

Scope – as requested

09.00 – 09.05 Introduction

09.05 – 09.45 MET calls: practical management of the deteriorating patient (Kath Fawcett)

09.45 – 10.20 Management of acute kidney injury. (Chris Laing)

10.20 – 11.00 Ward NIV: practical management, and its impact on patients and staff (Sussannah Bloch)

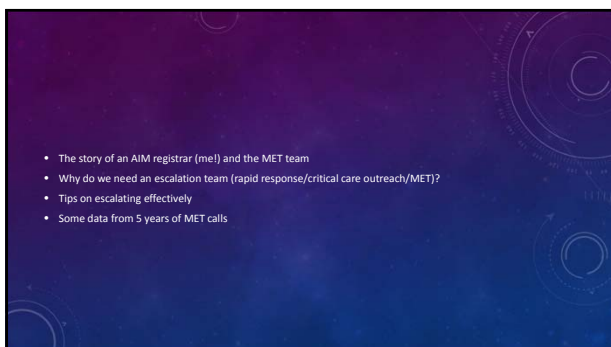
11.00 - 11.30 Coffee

11.30 – 12.00 Practical shock and sepsis management (Kath Fawcett)

12.00 – 12.35 Medical frailty and ICU admission. (Jamie Gross)

12-35 - 1300 Doing the right thing: who should we admit, and what are we committing them to?
(audience/panel debate) Chaired by Ganesh all presenters able to participate







BACKGROUND

- Flexi-trainee in Acute medicine
- Started at NPH Oct 2010
- Working on HDU, on call weekly or so,
- NPH MEWS obs charts
- Only 1 CCOT – who faced resistance from ward nurses
- Referrals for HDU from doctors, acute colleagues, nurses, physios, CCOT
- Often at 4.30pm
- (No cover for HDU after 5pm – only a med reg in ED until 9am)
- Mortality reviews, QIIP work

BACKGROUND CONTINUED

- 1 F/T registrar, 2 doing job share, 1 SHO
- 1 Consultant: who would do a 30-45min ward round before seeing her Respiratory patients.
- We registrars were all sharing mortality audit work
 - Notes v difficult to find
 - Left just looking at the scanned notes
 - Trust proforma distracting
 - Annoying and boring!

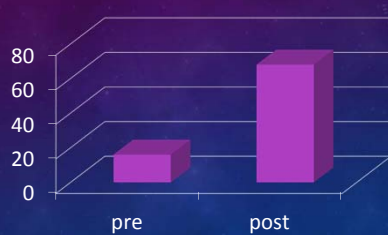
THEMES

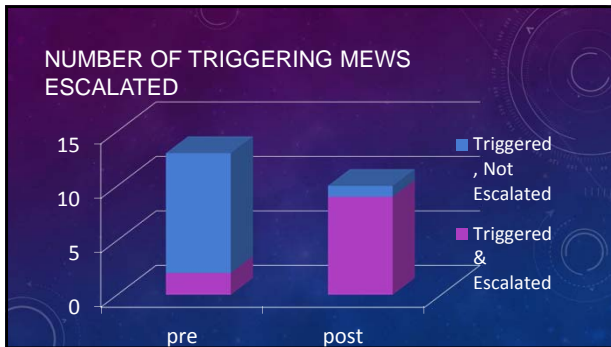
- Most useful just reading the notes through
- Get an overall sense of the failings
- Themes will then emerge
- A focus for quality improvement

THEMES FROM MORTALITY REVIEWS

1. Poor recording of observations and MEWS
2. Poor accuracy of MEWS
3. Poor escalation of raised MEWS
4. MEWS poorly designed
5. Poor response when this escalation is made
6. Poor setting of ceilings of care
7. Inappropriate aggressive treatment of frail elderly patients

% PATIENTS WITH ALL OBSERVATIONS RECORDED





AIMING HIGH: INTRODUCING THE MET CALL

We needed a team to be called early on in escalation, to:

- Take it seriously
- Stay involved as long as needed
- Be Voice called like cardiac arrest
- Links to ITU and medical HDU

And to change over to national EWS (NEWS) still in development: the best EWS possible with SBAR for making escalation calls

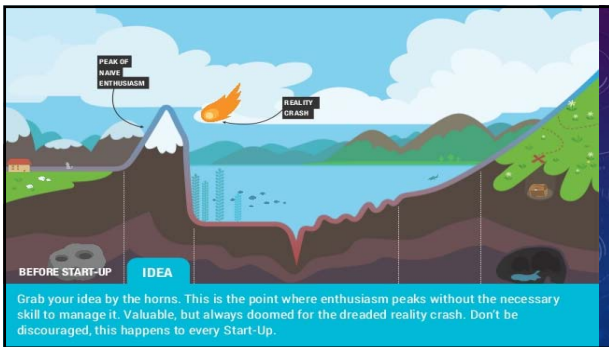
We had a ready made team at NPH: skilled acute medical registrars already running the HDU

- Used to taking deterioration seriously, already trained up
- Gatekeepers for HDU
- And with the outreach nurses who had links to ITU

AN IDEA IS BORN

- Presented findings at clinical governance
- Declared the need for a Medical Emergency Team to respond to deteriorating patients
- Sceptical response: "Won't work" "Team will be inundated"
- "Teams won't want other doctors to interfere with their patients"

- 2 CCOT nurses who had just taken over were there
- We pledged to make it work

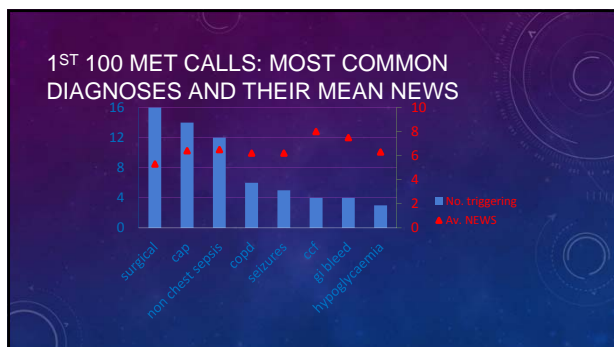


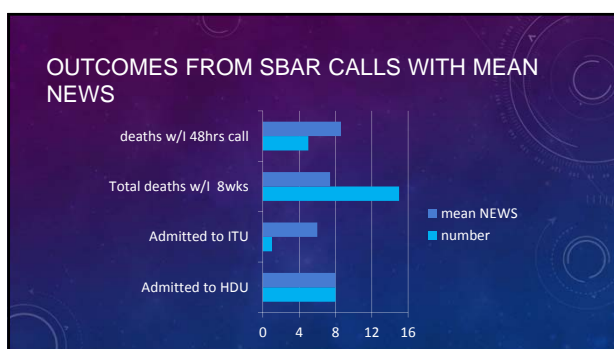
HOW DOES A REGISTRAR TAKE ON A PROJECT LIKE THIS?

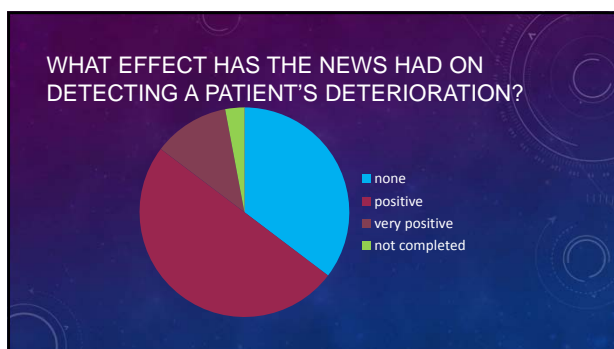
- Time
- Stakeholder "buy in"
- Established strong links with CCOT – who are the 'beating heart' of the hospital – know everyone, are trusted by everyone, know everything in terms of patients, S's, how to get things done etc
- Thick skin, belief vs delusional?

"POLI POLI"

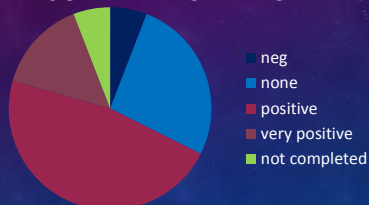
- Took about 9 months from idea to trial
- Spent that time
 - Writing Observations policy
 - Introduced SBAR system at same time for staff escalating deteriorating patients
 - Getting it ratified by the Board
 - Presenting the plan to different clinician groups: medical, surgical, critical care
 - Training the juniors
 - Training the nurses
 - Adding the Medical Emergency Call bleep to switchboard voice calls
 - Waiting for the National Early Warning Score to be released formally
- "Trial" on 2 acute wards and the gastroenterology ward



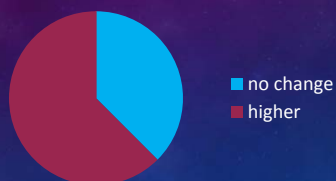




WHAT EFFECT HAS SBAR HAD ON GETTING HELP FOR YOUR DETERIORATING PATIENT?



HAS YOUR CONFIDENCE THAT YOU CAN GET HELP FOR YOUR PATIENT CHANGED SINCE THE PILOT BEGAN?



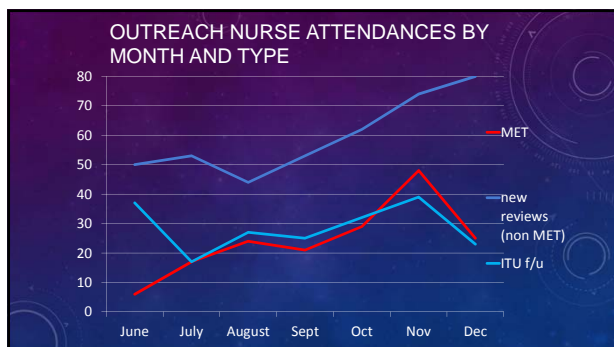
COMMENTS FROM QUESTIONNAIRE

Positives

- "SBAR builds nurses' confidence to articulate what they want for patients. Good for junior nurses."
- "Creates a sense of awareness on patient's conditions. SBAR draws dr's and CCOT's attention fast. MET gives nurses confidence that we have immediate response for our deteriorating patient"

Negatives

- "causes me stress, increased workload. Regardless of NEWS score I can identify a sick patient and monitor them and inform team. Many patients have systolics below 100mmHg"
- "pt had low BP and scored, but he was sitting up having his tea"



**ROLL OUT TO THE ENTIRE HOSPITAL
AUGUST 2013**

- Expansion was cautious
- From August 2013 (when I returned as a consultant), we opened it up to the whole hospital.
- Data collection initially the SBAR stickers, then electronic database
- MET calls have steadily increased
 - Data showing numbers of calls out of hours justified a ward registrar as well as registrar on take, and 24hr outreach nurse cover
 - Now we have 2 outreach nurses on day and night, 7 days a week
 - Reaching around 600 MET calls per month last Winter: 20/24hrs
- Downsides: winter months are extremely busy for MET team, sometimes 3 calls at once – but patients rescued earlier in general. SI panels and senior management have re-iterated the need to follow escalation policy.

RISK SCORING

| Aggregate score (NEWS) | Risk |
|---------------------------|--------|
| 1-4 | LOW |
| 5-6 (or 3 in 1 parameter) | MEDIUM |
| 7 OR MORE | HIGH |

CARE OF THE DETERIORATING PATIENT: WHAT WOULD YOU WANT FOR YOUR FAMILY?



2005 An Acute Problem

- Hours of deterioration preceding ITU admission
- Insufficient consultant involvement
- Insufficient escalation by juniors

NPSA 2007

"11% of hospital deaths were as a result of unrecognised or untreated deterioration"



CG 50: Recognition of and response to acute illness in adults in hospital
Robust tracking, triggering & escalation response required

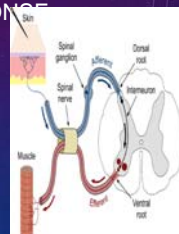
THE CHAIN OF SAFETY



G Smith

CONCEPT OF RAPID RESPONSE

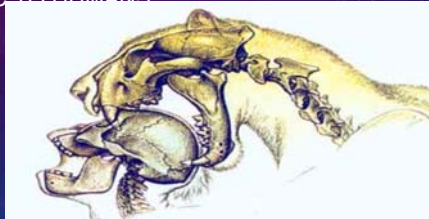
- Afferent limb = picking up a problem and calling for help
- Interneuron = call rapid response team via switch
- Efferent limb = the response
 - Reliable attendance of a team including specialists in deterioration
 - Rapid multi-system assessment
 - Treatment on the ward
 - Decision making on next steps
- Australians and Americans led on forming METs – usually with an intensivist and nurses “millennium”
 - Daryl Jones, Michael De Vita
 - Plenty of research took a long time to show any concrete benefit, although anecdotal evidence of culture shift
 - Most recent meta-analysis suggesting reduction in mortality (RR 0.88) (Solomon et al, 2016, J. Hospital Medicine) & CA



NEXT STEPS

- Audit the NEWS on our MAU – was this a wider problem or limited to the older frailer patients?
- Found that there was a general problem with the recording of and escalation of abnormal observations.
- Felt the MEWS was not fit for purpose
- Looked at a better version from our sister site CMH
- Introduced it on Dickens and then reaudited.
- Dramatic improvement in scores recording and escalation
- Tried to explore why this was and work out how to sustain it

SABRE TOOTH TIGER: OPTIMISM BIAS IS INTRINSIC TO HUMANS



the medical hierarchy: a visual guide



THE STIFF UPPER LIP



TIPS FOR SUCCESS WHEN DEALING WITH A DETERIORATING PATIENT

*If the NEWS doesn't
come ↓, refer it ↑*

MET CALLS: SITUATIONAL AWARENESS

- Know your team:
 - swap mobile numbers at beginning of shift
 - check competencies
 - Check bleeps are all getting MET calls
 - What will you do if there are 2 or more MET calls at once?
- Safety brief at beginning of shift:
 - Discuss patients of concern
 - Discuss how you will communicate.

