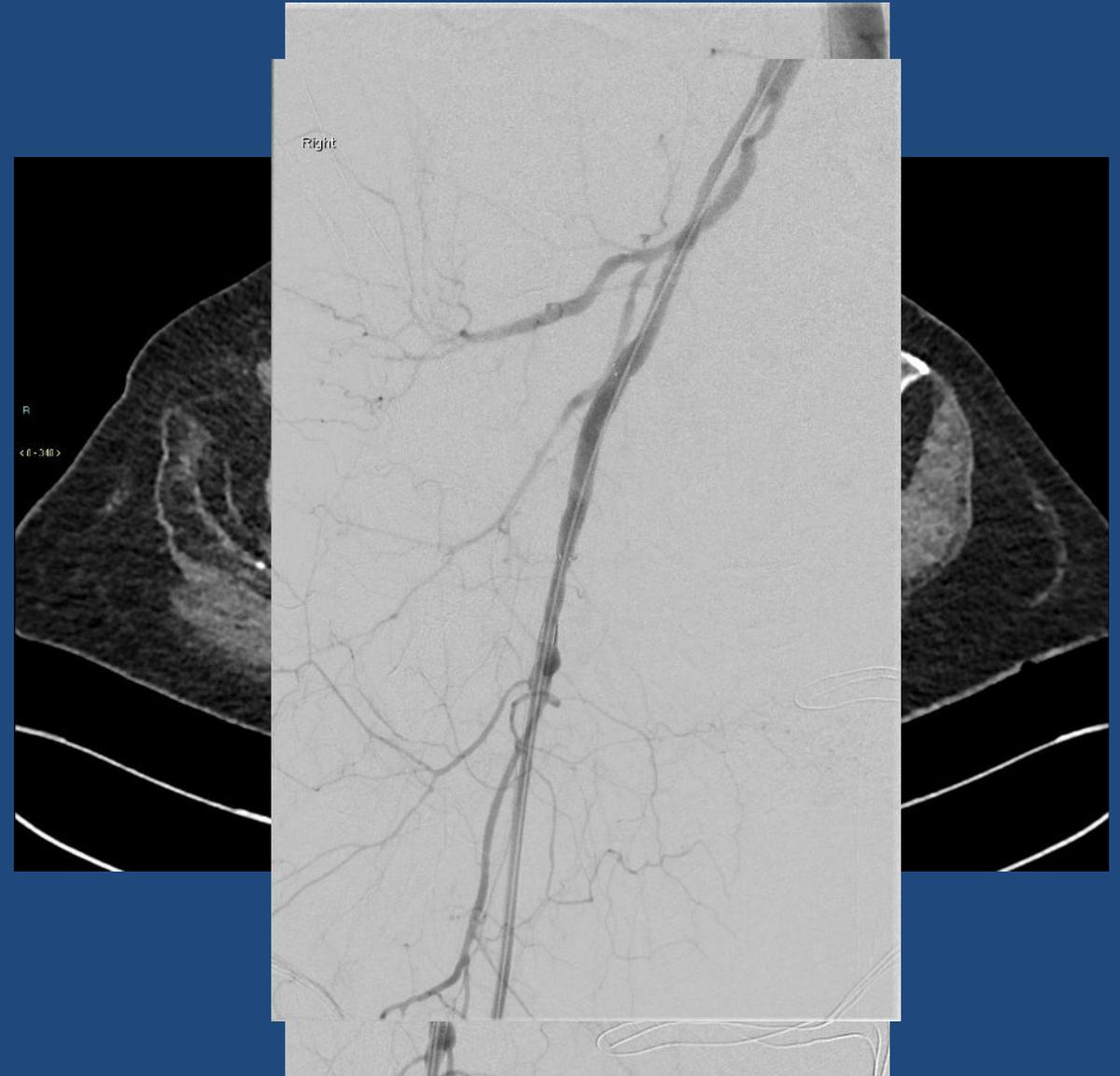
Rota resilience

- Severely tested during COVID (but continued)
- 1:8 became 1:6 over the last year
- Requires a committed team with shared values

- 82 year old man
- Hit by truck
- Pelvic fractures
- Transient response to volume



- 76 year old lady
- PCI Saturday morning
- Found collapsed in bed 4 hrs later
- Right groin haematoma