CEILINGS OF CARE

- Patients shouldn't be for MET calls if they are for conservative or palliative management.
- If a patient is for ward based care, it is the decision of the team's consultant as to whether MET calls would be of benefit compared to the team's own doctors being called.
- Be very clear if patients are not for MET – are they still for escalation to the ward team or for comfort measures only? Are they for observations?

FUNCTIONAL BASELINE

- Generally rather cursory
- Not just 'can they' but DO they?
- Do they leave the house often?
- Do they walk around a supermarket? Go up and down the stairs?
- Do they walk a mile?
- BiPAP for T2RF tends to be offered to COPD patients who are very limited – generally successful, but I would not give such patients BiPAP and vasopressors

INDIVIDUAL ESCALATION PLANS

- NEWS 2 now offers separate scale for CO2 retainers
- Such patients – on LTOT, high b/l RR, will still score 3 at baseline
- In such patients, difficult to decide on appropriate trigger for deterioration
 - Change in NEWS may be more relevant than absolute number
 - However, have less capacity to tolerate further changes
 - Other patients with altered baseline include disordered consciousness (brain injury etc), acute tachycardias
- Best NOT to alter NEWS scores or chart
- Change the ESCALATION – write it clearly in the notes and ensure nurses know and understand the plan
- Maintain safety net: nurses can always call if worried no matter what score is, add 1 or 2 to usual trigger, review the patient after a few hours and include a bleep number to contact.

TREAT THE PROBLEM EFFECTIVELY

- Work out the Whys and the Whats
 - Why is the patient in respiratory distress?
 - Secretions & sputum plugging
 - Chest physio, suctioning, nebulisers
 - PE – easy to overlook
 - Pneumonia vs Pulmonary Oedema
 - Be sparing with oxygen – no one needs sats 100%
 - Often FLOW which is needed – NHF, CPAP, humidified wall O2
 - Wheeze – back to back nebs,
 - What else is driving this?
 - Pain response
 - Atelectasis – try to sit people up, & if well enough, sit out
 - Undertreated bacterial infection
 - Flu – test everyone!
 - ABG, bloods
- escalate if not improving to aminophylline

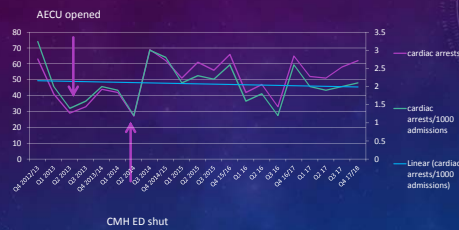
CRITICISM OF THE CALLER

- Incredibly damaging to escalation
- Try to pretend to be grateful that the team called you!
- It is terrifyingly easy to turn people off calling

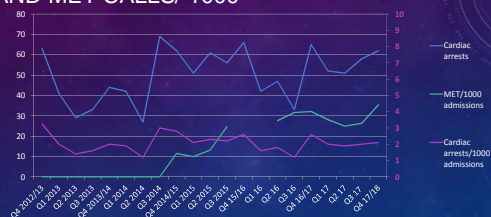
MET AUDITS

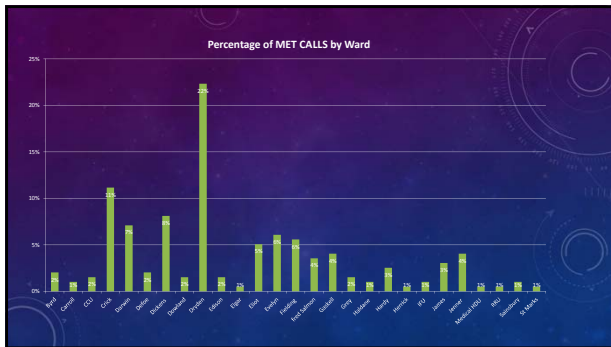
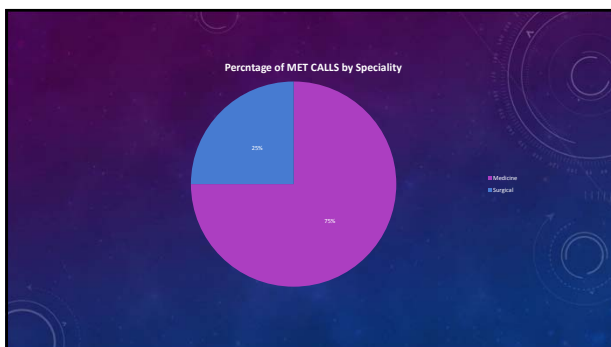
- 196 MET call patients and outcomes at 7 days

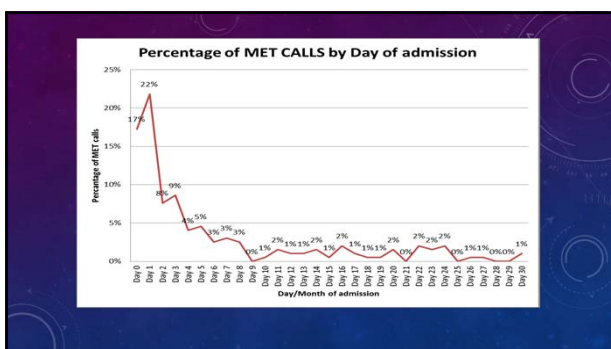
CARDIAC ARRESTS QUARTERLY SINCE 2013

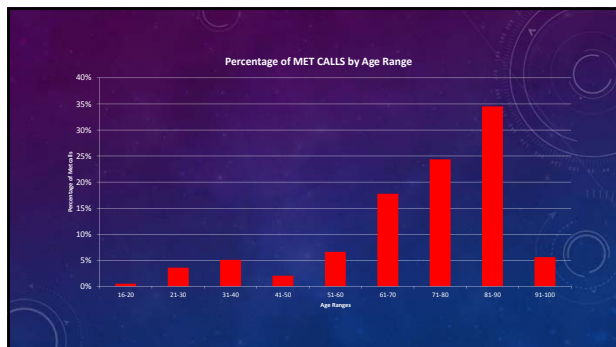


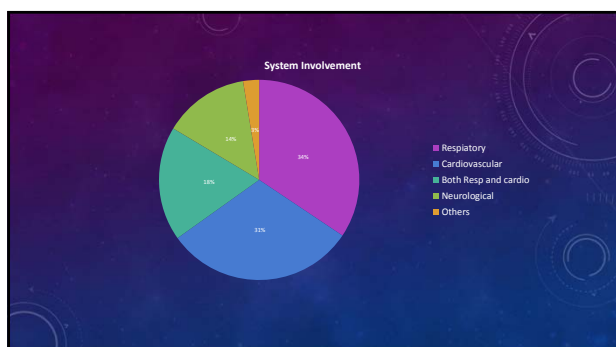
CARDIAC ARRESTS VS CA/1000 ADMISSIONS AND MET CALLS/ 1000

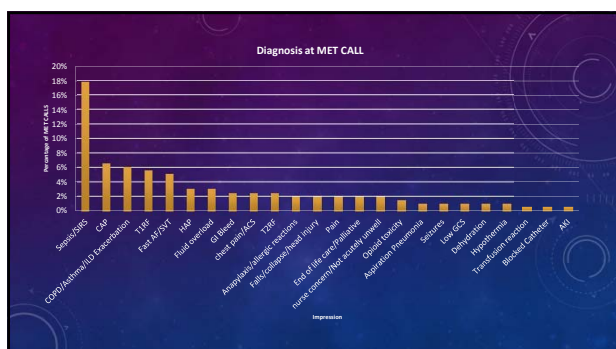


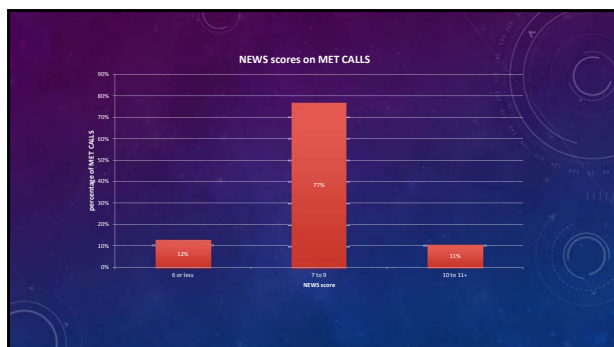
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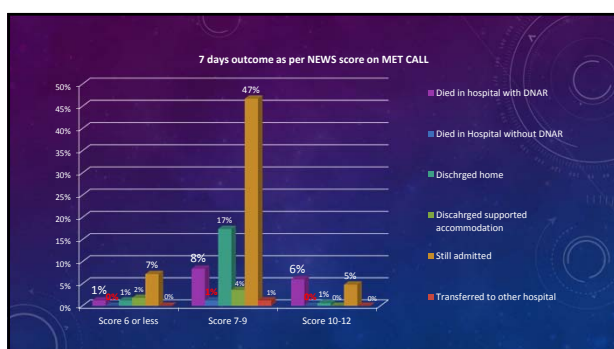


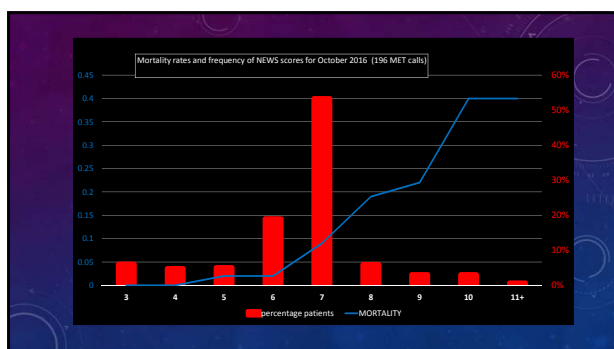


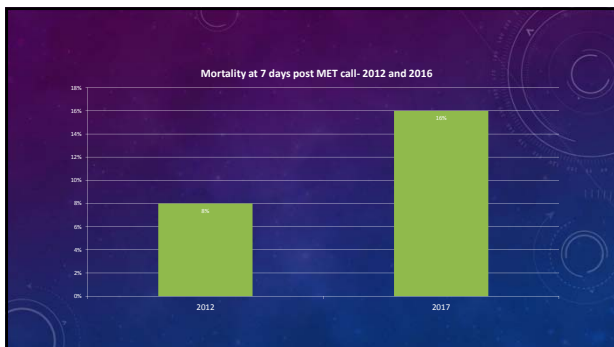


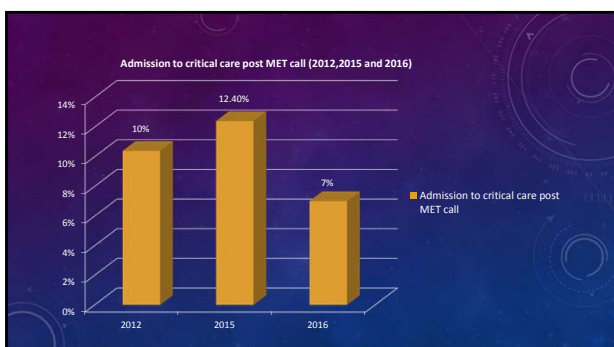


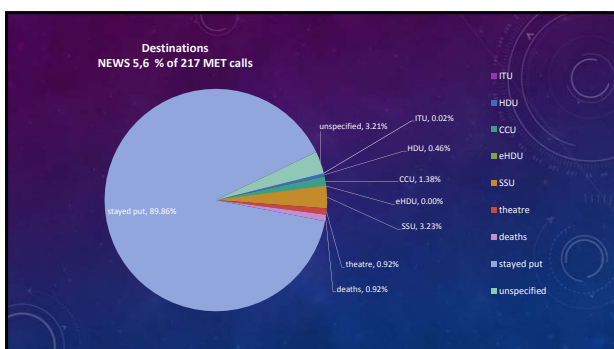


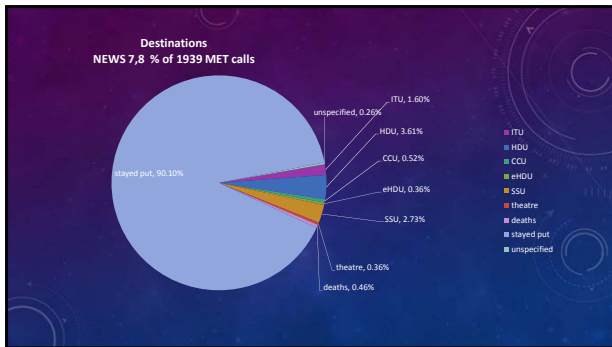


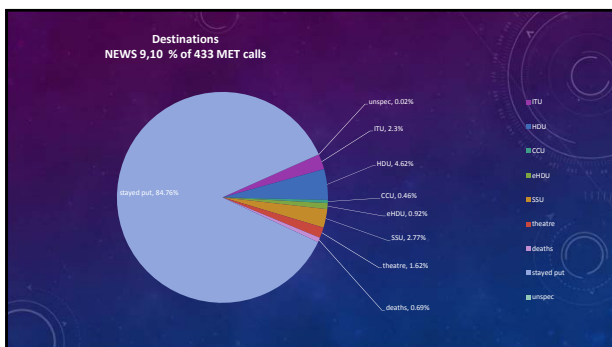






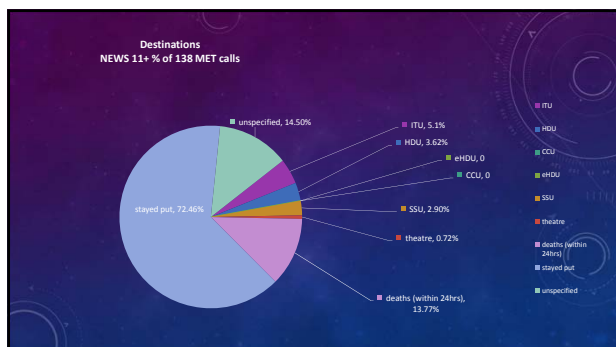


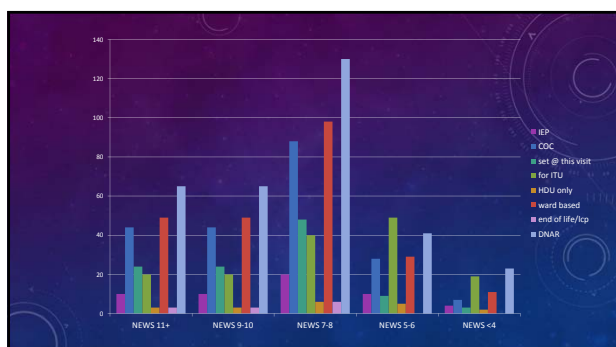


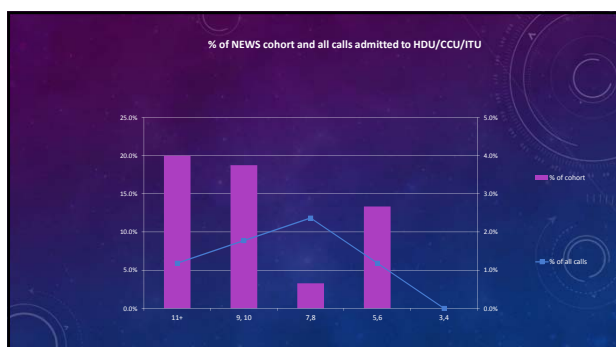


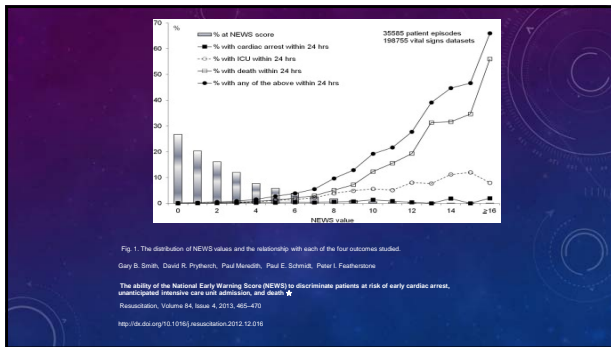
Benchmarking Report for
METHOD 2014 - ISRRS

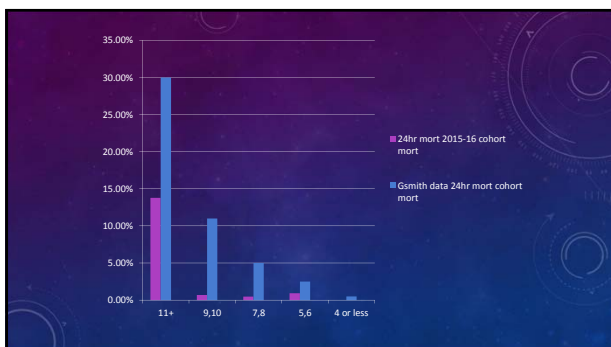
| Northwich Park | | All METHOD20 units | | Northwich Park | | All METHOD20 units | | Northwich Park | | All METHOD20 units | |
|--------------------------|----------------|--------------------|-------------------------------------|----------------|--------------------|------------------------------------|----------------|--------------------|----------|--------------------|--------------------|
| Case mix | Northwich Park | All METHOD20 units | Percentage | Northwich Park | All METHOD20 units | Outcomes | Northwich Park | All METHOD20 units | Outcomes | Northwich Park | All METHOD20 units |
| Total number of patients | 18 | 1188 | % patients with NEWS 10 | 83 | 63 | % admitted to ICU | 28 | 23.9 | | | |
| % from acute home | 70 | 80 | % patients with low conscious state | 33 | 30 | % admitted to ICU within 4 hours | 8 | 51.9 | | | |
| % for full active care | 72 | 81 | | | | % improved on ward within 24 hours | 82 | 65.0 | | | |
| % Department of Medicine | 28 | 53 | | | | % DNAR following call | 17 | 26.0 | | | |
| % Department of Surgery | 50 | 24 | | | | % mortality within 28hrs of MET | 0.0 | 8.8 | | | |
| | | | | | | % death with valid DNAR | 100 | 57.0 | | | |
| | | | % Composite MARIOR score | 28% | 52% | | | | | | |

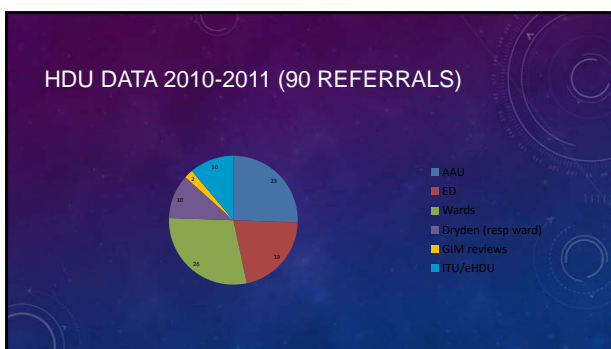


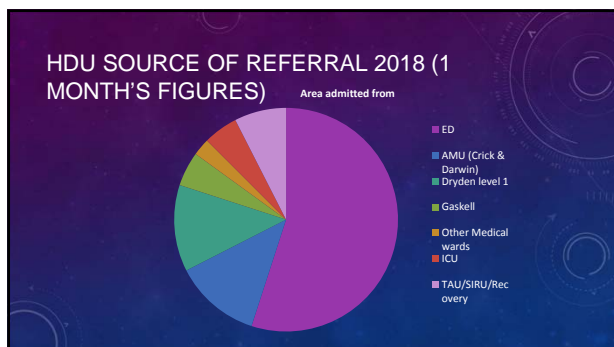


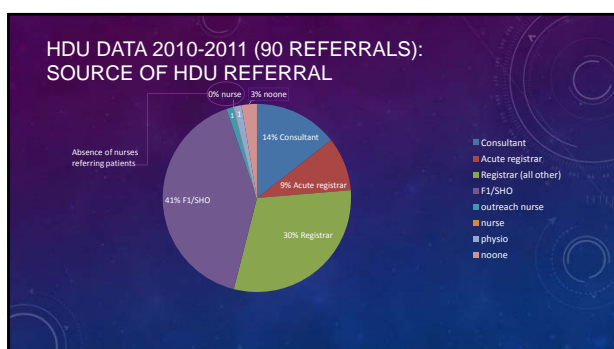


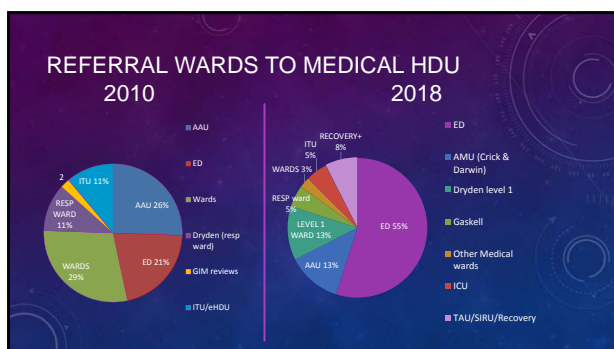












HDU MORTALITY COMPARISONS

- Mortality 2010: 25%
- Mortality 2018: 12%
- Vast majority of referrals via ED and MET* calls in 2018 (>95%)
- *from NURSES

IN SUMMARY...

- NEWS works: sensitive measure which conveys the risk of that patient deteriorating <4 = v low risk
- MET calls work: skilled team deal with raised NEWS across the hospital as it occurs (in general)
- Rarely calls made which should have been Crash calls (low GCS/fits/airway problems)
- Risk of 'call fatigue' has not been significant despite high call rates
- Risk of team burn out a concern
- Metrics of success difficult to pin down
- Some issues will improve with e-obs and NEWS 2
- Cultural change takes time
- Morale is shaky, frighteningly easy to deter MET calls being made
- We need ward based teams to respond to deterioration better, and earlier

Medical emergencies course for trainee doctors

Acute Kidney Injury

Chris Laing
Consultant Nephrologist
Clinical lead London AKI Networks



chris.laing@uclh.nth.net



Bywaters and Beal

British Medical Journal 1941

Acute kidney injury associated with crush injuries in bombing victims

...signs of renal damage soon appear, and progress even though the crushed limb be amputated...

...the urine output, initially small, owing perhaps to the severity of the shock, diminishes further.

...oedema, thirst and incessant vomiting soon develop. The blood urea and potassium, raised at an early stage, become progressively higher.....

...the patient is alternately drowsy and anxiously aware of the severity of his illness...

Case 1

- 78 year old
- CKD (Cr 130), peripheral vascular disease, diabetes, hypertension
- On ACE, diuretic
- Fractured neck of femur
- NSAID analgesia
- Dyspnoea ?PE - CTPA
- Cr 220 on admission, day 8 800, K 6.8, Bic 12
- Dialysis, cr on discharge 200

- MULTIFACTORIAL AKI (high risk with several acute insults)
- *Risk assessment, prevention, monitoring, recognition and early therapy all deficient*

Case 2

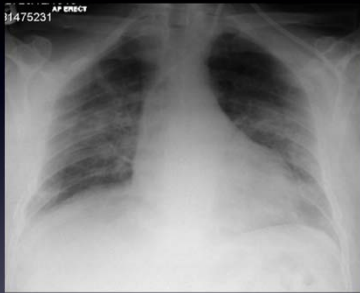
- 19 year old female
- Fever, malaise
- BP 85/60
- Petechial rash
- Cr 60, 90 on admission
- Lactate 5

- AKI SECONDARY TO SEPSIS/HYPOPERFUSION
- *Even mild AKI is a marker of illness severity*

Case 3

- 56 year old male
- Baseline Cr 82
- Attends GP surgery, malaise, cough
- Cr 550
- Referred local acute medicine team
- Urine dipstick blood and protein +++

- Anuric, continued rise in creatinine (>700)
- Falling Hb to 7.6
- Rise in K to 6.9, acidosis, 4 x doses of insulin dextrose
- Emergency transfer
- Same day biopsy - crescentic vasculitis



- ANCA +ve (pANCA)
- MPO IgG Ab 47
- raised KCO
- Anti-GBM, ANA, RF negative. Complement normal
- Randomised PEXIVAS trial (steroids, cyclophosphamide, plasma exchange)
*Plasma Exchange and Glucocorticoids for Treatment of Anti-Neutrophil Cytoplasm Antibody (ANCA) - Associated Vasculitis (PEXIVAS)
Castron et al
NCT00987389
- Dialysis independence Cr 200

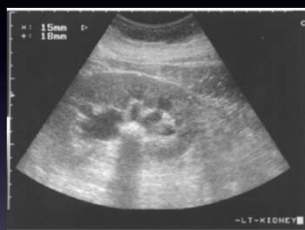
- AKI SECONDARY TO PARENCHYMAL KIDNEY DISEASE (VASCULITIS)
- *Delayed referral to nephrology services, inappropriate repeated use of insulin and dextrose, acute renal disease may be systemic*

Case 4

Case 5

- 22 year old female
- New diagnosis of Hodgkins lymphoma
- Progressive decline in conscious level
- Intubated, CT, MRI, LP no abnormality
- Urine volume 200mls/hr, Cr 180 (baseline 55), urea 38