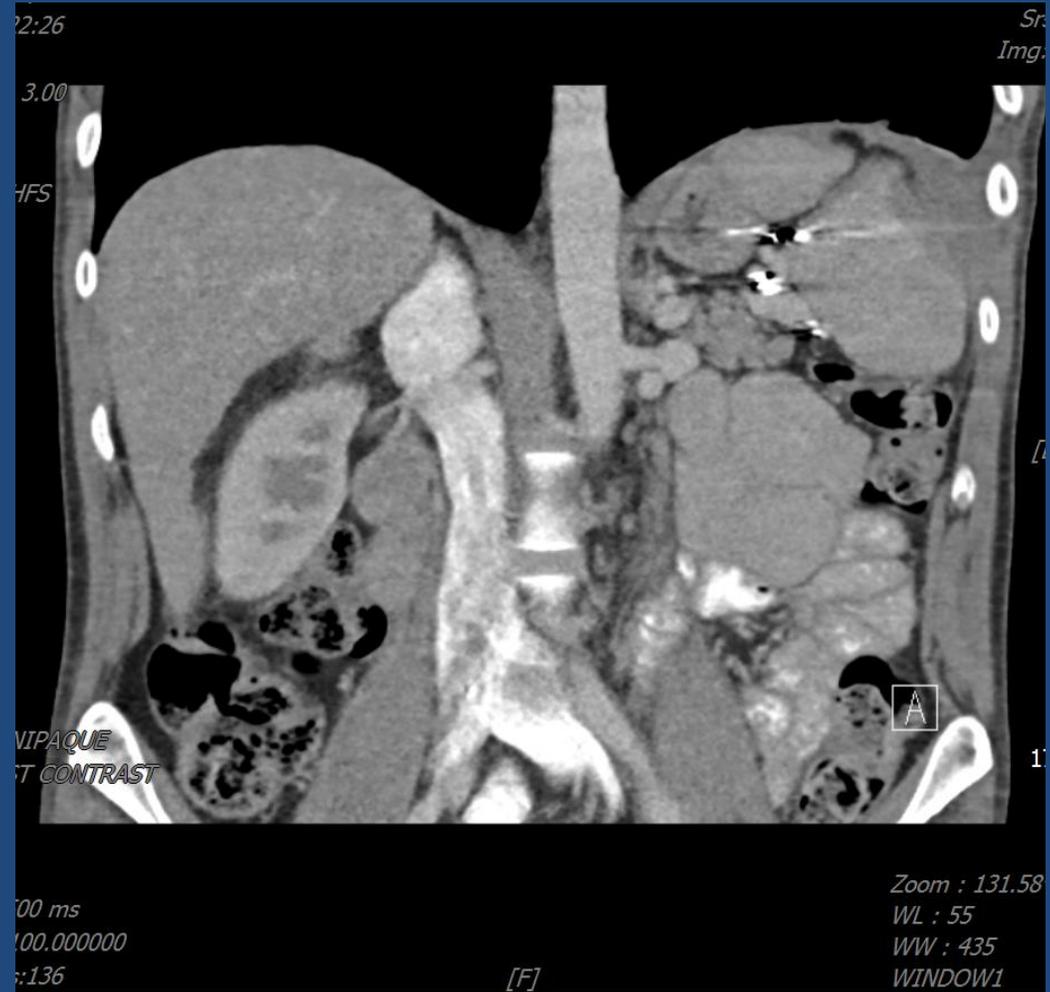


Keep it simple

- 36 year old male
- Assault with metal bar
- Failed non-operative management



- 2 days later
 - Pyrexial
 - Self discharged
- 3 weeks later
 - Pyrexial
 - Haemoptysis
 - Rigors
- US guided drainage
- 3 months later
 - asymptomatic