- Renal replacement therapy recommended (CVVH)
- Patient wakes up
- USS - pelvicalyceal dilatation, CT extrinsic compression from lymphadenopathy
- Ureteric stenting, therapy for lymphoma
- Cr returns to baseline



Ultrasound showing pelvicalyceal and ureteric dilatation

- AKI SECONDARY TO OBSTRUCTION (extrinsic compression of ureters secondary to lymphoma)
- *Underestimation of AKI severity, good urine volume does not mean no AKI and does not mean no obstruction, don't miss uraemic encephalopathy*

Case 6

- 35 year old crohns disease, sepsis, small bowel resection, high dose steroids, TPN, TPN and NG feeding
- Baseline Cr 40, now 170
- Phosphate 3.1, Bic 15, urea 30

- AKI SECONDARY TO SEPSIS
- *Don't underestimate degree of AKI, need for RRT dependent on compensation*

Case 7

- 46 year old lymphoma, chemotherapy
- 2 days post chemotherapy LDH 2000, Cr rise 90 to 140, PO4 4.1, Ca 1.7

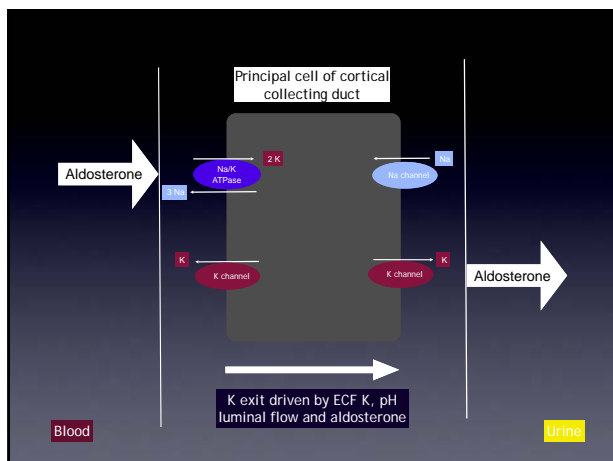
- Urate high also
- Emergency dialysis to reduce phosphate
- Avoided IV calcium

- AKI SECONDARY TO PARENCHYMAL KIDNEY DISEASE (tumour lysis syndrome)
- *Anticipate AKI and prevent, need for RRT not dependent on level of renal impairment but on decompensation*

Case 8

- 73 year old male
- Background ischaemic heart disease, LVF, CKD (baseline Cr 140)
- ACE, spironolactone, frusemide, B-blocker
- Admitted pneumonia, Cr 180
- K 7.8 with ECG changes, not acidotic

- Fluids, urine volume monitoring, antibiotics
- 4 x insulin and dextrose
- Cardiac arrest from hyperkalaemia and death

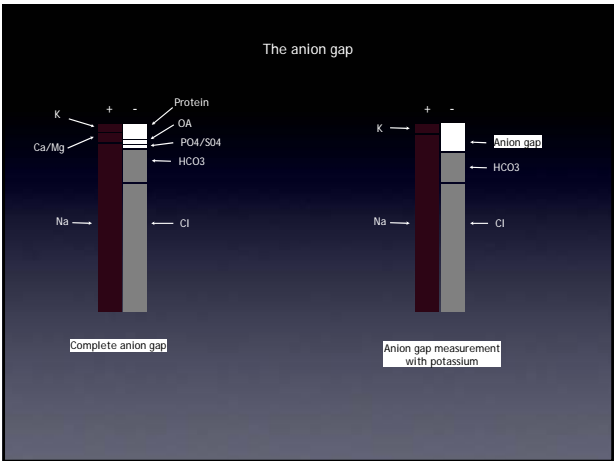


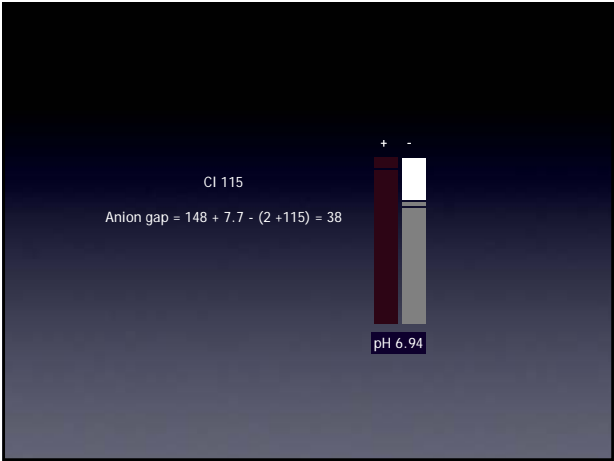
- AKI SECONDARY TO SEPSIS (several background risk factors)
- *Other factors may influence metabolic decompensation and recovery (drugs)*

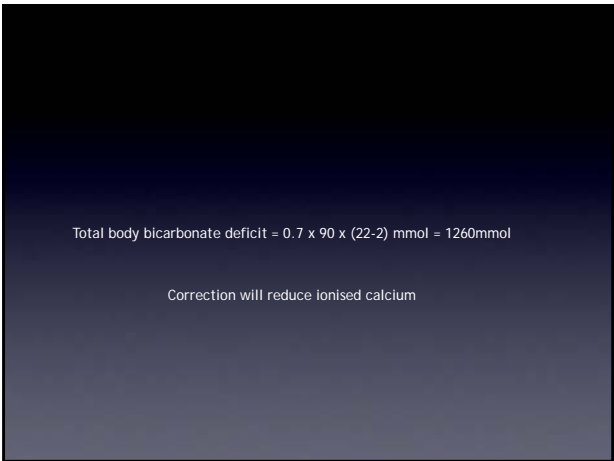
Case 9

- 45 year old male
- Diabetic, mild CKD (Cr 120)
- Generally unwell, malaise, lethargy, dyspnoea
- Dry, normotensive

| | | | |
|------|------|---------|------|
| Urea | 120 | pH | 6.94 |
| Cr | 3472 | PCO2 | 1.9 |
| Na | 148 | PO2 | 17.6 |
| K | 7.7 | HCO3 | 3 |
| Bic | 2 | BX2 | -26 |
| Ca | 1.87 | Lactate | 1.8 |
| PO4 | 2.8 | Alb | 40 |







Acidosis treatments



Small kidney/URR 25%
HCO₃ rise 10

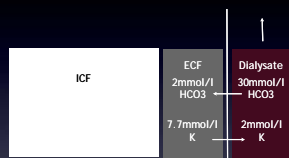


70mmol HCO₃ and Na/500mls
18 polyfusers (9 litres)



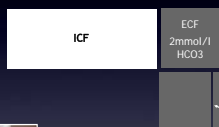
Lactate 30mmol/l
2.0l exchange 60 mmol
- 20 exchanges

Haemodialysis in AKI



Limit of bicarbonate infusion determined by
duration
kidney size
pump speed
dialysate flow
Rapid, early diffusion

Haemofiltration in AKI - acidosis

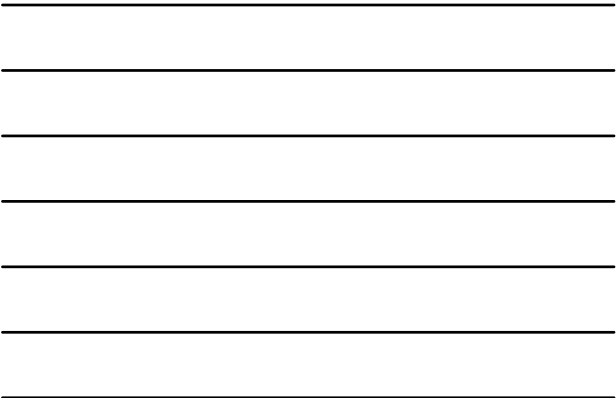
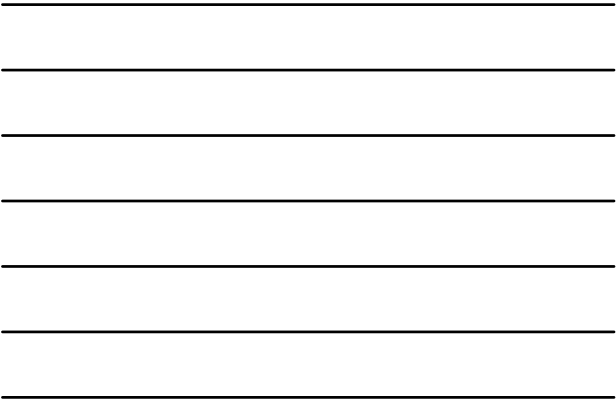


400mls ← 2l exchange
56mmol HCO₃ infused
Approx. 20 x 2 litre exchanges CVVH for correction
New acid production dietary (slow)

4mmol HCO₃ removed
(with other uraemic toxins)

60mmol HCO₃ replaced
with other electrolytes





-
-
-
-
-
-

Case 10

- 38 year old with malaise, lethargy, vaginal bleeding
- Trying for a child, positive kit test
- Gynaecology review - open cervical OS, bleeding
- BP 240/147mmHg
- Grand mal convulsion
- 'Medical opinion please'

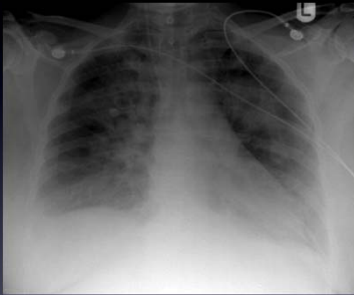


| | | | |
|------|------|----------|------|
| Urea | 22.4 | ALP | 55 |
| Cr | 387 | ALT | 13 |
| Na | 132 | AST | 39 |
| K | 3.2 | LDH | 2846 |
| Alb | 29 | Glucose | 6.7 |
| Ca | 1.73 | Chloride | 94 |
| PO4 | 2.09 | | |

| | |
|---------------|--|
| Hb | 10.0 |
| WCC | 15.4 |
| Platelets | 40 |
| Reticulocytes | 6.2% |
| MCV | 88 |
| PT | 10.4 |
| TT | 14 |
| APTT | 19 |
| Blood film | Moderate red cell fragmentation, platelets genuinely low |

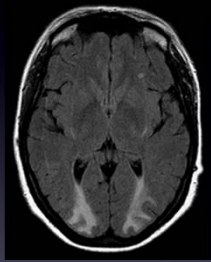
| | |
|---------------|-------|
| pH | 7.34 |
| PCO2 | 2.99 |
| PO2(FiO2 40%) | 23.28 |
| HCO3 | 14.5 |
| BXS | -12.4 |

- Frusemide, GTN
- Nitrates
- Lorazepam, phenytoin
- Transfer renal unit

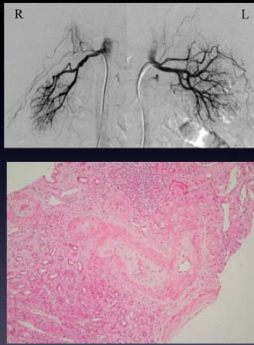


- MAHA
- AKI
- Pulmonary infiltrates - likely oedema
- Seizures
- 1st trimester miscarriage

- Dialysis
- PEX
- Captopril
- Amlodipine
- Bisoprolol
- Renal ultrasound - no perfusion



- PEX
- Captopril
- Amlodipine
- Bisoprolol
- Renal ultrasound - no perfusion



- RNA polymerase positive
- All other immunology negative
- Screening for secondary hypertension otherwise negative

AKI SECONDARY TO PARENCHYMAL KIDNEY DISEASE (SCLERODERMA RENAL CRISIS) causing malignant hypertension

- Beware hypertensive urgency and AKI - encephalopathy, MAHA, LVF



NON-INVASIVE VENTILATION: PRACTICAL MANAGEMENT AND IT'S IMPACT ON PATIENTS

Vicky Mummery/Susannah Bloch



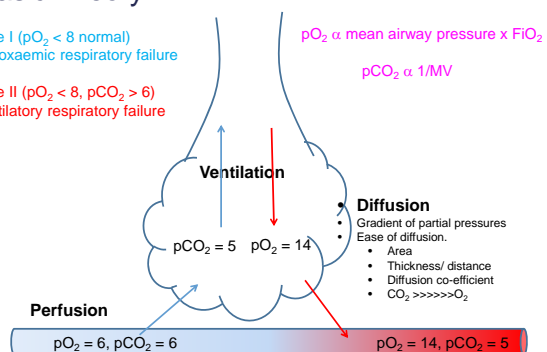
Aim

- Theory of Non-Invasive Ventilation
- Indications/contraindications
- Guideline Update
- Setting up NIV
- Trouble shooting
- NIV treatment failure
- Key take home messages
- V60

Basic Theory

Type I ($pO_2 < 8$ normal)
Hypoxaemic respiratory failure

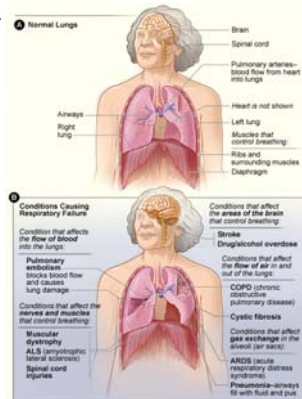
Type II ($pO_2 < 8$, $pCO_2 > 6$)
Ventilatory respiratory failure



Causes of respiratory failure

- Type I
- V/Q mismatch
- Rt to Lt intrapulmonary shunt
- Capillary blood supply
- Impairment of diffusion at level of alveolar-capillary membrane
- Rib fractures
- Pain

- Type II
- Reduced ventilatory drive
- Reduced tidal volume
- Dead space
- Increased CO₂ production
- Changes to alveoli
- NMD/CWD/OSA



NIV explained

Non Invasive Ventilation (Bipap/ BiLevel)

Provision of ventilatory support through the patients upper airway via a mask or similar device.
Used to provide ventilatory support i.e. Type II Respiratory Failure.