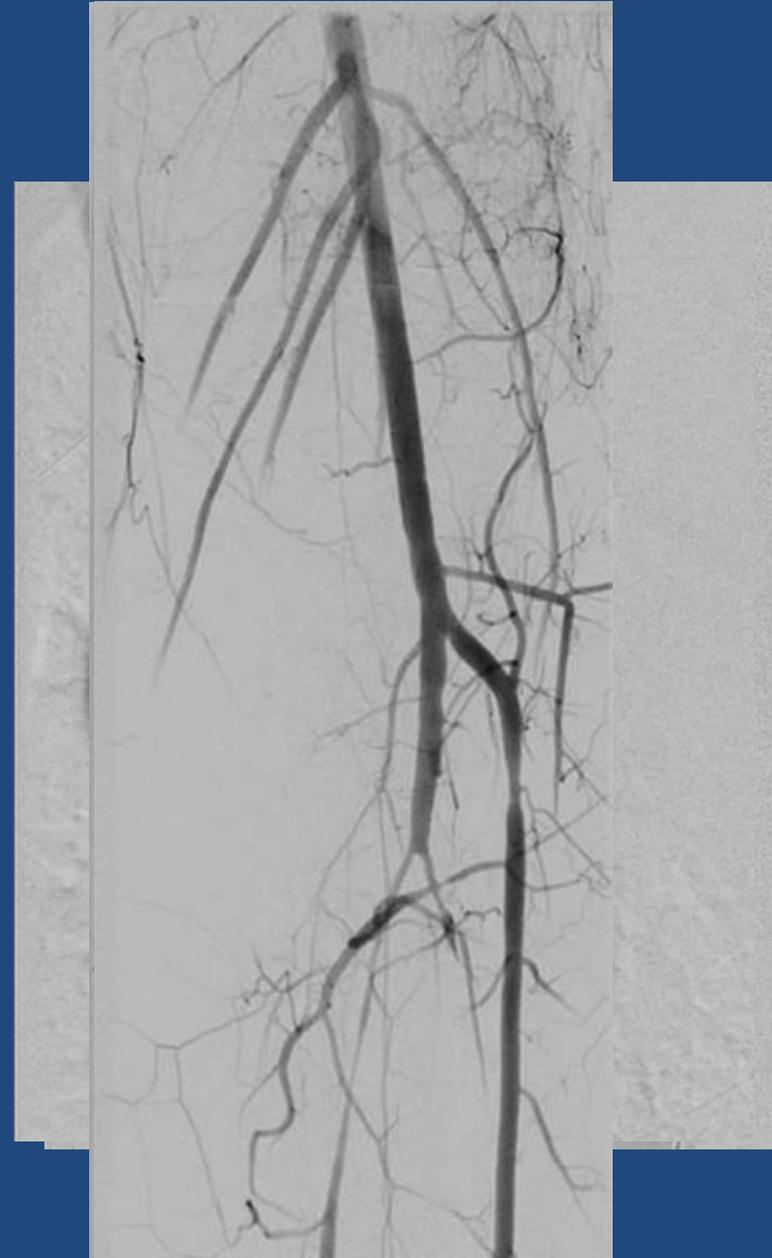


- 73 year old male
- IHD
 - Apixoban
 - Clopidogrel
- Minor trauma



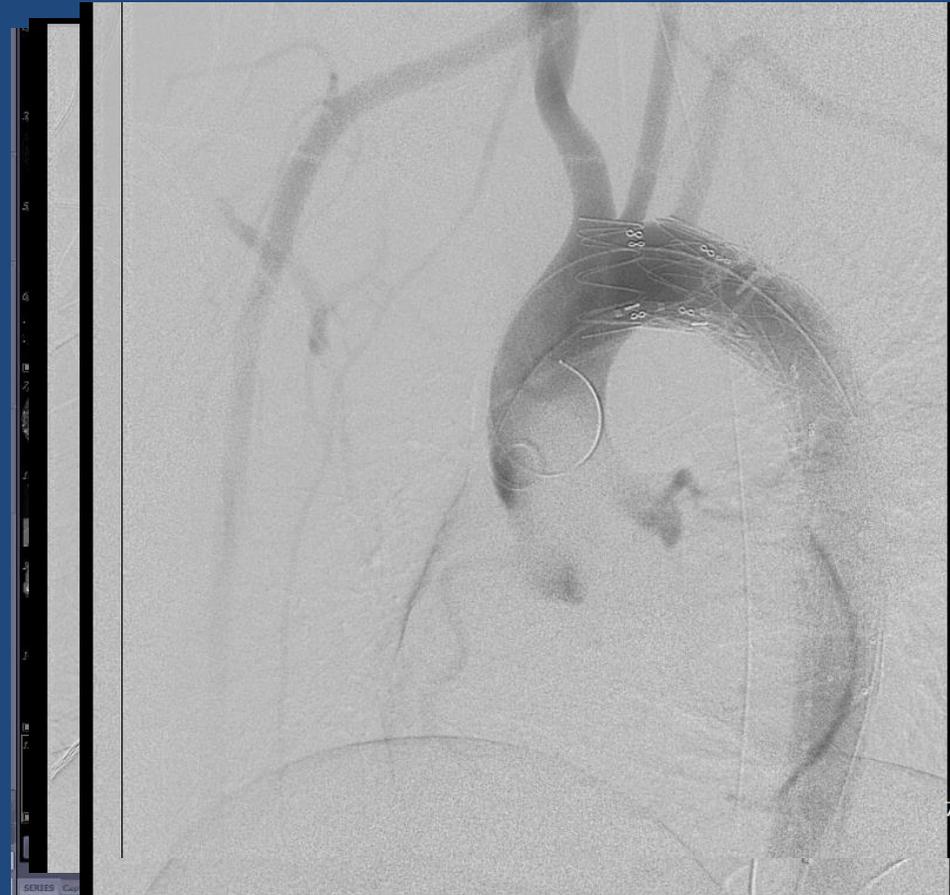
- 31 year old man
- Jumped from bridge
- Grade 3 BTAI
- Aortic stent graft
 - Partially covering left CCA
 - Covered stent rescue