Advantages of NIV over Ventilation

- Avoids intubation & assoc. problems
- Shorter hospital stay
- Avoids sedation
- Patient able to interact
- Patient able to take breaks for meals
- Able to administer in non-ICU setting
- BUT IT DOES NOT TREAT THE UNDERLYING CAUSE

MAXIMISE MEDICAL TREATMENT FIRST

NIV Theory

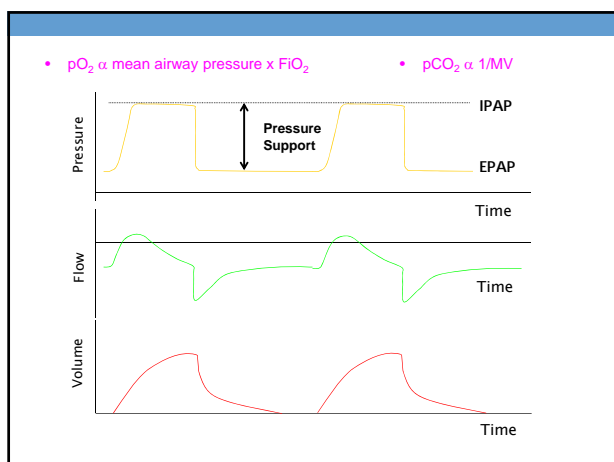
The aim of NIV is to support ventilation

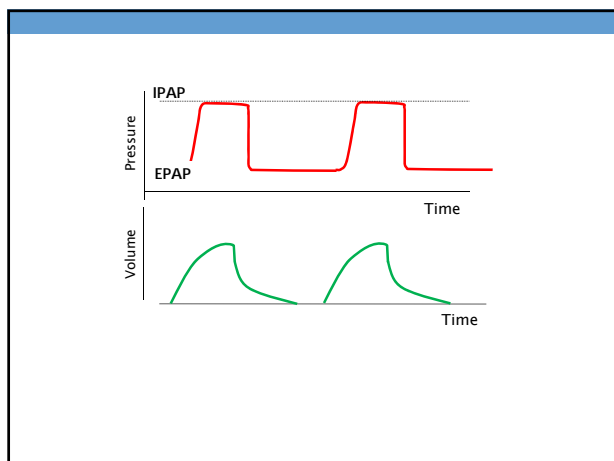
There are 2 parts to NIV

Together they improve gas exchange and support respiratory function

NIV machines allow a higher FIO₂ delivery

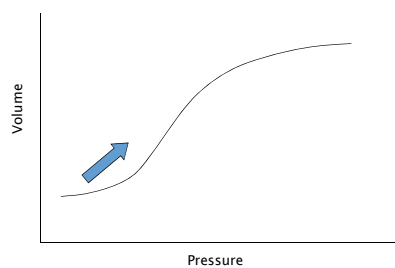
- **PS or IPAP**
- Positive pressure support to inspiration
 - Increase TV (tidal volume)
 - Also Improve recruitment and compliance
 - Reduce work of breathing
- **PEEP/ EPAP**
- Positive end expiratory pressure throughout the ventilatory cycle
 - Improves alveolar recruitment
 - Increases mean airway pressure
 - Improves Recruitment and reduces shunt
 - Unloads respiratory muscles and reduces the work of breathing
 - Positive effect on cardiac afterload
 - Stents open upper airway





Lung compliance and functional residual capacity (FRC)

- PEEP also reduces work of breathing by improving compliance -> recruitment of alveoli increases FRC, shifting patient to more compliant part of lung volume-pressure curve



This is the important slide!

- $pO_2 \propto \text{mean airway pressure} \times FiO_2$
- Therefore to improve oxygenation increase the FiO_2 or PEEP
- $pCO_2 \propto 1/MV$
- Therefore to improve pCO_2 increase the ventilation – increase the RR or the TV (PS)

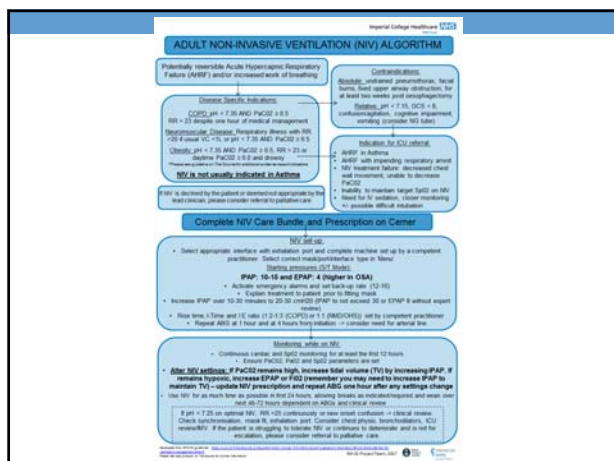
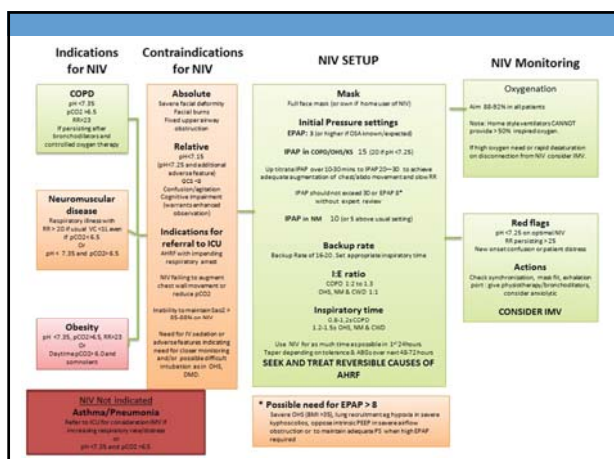
Indications for NIV

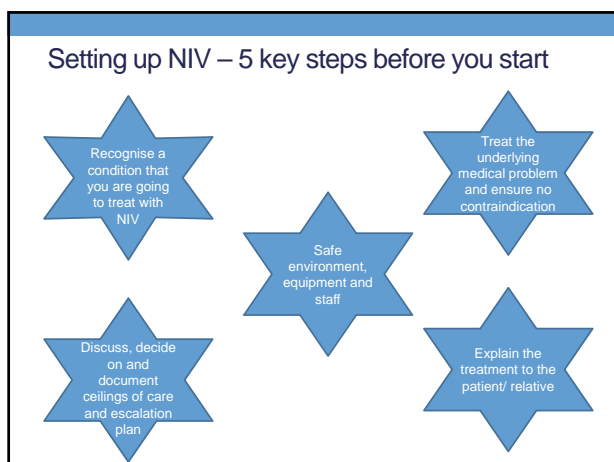


- Acute
 - Acidotic exacerbations of COPD
 - Pulmonary oedema unresponsive to CPAP
 - Acute-on-chronic hypercapnic respiratory failure in chest wall deformity / NM disease / OSA
 - Weaning from ventilation
- Chronic
 - Neuromuscular & chest wall diseases, COPD, OHS

Contraindications to NIV

- Unconscious patient, inability to maintain own airway *
- Confusion/agitation *
- Vomiting
- High risk of aspiration
- Facial trauma/burns
- Recent facial/upper airway/upper GI surgery *
- Fixed upper airway obstruction
- Bronchial +/- pleural fistula
- Haemodynamic instability *
- Copious secretions *
- Suspected/confirmed undrained pneumothorax *
- Bowel obstruction *
- Life-threatening hypoxemia *
- Severe co-morbidity *





Imperial College Healthcare NHS Trust

ADULT NON-INVASIVE VENTILATION (NIV) CARE BUNDLE: HOW TO COMPLETE ON CERNER

Open Patient Record
Go to **'Record'** on top bar
Down to **'Ad Hoc Recording'**
Click

Click on 'Medics Forms'
Select **'Non-Invasive Ventilation'**
Click **'Record'**
Complete bundle (all elements are mandatory)

Click 'Medication List' tab to complete prescription: click '+add', search BIPAP, complete prescription and sign
Return to **'Adult Non-Invasive Ventilation'** tab
Tick **'Yes'** to prescription complete and sign form

The care bundle **must** be completed prior to initiating NIV

NIV QI Project Team, 2017

How to set up NIV

- Initially hold the face mask in place.
- Then secure the head straps
- STAY WITH THE PATIENT
- Starting settings (12 and 4) increase every few minutes as tolerated.
- Aim for
 - Sats 88-92% (or >94%)
 - IPAP of 20
 - PEEP of 4 upwards
- Make sure the back up rate is on (12-14)
- Make sure the apnoea alarm is on
- Show the patient how to call for help and remove the mask
- Check that the chest wall is moving (coordination/ synchronisation), mask fit, comfort, haemodynamics, GCS

Frequency of assessment

- Baseline
- Response to maximal medical therapy
- At initiation of NIV
- One hour
- Frequency then depends on response
- ABG at 1 hour, then at 4-6hrs if stable
- If settings are changed, ABG 30-60 minutes after change is implemented
- CXR in event of any acute deterioration

Length of treatment

- NIV should be almost continuous for first 24 hrs (breaks allowed for meals, PHYSIO, nebs)
- Next 24 hours, at least 12 hours
- Switch to nocturnal NIV
- Consider withdrawal day 3 - 4

Troubleshooting

- Inadequate ventilatory support (persisting acidosis/high CO_2)

$$p\text{CO}_2 \propto 1/\text{MV}$$

- Check for leaks
- Check expiratory port is not blocked
- Clinical re-evaluation (may include CXR)
- Wean FiO_2 if SpO_2 is $>94\%$
- Increase IPAP in increments of 2-4cm H_2O & repeat ABG after 30-60 minutes
- Ensure optimal additional medical management

Troubleshooting

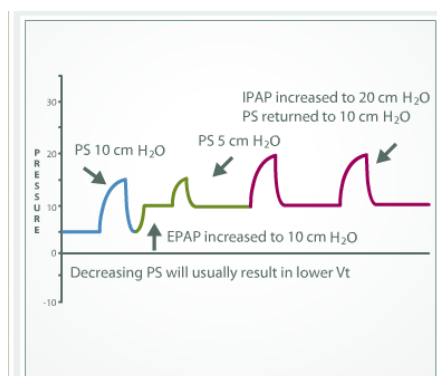
- Persisting hypoxia

$$p\text{O}_2 \propto \text{mean airway pressure} \times \text{FiO}_2$$

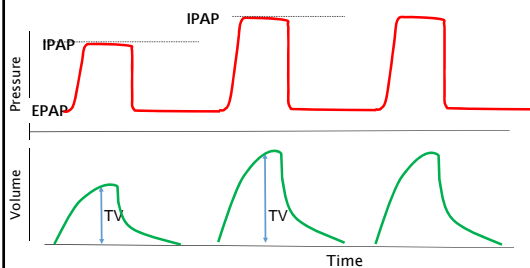
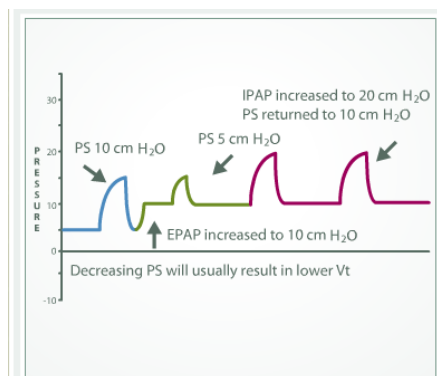
- Check for leaks
- Clinical re-evaluation (may include CXR)
- Increase EPAP in increments of 2cm H_2O (& IPAP by the same amount to maintain PS) & repeat ABG after 30-60 minutes
- Increase FiO_2 & repeat ABG after 30-60 minutes
- Ensure optimal additional medical management

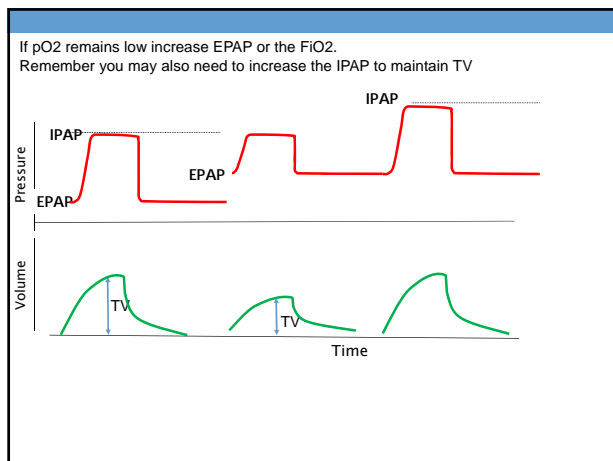
You only need to know 4 things

- $p\text{O}_2 \propto \text{mean airway pressure} \times \text{FiO}_2$
- Therefore to improve oxygenation increase the FiO_2 or PEEP
- $p\text{CO}_2 \propto 1/\text{MV}$
- Therefore to improve $p\text{CO}_2$ increase the ventilation – increase the RR or the TV (PS)

$pO_2 \propto \text{mean airway pressure} \times FiO_2$
 $pCO_2 \propto 1/MV$


If pCO_2 remains high increase your Tidal Volume (TV) by increasing the IPAP


 $pO_2 \propto \text{mean airway pressure} \times FiO_2$
 $pCO_2 \propto 1/MV$




Troubleshooting

- Leak from mask
 - Adjust straps
 - Consider pressure dressing to cheeks/nose
- Nasal and forehead damage
 - Apply padded dressing
- Non-co-operation/aggression
 - IF sedation necessary do it carefully
- Swallowing air
 - Insert NG
- Eye irritation
 - Adjust mask fittings
- Asynchrony
 - Consider different mode or machine discuss with Respiratory, it may be necessary to adjust the pressure rise time or the inspiratory trigger

Treatment failure

- Deterioration in patients condition
- Failure to improve ABGs
- Complications: pneumothorax, facial bridge erosion, sputum retention
- Intolerance
- Failure to alleviate symptoms
- Deteriorating conscious level
- Patient / carer wish to withdraw treatment
- If the patient is for escalation of treatment start the referral process early!

Key points

- TREAT UNDERLYING CAUSE
- Ensure adequate monitoring and support
- Make a plan for treatment failure
- Ensure NIV is prescribed and the bundle is completed before initiation

- $pO_2 \propto \text{mean airway pressure} \times FiO_2$
- Therefore to improve oxygenation increase the FiO_2 or PEEP
- $pCO_2 \propto 1/MV$
- Therefore to improve pCO_2 increase the ventilation – increase the RR or the TV (PS)

Further reading and competencies

- BTS/ICS Guidelines (2016)
- ATS/ERS Guidelines (2017)
- NCEPOD report (2017)
- Acute Adult NIV Competencies:
http://source.cs/groups/extranet/@clinical/@guidelines/documents/ppgs/sid_100819.pdf



• Questions?





Watch our new video: Non Invasive Ventilation (NIV) for patients

NIV is often used in the treatment of acute respiratory failure, this video explains the treatment from a patient's perspective. It explains why you might need NIV and what will happen if you do.

The video includes interviews with patients who explain how the experience of using acute NIV felt to them.

<https://www.youtube.com/watch?v=RSgwIEziWO0&t=2s>





Non Invasive Ventilation: An educational video designed for medical practitioners describing the patient centred approach to acute NIV.

<https://www.youtube.com/watch?v=a1R3hsusMAA&t=8s>



Part II - Practical management of shock

- Shock
- Bedside assessment
- 4 stages of shock management
- Fluids
- Volume assessment
- Vasopressors

What is shock?

- High lactate
- Organs not working: brain, kidneys
- Hypotension (*could have a MAP >65 but still in shock)

Other causes of high lactate

- Endogenous or exogenous adrenaline
 - Asthma
 - Vasopressor infusions
- Bowel ischaemia
- Liver failure, renal failure
- Convulsions
- Drugs (ARTs, aspirin, ETOH, methanol, metformin)

| Different types of shock & Presentation | |
|---|--|
| Type | Common Features |
| <ul style="list-style-type: none"> Hypovolaemic Cardiogenic | <ul style="list-style-type: none"> COLD peripheries, HR↑ BP↓ |
| <ul style="list-style-type: none"> Distributive <ul style="list-style-type: none"> Septic Anaphylactic (Neurogenic) | <ul style="list-style-type: none"> DIAPHORETIC WARM peripheries, HR↑ BP↓ |
| <ul style="list-style-type: none"> Obstructive <ul style="list-style-type: none"> Embolic, Tamponade Tension pneumothorax (Hyperinflation -asthma) | <ul style="list-style-type: none"> Diaphoretic, JVP↑ HR↑ BP↓ |
| <ul style="list-style-type: none"> Combined causes Endo/Severe acidosis/↓Ca²⁺ | |

| Diagnosis |
|---|
| <ul style="list-style-type: none"> Clinical examination, examination, examination BP, pulse, diaphoresis, RR, sats Peripheral temperature and its change as you move up the arm JVP ABG: lactic acidosis (Oxygenation may be low purely because lungs hypoperfused) Central capillary refill time >3 seconds Peripheral oedema |

| Assess, Act, Assess, Ask.. |
|---|
| <ul style="list-style-type: none"> A: airway intact/self ventilating? B: RR, sats, chest exam, ABG (lactate), CXR C: peripheral temperature & change, HR, BP, postural BP drop, JVP! D: GCS/AVPU/new Change in mental status/glucose E: rash, mottling, oedema |
| <ul style="list-style-type: none"> F: Urine output/balance, U&E G: abdo examination, LFTs H: bloods, clotting I: temp, source, antiBs, culture results...And repeat... (ASK: b/g, function, allergies, last ate, collateral, ceilings/wishes) |

Cardiogenic and Obstructive

- Tend to look much worse
- VERY sweaty, grey
- Remember tension
- Obstructive - quicker deterioration to cardiac arrest
- (Massive PE - continue CPR 1hr after thrombolysing!)

Septic shock

- Can present with hypothermia
- Peripheries warmer > proximal limbs,
- Sepsis 6: the earlier antibiotics given, after blood cultures, the lower the mortality
- Expanded circulation, more insensible loss from sweating/breathing, or vomiting/diarrhoea, - can be very negative fluid balance on arrival
- As circulation tightens again - vasopressors or sepsis resolving, patient may well become overloaded, slow wean, ARDS etc
- After 2-4L fluid, need to assess fluid responsiveness, be ready to start vasopressors and give smaller fluid challenges
- *mortality increases if patients become boggy!

Shock requiring immediate specific action

- Anaphylaxis
- Tension pneumothorax
- Addisonian crisis
- Embolism
- 'Silent chest' Asthma

Other points

- Deranged electrolytes - K, Mg - AF, Hypocalcaemia (esp in severe acidosis) - Calcium is an inotrope in this scenario
- Toxicology: BB/CCB overdose - don't forget glucagon, insulin infusion (high dose), calcium, filtration
- Pregnant: remember to put pillow under R buttock
 - IVC will be compressed by gravid uterus

4 stages of shock management - ROSS(D)

- Concept of different stages of shock (Vincent & De Backer)
 - Require different approaches
 - Different electrolyte/fluid needs
 - Fluid status
 - Need very different intensity of clinician attention
- Rescue Stabilisation
- Optimisation Stepdown/De-escalation

Stage 1 - Rescue

- Scenario: New arrival in resusc or ward MET call or cardiac arrest
- Goal: achieve adequate cardiac output as soon as possible
- Secondary goal: establish differential diagnosis
- Fluids: N. Saline, Blood
- Rate: bolus - i.e. 500mls 'stat', need large bore cannulae etc
- Clinician presence: at bedside, continuous

Stage 2 - Optimisation

- Scenario: Hour 1 – Hour 2
- Goal: Continue to aim for adequate Cardiac output, using bedside parameters
 - Peripheral temperature
 - Lactate
 - Urine Output
 - AVPU
- Secondary goal: confirm type of shock(s), consider further diagnostics & treatment
- Consider advanced volume assessment* to assess for volume responsiveness

Stage 3: Stabilisation

- Scenario: Hour 3 – Day 2 (elastic)
- Goal: minimising harm – from fluid and vasopressors
- Secondary goal: acid-base balance, minimise 3rd space losses,
- Think about nutrition – NG placement – giving water enterally,
 - This helps to maintain muscle mass & strength for weaning and rehabilitation
- Fluids: water NG, saline with drugs (antibiotics) & electrolytes, blood, albumin,
- Holistic assessment including fluid status
- Doctor: 2 assessments (at least) per day, but can be away from ward

Stage 4: Stepdown or De-escalation

- Scenario: Day 1 or 2 up until stepdown from level 2 or 3 care
- Goal: Weaning and diuresis to clear excess fluid
- Secondary goal: Fine tuning medical treatment, addressing issues holistically and using MDT interventions especially PT
- Fluids: minimal – orally or NG only, Diuresing with frusemide, or potassium spasers
- Assessment: holistic
- Doctor: BD assessments, but MDT takes front seat role.

Filling - What?

- N. Saline for rescue phase.
 - Eventually chloride levels will rise, causing acidosis
 - Not a problem in the early stage
- Blood for bleeding (+FFP/Cryo/platelets prn)
- Albumin - not contraindicated for use in sepsis, but place not defined yet
 - Save for very low albumin states, generally later stages of shock management
 - Nephrotic syndrome, Cirrhosis

Fluid resuscitation

- What How?
- Saline
- Blood (if bleeding) - remember MAJOR HAEMORRHAGE protocol)
- Just not dextrose
- Even cirrhotic patients - resuscitate them, worry about the ascites much later.
- If young: give a litre stat
- If old/chronically hypertensive - be aware their LV won't have the capacitance/stretch to take large volumes fast -either slower or smaller volumes stat

Filling: How?

- Deficit
 - Diagnosis
 - Disease:
 - Anuric ESRF
 - Tachyarrhythmia (less filling time)
 - L/T hypertension,
 - Aortic stenosis
 - HOCM
 - Systolic heart disease
 - Advanced age
- Diastolic dysfunction**

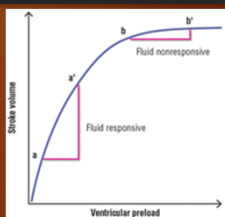
Shock management

- International Surviving Sepsis: 1.4L stat fluids (70kg) for septic shock
- Hypovolaemic shock but no bleeding source apparent
 - Retroperitoneal haemorrhage
 - AAA rupture
 - Most difficult to identify source without scanning but too unstable to scan
 - Major Haemorrhage call - need blood, personnel, senior decisions
- Don't forget Tranexamic acid to control all bleeding
- If variceal haemorrhage: aim for SBP 100 - not too high

Next stage... HDU

- A few hours/Litres of fluid down the line...
- Still shocked, not peeing, BP dropped down again
- What now?
- Try fluid challenge- 250-500mls stat (pressure bag/pump)
- Insert lines - arterial line, CVC
- Look for signs patient is still fluid deplete/still responsive

Starling's curve



High tech or Low tech?

- Fancy toys only as good as the care taken to set up and calibrate
- Trust your clinical skills!

Measures of fluid responsiveness - venous

- Central venous saturations: take a venous gas from the central line - measures sats in blood in RA
- Aiming for 80%
- Can also look at peripheral venous sats aiming >66%
- Caveats: more 'validated' in cardiogenic shock
- Delays in analysing sample will reduce accuracy

CVP measurements

- Relies on transducer being placed at midaxillary height
- "normal" = 8-12 - actually could be 3, could be 15
- Large inter and intra-personal variability
- Out of vogue- pretty useless
- If using, make a dynamic measurement - compare pre and post fluid bolus or PLR
- Beware: many resp patients have pulmonary HTN and TR - CVP will be permanently raised.
- In practice, clinical examination/U/O/lactate etc more useful

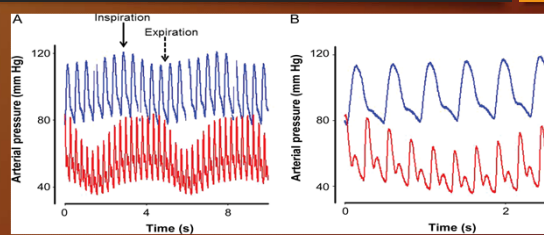
Passive leg raise

- Equivalent to about 300ml fluid bolus, but reversible
- Need patient's head at 30 degrees and legs flat at start
- Ideally use bed controls rather than lifting legs as pain will mitigate effects
- Lower patient's head to flat and lift legs to 45 degrees or more.
- After a minute, remeasure your chosen parameter
- In theory should be oesophageal doppler or aortic pressure, or CO measurement
- In practice, arterial line trace may show an improvement

Arterial line trace analysis

- Arterial pulse wave can be analysed
- Area under the curve equivalent to stroke volume
- Diastolic notch: placement on the down stroke gives info on fluid status
- Relies on a good trace (not attenuated) , good flow in the cannula
- Actual BP recorded relies on accurate alignment of the transducer at the height of the patient's RA = the patient's midaxillary line - if the transducer is higher then it will seem like the patient is hypotensive

Swinging...