- Drapes removed
 - Left foot cold and poorly perfused
 - Antegrade angiogram
 - Suction thrombectomy and vasodilators

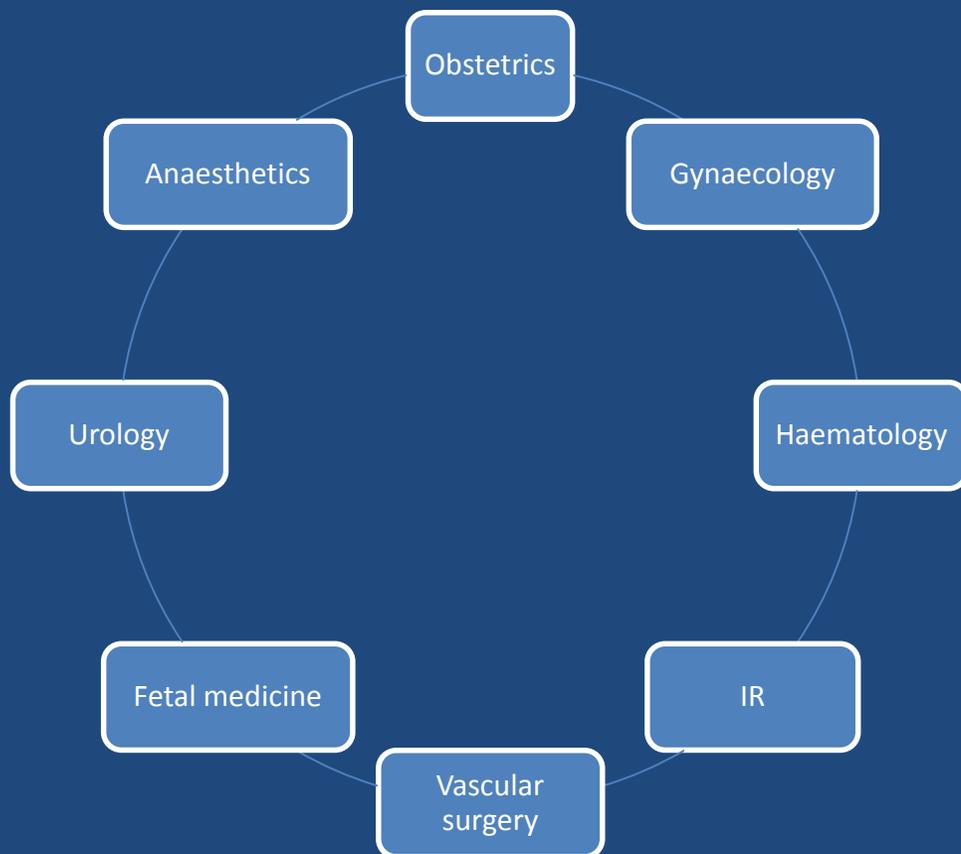


Contingency planning

- 33 year old male
- Aortic transection
- 8mm from LSA
- Plan to cover LSA
- Too long?
 - Cover LCCA
- Too short
 - Second graft?