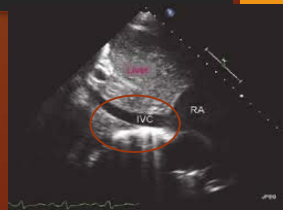


Arterial wave form + dilution = high tech analysis

- Can use computer analysis of arterial wave forms to calculate cardiac output beat by beat
- In steady state - if capacitance and systemic resistance constant then
- Pulse pressure can derive the SV and CO.
- PICCO and LiDCO - uses thermodilution, lithium dilution + wave analysis
- Other measures coming through eg end tidal CO₂ variation with filling,

Echo

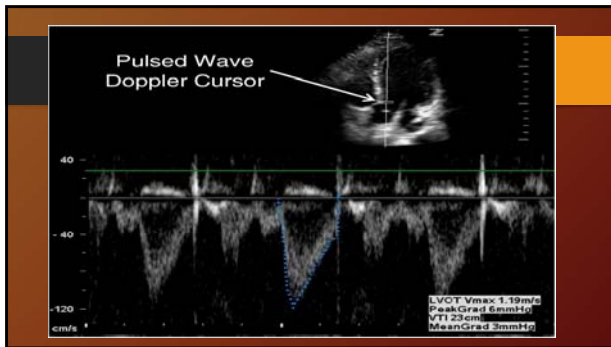
Can look at IVC diameter - better to look at before/after bolus
 Subcostal view, measure IVC diameter 0.5-3cm distal to RA
 If <1cm - fluid responsiveness likely
 If >2cm unlikely
 If 1-2cm look for >50% collapse - fluid responsive



Other volume responses on Echo

Apical views: Look at LVOT VTI (5 chamber view, apical) - trace around Pulsed wave doppler trace (quality) - if >20 = good SV or look for >15% increase after filling/Passive Leg Raise

Left atrium : if remains circular throughout cycle (ie bowing into RA) then pt is well filled.





Echo: PE and tamponade

- PE:
 - RV dilated - D shape on short axis parasternal or similar size to LV on 4 chamber apical (should be 0.5 the volume)
 - May also see paradoxical septal motion (septum moves to L on systole)
 - LV may well be small, collapsing on end systole (less filling)
- Tamponade: effusion +
 - RA wall systolic collapse for >1/3 of cycle
 - RV wall collapse in diastole
 - IVC dilated >2cm

PLETHORIC JVC
<50% COLLAPSE

McCONNELL'S SIGN

TAPSE
< 1.7cm



Tamponade

Diagram illustrating the relationship between RA pressure and IVC collapse:

- Valves Closed RA Collapse
- Plethoric IVC <50% Collapse
- Valves Open RV Collapse
- RV Inflow Variation >25%



Clever toys in summary

- 12

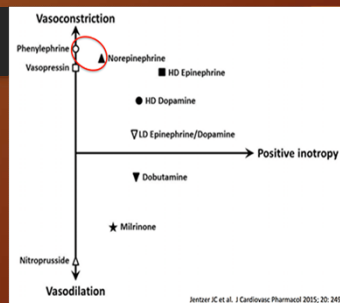
Vasopressors

- Temporising measure - need to treat the cause
- Timing: give some fluid first - patients need it
- Don't be afraid of fluids
- Don't give patient 10L either!!
- Markers: lactate and U/O not responding
- Use peripheral temp as a guide + consider it once 3L+
- "start VP when they're warm"
- Generally started during stage 2 of Shock treatment

Which one?

| Effects: | B ₁ receptors • +HR, inotropy • +Blood flow | B ₂ receptors • Vaso+ broncho- dilation • + inotropy | A ₁ r. • +SVR • +inotropy | A ₂ r. • +Systemic Vascular Resistance | DA ₁ and DA ₂ • Natriuresis • Splanchnic vasodilator |
|---------------|---|---|--|--|---|
| Adrenaline | ++ to +++ | + to ++ | + to +++ (dose) | +/- to +++ (dose) | - |
| Noradrenaline | ++ (higher doses) | - | +++ (reflex bradycardia) | +++ | - |
| Isoprenaline | +++ | +++ | - | - | - |
| Dopamine | +/- to +++ (dose) | - to ++ (dose) | +/- to +++ (dose) | + | + |
| Dobutamine | ++ | + | +/- | ?? | 0 |

Vasopressors



| Agent | VASOPRESSIN | LEVOSIMENDAN | MILRINONE |
|-----------|--|---|--|
| Class | Endogenous peptide | Calcium sensitiser Inodilator | Bipyridine Inodilator |
| Mechanism | V1=vasoconstriction V2=renal + endo V3= pituitary OxyT | Modulates troponin C Vascular ATP-K channels | |
| Effects | Antidiuresis +SVR +platelet aggreg Less splanchnic flow | Inotropy Less SVR Less PVR +CO | Inotropy Less SVR Less PVR +CO |
| Cons | \$\$\$ PHT Splanchnic ischaemia Uterine contraction Digital ischaemia | \$\$\$\$\$ Tachycardia, low BP Can't use in liver/renal F | \$\$\$ Low BP, may need NA too Little evidence |
| Uses | Added in for septic shock (Terli - Decomp cirrhosis) | HF, can use with BB | HF, supports RV, can use with BB |

In practice

- Most patients have a combination of sepsis + hypo or cardio shock
- Practically:
 - Start NA first, achieve a MAP of 65 and urine output
 - If not achieving aims and using lots of NA
 - Look for other cause: bleeding/third space losses/cardiac failure/addisonian
 - If cardiac failure: add in dobutamine
 - If patient is a candidate for ITU: refer if steadily increasing req
 - Dobutamine on its own frequently causes hypotension
 - NA can cause reflex bradycardia - switch to adrenaline instead

In summary

- Saline for filling in rescue stage
- Once 3-4 L given
 - Look for volume responsiveness
 - Look to start vasopressors
- Use repeated clinical examination to guide you
- Low tech volume assessment is useful:
 - PLR
- Arterial line swing
- Central venous saturations
- Don't rely on one parameter, use a variety
- Vasopressors: Noradrenaline
 - Add in dobutamine if HF
 - Metaraminol can be useful

ICU: To admit or not to admit?

Jamie Gross
Consultant in Intensive Care
Northwick Park Hospital



@GrossJamie



Case 1

- 72 year old gentleman
- Type 2 respiratory failure secondary to pneumonia
- Multiple comorbidities
 - IHD and CCF with Dual chamber PPM
 - AF (on warfarin)
 - COPD on inhalers
 - Type 2 DM and Hypertension
 - Stage 3 CKD
- Functionally at baseline: SOB on walking 5-10 metres
- Social history: lives with wife who is the main carer; doesn't leave house; Can wash/dress self but needs help showering. Wife does housework/cooking

Observations and bloods

Alert but slightly confused
 Tachypnoeic (RR 40) and using accessory muscles
 On FiO2 1.0; SpO2 82%
 HR 105 (AF) BP 90/40 (normally 130 systolic)
 Bloods:
 Creat 250 (B/L 140)
 Lactate 3.2
 Rx: Already started on broad spectrum cover
 antibiotics



Family want "everything to be done"
 "she's a fighter"

Medical consultant does not know
 the patient "let ICU decide"

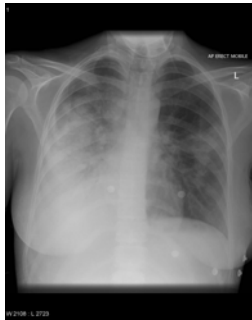
How far would you escalate this patient?

1. "Full escalation" if needed on ICU
 - mechanical ventilation
 - inotropes
 - Renal replacement therapy
2. "partial escalation" on HCU
 - NIV/optiflow
 - Inotropes
 - +/- renal replacement therapy
3. Ward care only

Case 2

- 90 year old lady
- Type 2 respiratory failure secondary to pneumonia
- PMH: F+W. Lifelong non-smoker
- Functional status:
 - "independent" (Weight 50 Kg)
 - lives on own but "slowed up a bit" recently. Manages ADLs
 - Gets out to the shops 2-3 times/week
 - Has a cleaner

Alert but confused and disorientated
 Tachypnoeic (RR 35) and using accessory muscles
 On FiO2 1.0; SpO2 82%
 ABGs on 100% O2: pO2 6.1, pCO2 8.4 pH 7.31
 (normal Bicarb/BE)
 BP 140/84
 Bloods: Nil significant
 Lactate 1.1
 Rx: Already started on broad spectrum cover
 antibiotics



Medics
 "She is a good 90 year old"

 Family: "patient doesn't want a
 quality of life that is dependent on
 others"

How far would you escalate this
 patient?

1. "Full escalation" if needed on ICU
 - mechanical ventilation
 - inotropes
 - Renal replacement therapy
2. "partial escalation"
 - NIV/optiflow
 - Inotropes
 - +/- renal replacement therapy
3. Ward care only







BENEFACTENCE
- Doing Good

NON MALEFACTENCE
- Avoiding harm

AUTONOMY
- Informed consent



BENEFICENCE

- **Doing Good**

NON MALIFICENCE

- **Avoiding harm**

AUTONOMY

- Informed consent

Beneficence v Non malificence

Beneficence (doing good):

- Longer term survival

+

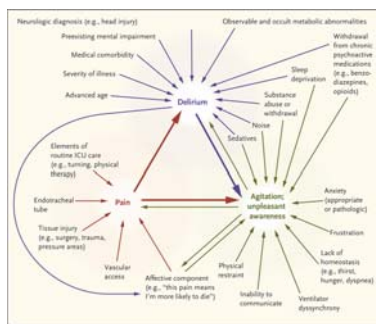
- Left with a quality of life that is acceptable to the patient

Non Malificence (avoiding harm)

→ ICU IS HARMFUL TO MANY PATIENTS

(particularly those intubated and ventilated)

The Harms of ICU



Reade MC, Finfer S. Sedation and Delirium in the Intensive Care Unit. NEJM 2014; 370:444-454

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Thursday, Feb 9th 2017 12:28 PM 3°C 2°C 5-Day Forecast

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Why is intensive care a living nightmare for so many patients?

By JO CARLOWE
Last updated at 11:10 03 April 2007

When intensive care is just too intense

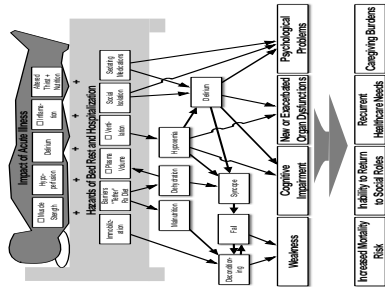
The treatment patients receive in intensive care usually works but many are left with deep psychological scars

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Intermediate/Long term physical and psychological sequelae

- Profound muscle weakness*
 - Difficulty weaning from ventilator
 - Prolonged period of rehabilitation
- Amnesia and cognitive impairment
- Anxiety/depression
- Post Traumatic Stress Disorder (PTSD)

→ **May not ever get back to functional baseline and can be left with significant disability, reduced psychosocial function and poor QOL**



Reproduced with permission. Mikkelsen & Iwashyna 2017. Oxford Textbook of Medicine

Cuthbertson et al. Critical Care 2010, 14:R6
http://ccforum.com/content/14/1/R6



RESEARCH

Open Access

Quality of life in the five years after intensive care: a cohort study

Brian H Cuthbertson^{1*}, Siân Roughton², David Jenkinson³, Graeme MacLennan³, Luke Vale^{2,4}

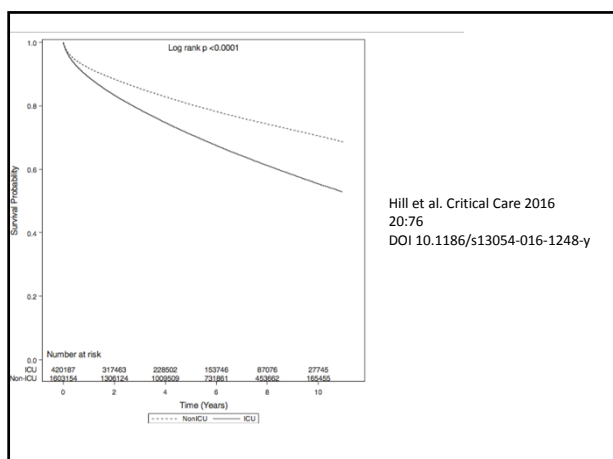
Abstract

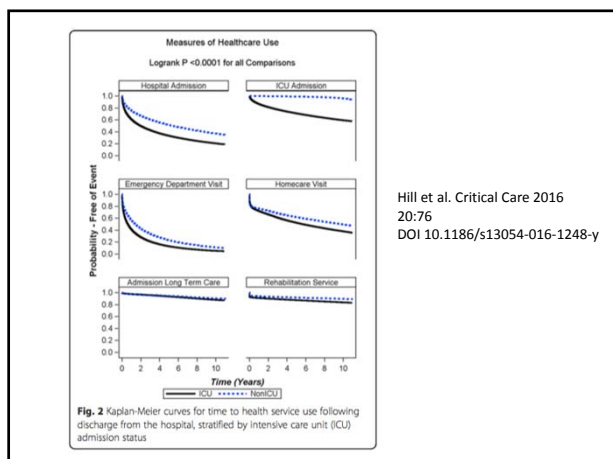
Introduction: Data on quality of life beyond 2 years after intensive care discharge are limited and we aimed to explore this area further. Our objective was to quantify quality of life and health utilities in the 5 years after intensive care discharge.