AIP / Placenta Accreta Spectrum service



- Specialist prenatal diagnosis, risk assessment and definitive treatment of AIP by a multidisciplinary team (MDT)
- Expertise in complex pelvic surgery.
- AIP Centres are required to have
 - antenatal imaging (fetal medicine or radiology),
 - adult intensive care,
 - level 3 neonatal intensive care services
 - immediate access to blood products.
- Planned C-Section delivery before 36 weeks
 - But sometimes bleeding or spontaneous labour before this
- Detailed SOP

Paediatrics

- Biopsies and drainages done by paediatric diagnostic team
- Very rarely paediatric emergencies (4 cases in 10 years)
 - Nephrostomy- 1 day old
 - Straightforward
 - Life-threatening pelvic pseudoaneurysm bleeding 7 year old
 - embolisation
 - GI bleeding post heart transplant 8 year old
 - 2 x embolisation
 - Maxillary AVM bleeding 10 year old
 - No procedure-transferred to London

Contingency planning

- IR room failure/II failure
 - Back up venue?
- PACS/networking failure
 - Patient transfers
 - Case planning/graft sizing?
- Patient deterioration?
 - Is the team adequate
 - Who else can help?

05:30 Monday morning

- Outside hospital 18 km away
- 19 year old woman
- Autoimmune hepatitis
 - Known varices (endoscopy 3 days previously)
- 28 weeks pregnant
- Abdominal pain
- No PV bleeding or haematemesis
 - Hypotension BP 89/50
 - Heart rate 145/min
 - Haemoglobin 63
 - Lactate 11, pH 7.026
 - Fetal death



Pain improved with analgesia
Abdomen diffusely tender
Vomiting
Pulse 101
BP 115/59
EWS 4

Severe pain (epigastric)
Very tender
Pulse 145/min
BP 89/50
EWS 7
pH 7.026, Lactate 11.2
Hb 63

20:00

23:00

01:00

02:30

03:00

LUQ abdominal pain
Diffuse tenderness
Pulse 81
BP 138/76
EWS 0
Baby moving

Fetal heart rate 140/min
Drowsy
Pulse 89/min

Major haemorrhage protocol
ED, O&G, Obstetric anaesthetist review
US no fetal heart seen

CT



Where to treat?

Current hospital
Obstetrics
Vascular surgery
General surgery
IR, but not 24/7



Transfer 14 miles
Obstetrics (regional high risk centre)
Vascular surgery
General surgery
IR 24/7



Transfer 15 miles
No Obstetrics
Vascular surgery
Hepatobiliary surgery
IR 24/7

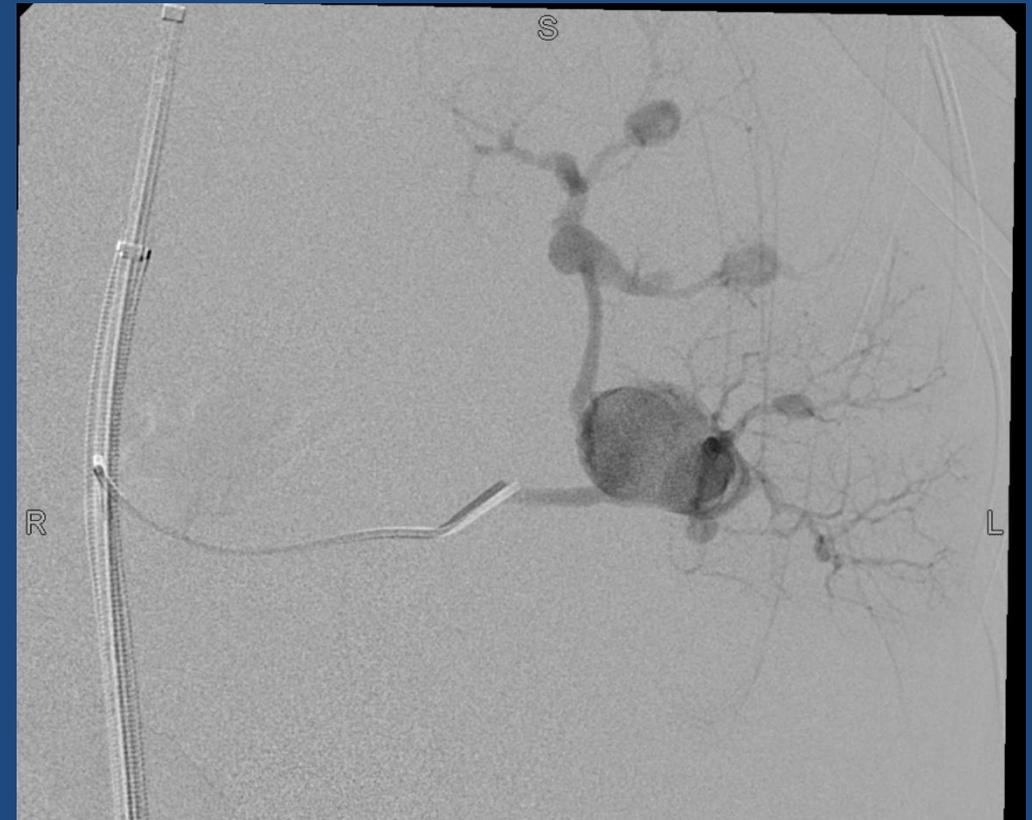


- 1 Treat at current hospital
- 2 Transfer to regional high risk obstetric centre
- 3 Transfer to hepatobiliary centre
- 4 Insert aortic occlusion balloon prior to transfer

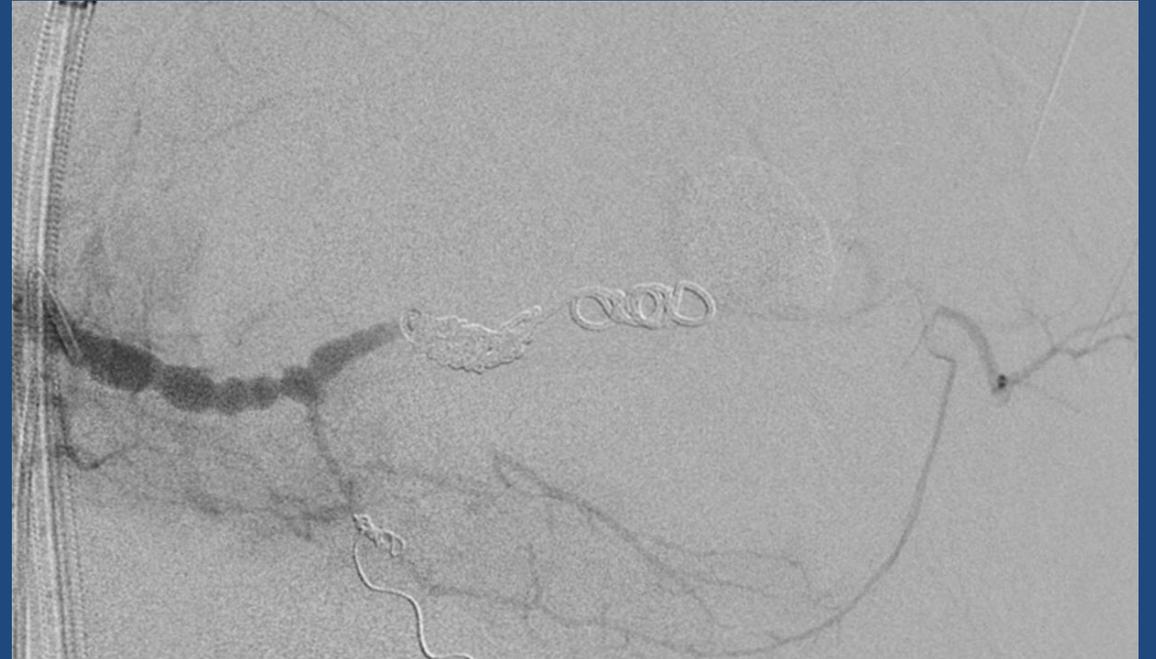
05:40

- Called back
- BP now 50 systolic
- Transfer no longer an option
- Undergoing large volume transfusion in endovascular theatre (within theatre suite)
- Concerned re risk of splenectomy in patient with portal hypertension
- Vascular surgeon has just arrived

- On arrival
- Intubated
- Vascular surgeon present
- Has placed an aortic occlusion balloon (but not inflated)
- Choice of embolic agent



- No aneurysm filling
- Haemodynamically improved
- Uneventful percutaneous closure
- 21 units blood (+blood products)
- Coagulopathic
- pH 7.0



- 12 hrs optimisation
- Transferred to regional high risk obstetric centre
- 36 hrs post haemorrhage
 - Caesarean section
 - Splenectomy and ligation of varices (Hepatobiliary surgeon with haemostatic aids)
 - Estimated blood loss 7000mls
- Post splenectomy vaccinations and antibiotics
- Discharged home on day 9

Conclusion

- Emergency IR needs a robust system
- Reliable teleradiology is essential
- Get the best from your team
 - WHO checklist
 - Be patient and supportive
- Use proven techniques
- Anticipate disasters and have a plan