Methods: A prospective longitudinal cohort study in a University Hospital in the UK. Quality of life was assessed from the period before ICU admission until 5 years and quality adjusted life years calculated.

Results: 300 level 3 intensive care patients of median age 60.5 years and median length of stay 6.7 days, were recruited. Physical quality of life fell to 3 months ($P = 0.003$), rose back to pre-morbid levels at 12 months then fell again from 2.5 to 5 years after intensive care ($P = 0.002$). Mean physical scores were below the population norm at all time points but the mean mental scores after 6 months were similar to those population norms. The utility value measured using the EuroQOL-5D quality of life assessment tool (EQ-5D) at 5 years was 0.677. During the five years after intensive care unit, the cumulative quality adjusted life years were significantly lower than that expected for the general population ($P < 0.001$).

Conclusions: Intensive care unit admission is associated with a high mortality, a poor physical quality of life and a low quality adjusted life years gained compared to the general population for 5 years after discharge. In this group, critical illness associated with ICU admission should be treated as a life time diagnosis with associated excess mortality, morbidity and the requirement for ongoing health care support.





The NEW ENGLAND JOURNAL of MEDICINE


ORIGINAL ARTICLE

One-Year Outcomes in Caregivers of Critically Ill Patients

CONCLUSIONS
In this study, most caregivers of critically ill patients reported high levels of depressive symptoms, which commonly persisted up to 1 year and did not decrease in some caregivers. (Funded by the Canadian Institutes of Health Research and others; ClinicalTrials.gov number, NCT00896220.)

N ENGL J MED 374:19 NEJM.ORG MAY 12, 2016

Cameron JI et al. NEJM 2016;374:1831-41



CHEST Original Research
CRITICAL CARE

ICU Care Associated With Symptoms of Depression and Posttraumatic Stress Disorder Among Family Members of Patients Who Die in the ICU


Erin K. Kross, MD; Ruth A. Engelberg, PhD; Cynthia J. Gries, MD; Elizabeth L. Nielsen, MPH; Douglas Zatzick, MD; and J. Randall Curtis, MD, MPH, FCCP

Is it the right thing to put my patient through that degree of potential harm in the context of critical illness?

Are they likely to survive?

Are they likely to be left with a quality of life that is acceptable to them?

BMJ 2018;363:k4135 doi: 10.1136/bmj.k4135 (Published 19 October 2018) Page 1 of 3



ANALYSIS

Intensive care: balancing risk and benefit to facilitate informed decisions

More efforts are needed to engage with the wider healthcare community and the public about what intensive care can—and can't—achieve, say **Jamie Gross and colleagues**

Jamie Gross consultant in intensive care medicine¹, Barry Williams patient and public representative², Premila Fade consultant geriatrician¹, Stephen J Brett consultant in intensive care medicine and professor of critical care³

How do we make benefit v
burden assessment?

Patient's that don't do well in ICU

- Severe chronic respiratory disease
- Severe cardiovascular disease
- Cirrhosis of the liver with portal hypertension
- Those on long term dialysis
- Immunocompromised state (e.g. haematological malignancy, AIDS etc)
- ? Age
→ Frailty

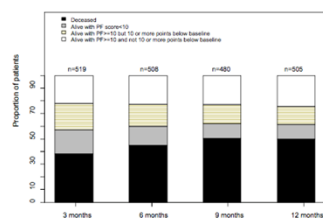
Intensive Care Med
DOI: 10.1007/s00134-015-4028-2

ORIGINAL



Daren K. Heyland
Allan Garland
Sean M. Bagshaw
Deborah Cook
Kenneth Rockwood
Henry T. Stelfox
Peter Dodek
Robert A. Fowler
Alexis F. Turgeon
Karen Burns
John Muscedere
Jim Kutogiannis
Martin Albert
Sangeeta Mehta
Xuran Jiang
Andrew G. Day

Recovery after critical illness in patients aged 80 years or older: a multi-center prospective observational cohort study



Heyland DK et al, Intensive Care Medicine 2015; 41:1911-20

Table 3 Logistic regression model predicting physical recovery 12 months after ICU admission

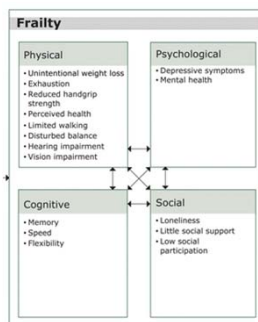
| Variables | Single predictor | | |
|---|--------------------------|----------------|-------------------|
| | OR (95 % CI) | c ^a | P value |
| Age (per 5 years) | 0.77 (0.64, 0.93) | 0.53 | 0.006 |
| Sex (male vs. female) | 0.79 (0.60, 1.04) | 0.53 | 0.09 |
| APACHE II score (per 10 points) | 0.55 (0.38, 0.80) | 0.62 | 0.002 |
| Marital status (married or living as married vs. other) | 0.85 (0.60, 1.20) | 0.52 | 0.36 |
| Baseline SOFA score (per 5 points) | 0.82 (0.64, 1.05) | 0.54 | 0.12 |
| Admission type (medical vs. surgical) | | 0.64 | <0.0001 |
| Surgical elective vs. medical | 4.37 (2.82, 6.76) | | |
| Surgical emergency vs. medical | 1.99 (1.18, 3.35) | 0.64 | <0.0001 |
| Primary ICU diagnosis | | | |
| CABG/valve vs. cardiovascular/vascular | 5.60 (3.32, 9.43) | | |
| Gastrointestinal vs. cardiovascular/vascular | 1.25 (0.59, 2.65) | | |
| Neurologic vs. cardiovascular/vascular | 2.10 (0.88, 5.00) | | |
| Other vs. cardiovascular/vascular | 0.73 (0.29, 1.83) | | |
| Respiratory vs. cardiovascular/vascular | 0.96 (0.51, 1.80) | | |
| Sepsis vs. cardiovascular/vascular | 0.85 (0.36, 1.98) | | |
| Stroke vs. cardiovascular/vascular | 0.18 (0.02, 1.53) | | |
| Trauma vs. cardiovascular/vascular | 0.70 (0.29, 1.70) | | |
| Baseline PF score (per 50 points) | 1.00 (0.73, 1.37) | 0.51 | 0.98 |
| Charlson Comorbidity Index (per 2 units) | 0.61 (0.49, 0.77) | 0.60 | <0.0001 |
| ICCODE at baseline (per 0.5 point) | 0.75 (0.57, 0.98) | 0.59 | 0.04 |
| Frailty index (per 0.2 point) | 0.48 (0.35, 0.66) | 0.63 | <0.0001 |
| Family preferences for life sustaining treatment | | | |
| Comforts measures vs. other | 0.69 (0.29, 1.65) | 0.53 | 0.40 |
| Total model degrees of freedom/events | 1-8/123 | | |
| c-Statistic ^a | 0.51-0.64 | | |

Heyland D et al. Intensive Care Medicine 2015

McDermid et al. Critical Care 2011, 15:301
http://ccforum.com/content/15/1/301

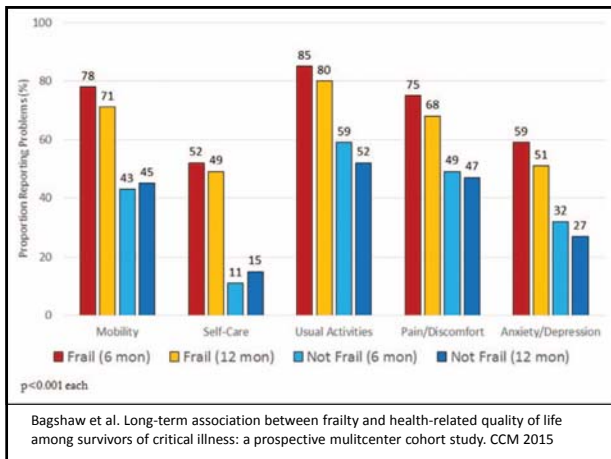
VIEWPOINT

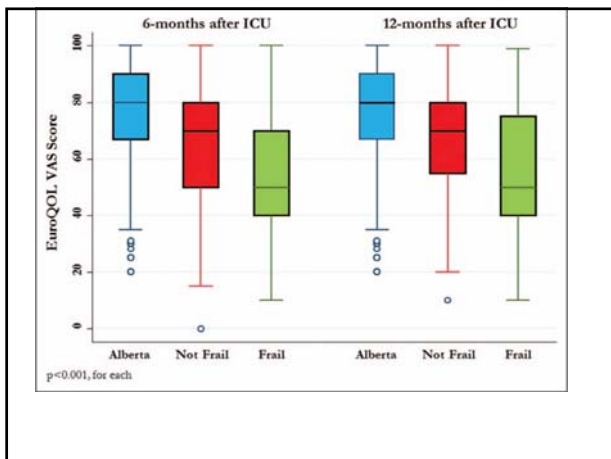
Frailty in the critically ill: a novel concept


Robert C McDermid¹, Henry T Steffox² and Sean M Bagshaw^{3*}

van Oostrom et al A four-domain approach of frailty explored in the Doetinchem Cohort Study. BMC Geriatr 2017;17:196.
10.1186/s12877-017-0595-0
28854882









BENEFICENCE
- Doing Good

NON MALEFICENCE
- Avoiding harm

AUTONOMY
- Informed consent

**BENEFICENCE**

- Doing Good

NON MALEFICENCE

- Avoiding harm

AUTOMONY

- Informed consent

Are elderly patients' opinions sought before admission to an intensive care unit? Results of the ICE-CUB study FREE

Julien Le Guen ; Ariane Boumendil; Bertrand Guidet; Aline Corvol; Olivier Saint-Jean; Dominique Somme

Age Ageing (2016) 45 (2): 303-309. DOI: <https://doi.org/10.1093/ageing/afv191>

Published: 11 January 2016 Article history ▼

ONLY 12.7% (of a total of 2115) PATIENTS WERE CONSULTED ABOUT WISHES FOR ICU

Consent: patients and doctors making decisions together

Working with doctors Working for patients

General Medical Council

Making decisions when a patient lacks capacity

75 In making decisions about the treatment and care of patients who lack capacity, you must:

- make the care of your patient your first concern
- treat patients as individuals and respect their dignity
- support and encourage patients to be involved, as far as they want to and are able, in decisions about their treatment and care
- treat patients with respect and not discriminate against them.

76 You must also consider:

- whether the patient's lack of capacity is temporary or permanent
- which options for treatment would provide overall clinical benefit for the patient
- which option, including the option not to treat, would be least restrictive of the patient's future choices
- any evidence of the patient's previously expressed preferences, such as an advance statement or decision.



- BENEFICENCE
 - Doing Good

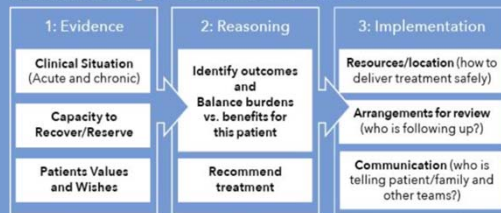
- NON MALEFICENCE
 - Avoiding harm

- AUTOMONY
 - Informed consent



WARWICK
MEDICAL SCHOOL

Decision-making for escalation of treatment



Decision-making for Intensive care unit admissions 2016. REC: 15/WM/0025

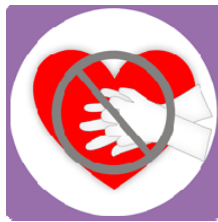
Bassford et al – unpublished
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Back to our 2 patients with
pneumonia

- 72 year old gentleman
 - Type 2 respiratory failure secondary to pneumonia
 - Multiple comorbidities
 - Poor exercise tolerance
 - Suggests limited physiological reserve
 - Social history: housebound and dependent on some ADLs
- High chance of not surviving current illness therefore risks of admitting to ICU likely to outweigh likelihood of survival let alone a return to the quality of life acceptable to the patient.
- 85 year old lady
 - Type 2 respiratory failure secondary to pneumonia
 - No comorbidities
 - "Independent"
 - But poor muscle mass and frail
 - ? Limited physiological reserve in view of age and frailty
 - Will she wean from a ventilator if remains intubated more than 3-4 days?
 - Will she be able to ever get back to her current baseline in the event of significant critical illness?
- Possibly better chance of surviving acute pneumonia in the short term but may be difficult to weaning from a ventilator and concern about long term functional status if she does survive – may need prolonged rehab. Will she be able to return home to independent living?
- Ascertain patients wishes

Don't forget....

PATIENTS NOT FOR
INTUBATION/MECH =
ANICAL
VENTILATION/ICU



Take home messages

- The goal of ICU is patient survival with a QOL that is acceptable to them
- ICU can be harmful to both patients and relatives
- Ethically guided decision making process should weigh up benefits v burdens
- Patient wishes should form part of decision making process where possible
- Frailty = increased vulnerability = decreased capacity to recover → ? Burdens > benefit

Thank you
